



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
Combined lateral and horizontal movements

Job No. Sheet No. Rev.

Drg. Ref.

Made by ML Date 02-Oct-2018 Checked

Problem Type

Problem Type : Tunnelling and Embedded Wall Excavations

Displacement Data

Type	Name	Direction of extrusion	Point/Line/Line for extrusion	No. of intervals across extrusion/line	Extrusion depth	No. of intervals along extrusion	Calculate	Surface type for tunnels					
			First point	Second point									
			X [m]	Y [m]	Z (level) [m]	X [m]	Y [m]	Z (level) [m]					
Grid	Grid 1	Global X	15.00000	0.00000	0.00000	-	50.00000	0.00000	25	40.00000	20	Yes	Surface
Line	No7 A	-	25.70000	33.20000	-2.50000	34.00000	22.60000	-2.50000	7	-	-	Yes	Surface
Line	No7 B	-	34.00000	22.60000	-2.50000	39.10000	26.10000	-2.50000	6	-	-	Yes	Surface
Line	No7 C	-	39.10000	26.10000	-2.50000	30.80000	37.20000	-2.50000	7	-	-	Yes	Surface
Line	No7 D	-	30.80000	37.20000	-2.50000	25.70000	33.20000	-2.50000	6	-	-	Yes	Surface
Line	No6 A	-	30.80000	37.20000	-2.50000	40.30000	25.00000	-2.50000	8	-	-	Yes	Surface
Line	No6 B	-	40.30000	25.00000	-0.70000	43.10000	21.10000	-0.70000	6	-	-	Yes	Surface
Line	No6 C	-	43.10000	21.10000	-0.70000	47.90000	24.70000	-0.70000	4	-	-	Yes	Surface
Line	No6 D	-	47.90000	24.70000	-0.70000	45.20000	28.40000	-0.70000	8	-	-	Yes	Surface
Line	No7 E	-	45.20000	28.40000	-2.50000	35.70000	41.10000	-2.50000	6	-	-	Yes	Surface
Line	No8 F	-	35.70000	41.10000	-3.50000	30.80000	37.20000	-3.50000	6	-	-	Yes	Surface
Line	No9 A	-	20.60000	29.40000	-3.50000	28.40000	19.40000	-3.50000	7	-	-	Yes	Surface
Line	No9 B	-	28.40000	19.40000	-3.50000	33.10000	13.40000	-3.50000	7	-	-	Yes	Surface
Line	122A	-	29.30000	10.20000	-3.50000	41.20000	19.20000	-3.50000	7	-	-	Yes	Surface
Line	122B	-	41.20000	19.20000	-3.50000	48.20000	10.40000	-3.50000	9	-	-	Yes	Surface
Line	No8 A	-	25.70000	33.20000	-3.50000	20.60000	29.40000	-3.50000	6	-	-	Yes	Surface

Vertical Ground Movement Curves (Excavations)

Curve Name: Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))
Coordinates: [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) (%)]
 [0.000,0.000,0.050] [0.050,0.000,0.047] [0.100,0.000,0.043] [0.150,0.000,0.040]
 [0.200,0.000,0.037] [0.250,0.000,0.034] [0.300,0.000,0.031] [0.350,0.000,0.028]
 [0.400,0.000,0.025] [0.450,0.000,0.022] [0.500,0.000,0.020] [0.550,0.000,0.018]
 [0.600,0.000,0.016] [0.650,0.000,0.014] [0.700,0.000,0.012] [0.750,0.000,0.010]
 [0.800,0.000,0.008] [0.850,0.000,0.007] [0.900,0.000,0.006] [0.950,0.000,0.005]
 [1.000,0.000,0.004] [1.050,0.000,0.003] [1.100,0.000,0.003] [1.150,0.000,0.002]
 [1.200,0.000,0.002] [1.250,0.000,0.001] [1.300,0.000,0.001] [1.350,0.000,0.001]
 [1.400,0.000,0.001] [1.450,0.000,0.000] [1.500,0.000,0.000]

Curve Fitting Polynomial
Method:
 x Order: 4
 y Order: 0
 Polynomial: $z = -1.2355E-2x^4 + 3.4814E-2x^3 - 2.8885E-3x^2 - 6.5618E-2x + 4.9987E-2$
 Coeff. of Determination: 1.0000

Curve Name: Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))
Coordinates: [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]
 [0.400,0.000,0.067] [0.500,0.000,0.070] [0.600,0.000,0.072] [0.700,0.000,0.073]
 [0.800,0.000,0.073] [0.900,0.000,0.072] [1.000,0.000,0.070] [1.100,0.000,0.068]
 [1.200,0.000,0.065] [1.300,0.000,0.061] [1.400,0.000,0.058] [1.500,0.000,0.054]
 [1.600,0.000,0.050] [1.700,0.000,0.046] [1.800,0.000,0.042] [1.900,0.000,0.038]
 [2.000,0.000,0.034] [2.100,0.000,0.030] [2.200,0.000,0.027] [2.300,0.000,0.023]
 [2.400,0.000,0.020] [2.500,0.000,0.017] [2.600,0.000,0.014] [2.700,0.000,0.012]
 [2.800,0.000,0.009] [2.900,0.000,0.008] [3.000,0.000,0.007] [3.100,0.000,0.005]
 [3.200,0.000,0.004] [3.300,0.000,0.004] [3.400,0.000,0.003] [3.500,0.000,0.002]
 [3.600,0.000,0.002] [3.700,0.000,0.002] [3.800,0.000,0.001] [3.900,0.000,0.001]
 [4.000,0.000,0.000]

Curve Fitting Polynomial
Method:
 x Order: 4
 y Order: 0
 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 (Excavations)

Curve Name: Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))
Coordinates: [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) (%)]
 [0.000,0.000,0.050] [1.500,0.000,0.000]

Curve Fitting Polynomial
Method:
 x Order: 1
 y Order: 0
 Polynomial: $z = -3.33E-2x + 5.00E-2$
 Coeff. of Determination: 1.00

Curve Name: Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))
Coordinates: [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]

Curve Fitting Polynomial
Method:
 x Order: 1
 y Order: 0
 Polynomial: $z = -3.75E-2x + 1.50E-1$
 Coeff. of Determination: 1.00

Polygonal Excavations

Excavation Name: Wall Installation
Surface level [m]: 0.0
Contribution: Positive
Enabled: Yes
 Surface movement curves which are selected are applied between surface and [m]: -3.5000

Corner	x	y	Base Level	Stiffened	Previous Side	Next Side
	[m]	[m]	[m]		d	d
					p1	p2*
					[m]	[m]
1	34.000	22.600	-3.5000	Yes	0.0	67.000
2	38.500	17.700	-3.5000	Yes	0.0	67.000
3	43.100	21.100	-1.1900	Yes	0.0	67.000
4	39.100	26.100	-3.5000	Yes	0.0	67.000



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Corner	x	y	Base Level	Stiffened	Previous Side	Next Side
	[m]	[m]	[m]	d	p1 p2*	d p1 p2*
				[m]	[%] [%]	[m] [%] [%]
Side	Corner 1	Corner 2	Ground Movement Curve			
	x y	x y	Vertical		Horizontal	
	[m] [m]	[m] [m]	[m] [m]		[m] [m]	
1	34.000 22.600	38.500 17.700	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))		Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))	
2	38.500 17.700	43.100 21.100	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))		Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))	
3	43.100 21.100	39.100 26.100	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))		Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))	
4	39.100 26.100	34.000 22.600	Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(b))		Installation of planar diaphragm wall in stiff clay (CIRIA 580 Fig. 2.9(a))	

Excavation Name: Copy of Basement Excavation
Surface level [m]: 0.0
Contribution: Positive
Enabled: Yes
Surface movement curves which are selected are applied between surface and [m]: -3.5000

Corner	x	y	Base Level	Stiffened	Previous Side	Next Side
	[m]	[m]	[m]	d	p1 p2*	d p1 p2*
				[m]	[%] [%]	[m] [%] [%]
1	34.000	22.600	-3.5000	Yes	0.0 67.000 25.000	0.0 67.000 25.000
2	38.500	17.700	-3.5000	Yes	0.0 67.000 25.000	0.0 67.000 25.000
3	43.100	21.100	-1.1900	Yes	0.0 67.000 25.000	0.0 67.000 25.000
4	39.100	26.100	-3.5000	Yes	0.0 67.000 25.000	0.0 67.000 25.000

Side	Corner 1	Corner 2	Ground Movement Curve			
	x y	x y	Vertical		Horizontal	
	[m] [m]	[m] [m]	[m] [m]		[m] [m]	
1	34.000 22.600	38.500 17.700	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))		Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))	
2	38.500 17.700	43.100 21.100	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))		Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))	
3	43.100 21.100	39.100 26.100	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))		Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))	
4	39.100 26.100	34.000 22.600	Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(b))		Excavation in front of high stiffness wall in stiff clay (CIRIA 580 Fig. 2.11(a))	

Damage Category Strains

Name	0 (Negligible) to	1 (Very Slight) to	2 (Slight) to	3 (Moderate) to
	0.0	500.00E-6	750.00E-6	0.0015000
Burland Strain Limits	0.0	500.00E-6	750.00E-6	0.0015000

Specific Structures - Geometry

Structure Name	Sub-Structure Name	Displacement Line	Start Distance Along Line	End Distance Along Line	Vertical Offsets from Line for Vertical Movement Calculations	Vertical Displacement Limit	Damage Category Strains	Poisson's Ratio	E/G
			[m]	[m]	[m]	[mm]			
No 6 Denmark Street	No6 A	No6 A	0.00000	15.46000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 6 Denmark Street	No6 C	No6 C	0.00000	5.99000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 6 Denmark Street	No6 D	No6 D	0.00000	4.58000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 6 Denmark Street	No6 E	No7 E	0.00000	15.86000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 6 Denmark Street	No6 F	No8 F	0.00000	6.26000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 9 Denmark Street	No9 A	No9 A	0.00000	12.68000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 9 Denmark Street	No9 B	No9 B	0.00000	7.62000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 8 Denmark Street	No8 A	No8 A	0.00000	6.36000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
122 Charing Cross Rd	122A	122A	0.00000	14.92000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
122 Charing Cross Rd	122B	122B	0.00000	11.24000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 7 Retained	No7 A	No7 A	0.00000	13.46000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 7 Retained	No7 C	No7 C	0.00000	13.86000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000
No 7 Retained	No7 D	No7 D	0.00000	6.48000	0.0	0.10000	Burland Strain Limits	0.20000	2.6000

Specific Structures - Bending Parameters

Structure Name	Sub-Structure Name	Height	Default Properties	Hogging			Sagging		
		[m]	Yes	2nd Moment of Area (per unit width)	Distance of Bending of N.A. from N.A.	Distance of N.A. of Beam in Tension	2nd Moment of Area (per unit width)	Distance of Bending of N.A. from N.A.	Distance of N.A. of Beam in Tension
				[m ³]	[m]	[m]	[m ³]	[m]	[m]
No 6 Denmark Street	No6 A	15.000	Yes	1125.0	15.000	15.000	281.25	7.5000	7.5000
No 6 Denmark Street	No6 C	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
No 6 Denmark Street	No6 D	9.0000	Yes	243.00	9.0000	9.0000	60.750	4.5000	4.5000
No 6 Denmark Street	No6 E	15.000	Yes	1125.0	15.000	15.000	281.25	7.5000	7.5000
No 6 Denmark Street	No6 F	15.000	Yes	1125.0	15.000	15.000	281.25	7.5000	7.5000
No 9 Denmark Street	No9 A	18.000	Yes	1944.0	18.000	18.000	486.00	9.0000	9.0000
No 9 Denmark Street	No9 B	18.000	Yes	1944.0	18.000	18.000	486.00	9.0000	9.0000
No 8 Denmark Street	No8 A	18.000	Yes	1944.0	18.000	18.000	486.00	9.0000	9.0000
122 Charing Cross Rd	122A	18.000	Yes	1944.0	18.000	18.000	486.00	9.0000	9.0000
122 Charing Cross Rd	122B	18.000	Yes	1944.0	18.000	18.000	486.00	9.0000	9.0000
No 7 Retained	No7 A	15.000	Yes	1125.0	15.000	15.000	281.25	7.5000	7.5000
No 7 Retained	No7 C	15.000	Yes	1125.0	15.000	15.000	281.25	7.5000	7.5000
No 7 Retained	No7 D	15.000	Yes	1125.0	15.000	15.000	281.25	7.5000	7.5000



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Structure Name	Sub-Structure Name	Height	Default Properties	Hogging			Sagging		
				2nd Moment of Area	Distance of Bending	Distance of N.A.	2nd Moment of Area	Distance of Bending	Distance of N.A.

Building Segment Combinations

Structure Name	Sub-Structure Name	Vertical Offset from Line for Vertical Movement	Segment Start	Segment Length	Curvature	Combined Segment
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No structures have segments combined. [m] [m]

Utility Strain Calculation Options

Neglect beneficial contribution of axial strains : No

Displacement and Strain Results

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Horizontal displacement along Line	Horizontal displacement perpendicular to Line	to x Axis
	[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]	[mm]	[mm]	[°]
Grid 1	Grid 1	15.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		17.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		19.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		21.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		23.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		25.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		27.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		29.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		31.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		33.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		35.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		37.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		39.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		41.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		43.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		45.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		47.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		49.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		51.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		53.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		55.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		15.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		17.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		19.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		21.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		23.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		25.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		27.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		29.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		31.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		33.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		35.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		37.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		39.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		41.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		43.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		45.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		47.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		49.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		51.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		53.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		55.00000	2.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		15.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		17.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		19.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		21.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		23.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		25.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		27.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		29.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		31.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		33.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		35.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		37.00000	4.00000	0.00000	0.0038072	0.032436	0.0099496	0.0038072	0.032436	0.0099496
		39.00000	4.00000	0.00000	-0.0047125	0.046291	0.012981	-0.0047125	0.046291	0.012981
		41.00000	4.00000	0.00000	-0.0036495	0.012618	0.0051008	-0.0036495	0.012618	0.0051008
		43.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		45.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		47.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		49.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		51.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		53.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		55.00000	4.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		15.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		17.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		19.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		21.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		23.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		25.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		27.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		29.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		31.00000	6.00000	0.00000	0.013213	0.017014	0.0068027	0.013213	0.017014	0.0068027
		33.00000	6.00000	0.00000	0.10430	0.17263	0.035931	0.10430	0.17263	0.035931
		35.00000	6.00000	0.00000	0.10969	0.27799	0.050160	0.10969	0.27799	0.050160
		37.00000	6.00000	0.00000	0.048306	0.32930	0.058602	0.048306	0.32930	0.058602
		39.00000	6.00000	0.00000	-0.040371	0.36550	0.064010	-0.040371	0.36550	0.064010
		41.00000	6.00000	0.00000	-0.11454	0.35331	0.059440	-0.11454	0.35331	0.059440
		43.00000	6.00000	0.00000	-0.13520	0.27312	0.046771	-0.13520	0.27312	0.046771
		45.00000	6.00000	0.00000	-0.076672	0.12195	0.026772	-0.076672	0.12195	0.026772
		47.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		49.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		51.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		53.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		55.00000	6.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		15.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		17.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		19.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		21.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		23.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		25.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		27.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		29.00000	8.00000	0.00000	0.075441	0.073414	0.020850	0.075441	0.073414	0.020850
		31.00000	8.00000	0.00000	0.26114	0.29429	0.055672	0.26114	0.29429	0.055672
		33.00000	8.00000	0.00000	0.32988	0.46707	0.097733	0.32988	0.46707	0.097733
		35.00000	8.00000	0.00000	0.27585	0.58115	0.15151	0.27585	0.58115	0.15151
		37.00000	8.00000	0.00000	0.13792	0.62923	0.18719	0.13792	0.62923	0.18719
		39.00000	8.00000	0.00000	-0.084278	0.68758	0.20513	-0.084278	0.68758	0.20513
		41.00000	8.00000	0.00000	-0.26235	0.70497	0.18623	-0.26235	0.70497	0.18623
		43.00000	8.00000	0.00000	-0.35646	0.63515	0.13329	-0.35646	0.63515	0.13329
		45.00000	8.00000	0.00000	-0.33390	0.47626	0.078943	-0.33390	0.47626	0.078943
		47.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		49.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-
		51.00000	8.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
Combined lateral and horizontal movements

Job No. Sheet No. Rev.

Drg. Ref.

Made by
ML

Date
02-Oct-2018

Checked

Type/No.	Coordinates			Displacements			Angle of			
Name	Dist.	x	y	z	x	y	z	Horizontal displacement	Horizontal displacement	to x Axis
53.00000	8.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
55.00000	8.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
15.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
17.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
19.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
21.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
23.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
25.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
27.00000	10.00000	0.00000	0.00000	0.088822	0.081571	0.024910	0.0	-	-	-
29.00000	10.00000	0.00000	0.00000	0.49568	0.45522	0.087385	0.0	-	-	-
31.00000	10.00000	0.00000	0.00000	0.57792	0.56415	0.13520	0.0	-	-	-
33.00000	10.00000	0.00000	0.00000	0.63989	0.76156	0.26877	0.0	-	-	-
35.00000	10.00000	0.00000	0.00000	0.52215	0.88998	0.41054	0.0	-	-	-
37.00000	10.00000	0.00000	0.00000	0.23144	0.93451	0.48652	0.0	-	-	-
39.00000	10.00000	0.00000	0.00000	-0.14283	1.0348	0.52420	0.0	-	-	-
41.00000	10.00000	0.00000	0.00000	-0.47275	1.0752	0.49326	0.0	-	-	-
43.00000	10.00000	0.00000	0.00000	-0.65829	1.0157	0.36621	0.0	-	-	-
45.00000	10.00000	0.00000	0.00000	-0.64502	0.87267	0.17084	0.0	-	-	-
47.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
49.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
51.00000	10.00000	0.00000	0.00000	-0.23120	1.3010	0.0	0.0	-	-	-
53.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
55.00000	10.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
15.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
17.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
19.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
21.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
23.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
25.00000	12.00000	0.00000	0.00000	0.055609	0.051070	0.017447	0.0	-	-	-
27.00000	12.00000	0.00000	0.00000	0.46247	0.42471	0.082176	0.0	-	-	-
29.00000	12.00000	0.00000	0.00000	0.86932	0.79939	0.18690	0.0	-	-	-
31.00000	12.00000	0.00000	0.00000	1.2762	1.1720	0.43376	0.0	-	-	-
33.00000	12.00000	0.00000	0.00000	1.0738	1.0538	0.57796	0.0	-	-	-
35.00000	12.00000	0.00000	0.00000	0.90809	1.2081	0.83000	0.0	-	-	-
37.00000	12.00000	0.00000	0.00000	0.43200	1.2504	0.93093	0.0	-	-	-
39.00000	12.00000	0.00000	0.00000	-0.23120	1.3512	0.97898	0.0	-	-	-
41.00000	12.00000	0.00000	0.00000	-0.80051	1.4799	0.96687	0.0	-	-	-
43.00000	12.00000	0.00000	0.00000	-1.4196	1.9206	0.98849	0.0	-	-	-
45.00000	12.00000	0.00000	0.00000	-0.57549	0.77860	0.15904	0.0	-	-	-
47.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
49.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
51.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
53.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
55.00000	12.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
15.00000	14.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
17.00000	14.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
19.00000	14.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
21.00000	14.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
23.00000	14.00000	0.00000	0.00000	0.006055	0.0051753	0.0034980	0.0	-	-	-
25.00000	14.00000	0.00000	0.00000	0.42925	0.39421	0.077272	0.0	-	-	-
27.00000	14.00000	0.00000	0.00000	0.83611	0.76783	0.17395	0.0	-	-	-
29.00000	14.00000	0.00000	0.00000	1.2430	1.1415	0.40703	0.0	-	-	-
31.00000	14.00000	0.00000	0.00000	1.6498	1.5151	0.81520	0.0	-	-	-
33.00000	14.00000	0.00000	0.00000	2.0567	1.8888	1.3671	0.0	-	-	-
35.00000	14.00000	0.00000	0.00000	1.5762	1.5649	1.3311	0.0	-	-	-
37.00000	14.00000	0.00000	0.00000	0.93670	1.7059	1.4349	0.0	-	-	-
39.00000	14.00000	0.00000	0.00000	-0.44974	1.9423	1.4605	0.0	-	-	-
41.00000	14.00000	0.00000	0.00000	-1.4794	2.1005	1.5192	0.0	-	-	-
43.00000	14.00000	0.00000	0.00000	-1.3500	1.8265	1.0748	0.0	-	-	-
45.00000	14.00000	0.00000	0.00000	-0.50595	0.68453	0.14901	0.0	-	-	-
47.00000	14.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
49.00000	14.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
51.00000	14.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
53.00000	14.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
55.00000	14.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
15.00000	16.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
17.00000	16.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
19.00000	16.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
21.00000	16.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
23.00000	16.00000	0.00000	0.00000	0.18146	0.13487	0.035996	0.0	-	-	-
25.00000	16.00000	0.00000	0.00000	0.45720	0.37800	0.091722	0.0	-	-	-
27.00000	16.00000	0.00000	0.00000	1.2098	1.1110	0.38150	0.0	-	-	-
29.00000	16.00000	0.00000	0.00000	1.6166	1.4846	0.77562	0.0	-	-	-
31.00000	16.00000	0.00000	0.00000	2.0235	1.8583	1.3186	0.0	-	-	-
33.00000	16.00000	0.00000	0.00000	2.4424	2.2430	1.9184	0.0	-	-	-
35.00000	16.00000	0.00000	0.00000	3.2109	2.9489	2.5045	0.0	-	-	-
37.00000	16.00000	0.00000	0.00000	2.3857	2.4696	2.0183	0.0	-	-	-
39.00000	16.00000	0.00000	0.00000	-1.1283	2.7543	1.9418	0.0	-	-	-
41.00000	16.00000	0.00000	0.00000	-2.4795	3.3546	2.3788	0.0	-	-	-
43.00000	16.00000	0.00000	0.00000	-1.2805	1.7324	1.1760	0.0	-	-	-
45.00000	16.00000	0.00000	0.00000	-0.43642	0.59046	0.14234	0.0	-	-	-
47.00000	16.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
49.00000	16.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
51.00000	16.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
53.00000	16.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
55.00000	16.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
15.00000	18.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
17.00000	18.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
19.00000	18.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
21.00000	18.00000	0.00000	0.00000	0.029724	0.015960	0.0096754	0.0	-	-	-
23.00000	18.00000	0.00000	0.00000	0.30194	0.18045	0.053968	0.0	-	-	-
25.00000	18.00000	0.00000	0.00000	0.58506	0.39633	0.16277	0.0	-	-	-
27.00000	18.00000	0.00000	0.00000	0.88624	0.69225	0.40812	0.0	-	-	-
29.00000	18.00000	0.00000	0.00000	1.9903	1.8278	1.2705	0.0	-	-	-
31.00000	18.00000	0.00000	0.00000	2.3971	2.2014	1.8679	0.0	-	-	-
33.00000	18.00000	0.00000	0.00000	3.1482	2.8912	2.4596	0.0	-	-	-
35.00000	18.00000	0.00000	0.00000	3.9167	3.5970	2.9807	0.0	-	-	-
37.00000	18.00000	0.00000	0.00000	4.6852	4.3027	3.2709	0.0	-	-	-
39.00000	18.00000	0.00000	0.00000	-3.8585	5.2204	2.9271	0.0	-	-	-
41.00000	18.00000	0.00000	0.00000	-2.5859	3.4986	2.3725	0.0	-	-	-
43.00000	18.00000	0.00000	0.00000	-1.3133	1.7763	1.2789	0.0	-	-	-
45.00000	18.00000	0.00000	0.00000	-0.36689	0.49638	0.14310	0.0	-	-	-
47.00000	18.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
49.00000	18.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
51.00000	18.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
53.00000	18.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
55.00000	18.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
15.00000	20.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
17.00000	20.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-
19.00000	20.00000	0.00000	0.00000	0.0	0.0	0.0	0.0	-	-	-



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
Combined lateral and horizontal movements

Job No. Sheet No. Rev.

Drg. Ref.

Made by Date Checked
ML 02-Oct-2018

Type/No.		Coordinates			Displacements			Angle of Line		
Name	Dist.	x	y	z	x	y	z	Horizontal displacement	Horizontal displacement	to x Axis
19.00000	22.00000	0.00000	0.0	0.0	0.0	0.0	0.0	-	-	-
21.00000	22.00000	0.00000	0.12008	0.018247	0.027006	-	-	-	-	-
23.00000	22.00000	0.00000	0.36499	0.060086	0.082210	-	-	-	-	-
25.00000	22.00000	0.00000	0.61323	0.11204	0.25390	-	-	-	-	-
27.00000	22.00000	0.00000	0.86764	0.18272	0.57892	-	-	-	-	-
29.00000	22.00000	0.00000	1.11596	0.30052	0.93940	-	-	-	-	-
31.00000	22.00000	0.00000	1.6998	0.61941	1.4048	-	-	-	-	-
33.00000	22.00000	0.00000	2.5494	1.8948	1.8656	-	-	-	-	-
35.00000	22.00000	0.00000								
37.00000	22.00000	0.00000								
39.00000	22.00000	0.00000								
41.00000	22.00000	0.00000								
43.00000	22.00000	0.00000	-2.0218	-1.6175	1.3640	-	-	-	-	-
45.00000	22.00000	0.00000	-0.45834	-0.27683	0.31264	-	-	-	-	-
47.00000	22.00000	0.00000	-0.11732	-0.044489	0.020952	-	-	-	-	-
49.00000	22.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
51.00000	22.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
53.00000	22.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
55.00000	22.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
15.00000	24.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
17.00000	24.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
19.00000	24.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
21.00000	24.00000	0.00000	0.10312	-0.010609	0.024372	-	-	-	-	-
23.00000	24.00000	0.00000	0.32429	-0.044772	0.074224	-	-	-	-	-
25.00000	24.00000	0.00000	0.54779	-0.10309	0.23050	-	-	-	-	-
27.00000	24.00000	0.00000	0.77465	-0.20524	0.53395	-	-	-	-	-
29.00000	24.00000	0.00000	1.0145	-0.40271	0.93004	-	-	-	-	-
31.00000	24.00000	0.00000	1.4648	-0.98153	1.3647	-	-	-	-	-
33.00000	24.00000	0.00000	1.9883	-2.8467	1.9169	-	-	-	-	-
35.00000	24.00000	0.00000	3.7250	-5.4279	3.2578	-	-	-	-	-
37.00000	24.00000	0.00000								
39.00000	24.00000	0.00000								
41.00000	24.00000	0.00000	-3.7784	-3.0227	2.2639	-	-	-	-	-
43.00000	24.00000	0.00000	-2.2107	-1.7685	1.6081	-	-	-	-	-
45.00000	24.00000	0.00000	-0.88426	-0.70741	0.48359	-	-	-	-	-
47.00000	24.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
49.00000	24.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
51.00000	24.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
53.00000	24.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
55.00000	24.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
15.00000	26.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
17.00000	26.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
19.00000	26.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
21.00000	26.00000	0.00000	0.064235	-0.023593	0.018163	-	-	-	-	-
23.00000	26.00000	0.00000	0.28616	-0.12671	0.061944	-	-	-	-	-
25.00000	26.00000	0.00000	0.50972	-0.27841	0.19058	-	-	-	-	-
27.00000	26.00000	0.00000	0.73581	-0.51149	0.46396	-	-	-	-	-
29.00000	26.00000	0.00000	0.96579	-0.89122	0.85383	-	-	-	-	-
31.00000	26.00000	0.00000	1.2807	-1.6521	1.2910	-	-	-	-	-
33.00000	26.00000	0.00000	2.6105	-3.8039	2.6367	-	-	-	-	-
35.00000	26.00000	0.00000	3.0641	-4.4648	3.0231	-	-	-	-	-
37.00000	26.00000	0.00000	3.5177	-5.1258	3.2608	-	-	-	-	-
39.00000	26.00000	0.00000								
41.00000	26.00000	0.00000	-3.9673	-3.1738	2.7660	-	-	-	-	-
43.00000	26.00000	0.00000	-2.3995	-1.9196	1.7724	-	-	-	-	-
45.00000	26.00000	0.00000	-1.1783	-0.94267	0.62875	-	-	-	-	-
47.00000	26.00000	0.00000	-0.19308	-0.15446	0.033812	-	-	-	-	-
49.00000	26.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
51.00000	26.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
53.00000	26.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
55.00000	26.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
15.00000	28.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
17.00000	28.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
19.00000	28.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
21.00000	28.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
23.00000	28.00000	0.00000	0.20177	-0.14513	0.044066	-	-	-	-	-
25.00000	28.00000	0.00000	0.42128	-0.35181	0.12301	-	-	-	-	-
27.00000	28.00000	0.00000	0.63307	-0.64159	0.31438	-	-	-	-	-
29.00000	28.00000	0.00000	0.83848	-1.0533	0.61363	-	-	-	-	-
31.00000	28.00000	0.00000	1.6657	-2.4272	1.5317	-	-	-	-	-
33.00000	28.00000	0.00000	2.94996	-2.8406	1.9982	-	-	-	-	-
35.00000	28.00000	0.00000	2.4032	-3.5017	2.4452	-	-	-	-	-
37.00000	28.00000	0.00000	2.8567	-4.1627	2.8552	-	-	-	-	-
39.00000	28.00000	0.00000	0.35207	-2.4239	1.7663	-	-	-	-	-
41.00000	28.00000	0.00000	-2.3670	-2.1453	1.9039	-	-	-	-	-
43.00000	28.00000	0.00000	-2.5894	-2.0707	1.9237	-	-	-	-	-
45.00000	28.00000	0.00000	-1.4724	-1.1779	0.77418	-	-	-	-	-
47.00000	28.00000	0.00000	-0.48715	-0.38972	0.086251	-	-	-	-	-
49.00000	28.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
51.00000	28.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
53.00000	28.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
55.00000	28.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
15.00000	30.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
17.00000	30.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
19.00000	30.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
21.00000	30.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
23.00000	30.00000	0.00000	0.090088	-0.082444	0.024896	-	-	-	-	-
25.00000	30.00000	0.00000	0.28972	-0.30703	0.065554	-	-	-	-	-
27.00000	30.00000	0.00000	0.48067	-0.59657	0.16123	-	-	-	-	-
29.00000	30.00000	0.00000	1.0757	-1.5674	0.54415	-	-	-	-	-
31.00000	30.00000	0.00000	1.3158	-1.9173	0.89286	-	-	-	-	-
33.00000	30.00000	0.00000	1.5559	-2.2672	1.3212	-	-	-	-	-
35.00000	30.00000	0.00000	1.7961	-2.6171	1.7823	-	-	-	-	-
37.00000	30.00000	0.00000	1.2517	-2.0796	1.4817	-	-	-	-	-
39.00000	30.00000	0.00000	0.19617	-1.7885	1.3680	-	-	-	-	-
41.00000	30.00000	0.00000	-0.98972	-1.5876	0.21989	-	-	-	-	-
43.00000	30.00000	0.00000	-1.4777	-1.3393	1.1842	-	-	-	-	-
45.00000	30.00000	0.00000	-1.7665	-1.4132	0.91974	-	-	-	-	-
47.00000	30.00000	0.00000	-0.78123	-0.62498	0.16609	-	-	-	-	-
49.00000	30.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
51.00000	30.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
53.00000	30.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
55.00000	30.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
15.00000	32.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
17.00000	32.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
19.00000	32.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
21.00000	32.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
23.00000	32.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
25.00000	32.00000	0.00000	0.12417	-0.15304	0.032398	-	-	-	-	-
27.00000	32.00000	0.00000	0.29307	-0.41169	0.068072	-	-	-	-	-
29.00000	32.00000	0.00000	0.72577	-1.0576	0.21989	-	-	-	-	-
31.00000	32.00000	0.00000	0.96590	-1.4075	0.41839	-	-	-	-	-
33.00000	32.00000	0.00000	1.2060	-1.7574	0.72163	-	-	-	-	-
35.00000	32.00000	0.00000	1.4462	-2.1073	1.1180	-	-	-	-	-
37.00000	32.00000	0.00000	0.67870	-1.4528	0.93474	-	-	-	-	-
39.00000	32.00000	0.00000	0.12499	-1.2756	0.91308	-	-	-	-	-
41.00000	32.00000	0.00000	-0.47197	-1.1408	0.84492	-	-	-	-	-
43.00000	32.00000	0.00000	-0.87196	-1.0593	0.71743	-	-	-	-	-
45.00000	32.00000	0.00000	-0.98507	-0.89281	0.47163	-	-	-	-	-
47.00000	32.00000	0.00000	-1.0753	-0.86024	0.26589	-	-	-	-	-
49.00000	32.00000	0.00000	-0.09045	-0.072036	0.023066	-	-	-	-	-
51.00000	32.00000	0.00000	0.0	0.0	0.0	-	-	-	-	-
53.00										



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
 Combined lateral and horizontal movements

Job No. Sheet No. Rev.

Drg. Ref.

Made by Date Checked
 ML 02-Oct-2018

Type/No.		Coordinates			Displacements			Angle of Line to x Axis	
Name	Dist.	x	y	z	x	y	z	Horizontal displacement	Horizontal displacement
27.00000	34.00000	0.00000	0.13573	-0.19778	0.041407	-	-	-	-
29.00000	34.00000	0.00000	0.37586	-0.54768	0.086348	-	-	-	-
31.00000	34.00000	0.00000	0.61599	-0.89759	0.16148	-	-	-	-
33.00000	34.00000	0.00000	0.85613	-1.2475	0.31485	-	-	-	-
35.00000	34.00000	0.00000	0.60243	-1.0224	0.36376	-	-	-	-
37.00000	34.00000	0.00000	0.40459	-1.0493	0.46892	-	-	-	-
39.00000	34.00000	0.00000	0.088305	-0.95819	0.47858	-	-	-	-
41.00000	34.00000	0.00000	-0.24898	-0.84818	0.42462	-	-	-	-
43.00000	34.00000	0.00000	-0.49699	-0.77761	0.34059	-	-	-	-
45.00000	34.00000	0.00000	-0.57809	-0.63888	0.21060	-	-	-	-
47.00000	34.00000	0.00000	-0.49247	-0.44635	0.10216	-	-	-	-
49.00000	34.00000	0.00000	-0.38412	-0.30730	0.067967	-	-	-	-
51.00000	34.00000	0.00000	0.0	0.0	0.0	-	-	-	-
53.00000	34.00000	0.00000	0.0	0.0	0.0	-	-	-	-
55.00000	34.00000	0.00000	0.0	0.0	0.0	-	-	-	-
15.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
17.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
19.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
21.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
23.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
25.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
27.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
29.00000	36.00000	0.00000	0.025953	-0.037817	0.012090	-	-	-	-
31.00000	36.00000	0.00000	0.26609	-0.38773	0.065851	-	-	-	-
33.00000	36.00000	0.00000	0.31894	-0.49171	0.080173	-	-	-	-
35.00000	36.00000	0.00000	0.32514	-0.63221	0.12981	-	-	-	-
37.00000	36.00000	0.00000	0.22561	-0.68042	0.17299	-	-	-	-
39.00000	36.00000	0.00000	0.057020	-0.64304	0.18205	-	-	-	-
41.00000	36.00000	0.00000	-0.12247	-0.56140	0.15695	-	-	-	-
43.00000	36.00000	0.00000	-0.25459	-0.49651	0.12144	-	-	-	-
45.00000	36.00000	0.00000	-0.28387	-0.37563	0.076548	-	-	-	-
47.00000	36.00000	0.00000	-0.19657	-0.20696	0.043865	-	-	-	-
49.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
51.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
53.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
55.00000	36.00000	0.00000	0.0	0.0	0.0	-	-	-	-
15.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
17.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
19.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
21.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
23.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
25.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
27.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
29.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
31.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
33.00000	38.00000	0.00000	0.073444	-0.12554	0.026871	-	-	-	-
35.00000	38.00000	0.00000	0.12080	-0.26406	0.045033	-	-	-	-
37.00000	38.00000	0.00000	0.096788	-0.32992	0.055169	-	-	-	-
39.00000	38.00000	0.00000	0.028410	-0.32900	0.057065	-	-	-	-
41.00000	38.00000	0.00000	-0.046284	-0.27772	0.049757	-	-	-	-
43.00000	38.00000	0.00000	-0.091193	-0.21620	0.041584	-	-	-	-
45.00000	38.00000	0.00000	-0.069022	-0.10756	0.026537	-	-	-	-
47.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
49.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
51.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
53.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
55.00000	38.00000	0.00000	0.0	0.0	0.0	-	-	-	-
15.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
17.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
19.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
21.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
23.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
25.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
27.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
29.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
31.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
33.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
35.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
37.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
39.00000	40.00000	0.00000	0.0013215	-0.015602	0.0058356	-	-	-	-
41.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
43.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
45.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
47.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
49.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
51.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
53.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
55.00000	40.00000	0.00000	0.0	0.0	0.0	-	-	-	-
15.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
17.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
19.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
21.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
23.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
25.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
27.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
29.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
31.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
33.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
35.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
37.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
39.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
41.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
43.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
45.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
47.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
49.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
51.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
53.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
55.00000	42.00000	0.00000	0.0	0.0	0.0	-	-	-	-
15.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
17.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
19.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
21.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
23.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
25.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
27.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
29.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
31.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
33.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
35.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
37.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
39.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
41.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
43.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
45.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
47.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
49.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
51.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
53.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
55.00000	44.00000	0.00000	0.0	0.0	0.0	-	-	-	-
15.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-
17.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-
19.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-
21.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-
23.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-
25.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-
27.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-
29.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-
31.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-
33.00000	46.00000	0.00000	0.0	0.0	0.0	-	-	-	-



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
Combined lateral and horizontal movements

Job No.	Sheet No.	Rev.
Drg. Ref.		
Made by ML	Date 02-Oct-2018	Checked

Type/No.	Coordinates			Displacements			Angle of Line to x Axis			
	Name	Dist.								
	x	y	z	x	y	z				
				Horizontal displacement	Horizontal displacement					
	35.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	37.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	39.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	41.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	43.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	45.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	47.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	49.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	51.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	53.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	55.00000	46.00000	0.00000	0.0	0.0	0.0	-			
	15.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	17.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	19.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	21.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	23.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	25.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	27.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	29.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	31.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	33.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	35.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	37.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	39.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	41.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	43.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	45.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	47.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	49.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	51.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	53.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	55.00000	48.00000	0.00000	0.0	0.0	0.0	-			
	15.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	17.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	19.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	21.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	23.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	25.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	27.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	29.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	31.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	33.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	35.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	37.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	39.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	41.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	43.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	45.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	47.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	49.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	51.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	53.00000	50.00000	0.00000	0.0	0.0	0.0	-			
	55.00000	50.00000	0.00000	0.0	0.0	0.0	-			
No7 A	Line 1	25.70000	33.20000	-2.50000	0.068762	-0.094312	0.021854	0.11665	-0.0040040	308.06
	1.9233	26.88571	31.68571	-2.50000	0.31500	-0.43203	0.074726	0.53436	-0.018342	308.06
	3.9465	28.6143	30.17143	-2.50000	0.56123	-0.76976	0.22871	0.95207	-0.032680	308.06
	5.7698	29.25714	28.65714	-2.50000	0.80746	-1.1075	0.55650	1.3698	-0.047018	308.06
	7.6931	30.44286	27.14286	-2.50000	1.0537	-1.4452	1.0096	1.7875	-0.061356	308.06
	9.6164	31.62857	25.62857	-2.50000	1.4596	-2.0020	1.4720	2.4761	-0.084995	308.06
	11.540	32.81429	24.11429	-2.50000	1.9248	-2.6399	1.8620	3.2652	-0.11208	308.06
	13.463	34.00000	22.60000	-2.50000	2.3552	-3.4424	2.5064	4.3256	-0.159075	308.06
No7 B	Line 2	34.00000	22.60000	-2.50000	3.5521	-4.4424	2.5064	2.1126	-3.1992	34.461
	1.0309	34.85000	23.18333	-2.50000	0.0	0.0	0.0	0.0	0.0	34.461
	2.0618	35.70000	23.76667	-2.50000	0.0	0.0	0.0	0.0	0.0	34.461
	3.0927	36.55000	24.35000	-2.50000	3.9609	-5.7716	3.1142	0.0	-7.0000	34.461
	4.1236	37.40000	24.93333	-2.50000	3.9609	-5.7716	3.1142	0.0	-7.0000	34.461
	5.1546	38.25000	25.51667	-2.50000	3.9609	-5.7716	3.1142	0.0	-7.0000	34.461
	6.1855	39.10000	26.10000	-2.50000	-0.51582	-3.4765	2.1345	-2.3924	-2.5745	34.461
No7 C	Line 3	39.10000	26.10000	-2.50000	-0.51582	-3.4765	2.1345	-2.4753	-2.4950	126.79
	1.9800	37.91429	27.68571	-2.50000	3.1680	-4.6162	3.0974	-5.5940	0.22726	126.79
	3.9656	36.72857	29.25714	-2.50000	2.2750	-3.4424	2.5064	-4.1938	-0.17038	126.79
	5.9400	35.54286	30.85714	-2.50000	1.7113	-2.4936	1.6197	-3.0218	0.12276	126.79
	7.9200	34.35714	32.44286	-2.50000	1.2915	-1.8819	0.85337	-2.2806	0.092650	126.79
	9.9000	33.17143	34.02857	-2.50000	0.87171	-1.2702	0.32820	-1.5393	0.062535	126.79
	11.880	31.98571	35.61429	-2.50000	0.45192	-0.65851	0.10411	-0.79801	0.032420	126.79
	13.860	30.80000	37.20000	-2.50000	0.032128	-0.046815	0.014107	-0.056732	0.0023049	126.79
No7 D	Line 4	30.80000	37.20000	-2.50000	0.032128	-0.046815	0.014107	0.0036114	0.056663	218.11
	1.0803	29.95000	36.53333	-2.50000	0.046707	-0.068059	0.018665	0.0052502	0.082377	218.11
	2.1605	29.10000	35.86667	-2.50000	0.061287	-0.089303	0.022954	0.0068891	0.10809	218.11
	3.2408	28.25000	35.20000	-2.50000	0.075866	-0.11055	0.026995	0.0085279	0.13381	218.11
	4.3210	27.40000	34.53333	-2.50000	0.090446	-0.13179	0.030807	0.010167	0.15952	218.11
	5.4013	26.55000	33.86667	-2.50000	0.10503	-0.15304	0.034411	0.011806	0.18523	218.11
	6.4815	25.70000	33.20000	-2.50000	0.068762	-0.094312	0.021854	0.0040976	0.11665	218.11
No6 A	Line 5	30.80000	37.20000	-2.50000	0.032128	-0.046815	0.014107	0.056766	-0.0034135	307.91
	1.9328	31.98750	35.67500	-2.50000	0.44151	-0.64335	0.10142	0.77886	-0.046910	307.91
	3.9656	33.17500	34.15000	-2.50000	0.85909	-1.2997	0.31046	1.5010	-0.03766	307.91
	5.7985	34.26250	32.62500	-2.50000	1.2603	-1.8364	0.80392	2.2422	-0.13390	307.91
	7.7313	35.55000	31.10000	-2.50000	1.6697	-2.4329	1.5393	2.9454	-0.17740	307.91
	9.6641	36.73750	29.57500	-2.50000	1.5500	-2.2694	1.5918	2.7429	-0.17135	307.91
	11.597	37.92500	28.05000	-2.50000	1.9004	-2.9654	2.0253	3.5073	-0.22250	307.91
	13.530	39.11250	26.52500	-2.50000	0.091511	-0.117955	0.012929	0.010929	-0.001609	307.91
	15.463	40.30000	25.00000	-2.50000	-4.4216	-3.5373	2.6770	0.074348	-5.6619	307.91
No6 B	Line 6	40.30000	25.00000	-0.70000	-4.4216	-3.5373	2.6770	0.29471	-5.6547	305.68
	0.80017	40.76667	24.35000	-0.70000	-3.9944	-3.1955	2.4086	0.26623	-5.1084	305.68
	1.6003	41.23333	23.70000	-0.70000	-3.5672	-2.8538	2.1399	0.23776	-4.5621	305.68
	2.4005	41.70000	23.05000	-0.70000	-3.1400	-2.5120	1.8709	0.20929	-4.0157	305.68
	3.2007	42.16667	22.40000	-0.70000	-2.7128	-2.1703	1.6013	0.18082	-3.4694	305.68
	4.0009	42.63333	21.75000	-0.70000	-2.2857	-1.8285	1.3308	0.15234	-2.9231	305.68
	4.8010	43.10000	21.10000	-0.70000	-0.60743	-0.48595	0.34607	0.040487	-0.77684	305.68
No6 C	Line 7	43.10000	21.10000	-0.70000	-0.60743	-0.48595	0.34607	-0.77751	-0.024297	36.870
	1.5000	43.00000	21.00000	-0.70000	-0.65398	-0.52908	0.39398	-0.83978	-0.03766	36.870
	3.0000	43.00000	22.90000	-0.70000	-0.33241	-0.25793	0.12608	-0.42069	-0.0068968	36.870
	4.5000	46.70000	23.80000	-0.70000	-0.049106	-0.038103	0.010325	-0.062147	-0.0010189	36.870
	6.0000	47.90000	24.70000	-0.70000	0.0	0.0	0.0	0.0	0.0	36.870
No6 D	Line 8	47.90000	24.70000	-0.70000	0.0	0.0	0.0	0.0	0.0	126.12
	0.57255	47.56250	24.12500	-0.70000	0.0	0.0	0.0	0.0	0.0	126.12
	1.1451	47.22500	25.62500	-0.70000	-0.027097	-0.021678	0.0079277	-0.0015381	0.034667	126.12
	1.7176	46.88750	26.08750	-0.70000	-0.26136	-0.20909	0.043462	-0.014836	0.33438	126.12
	2.2902	46.55000	26.55000	-0.70000	-0.49563	-0.39651	0.097575	-0.028134	0.63410	126.12
	2.8627	46.21250	27.01250	-0.70000	-0.72990	-0.58392	0.19546	-0.041432	0.93381	126.12
	3.4353	45.87500	27.47500	-0.70000	-0.96417	-0.77133	0.33456	-0.054730	1.2335	126.12
	4.0078	45.53750	27.93750	-0.70000	-1.1984	-0.95875	0.50586	-0.068028	1.5332	126.12
	4.5804	45.20000	28.40000	-0.70000	-1.4327	-1.1462	0.70026	-0.081326	1.8330	126.12
No7 E	Line 9	45.20000	28.40000	-2.50000	-1.4327	-1.1462	0.70026	-0.059621	1.8338	126.80
	2.6433	43.61667	30.51667							



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
Combined lateral and horizontal movements

Job No. Sheet No. Rev.

Drg. Ref.

Made by Date Checked
ML 02-Oct-2018

Type/No.	Coordinates			Displacements			Angle of Line			
Name	Dist.	x	y	z	x	y	z	Horizontal displacement	Horizontal displacement	to x Axis
	5.4353	23.94286	25.11429	-3.50000	0.0	0.0	0.0	0.0	0.0	307.95
	7.2470	25.05714	23.68571	-3.50000	0.0	0.0	0.0	0.0	0.0	307.95
	9.0588	26.17143	22.25714	-3.50000	0.0	0.0	0.0	0.0	0.0	307.95
	10.871	27.28571	20.82857	-3.50000	0.0	0.0	0.0	0.0	0.0	307.95
	12.682	28.40000	19.40000	-3.50000	0.0	0.0	0.0	0.0	0.0	307.95
No9 B	Line 12	28.40000	19.40000	-3.50000	0.0	0.0	0.0	0.0	0.0	308.07
	1.0888	29.07143	18.54286	-3.50000	0.0	0.0	0.0	0.0	0.0	308.07
	2.1776	29.74286	17.68571	-3.50000	0.0	0.0	0.0	0.0	0.0	308.07
	3.2664	30.41429	16.82857	-3.50000	0.0	0.0	0.0	0.0	0.0	308.07
	4.3552	31.08571	15.97143	-3.50000	0.0	0.0	0.0	0.0	0.0	308.07
	5.4441	31.75714	15.11429	-3.50000	0.0	0.0	0.0	0.0	0.0	308.07
	6.5329	32.42857	14.25714	-3.50000	0.0	0.0	0.0	0.0	0.0	308.07
	7.6217	33.10000	13.40000	-3.50000	0.0	0.0	0.0	0.0	0.0	308.07
122A	Line 13	29.30000	10.20000	-3.50000	0.0	0.0	0.0	0.0	0.0	37.100
	2.1354	31.00000	11.48571	-3.50000	0.0	0.0	0.0	0.0	0.0	37.100
	4.2629	32.70000	12.77143	-3.50000	0.0	0.0	0.0	0.0	0.0	37.100
	6.3943	34.40000	14.05714	-3.50000	0.0	0.0	0.0	0.0	0.0	37.100
	8.5258	36.10000	15.34286	-3.50000	0.0	0.0	0.0	0.0	0.0	37.100
	10.657	37.80000	16.62857	-3.50000	0.0	0.0	0.0	0.0	0.0	37.100
	12.789	39.50000	17.91429	-3.50000	0.0	0.0	0.0	0.0	0.0	37.100
	14.920	41.20000	19.20000	-3.50000	0.0	0.0	0.0	0.0	0.0	37.100
122B	Line 14	41.20000	19.20000	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
	1.2494	41.97778	18.22222	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
	2.4988	42.75556	17.24444	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
	3.7482	43.53333	16.26667	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
	4.9976	44.31111	15.28889	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
	6.2470	45.08889	14.31111	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
	7.4964	45.86667	13.33333	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
	8.7458	46.64444	12.35556	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
	9.9952	47.42222	11.37778	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
	11.2445	48.20000	10.40000	-3.50000	0.0	0.0	0.0	0.0	0.0	308.50
No8 A	Line 15	25.70000	33.20000	-3.50000	0.0	0.0	0.0	0.0	0.0	216.69
	1.0600	24.85000	32.56667	-3.50000	0.0	0.0	0.0	0.0	0.0	216.69
	2.1200	24.00000	31.93333	-3.50000	0.0	0.0	0.0	0.0	0.0	216.69
	3.1800	23.15000	31.30000	-3.50000	0.0	0.0	0.0	0.0	0.0	216.69
	4.2400	22.30000	30.66667	-3.50000	0.0	0.0	0.0	0.0	0.0	216.69
	5.3000	21.45000	30.03333	-3.50000	0.0	0.0	0.0	0.0	0.0	216.69
	6.3600	20.60000	29.40000	-3.50000	0.0	0.0	0.0	0.0	0.0	216.69

Specific Building Damage Results - Horizontal Displacements

Structure: No 6 Denmark Street | Sub-structure: No6 A

Dist.	Coordinates			Displacements		
	x	y	z	x	y	z
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	30.80000	37.00000	-2.50000	0.02128	-0.046815	0.056676
1.9328	31.98750	35.67500	-2.50000	0.44151	-0.64335	0.77886
3.8656	33.17500	34.15000	-2.50000	0.85090	-1.2399	1.5010
5.7985	34.36250	32.62500	-2.50000	1.2603	-1.8364	2.2232
7.7313	35.55000	31.10000	-2.50000	1.6697	-2.4329	2.9454
9.6641	36.73750	29.57500	-2.50000	1.5500	-2.2694	2.7429
11.597	37.92500	28.05000	-2.50000	1.9004	-2.9654	3.5073
13.530	39.11250	26.52500	-2.50000	0.091511	-2.7363	2.2152
15.463	40.30000	25.00000	-2.50000	-4.4216	-3.5373	0.074348

Structure: No 6 Denmark Street | Sub-structure: No6 C

Dist.	Coordinates			Displacements		
	x	y	z	x	y	z
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	43.10000	21.10000	-0.70000	-0.60743	-0.48595	-0.77751
1.5000	44.30000	22.00000	-0.70000	-0.66356	-0.51488	-0.83978
3.0000	45.50000	22.90000	-0.70000	-0.33241	-0.25793	-0.42069
4.5000	46.70000	23.80000	-0.70000	-0.049106	-0.038103	-0.062147
6.0000	47.90000	24.70000	-0.70000	0.0	0.0	0.0

Structure: No 6 Denmark Street | Sub-structure: No6 D

Dist.	Coordinates			Displacements		
	x	y	z	x	y	z
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	47.90000	24.70000	-0.70000	0.0	0.0	0.0
0.57255	47.56250	25.16250	-0.70000	0.0	0.0	0.0
1.1451	47.22500	25.62500	-0.70000	-0.027097	-0.021678	-0.0015381
1.7176	46.88750	26.08750	-0.70000	-0.26136	-0.20909	-0.014836
2.2902	46.55000	26.55000	-0.70000	-0.49563	-0.39651	-0.028134
2.8627	46.21250	27.01250	-0.70000	-0.72990	-0.58392	-0.041432
3.4353	45.87500	27.47500	-0.70000	-0.96417	-0.77133	-0.054730
4.0078	45.53750	27.93750	-0.70000	-1.1984	-0.95875	-0.068028
4.5804	45.20000	28.40000	-0.70000	-1.4327	-1.1462	-0.081326

Structure: No 6 Denmark Street | Sub-structure: No6 E

Dist.	Coordinates			Displacements		
	x	y	z	x	y	z
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	45.20000	28.40000	-2.50000	-1.4327	-1.1462	-0.059621
2.6433	43.61667	30.51667	-2.50000	-1.3587	-1.2148	-0.15896
5.2867	42.03333	32.63333	-2.50000	-0.59488	-1.0185	-0.45923
7.9300	40.45000	34.75000	-2.50000	-0.12013	-0.74686	-0.52609
10.573	38.86667	36.86667	-2.50000	0.053250	-0.51026	-0.44049
13.217	37.28333	38.98333	-2.50000	0.042358	-0.16714	-0.15921
15.860	35.70000	41.10000	-2.50000	0.0	0.0	0.0

Structure: No 6 Denmark Street | Sub-structure: No6 F

Dist.	Coordinates			Displacements		
	x	y	z	x	y	z
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	35.70000	41.10000	-3.50000	0.0	0.0	0.0
1.0438	34.88333	40.45000	-3.50000	0.0	0.0	0.0
2.0875	34.06667	39.80000	-3.50000	0.0	0.0	0.0
3.1313	33.25000	39.15000	-3.50000	0.0	0.0	0.0
4.1751	32.43333	38.50000	-3.50000	0.0	0.0	0.0
5.2188	31.61667	37.85000	-3.50000	0.0	0.0	0.0



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
 Combined lateral and horizontal movements

Job No.	Sheet No.	Rev.
J18119		
Drg. Ref.		
Made by	Date	Checked
ML	02-Oct-2018	

Dist.	Coordinates			Displacements		
x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
6.2626	30.80000	37.20000	-3.50000	0.0	0.0	0.0
Structure: No 9 Denmark Street Sub-structure: No9 A						
Dist.	Coordinates			Displacements		
x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	20.60000	29.40000	-3.50000	0.0	0.0	0.0
1.8118	21.71429	27.97143	-3.50000	0.0	0.0	0.0
3.6235	22.82857	26.54286	-3.50000	0.0	0.0	0.0
5.4353	23.94286	25.11429	-3.50000	0.0	0.0	0.0
7.2470	25.05714	23.68571	-3.50000	0.0	0.0	0.0
9.0588	26.17143	22.25714	-3.50000	0.0	0.0	0.0
10.871	27.28571	20.82857	-3.50000	0.0	0.0	0.0
12.682	28.40000	19.40000	-3.50000	0.0	0.0	0.0
Structure: No 9 Denmark Street Sub-structure: No9 B						
Dist.	Coordinates			Displacements		
x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	28.40000	19.40000	-3.50000	0.0	0.0	0.0
1.0888	29.07143	18.54286	-3.50000	0.0	0.0	0.0
2.1776	29.74286	17.68571	-3.50000	0.0	0.0	0.0
3.2664	30.41429	16.82857	-3.50000	0.0	0.0	0.0
4.3552	31.08571	15.97143	-3.50000	0.0	0.0	0.0
5.4441	31.75714	15.11429	-3.50000	0.0	0.0	0.0
6.5329	32.42857	14.25714	-3.50000	0.0	0.0	0.0
7.6217	33.10000	13.40000	-3.50000	0.0	0.0	0.0
Structure: No 8 Denmark Street Sub-structure: No8 A						
Dist.	Coordinates			Displacements		
x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	25.70000	33.20000	-3.50000	0.0	0.0	0.0
1.0600	24.85000	32.56667	-3.50000	0.0	0.0	0.0
2.1200	24.00000	31.93333	-3.50000	0.0	0.0	0.0
3.1800	23.15000	31.30000	-3.50000	0.0	0.0	0.0
4.2400	22.30000	30.66667	-3.50000	0.0	0.0	0.0
5.3000	21.45000	30.03333	-3.50000	0.0	0.0	0.0
6.3600	20.60000	29.40000	-3.50000	0.0	0.0	0.0
Structure: 122 Charing Cross Rd Sub-structure: 122A						
Dist.	Coordinates			Displacements		
x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	29.30000	10.20000	-3.50000	0.0	0.0	0.0
2.1314	31.00000	11.48571	-3.50000	0.0	0.0	0.0
4.2629	32.70000	12.77143	-3.50000	0.0	0.0	0.0
6.3943	34.40000	14.05714	-3.50000	0.0	0.0	0.0
8.5258	36.10000	15.34286	-3.50000	0.0	0.0	0.0
10.657	37.80000	16.62857	-3.50000	0.0	0.0	0.0
12.789	39.50000	17.91429	-3.50000	0.0	0.0	0.0
14.920	41.20000	19.20000	-3.50000	0.0	0.0	0.0
Structure: 122 Charing Cross Rd Sub-structure: 122B						
Dist.	Coordinates			Displacements		
x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	41.20000	19.20000	-3.50000	0.0	0.0	0.0
1.2494	41.97778	18.22222	-3.50000	0.0	0.0	0.0
2.4988	42.75556	17.24444	-3.50000	0.0	0.0	0.0
3.7482	43.53333	16.26667	-3.50000	0.0	0.0	0.0
4.9976	44.31111	15.28889	-3.50000	0.0	0.0	0.0
6.2470	45.08889	14.31111	-3.50000	0.0	0.0	0.0
7.4964	45.86667	13.33333	-3.50000	0.0	0.0	0.0
8.7458	46.64444	12.35556	-3.50000	0.0	0.0	0.0
9.9952	47.42222	11.37778	-3.50000	0.0	0.0	0.0
11.245	48.20000	10.40000	-3.50000	0.0	0.0	0.0
Structure: No 7 Retained Sub-structure: No7 A						
Dist.	Coordinates			Displacements		
x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	25.70000	33.20000	-2.50000	0.068762	-0.094312	0.11665
1.9233	26.88571	31.68571	-2.50000	0.31500	-0.43203	0.53436
3.8465	28.07143	30.17143	-2.50000	0.5123	-0.76976	0.95207
5.7698	29.25714	28.65714	-2.50000	0.80746	-1.1075	1.3698
7.6931	30.44286	27.14286	-2.50000	1.0537	-1.4452	1.7875
9.6164	31.62857	25.62857	-2.50000	1.4596	-2.0020	2.4761
11.540	32.81429	24.11429	-2.50000	1.9248	-2.6399	3.2652
13.463	34.00000	22.60000	-2.50000	3.5521	-4.4424	5.3256
Structure: No 7 Retained Sub-structure: No7 C						
Dist.	Coordinates			Displacements		
x	y	z	x	y	Horizontal displacement along the Line	Horizontal displacement perpendicular to Line
[m]	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	39.10000	26.10000	-2.50000	-0.51582	-3.4765	-2.4753
1.9800	37.91429	27.68571	-2.50000	3.1680	-4.6162	-5.5940
3.9600	36.72857	29.27143	-2.50000	2.3750	-3.4607	-4.1938
5.9400	35.54286	30.85714	-2.50000	1.7113	-2.4936	-3.0218
7.9200	34.35714	32.44286	-2.50000	1.2915	-1.8819	-2.2806
9.9000	33.17143	34.02857	-2.50000	0.87171	-1.2702	-1.5393
11.880	31.98571	35.61429	-2.50000	0.45122	-0.65851	-0.79811
13.860	30.80000	37.20000	-2.50000	0.032128	-0.046815	-0.056732



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
Combined lateral and horizontal movements

Job No. Sheet No. Rev.

Drg. Ref.

Made by ML Date 02-Oct-2018 Checked

Dist.	Coordinates			Displacements		
	x	y	z	x	y	z

Structure: No 7 Retained | Sub-structure: No7 D

Dist.	Coordinates			Displacements		
	x	y	z	x	y	z
	[m]	[m]	[m]	[mm]	[mm]	[mm]
0.0	30.80000	37.20000	-2.50000	0.032128	-0.046815	0.0036114
1.0803	29.95000	36.53333	-2.50000	0.046707	-0.068059	0.0052502
2.1605	29.10000	35.86667	-2.50000	0.061287	-0.089303	0.0068891
3.2408	28.25000	35.20000	-2.50000	0.075866	-0.11055	0.0085279
4.3210	27.40000	34.53333	-2.50000	0.090446	-0.13179	0.010167
5.4013	26.55000	33.86667	-2.50000	0.10503	-0.15304	0.011806
6.4815	25.70000	33.20000	-2.50000	0.068762	-0.094312	0.0040976

Specific Building Damage Results - Vertical Displacements

Structure: No 6 Denmark Street | Sub-structure: No6 A

Dist.	Coordinates			Displacements
	x	y	z	
	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	30.80000	37.20000	-2.50000	0.014107
1.9328	31.98750	35.67500	-2.50000	0.10142
3.8656	33.17500	34.15000	-2.50000	0.31046
5.7985	34.36250	32.62500	-2.50000	0.80392
7.7313	35.55000	31.10000	-2.50000	1.5393
9.6641	36.73750	29.57500	-2.50000	1.5918
11.597	37.92500	28.05000	-2.50000	2.0253
13.530	39.11250	26.52500	-2.50000	1.7755
15.463	40.30000	25.00000	-2.50000	2.6770

Structure: No 6 Denmark Street | Sub-structure: No6 C

Dist.	Coordinates			Displacements
	x	y	z	
	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	43.10000	21.10000	-0.70000	0.34607
1.5000	44.30000	22.00000	-0.70000	0.49398
3.0000	45.50000	22.90000	-0.70000	0.12608
4.5000	46.70000	23.80000	-0.70000	0.010325
6.0000	47.90000	24.70000	-0.70000	0.0

Structure: No 6 Denmark Street | Sub-structure: No6 D

Dist.	Coordinates			Displacements
	x	y	z	
	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	47.90000	24.70000	-0.70000	0.0
0.57255	47.56250	25.16250	-0.70000	0.0
1.1451	47.22500	25.62500	-0.70000	0.0079277
1.7176	46.88750	26.08750	-0.70000	0.043462
2.2902	46.55000	26.55000	-0.70000	0.097575
2.8627	46.21250	27.01250	-0.70000	0.19546
3.4353	45.87500	27.47500	-0.70000	0.33456
4.0078	45.53750	27.93750	-0.70000	0.50586
4.5804	45.20000	28.40000	-0.70000	0.70026

Structure: No 6 Denmark Street | Sub-structure: No6 E

Dist.	Coordinates			Displacements
	x	y	z	
	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	45.20000	28.40000	-2.50000	0.70026
2.6433	43.61667	30.51667	-2.50000	0.97137
5.2867	42.03333	32.63333	-2.50000	0.65666
7.9300	40.45000	34.75000	-2.50000	0.31073
10.573	38.86667	36.86667	-2.50000	0.10993
13.217	37.28333	38.98333	-2.50000	0.032754
15.860	35.70000	41.10000	-2.50000	0.0

Structure: No 6 Denmark Street | Sub-structure: No6 F

Dist.	Coordinates			Displacements
	x	y	z	
	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	35.70000	41.10000	-3.50000	0.0
1.0438	34.88333	40.45000	-3.50000	0.0
2.0875	34.06667	39.80000	-3.50000	0.0
3.1313	33.25000	39.15000	-3.50000	0.0
4.1751	32.43333	38.50000	-3.50000	0.0
5.2188	31.61667	37.85000	-3.50000	0.0
6.2626	30.80000	37.20000	-3.50000	0.0

Structure: No 9 Denmark Street | Sub-structure: No9 A

Dist.	Coordinates			Displacements
	x	y	z	
	[m]	[m]	[m]	[mm]

Vertical Offset 1

0.0	20.60000	29.40000	-3.50000	0.0
1.8118	21.71429	27.97143	-3.50000	0.0
3.6235	22.82857	26.54286	-3.50000	0.0
5.4353	23.94286	25.11429	-3.50000	0.0
7.2470	25.05714	23.68571	-3.50000	0.0
9.0588	26.17143	22.25714	-3.50000	0.0
10.871	27.28571	20.82857	-3.50000	0.0
12.682	28.40000	19.40000	-3.50000	0.0

Structure: No 9 Denmark Street | Sub-structure: No9 B

Dist.	Coordinates			Displacements
	x	y	z	
	[m]	[m]	[m]	[mm]

Vertical Offset 1



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
Combined lateral and horizontal movements

Job No.	Sheet No.	Rev.
J18119		
Drg. Ref.		
Made by	Date	Checked
ML	02-Oct-2018	

Dist.	Coordinates			Displacements	
	x	y	z	z	z
[m]	[m]	[m]	[m]	[mm]	[mm]
0.0	28.40000	19.40000	-3.50000	0.0	
1.0888	29.07143	18.54286	-3.50000	0.0	
2.1776	29.74286	17.68571	-3.50000	0.0	
3.2664	30.41429	16.82857	-3.50000	0.0	
4.3552	31.08571	15.97143	-3.50000	0.0	
5.4441	31.75714	15.11429	-3.50000	0.0	
6.5329	32.42857	14.25714	-3.50000	0.0	
7.6217	33.10000	13.40000	-3.50000	0.0	

Structure: No 8 Denmark Street | Sub-structure: No8 A

Dist.	Coordinates			Displacements	
	x	y	z	z	z
[m]	[m]	[m]	[m]	[mm]	[mm]
Vertical Offset 1					
0.0	25.70000	33.20000	-3.50000	0.0	
1.0600	24.85000	32.56667	-3.50000	0.0	
2.1200	24.00000	31.93333	-3.50000	0.0	
3.1800	23.15000	31.30000	-3.50000	0.0	
4.2400	22.30000	30.66667	-3.50000	0.0	
5.3000	21.45000	30.03333	-3.50000	0.0	
6.3600	20.60000	29.40000	-3.50000	0.0	

Structure: 122 Charing Cross Rd | Sub-structure: 122A

Dist.	Coordinates			Displacements	
	x	y	z	z	z
[m]	[m]	[m]	[m]	[mm]	[mm]
Vertical Offset 1					
0.0	29.30000	10.20000	-3.50000	0.0	
2.1314	31.00000	11.48571	-3.50000	0.0	
4.2629	32.70000	12.77143	-3.50000	0.0	
6.3943	34.40000	14.05714	-3.50000	0.0	
8.5259	36.10000	15.34286	-3.50000	0.0	
10.657	37.80000	16.62857	-3.50000	0.0	
12.789	39.50000	17.91429	-3.50000	0.0	
14.920	41.20000	19.20000	-3.50000	0.0	

Structure: 122 Charing Cross Rd | Sub-structure: 122B

Dist.	Coordinates			Displacements	
	x	y	z	z	z
[m]	[m]	[m]	[m]	[mm]	[mm]
Vertical Offset 1					
0.0	41.20000	19.20000	-3.50000	0.0	
1.2494	41.97778	18.22222	-3.50000	0.0	
2.4988	42.75556	17.24444	-3.50000	0.0	
3.7482	43.53333	16.26667	-3.50000	0.0	
4.9976	44.31111	15.28889	-3.50000	0.0	
6.2470	45.08889	14.31111	-3.50000	0.0	
7.4964	45.86667	13.33333	-3.50000	0.0	
8.7458	46.64444	12.35556	-3.50000	0.0	
9.9952	47.42222	11.37778	-3.50000	0.0	
11.245	48.20000	10.40000	-3.50000	0.0	

Structure: No 7 Retained | Sub-structure: No7 A

Dist.	Coordinates			Displacements	
	x	y	z	z	z
[m]	[m]	[m]	[m]	[mm]	[mm]
Vertical Offset 1					
0.0	25.70000	33.20000	-2.50000	0.021854	
1.9233	26.88571	31.68571	-2.50000	0.074726	
3.8465	28.07143	30.17143	-2.50000	0.22871	
5.7698	29.25714	28.65714	-2.50000	0.55650	
7.6931	30.44286	27.14286	-2.50000	1.0096	
9.6164	31.62857	25.62857	-2.50000	1.4720	
11.540	32.81429	24.11429	-2.50000	1.8620	
13.463	34.00000	22.60000	-2.50000	2.5064	

Structure: No 7 Retained | Sub-structure: No7 C

Dist.	Coordinates			Displacements	
	x	y	z	z	z
[m]	[m]	[m]	[m]	[mm]	[mm]
Vertical Offset 1					
0.0	39.10000	26.10000	-2.50000	2.1345	
1.9800	37.91429	27.68571	-2.50000	3.0974	
3.9600	36.72857	29.27143	-2.50000	2.4188	
5.9400	35.54286	30.85714	-2.50000	1.6197	
7.9200	34.35714	32.44286	-2.50000	0.8337	
9.9000	33.17143	34.02857	-2.50000	0.32820	
11.880	31.98571	35.61429	-2.50000	0.10411	
13.860	30.80000	37.20000	-2.50000	0.014107	

Structure: No 7 Retained | Sub-structure: No7 D

Dist.	Coordinates			Displacements	
	x	y	z	z	z
[m]	[m]	[m]	[m]	[mm]	[mm]
Vertical Offset 1					
0.0	30.80000	37.20000	-2.50000	0.014107	
1.0803	29.95000	36.53333	-2.50000	0.018665	
2.1605	29.10000	35.86667	-2.50000	0.022954	
3.2408	28.25000	35.20000	-2.50000	0.026995	
4.3210	27.40000	34.53333	-2.50000	0.030807	
5.4013	26.55000	33.86667	-2.50000	0.034411	
6.4815	25.70000	33.20000	-2.50000	0.021854	

Specific Building Damage Results - All Segments

Structure: No 6 Denmark Street | Sub-structure: No6 A

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category	
												[m]
0.0		1	1.9328	4.0646	Hogging	0.0039534	0.037364	0.038185	-373.51E-6	-380.33E-6	16045.0	(Negligible) 0
		2	5.9974	5.1779	Sagging	0.0059123	0.020142	0.023189	-395.31E-6	-380.33E-6	20212.0	(Negligible) 0
		3	11.175	4.2847	Hogging	0.013063	-0.076163	0.017044	0.0011089	-466.92E-6	2315.8	(Negligible) 0



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
Combined lateral and horizontal movements

Job No. Sheet No. Rev.

Drg. Ref.

Made by
ML

Date
02-Oct-2018

Checked

Vertical Offset from Line for Vertical Movement
Segment Start Length Curvature Deflection Ratio Average Horizontal Strain Max Tensile Strain Max Gradient of Horizontal Displacement Max Gradient of Vertical Displacement Curve Min Radius of Curvature Damage Category
Tensile horizontal strains are +ve, compressive horizontal strains are -ve. (Negligible)

Structure: No 6 Denmark Street | Sub-structure: No6 C

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0	1	[m] 0.0	[m] 2.8984	Sagging	[%] 0.0085466	[%] 0.011332	[%] 0.015456	-279.32E-6	245.20E-6	[m] 3180.1	0 (Negligible)
	2	[m] 2.8984	[m] 0.10161	Hogging	[%] 0.0	[%] 0.027940	[%] 0.027939	-279.32E-6	245.20E-6	[m] 95637.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: No 6 Denmark Street | Sub-structure: No6 D

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0	1	[m] 2.8627	[m] 1.7173	Hogging	[%] 0.0016976	[%] -0.0023226	[%] 0.0012642	23.226E-6	-339.54E-6	[m] 8277.7	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: No 6 Denmark Street | Sub-structure: No6 E

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0	1	[m] 0.0	[m] 6.7881	Sagging	[%] 0.0053338	[%] -0.0064464	[%] 0.0037965	113.61E-6	130.87E-6	[m] 9642.9	0 (Negligible)
	2	[m] 6.7881	[m] 3.7853	Hogging	[%] 0.0011545	[%] 0.0014985	[%] 0.0020590	-106.40E-6	130.87E-6	[m] 63988.	0 (Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: No 6 Denmark Street | Sub-structure: No6 F

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0		[m] 0.0	[m] 0.0		[%] 0.0	[%] 0.0	[%] 0.0			[m] 0.0	0 (Negligible)

All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: No 9 Denmark Street | Sub-structure: No9 A

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0		[m] 0.0	[m] 0.0		[%] 0.0	[%] 0.0	[%] 0.0			[m] 0.0	0 (Negligible)

All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: No 9 Denmark Street | Sub-structure: No9 B

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0		[m] 0.0	[m] 0.0		[%] 0.0	[%] 0.0	[%] 0.0			[m] 0.0	0 (Negligible)

All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: No 8 Denmark Street | Sub-structure: No8 A

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0		[m] 0.0	[m] 0.0		[%] 0.0	[%] 0.0	[%] 0.0			[m] 0.0	0 (Negligible)

All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 122 Charing Cross Rd | Sub-structure: 122A

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0		[m] 0.0	[m] 0.0		[%] 0.0	[%] 0.0	[%] 0.0			[m] 0.0	0 (Negligible)

All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: 122 Charing Cross Rd | Sub-structure: 122B

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0		[m] 0.0	[m] 0.0		[%] 0.0	[%] 0.0	[%] 0.0			[m] 0.0	0 (Negligible)

All settlements are less than the Settlement Trough Limit Sensitivity.
Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: No 7 Retained | Sub-structure: No7 A

Vertical Offset from Line for Vertical Movement Calculations	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
[m] 0.0		[m] 0.0	[m] 0.0		[%] 0.0	[%] 0.0	[%] 0.0			[m] 0.0	0 (Negligible)



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
Combined lateral and horizontal movements

Job No. Sheet No. Rev.

Drg. Ref.

Made by ML Date 02-Oct-2018 Checked

Vertical Offset from Line for Vertical Movement	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
0.0		1	3.8465	9.6135	Hogging	0.0019553	0.024689	0.025628	-410.07E-6	-335.07E-6	10996.0

(Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: No 7 Retained | Sub-structure: No7 C

Vertical Offset from Line for Vertical Movement	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
0.0		1	0.0	5.7596	Sagging	0.019350	-0.011343	0.015311	0.0015776	-487.08E-6	1937.4
		2	5.7596	6.1204	Hogging	0.0047287	0.038079	0.039548	-591.57E-6	403.31E-6	16059.0

(Negligible)

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

Structure: No 7 Retained | Sub-structure: No7 D

Vertical Offset from Line for Vertical Movement	Segment	Start	Length	Curvature	Deflection Ratio	Average Horizontal Strain	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature	Damage Category
0.0											

All settlements are less than the Settlement Trough Limit Sensitivity.

Tensile horizontal strains are +ve, compressive horizontal strains are -ve.

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

Structure: No 6 Denmark Street | Sub-structure: No6 A

Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
0.0	0.013063	-0.076163	-466.92E-6	2.6758	0.038185	0.0011089	-466.92E-6	2315.8	20212.0	0 (Negligible)

Structure: No 6 Denmark Street | Sub-structure: No6 C

Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
0.0	0.0085466	0.027940	245.20E-6	0.49333	0.027939	-279.32E-6	245.20E-6	95637.0	3180.1	0 (Negligible)

Structure: No 6 Denmark Street | Sub-structure: No6 D

Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
0.0	0.0016976	-0.0023226	-339.54E-6	0.70013	0.0012642	23.226E-6	-339.54E-6	8277.7	-	0 (Negligible)

Structure: No 6 Denmark Street | Sub-structure: No6 E

Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
0.0	0.0053338	-0.0064464	130.87E-6	0.96772	0.0037965	113.61E-6	130.87E-6	63988.0	9642.9	0 (Negligible)

Structure: No 6 Denmark Street | Sub-structure: No6 F

Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category

Structure: No 9 Denmark Street | Sub-structure: No9 A

Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category

Structure: No 9 Denmark Street | Sub-structure: No9 B

Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category

Structure: No 8 Denmark Street | Sub-structure: No8 A

Vertical Offset from Line for Vertical Movement	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category



GEOTECHNICAL AND ENVIRONMENTAL ASSOCIATES LTD J18119

7 Denmark Street, London WC2H 8LZ
 Combined lateral and horizontal movements

Job No.	Sheet No.	Rev.
Drng. Ref.		
Made by	Date	Checked
ML	02-Oct-2018	

Structure: 122 Charing Cross Rd | Sub-structure: 122A

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Structure: 122 Charing Cross Rd | Sub-structure: 122B

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Structure: No 7 Retained | Sub-structure: No7 A

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.0019553	0.024689	-335.07E-6	2.5055	0.025628	-410.07E-6	-335.07E-6	10996.		- 0 (Negligible)

Structure: No 7 Retained | Sub-structure: No7 C

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	
0.0	0.019350	0.038079	-487.08E-6	3.0970	0.039548	0.0015776	-487.08E-6	16059.	1937.4	0 (Negligible)

Structure: No 7 Retained | Sub-structure: No7 D

Vertical Offset from Line for Vertical Movement Calculations	Deflection Ratio	Average Horizontal Strain	Max Slope	Max Settlement	Max Tensile Strain	Max Gradient of Horizontal Displacement Curve	Max Gradient of Vertical Displacement Curve	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category
[m]	[%]	[%]		[mm]	[%]			[m]	[m]	

Specific Building Damage Results - Critical Segments within Each Structure

Structure Name	Parameter	Critical Sub-Structure	Critical Start Segment	End	Curvature	Max Slope	Max Settlement	Max Tensile Strain	Min Radius of Curvature (Hogging)	Min Radius of Curvature (Sagging)	Damage Category	
No 6 Denmark Street	Max Slope	No6 A			[m]	[m]						
			3	11.175	15.460	Hogging	466.92E-6	2.6758	0.017044	2315.8	- 0 (Negligible)	
	Max Settlement	No6 A	3	11.175	15.460	Hogging	466.92E-6	2.6758	0.017044	2315.8	- 0 (Negligible)	
	Max Tensile Strain	No6 A	1	1.9328	5.9974	Hogging	380.33E-6	0.87962	0.038185	16045.	- 0 (Negligible)	
	Min Radius of Curvature (Hogging)	No6 A	3	11.175	15.460	Hogging	466.92E-6	2.6758	0.017044	2315.8	- 0 (Negligible)	
Min Radius of Curvature (Sagging)	No6 C	1	0.0	2.8984	Sagging	245.20E-6	0.49333	0.015456	-	3180.1	0 (Negligible)	
No 9 Denmark Street	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
No 8 Denmark Street	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
122 Charing Cross Rd	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
	All settlements are less than the Settlement Trough Limit Sensitivity.											
No 7 Retained	Max Slope	No7 C	1	0.0	5.7596	Sagging	487.08E-6	3.0970	0.015311	-	1937.4	0 (Negligible)
	Max Settlement	No7 C	1	0.0	5.7596	Sagging	487.08E-6	3.0970	0.015311	-	1937.4	0 (Negligible)
	Max Tensile Strain	No7 C	2	5.7596	11.880	Hogging	403.31E-6	1.6925	0.039548	16059.	- 0 (Negligible)	
	Min Radius of Curvature (Hogging)	No7 A	1	3.8465	13.460	Hogging	335.07E-6	2.5055	0.025628	10996.	- 0 (Negligible)	
	Min Radius of Curvature (Sagging)	No7 C	1	0.0	5.7596	Sagging	487.08E-6	3.0970	0.015311	-	1937.4	0 (Negligible)