



SOUTHERN TESTING LTD

46 Inverness Street
London, NW1 7HB
Q1

Job No.	Sheet No.	Rev.
J13674		
Drg. Ref.		
Made by	Date	Checked
TRL	15-Aug-2018	

Titles

Job No.: J13674
 Job Title: 46 Inverness Street
 Sub-title: London, NW1 7HB
 Calculation Heading: Q1
 Initials: TRL
 Checker:
 Date Saved: 15-Aug-2018
 Date Checked:
 Notes:
 File Name: Q - movements due to excavation in front of wall, plus drained PDISP.kdd
 File Path: S:\SI Data\Job\J13674 London NW1\GMA\Xdisp - (Q)

History

Date	Time	By	Notes
24-Jul-2018	10:55	thomasl	
07-Aug-2018	12:14	thomasl	
07-Aug-2018	13:15	thomasl	
15-Aug-2018	12:02	thomasl	
15-Aug-2018	12:35	thomasl	
15-Aug-2018	16:56	thomasl	
11-Mar-2020	09:09	thomasl	

Displacement Lines

Ref.	Name	x1	y1	z1	x2	y2	z2	Intervals	Surface type	Interpolate imported for displacements	Calculate
		[m]	[m]	[m]	[m]	[m]	[m]	[No.]	tunnels		
1	Line 1	-0.78000	3.38000	-1.10000	-10.05000	1.45000	-1.10000	16	Surface	Yes	Yes
2	Line 2	1.50000	4.65000	-1.10000	0.15000	10.45000	-1.10000	12	Surface	Yes	Yes
3	Line 3	9.00000	5.98000	-1.10000	9.00000	13.48000	-1.10000	15	Surface	Yes	Yes
4	Line 4	9.00000	1.70000	0.00000	14.50000	1.70000	0.00000	11	Surface	Yes	Yes
5	Line 5	4.50000	0.00000	0.00000	4.50000	-14.50000	0.00000	29	Surface	Yes	Yes

Imported Displacements

Set:	Set:	Result:	Coordinates:	Coordinates:	Coordinates:	Displacements:	Displacements:	Displacements:
Ref.	Name	Ref.	x	y	z	x	y	z
			[m]	[m]	[m]	[mm]	[mm]	[mm]
1	ID Set #	1	-1.35938	3.25937	-1.10000	2.68663	0.53733	1.54522
		2	-1.93875	3.13875	-1.10000	2.46903	0.49381	1.44726
		3	-2.51812	3.01812	-1.10000	2.25142	0.45028	1.35249
		4	-3.09750	2.89750	-1.10000	2.03381	0.40676	1.19000
		5	-3.67687	2.77687	-1.10000	1.81620	0.36324	0.97645
		6	-4.25625	2.65625	-1.10000	1.59859	0.31972	0.74315
		7	-4.83563	2.53563	-1.10000	1.38098	0.27620	0.51936
		8	-5.41500	2.41500	-1.10000	1.16338	0.23268	0.32732
		9	-5.99437	2.29437	-1.10000	0.94577	0.18915	0.18051
		10	-6.57375	2.17375	-1.10000	0.72816	0.14563	0.08302
		11	-7.15313	2.05313	-1.10000	0.51055	0.10211	0.02940
		12	-7.73250	1.93250	-1.10000	0.29294	0.05860	0.00438
		13	-8.31188	1.81187	-1.10000	0.07530	0.01510	-0.01690
		14	-8.89125	1.69125	-1.10000	0.00000	0.00000	-0.02900
		15	-9.47063	1.57062	-1.10000	0.00000	0.00000	-0.02610
		16	-10.05000	1.45000	-1.10000	0.00000	0.00000	-0.02358
		17	-1.50000	4.65000	-1.10000	0.79862	-2.85741	4.00390
		18	1.38750	5.13333	-1.10000	0.75598	-2.72869	2.33852
		19	1.27500	5.61667	-1.10000	0.71254	-2.59467	1.77972
		20	1.16250	6.10000	-1.10000	0.66789	-2.45258	1.56261
		21	1.05000	6.58333	-1.10000	0.62177	-2.31070	1.39151
		22	0.93750	7.06667	-1.10000	0.57407	-2.13833	1.20636
		23	0.82500	7.55000	-1.10000	0.52482	-1.96555	1.00257
		24	0.71250	8.03333	-1.10000	0.47409	-1.78295	0.79178
		25	0.60000	8.51667	-1.10000	0.42202	-1.59139	0.58926
		26	0.48750	9.00000	-1.10000	0.36930	-1.39551	0.40930
		27	0.37500	9.48333	-1.10000	0.31562	-1.19326	0.26109
		28	0.26250	9.96667	-1.10000	0.26053	-0.98155	0.14906
		29	0.15000	10.45000	-1.10000	0.20420	-0.76158	0.07252
		30	9.00000	5.98000	-1.10000	0.45686	-2.99112	1.29951
		31	9.00000	6.98000	-1.10000	0.43850	-2.84036	1.34910
		32	9.00000	7.98000	-1.10000	0.41864	-2.68426	1.44566
		33	9.00000	8.98000	-1.10000	0.39686	-2.52132	1.45826
		34	9.00000	9.98000	-1.10000	0.37296	-2.35081	1.37859
		35	9.00000	10.98000	-1.10000	0.34692	-2.17268	1.23051
		36	9.00000	11.98000	-1.10000	0.31885	-1.98730	1.04083
		37	9.00000	12.98000	-1.10000	0.19096	-1.14213	0.49487
		38	9.00000	13.98000	-1.10000	0.16859	-1.00563	0.36533
		39	9.00000	14.98000	-1.10000	0.14610	-0.87090	0.25202
		40	9.00000	15.98000	-1.10000	0.12285	-0.73502	0.15978
		41	9.00000	16.98000	-1.10000	0.09830	-0.59564	0.09037
		42	9.00000	17.98000	-1.10000	0.07260	-0.45297	0.04220
		43	9.00000	18.98000	-1.10000	0.04640	-0.30909	0.00961
		44	9.00000	19.98000	-1.10000	0.03030	-0.20202	-0.00392
		45	9.00000	20.98000	-1.10000	0.01440	-0.09580	-0.01270
		46	9.00000	21.98000	-1.10000	0.00000	0.00000	-0.01315
		47	9.50000	1.70000	0.00000	0.00000	0.00000	0.26487
		48	10.00000	1.70000	0.00000	0.00000	0.00000	0.03114
		49	10.50000	1.70000	0.00000	0.00000	0.00000	-0.02664
		50	11.00000	1.70000	0.00000	0.00000	0.00000	-0.04142
		51	11.50000	1.70000	0.00000	0.00000	0.00000	-0.04502
		52	12.00000	1.70000	0.00000	0.00000	0.00000	-0.04443
		53	12.50000	1.70000	0.00000	0.00000	0.00000	-0.04215
		54	13.00000	1.70000	0.00000	0.00000	0.00000	-0.03926
		55	13.50000	1.70000	0.00000	0.00000	0.00000	-0.03625
		56	14.00000	1.70000	0.00000	0.00000	0.00000	-0.03334
		57	14.50000	1.70000	0.00000	0.00000	0.00000	-0.03062
		58	4.50000	0.00000	0.00000	0.00000	4.65000	2.13604
		59	4.50000	-0.50000	0.00000	0.00000	4.46250	1.95980
		60	4.50000	-1.00000	0.00000	0.00000	4.27500	2.04500
		61	4.50000	-1.50000	0.00000	0.00000	4.08750	2.14776
		62	4.50000	-2.00000	0.00000	0.00000	3.90000	2.20136
		63	4.50000	-2.50000	0.00000	0.00000	3.71250	2.19334
		64	4.50000	-3.00000	0.00000	0.00000	3.52500	2.12756
		65	4.50000	-3.50000	0.00000	0.00000	3.33750	2.01344
		66	4.50000	-4.00000	0.00000	0.00000	3.15000	1.86202
		67	4.50000	-4.50000	0.00000	0.00000	2.96250	1.68432
		68	4.50000	-5.00000	0.00000	0.00000	2.77500	1.49068
		69	4.50000	-5.50000	0.00000	0.00000	2.58750	1.29042
		70	4.50000	-6.00000	0.00000	0.00000	2.40000	1.09167
		71	4.50000	-6.50000	0.00000	0.00000	2.21250	0.90131
		72	4.50000	-7.00000	0.00000	0.00000	2.02500	0.72495
		73	4.50000	-7.50000	0.00000	0.00000	1.83750	0.56684
		74	4.50000	-8.00000	0.00000	0.00000	1.65000	0.42995



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Set: Ref.	Set: Name	Result: Ref.	Coordinates: x [m]	Coordinates: y [m]	Coordinates: z [m]	Displacements: x [mm]	Displacements: y [mm]	Displacements: z [mm]
75			4.50000	-8.50000	0.00000	0.00000	1.46250	0.31590
76			4.50000	-9.00000	0.00000	0.00000	1.27500	0.22497
77			4.50000	-9.50000	0.00000	0.00000	1.08750	0.15612
78			4.50000	-10.00000	0.00000	0.00000	0.90000	0.10697
79			4.50000	-10.50000	0.00000	0.00000	0.71250	0.07380
80			4.50000	-11.00000	0.00000	0.00000	0.52500	0.05160
81			4.50000	-11.50000	0.00000	0.00000	0.33750	0.03390
82			4.50000	-12.00000	0.00000	0.00000	0.15000	0.01300
83			4.50000	-12.50000	0.00000	0.00000	0.00000	-0.01441
84			4.50000	-13.00000	0.00000	0.00000	0.00000	-0.01347
85			4.50000	-13.50000	0.00000	0.00000	0.00000	-0.01262
86			4.50000	-14.00000	0.00000	0.00000	0.00000	-0.01183
87			4.50000	-14.50000	0.00000	0.00000	0.00000	-0.01111

2 - Data point coincident with horizontal movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.
6 - Data point coincident with vertical movement calculation point for a specific building. Its displacement has been added before performing building damage calculations.

Polygonal Excavations

Ref.	1										
Excavation Name:	Basement										
Surface level [m]:	-1.1000										
Contribution:	Positive										
Corner	x	y	Base Level	Arc Enabled	Stiffened	Prev. Side	Prev. Side	Prev. Side	Next Side	Next Side	Next Side
	[m]	[m]	[m]			d	p1	p2*	d	p1	p2*
	[m]	[m]	[m]			[m]	[%]	[%]	[m]	[%]	[%]
1	0.0	0.0	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	-0.80000	4.0000	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	-0.50000	4.0000	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	0.50000	0.0	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
Side	x1	y1	x2	y2	G.M. Curve: Vertical			G.M. Curve: Horizontal			
	[m]	[m]	[m]	[m]							
1	0.0	0.0	-0.80000	4.0000	No	vertical ground movement			No	horizontal ground movement	
2	-0.80000	4.0000	-0.50000	4.0000	No	vertical ground movement			No	horizontal ground movement	
3	-0.50000	4.0000	0.50000	0.0	No	vertical ground movement			No	horizontal ground movement	
4	0.50000	0.0	0.0	0.0	No	vertical ground movement			No	horizontal ground movement	

Ref.	2										
Excavation Name:	Basement near 24 GC rear wall										
Surface level [m]:	-1.1000										
Contribution:	Positive										
Corner	x	y	Base Level	Arc Enabled	Stiffened	Prev. Side	Prev. Side	Prev. Side	Next Side	Next Side	Next Side
	[m]	[m]	[m]			d	p1	p2*	d	p1	p2*
	[m]	[m]	[m]			[m]	[%]	[%]	[m]	[%]	[%]
1	-0.30000	4.0000	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	5.05000	5.5000	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	5.0000	5.0000	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	-0.30000	3.5000	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
Side	x1	y1	x2	y2	G.M. Curve: Vertical			G.M. Curve: Horizontal			
	[m]	[m]	[m]	[m]							
1	-0.30000	4.0000	5.05000	5.5000	No	vertical ground movement			No	horizontal ground movement	
2	5.05000	5.5000	5.0000	5.0000	No	vertical ground movement			No	horizontal ground movement	
3	5.0000	5.0000	-0.30000	3.5000	No	vertical ground movement			No	horizontal ground movement	
4	-0.30000	3.5000	-0.30000	4.0000	No	vertical ground movement			No	horizontal ground movement	

Ref.	3										
Excavation Name:	Basement front (Inverness St)										
Surface level [m]:	0.0										
Contribution:	Positive										
Corner	x	y	Base Level	Arc Enabled	Stiffened	Prev. Side	Prev. Side	Prev. Side	Next Side	Next Side	Next Side
	[m]	[m]	[m]			d	p1	p2*	d	p1	p2*
	[m]	[m]	[m]			[m]	[%]	[%]	[m]	[%]	[%]
1	0.50000	0.0	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	0.50000	0.50000	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	8.50000	0.50000	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	8.50000	0.0	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
Side	x1	y1	x2	y2	G.M. Curve: Vertical			G.M. Curve: Horizontal			
	[m]	[m]	[m]	[m]							
1	0.50000	0.0	0.50000	0.50000	No	vertical ground movement			No	horizontal ground movement	
2	0.50000	0.50000	8.50000	0.50000	No	vertical ground movement			No	horizontal ground movement	
3	8.50000	0.50000	8.50000	0.0	No	vertical ground movement			No	horizontal ground movement	
4	8.50000	0.0	0.50000	0.0	No	vertical ground movement			No	horizontal ground movement	

Ref.	4										
Excavation Name:	Corner nr. 46 Inv St side elev										
Surface level [m]:	-1.1000										
Contribution:	Positive										
Corner	x	y	Base Level	Arc Enabled	Stiffened	Prev. Side	Prev. Side	Prev. Side	Next Side	Next Side	Next Side
	[m]	[m]	[m]			d	p1	p2*	d	p1	p2*
	[m]	[m]	[m]			[m]	[%]	[%]	[m]	[%]	[%]
1	5.5000	5.3500	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
2	9.5000	5.9500	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
3	9.5000	5.4500	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
4	5.6000	4.9000	-3.1000	Yes	Yes	0.0	67.000	25.000	0.0	67.000	25.000
Side	x1	y1	x2	y2	G.M. Curve: Vertical			G.M. Curve: Horizontal			
	[m]	[m]	[m]	[m]							
1	5.5000	5.3500	9.5000	5.9500	No	vertical ground movement			No	horizontal ground movement	
2	9.5000	5.9500	5.4500	5.4500	No	vertical ground movement			No	horizontal ground movement	
3	9.5000	5.4500	5.6000	4.9000	No	vertical ground movement			No	horizontal ground movement	
4	5.6000	4.9000	5.5000	5.3500	No	vertical ground movement			No	horizontal ground movement	

Circular Excavations

Vertical Ground Movement Curves

Curve Name: No vertical ground movement
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) (%)
[0.000,0.000,0.000][1.000,0.000,0.000][0.000,1.000,0.000][1.000,1.000,0.000]



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Side x1 y1 x2 y2 G.M. Curve: Vertical G.M. Curve: Horizontal
[m] [m] [m] [m]

Curve Fitting Method: Polynomial
x Order: 1
y Order: 0
Polynomial: z = 0.0x + 0.0
Coeff. of Determination:

Horizontal Ground Movement Curves

Curve Name: No horizontal ground movement
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) (%)]
[0.000,0.000,0.000][1.000,0.000,0.000][0.000,1.000,0.000][1.000,1.000,0.000]
Curve Fitting Method: Polynomial
x Order: 0
y Order: 0
Polynomial: z = 0.0
Coeff. of Determination:

Damage Category Strains

Table with 5 columns: Ref., Name, 0 (Negligible) to 1 (Very Slight), 2 (Slight) to 3 (Moderate), 4 (Severe) to 5 (Very Severe). Row 1: Burland Strain Limits, 0.0, 500.00E-6, 750.00E-6, 0.0015000.

Specific Buildings - Geometry

Table with 10 columns: Ref., Building Name, Sub-Building Name, Displacement Line, Distance Along Line, Distance Along Line, Vertical Offsets from Line for Vertical Movement Calculations, Vertical Displacement Limit Sensitivity, Damage Category Strains, Poisson's Ratio, E/G. Rows include Gloucester Crescent and Inverness Street elevations.

Specific Buildings - Bending Parameters

Table with 10 columns: Ref., Building Name, Sub-Building Name, Height Default, Hogging, Hogging, Hogging, Sagging, Sagging, Sagging, 2nd Mom. of Area (per unit width), Dist. of Bending Strain from N.A., Dist. of Edge of Beam in Tension, 2nd Mom. of Area (per unit width), Dist. of Bending Strain from N.A., Dist. of Edge of Beam in Tension. Rows include Gloucester Crescent and Inverness Street elevations.

Warnings

1 Multiple excavations have been specified. Displacements resulting from each excavation are summed with no account taken of the interactions between excavations (e.g. overlapping zones of influence or 'shielding' of one excavation by another).
2 If an embedded wall excavation is assigned a 'sub-surface' ground movement curve then displacements induced by it can only be calculated for those points that are level with or below the embedded wall excavation's 'surface level'. Others are ignored. An example of such a combination, for which displacements will not be calculated is Excavation XP1/Side 1/Line 4/Vertical. This is an example only. There are 47 others.

Errors

None

Displacement Results - Displacement Lines

Table with 14 columns: Stage Ref., Stage Name, Disp. Ref., Disp. Line, Chainage, x, y, z, delta x, delta y, delta z, delta H, delta perp., Angle. Contains detailed displacement data for Base Model 1, Line 1 and Line 2, and Line 3.



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Table with columns: Stage Ref., Stage Name, Disp. Line Ref., Disp. Line Name, Chainage [m], x [m], y [m], z [m], dx [mm], dy [mm], dz [mm], delta H [mm], delta perp [mm], Angle [degrees]. Contains displacement data for various stages and chainages.

* Result includes imported displacement(s).

Specific Building Damage Results - Horizontal Displacements

Table with columns: Stage Ref., Stage Name, Specific Building Ref., Specific Building Name, Sub-building Name, Dist., x [m], y [m], z [m], dx [mm], dy [mm], delta H [mm], delta perp [mm]. Lists horizontal displacements for buildings like Gloucester Crescent and 46 Inverness Street.

d - Displacements include imported displacements.

Specific Building Damage Results - Vertical Displacements

Table with columns: Stage Ref., Stage Name, Specific Building Ref., Specific Building Name, Sub-building Name, Vertical Offset [m], Dist., x [m], y [m], z [m], delta [mm]. Lists vertical displacements for buildings.



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Table with columns: Stage Ref., Stage Name, Specific Building Ref., Specific Building Name, Sub-building Name, Vertical Offset, Dist., x, y, z, dz. Contains displacement data for various buildings and elevations.

d - Displacements include imported displacements.

Specific Building Damage Results - Detail

Table with columns: Stage Ref., Stage Name, Specific Building Ref., Specific Building Name, Sub-building Name, Vertical Offset, Segment, Start, Length, Curvature, Deflection, Average, Max, Max Gradient, Max Gradient. Includes curvature and deflection data.

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

Table with columns: Stage Ref., Stage Name, Specific Building Ref., Specific Building Name, Sub-building Name, Vertical Offset, Deflection, Average, Max Slope, Max, Max, Max Gradient, Max Gradient, Min Radius, Min. Includes critical values for segments.

Specific Building Damage Results - Critical Segments within Each Building

Table with columns: Stage Ref., Stage Name, Specific Building Ref., Specific Building Name, Parameter, Critical, Critical, Start, End, Curvature, Max Slope, Max, Max, Min, Min. Includes critical segments within buildings.



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Stage: Ref.	Stage: Name of Category	Specific Building: Name	Parameter	Critical	Critical	Start	End	Curvature	Max Slope	Max	Max	Min	Min
of	Building:				Sub-Building	Segment				Settlement	Tensile	Radius of	Radius
282.30 0	(Negligible)		Max Settlement		Sub 1	1	0.59180	3.3870	Sagging	0.0026232	1.5452	0.038674	-
282.30 0	(Negligible)		Max Tensile Strain		Sub 1	1	0.59180	3.3870	Sagging	0.0026232	1.5452	0.038674	-
282.30 0	(Negligible)		Min Radius of Curvature (Hogging)										
-	-		Min Radius of Curvature (Sagging)										
189.86 1	(Very Slight)	24 Gloucester Crescent (rear elevation)	Max Slope			1	0.0	1.9842	Sagging	0.0033550	4.0039	0.065434	-
189.86 1	(Very Slight)		Max Settlement			1	0.0	1.9842	Sagging	0.0033550	4.0039	0.065434	-
189.86 1	(Very Slight)		Max Tensile Strain			1	0.0	1.9842	Sagging	0.0033550	4.0039	0.065434	-
189.86 1	(Very Slight)		Min Radius of Curvature (Hogging)										
-	-		Min Radius of Curvature (Sagging)										
1983.4 0	(Negligible)	46 Inverness Street (side elevation)	Max Slope			2	0.60541	3.2033	Sagging	0.0010901	1.4582	0.048592	-
1983.4 0	(Negligible)		Max Settlement			2	0.60541	3.2033	Sagging	0.0010901	1.4582	0.048592	-
2036.1 1	(Very Slight)		Max Tensile Strain			3	3.2033	5.0000	Sagging	0.0010901	0.81885	0.053252	-
-	-		Min Radius of Curvature (Hogging)										
-	-		Min Radius of Curvature (Sagging)										
497.46 0	(Negligible)	46 Inverness Street (front elevation)	Max Slope			1	0.0	0.50000	Sagging	467.46E-6	0.26487	35.763E-9	-
497.46 0	(Negligible)		Max Settlement			1	0.0	0.50000	Sagging	467.46E-6	0.26487	35.763E-9	-
497.46 0	(Negligible)		Max Tensile Strain			1	0.0	0.50000	Sagging	467.46E-6	0.26487	35.763E-9	-
-	-		Min Radius of Curvature (Hogging)										
-	-		Min Radius of Curvature (Sagging)										