

From: [Trevor Clatworthy](#)
To: [Raymond Gonzalez Rios](#)
Cc: [Klaus Middleton-Smith \(klaus.middleton-smith@capita.co.uk\)](#); [Peter Brierley \(Peter.Brierley@tube.tfl.gov.uk\)](#); [Grandison, Andrew](#)
Subject: 1311-01 - 100 Avenue Road - Deformation Monitoring Set 02 - Issue
Date: 25 February 2016 16:34:26
Attachments: [SAL-1311-01-01 Set 02 Rev0 - Levelling.pdf](#)
[SAL-1311-01-02 Set 02 Rev0 - 3D Monitoring.pdf](#)

Raymond,

I am pleased to forward to you 100 Avenue Road Deformation Levelling Set 02 in Adobe PDF Format.

Electronic References:

SAL-1311-01-01 Set 02 Rev0 - Levelling.pdf

In comparison to the previous set the coordinate differences are within 0.2mm. In comparison to the base set the coordinate differences are within 0.2mm.

SAL-1311-01-02 Set 02 Rev0 - 3D Monitoring.pdf

In comparison to the previous set the coordinate differences are within 1.0mm. In comparison to the base set the coordinate differences are within 1.2mm.

If you have any queries or require any further information please do not hesitate to contact me.

Regards,

Trevor Clatworthy
(For Survey Associates Limited)

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Project: 100 Avenue Road Development, London

Job Description: Level Deformation Monitoring

Monitoring Location: Swiss Cottage Underground Station

Client: Capita

Address: 65 Gresham Street

London

EC2V 7NQ

Project Reference: SAL-1311-01

Report Reference: SAL-1311-01-01 Set 02 Rev0 - Levelling

Survey Date: 20/02/2016

REPORT BY SURVEY ASSOCIATES LTD



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Project: 100 Avenue Road Development, London
Job Description: Level Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL-1311-01-01 Set 02 Rev0 - Levelling - Content

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Survey Date: 20/02/2016

Content of Monitoring Report:

Section	Content
1	Remarks
2	Base Results - Levelling
3	Monitoring Results - Levelling
4	Graphs
5	Diagram

Project: 100 Avenue Road Development, London
Job Description: Level Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL-1311-01-01 Set 02 Rev0 - Levelling - Remarks

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Survey Date: 20/02/2016

Remarks

Reference	Remarks
1	The locations of the Monitoring Points are detailed on diagram SAL-1311-01 Diagram Rev0 attached at the end of this report.
2	All level monitoring points have been installed in the concrete Track Bed.
3	All Co-ordinates are related to LUL Grid Coordinate and Datum System.
4	The Base Readings are a mean of three independent sets of observations undertaken on 20th November 2015 and 24th November 2015.
5	<u>Positive Vertical</u> Level differences indicate <u>heave</u> in the tunnel profile, <u>negative Vertical</u> Level differences indicate <u>settlement</u> in the tunnel profile.
6	The estimated accuracy of the level monitoring is +/- 0.25mm relative to the Datum Points.
7	Set 01 21-01-2016: Datum Point 36 was obstructed during the survey.

Project: 100 Avenue Road Development, London
Job Description: Level Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL-1311-01-01 Set 00 Rev0 - Levelling - Baseline Results

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Survey Date: 24/11/2015

	Base Set A 20/11/2015	Base Set B 24/11/2015	Base Set C 24/11/2015	Diff Set A to Mean	Diff Set B to Mean	Diff Set B to Mean	Mean Baseline Readings
Reference	Level [m]	Level [m]	Level [m]	ΔL [mm]	ΔL [mm]	ΔL [mm]	Level [m]
1 - Datum	140.2092	140.2092	140.2092	0.0	0.0	0.0	140.2092
2 - Datum	140.2298	140.2298	140.2299	0.0	0.0	0.0	140.2298
3	140.3638	140.3638	140.3639	0.0	0.0	0.0	140.3638
4	140.3182	140.3183	140.3184	0.1	0.0	-0.1	140.3183
5	140.4046	140.4046	140.4046	0.0	0.0	0.0	140.4046
6	140.3612	140.3613	140.3612	0.0	0.0	0.0	140.3612
7	140.4482	140.4483	140.4483	0.0	0.0	0.0	140.4483
8	140.3939	140.3939	140.3939	0.0	0.0	0.0	140.3939
9	140.4733	140.4734	140.4734	0.1	0.0	0.0	140.4734
10	140.4378	140.4379	140.4380	0.1	0.0	-0.1	140.4379
11	140.4991	140.4992	140.4991	0.0	-0.1	0.0	140.4991
12	140.4707	140.4707	140.4707	0.0	0.0	0.0	140.4707
13	140.5293	140.5294	140.5293	0.0	-0.1	0.0	140.5294
14	140.4922	140.4922	140.4921	0.0	0.0	0.0	140.4922
15	140.5594	140.5594	140.5595	0.1	0.0	0.0	140.5594
16	140.5341	140.5342	140.5342	0.0	0.0	0.0	140.5341
17	140.5903	140.5903	140.5904	0.0	0.0	-0.1	140.5904
18	140.5595	140.5596	140.5596	0.0	0.0	0.0	140.5596
19	140.6219	140.6220	140.6220	0.0	0.0	-0.1	140.6220
20	140.5855	140.5855	140.5856	0.0	0.0	-0.1	140.5855
21	140.6583	140.6584	140.6584	0.1	0.0	-0.1	140.6584
22	140.6147	140.6147	140.6147	0.0	0.0	0.0	140.6147
23	140.6792	140.6793	140.6792	0.0	0.0	0.0	140.6793
24	140.6511	140.6511	140.6511	0.0	0.0	0.0	140.6511
25	140.7228	140.7228	140.7228	0.0	0.0	0.0	140.7228
26	140.6759	140.6759	140.6759	0.0	0.0	0.0	140.6759
27	140.7836	140.7836	140.7836	0.0	0.0	0.0	140.7836
28	140.6956	140.6956	140.6956	0.0	0.0	0.0	140.6956
29	140.7612	140.7612	140.7612	0.0	0.0	0.0	140.7612
30	140.7240	140.7240	140.7240	0.0	0.0	0.0	140.7240
31	140.7997	140.7997	140.7997	0.0	0.0	0.0	140.7997
32	140.7726	140.7725	140.7725	0.0	0.0	0.0	140.7725
33	140.8597	140.8596	140.8596	0.0	0.0	0.0	140.8597
34	140.8305	140.8304	140.8304	0.0	0.0	0.0	140.8304
35 - Datum	141.3915	141.3916	141.3915	0.1	0.0	0.0	141.3915
36 - Datum	141.9923	141.9923	141.9923	0.0	0.0	0.0	141.9923

Project: 100 Avenue Road Development, London
Job Description: Level Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01

Sheet Reference: SAL-1311-01-01 Set 02 Rev0 - Levelling - Results

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Survey Date: 20/02/2016

Base Readings		Set 01		Set 02		Set 03		Set 04		Set 05		Set 06		Set 07	
24/11/2014		21/01/2016		20/02/2016											
Reference	Level [m]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]
1 - Datum	140.2092	140.2092	0.0	140.2092	0.0										
2 - Datum	140.2298	140.2298	0.0	140.2297	-0.1										
3	140.3638	140.3637	-0.1	140.3636	-0.2										
4	140.3183	140.3182	-0.1	140.3181	-0.2										
5	140.4046	140.4045	-0.1	140.4044	-0.2										
6	140.3612	140.3612	-0.1	140.3611	-0.2										
7	140.4483	140.4482	-0.1	140.4481	-0.2										
8	140.3939	140.3938	-0.1	140.3937	-0.2										
9	140.4734	140.4733	-0.1	140.4733	-0.1										
10	140.4379	140.4378	-0.1	140.4378	-0.1										
11	140.4991	140.4990	-0.1	140.4990	-0.1										
12	140.4707	140.4706	-0.1	140.4706	-0.1										
13	140.5294	140.5293	-0.1	140.5292	-0.1										
14	140.4922	140.4921	-0.1	140.4921	-0.1										
15	140.5594	140.5594	-0.1	140.5594	0.0										
16	140.5341	140.5340	-0.1	140.5341	-0.1										
17	140.5904	140.5903	0.0	140.5903	-0.1										
18	140.5596	140.5595	0.0	140.5595	-0.1										
19	140.6220	140.6220	0.0	140.6220	0.0										
20	140.5855	140.5855	0.0	140.5855	0.0										
21	140.6584	140.6585	0.1	140.6585	0.1										
22	140.6147	140.6148	0.1	140.6148	0.1										
23	140.6793	140.6794	0.1	140.6793	0.0										
24	140.6511	140.6512	0.1	140.6511	0.0										

Project: 100 Avenue Road Development, London
Job Description: Level Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station

Project Reference: SAL-1311-01

Sheet Reference: SAL-1311-01-01 Set 02 Rev0 - Levelling - Results

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Survey Date: 20/02/2016

Base Readings		Set 01		Set 02		Set 03		Set 04		Set 05		Set 06		Set 07	
24/11/2014		21/01/2016		20/02/2016											
Reference	Level [m]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]	Level [m]	ΔL [mm]
25	140.7228	140.7229	0.1	140.7228	0.0										
26	140.6759	140.6760	0.1	140.6760	0.0										
27	140.7836	140.7837	0.1	140.7836	0.1										
28	140.6956	140.6957	0.1	140.6957	0.1										
29	140.7612	140.7614	0.2	140.7612	0.0										
30	140.7240	140.7241	0.1	140.7240	0.0										
31	140.7997	140.7998	0.1	140.7997	0.0										
32	140.7725	140.7727	0.1	140.7725	0.0										
33	140.8597	140.8598	0.1	140.8597	0.1										
34	140.8304	140.8306	0.1	140.8304	0.0										
35 - Datum	141.3915	141.3917	0.1	141.3915	0.0										
36 - Datum	141.9923	Obstructed	N/A	Obstructed	N/A										

Project: 100 Avenue Road Development, London

Job Description: Level Deformation Monitoring

Monitoring Location: Swiss Cottage Underground Station

Project Reference: SAL-1311-01

Sheet Reference: SAL-1311-01-01 Set 02 Rev0 - Levelling - Longitudinal Graphs

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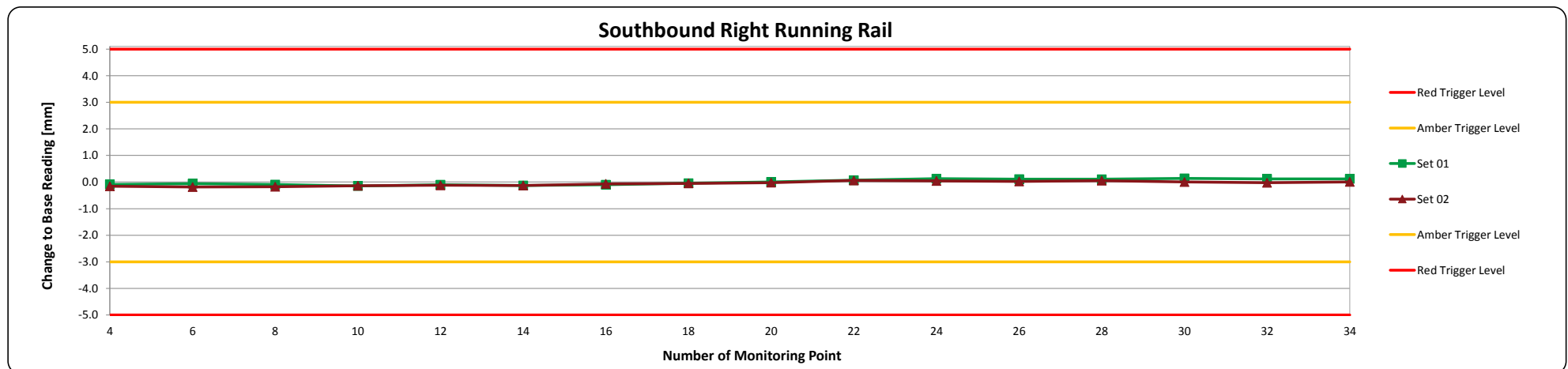
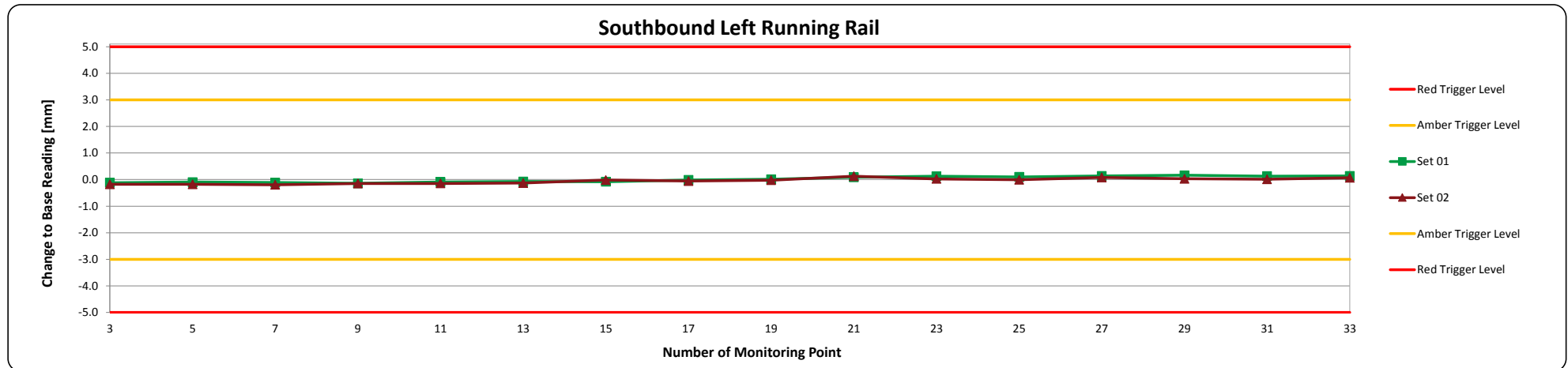
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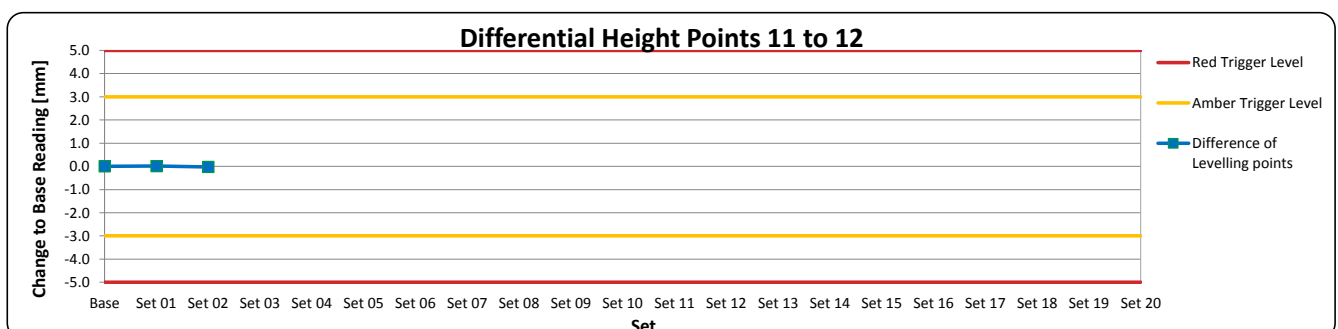
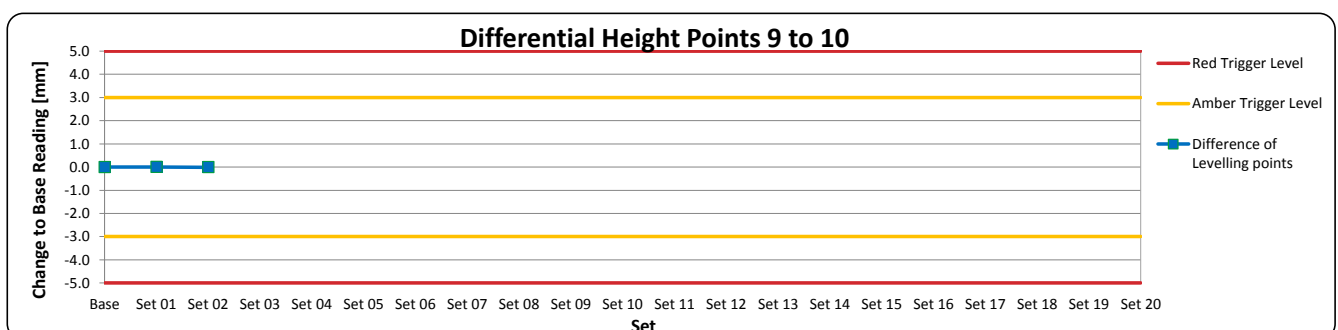
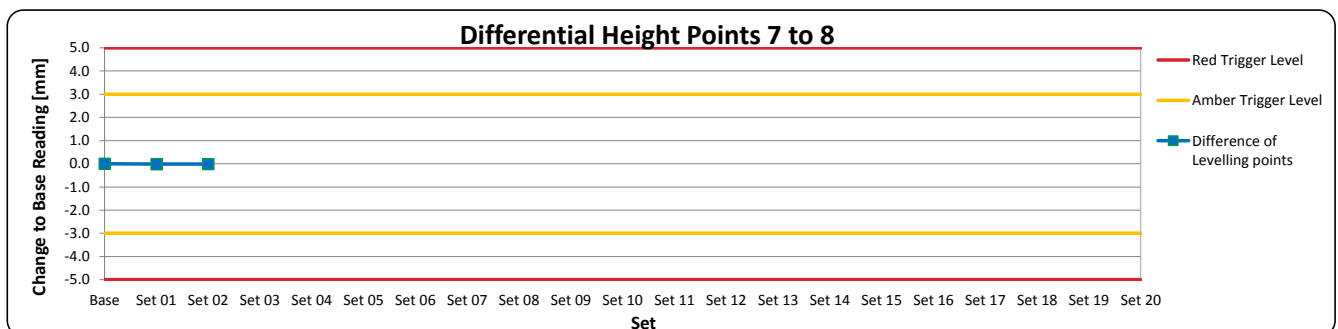
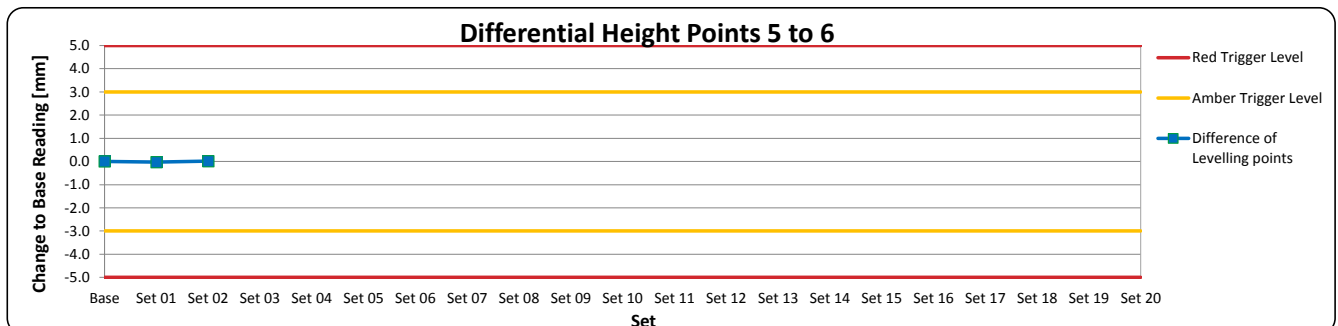
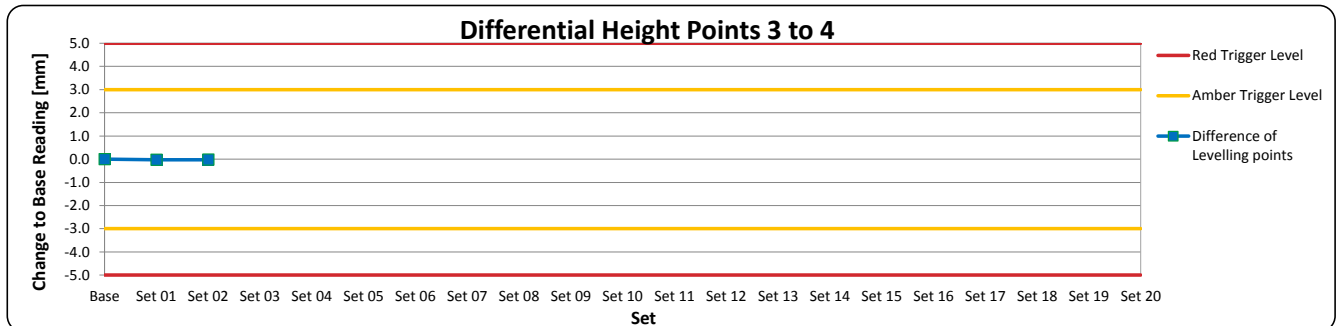


Survey Date: 20/02/2016



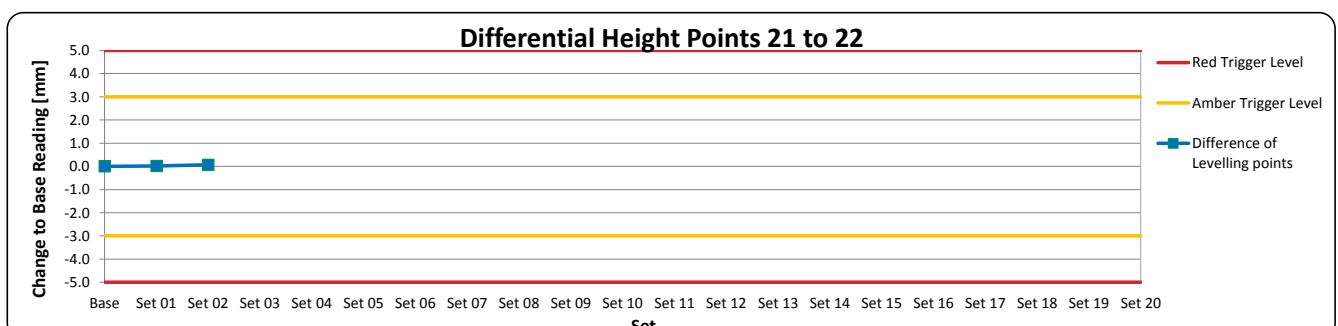
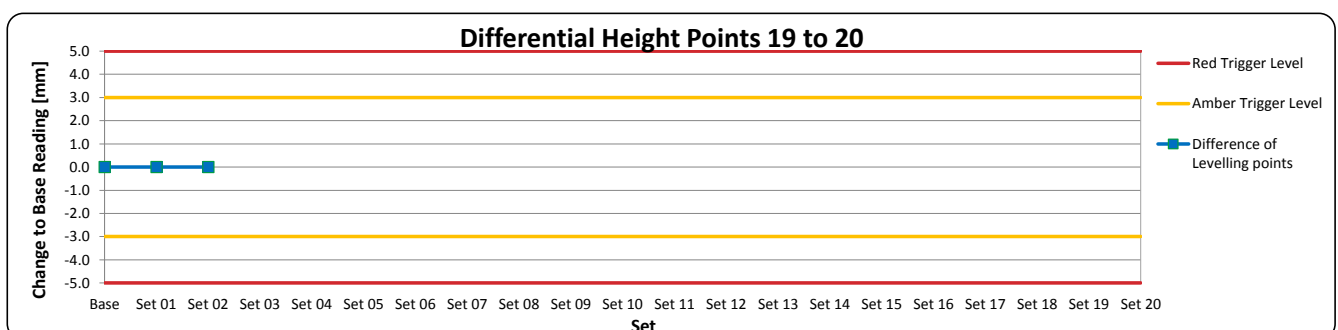
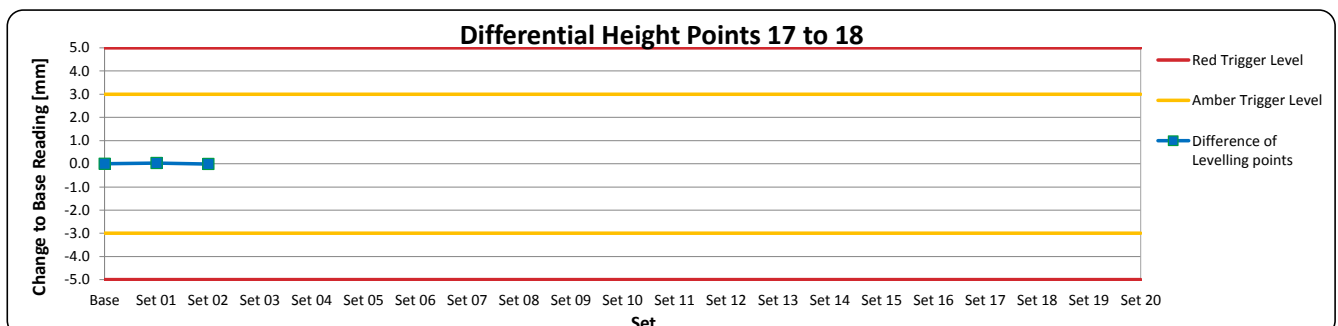
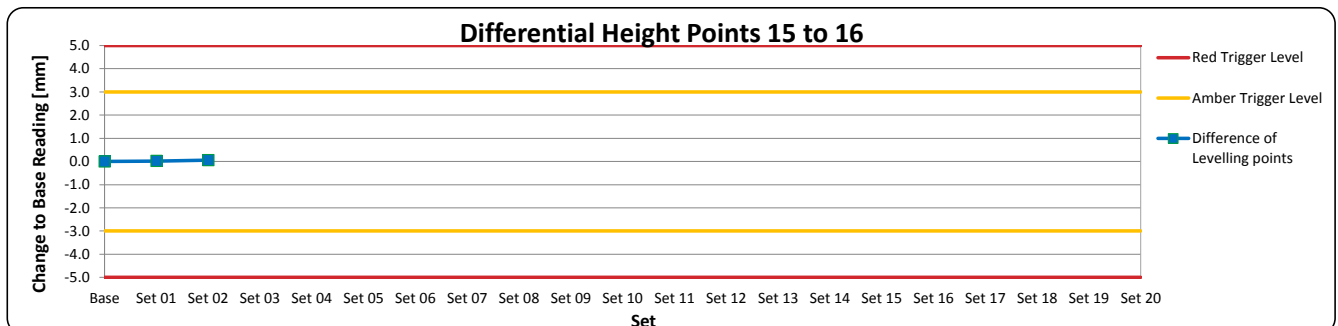
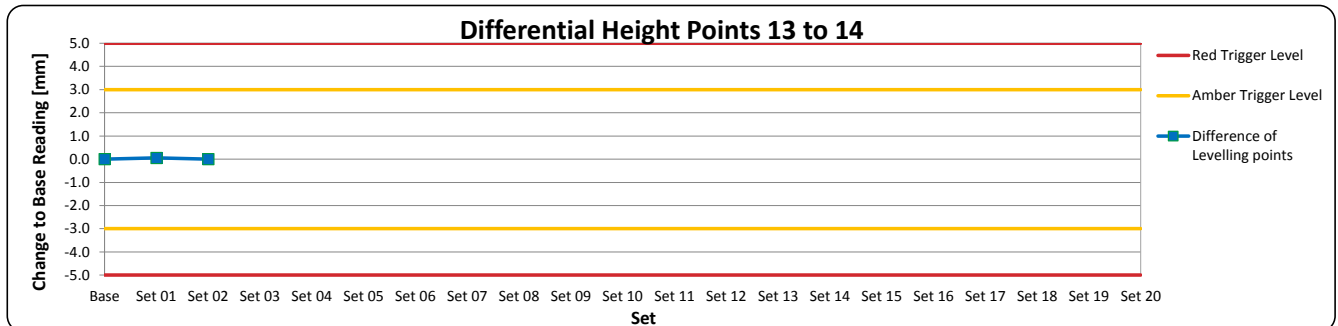
Project: 100 Avenue Road Development, London
 Job Description: Level Deformation Monitoring
 Monitoring Location: Swiss Cottage Underground Station
 Project Reference: SAL-1311-01
 Sheet Reference: SAL-1311-01-01 Set 02 Rev0 - Levelling - Sectional Graphs

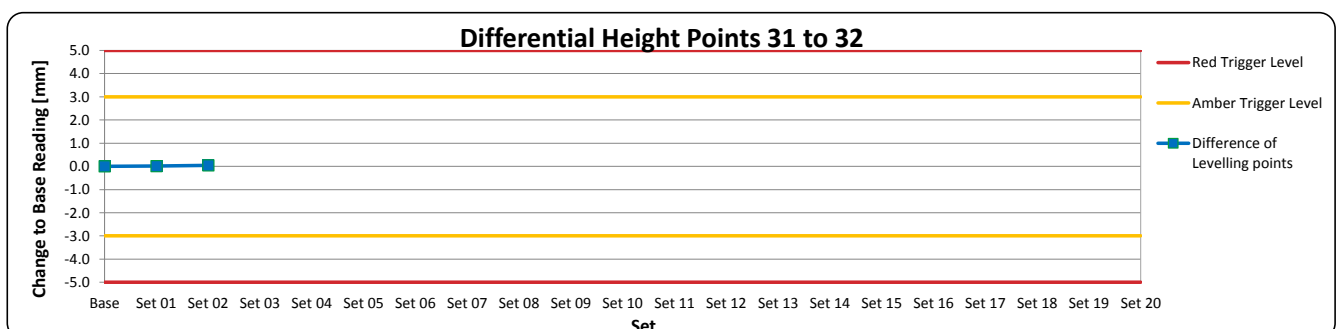
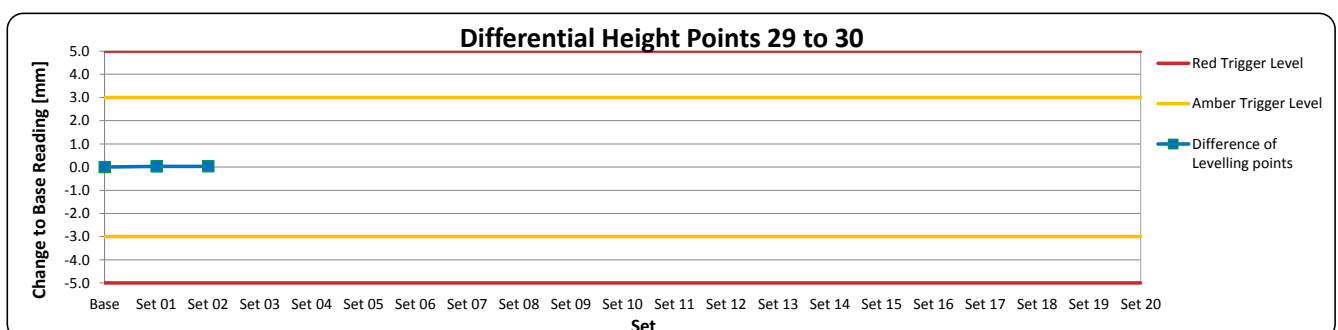
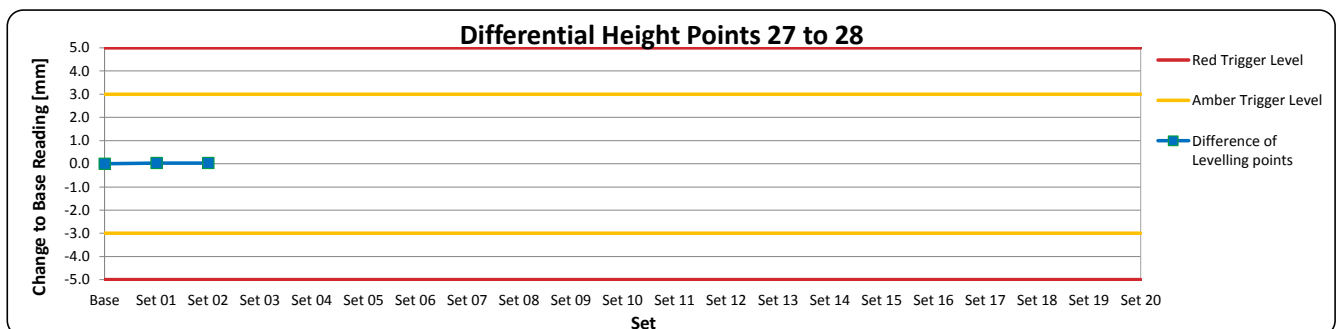
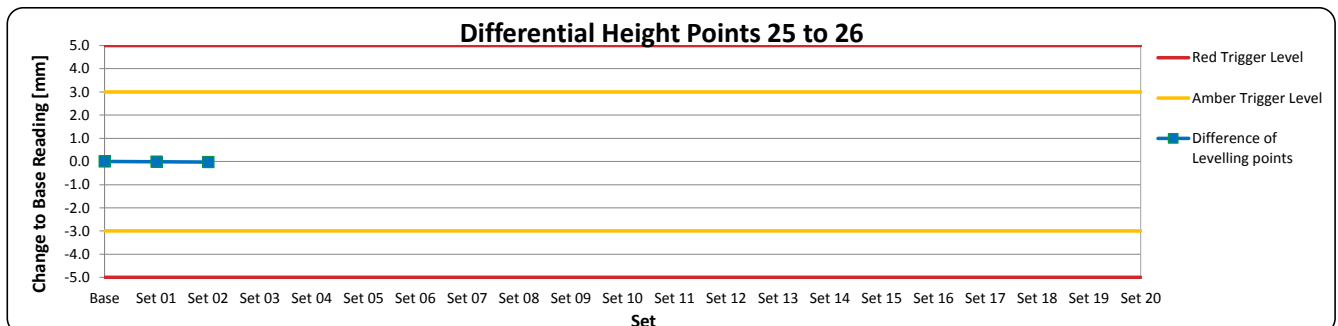
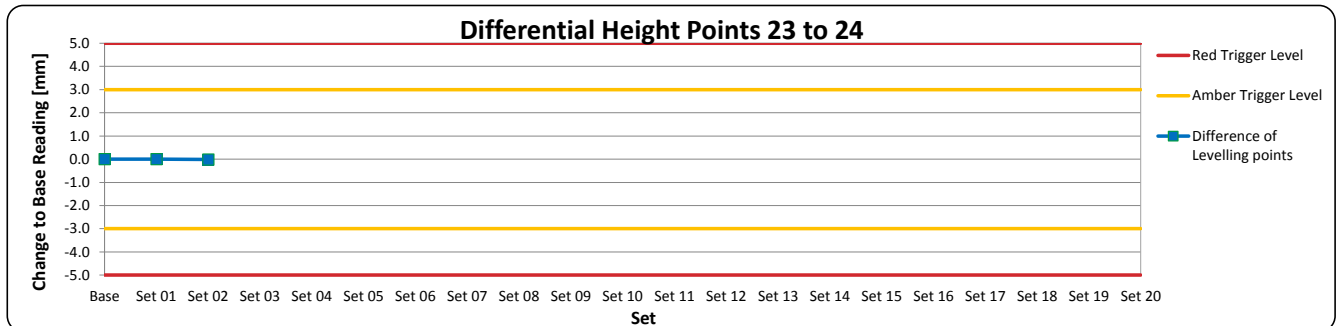
Survey Date: 20/02/2016



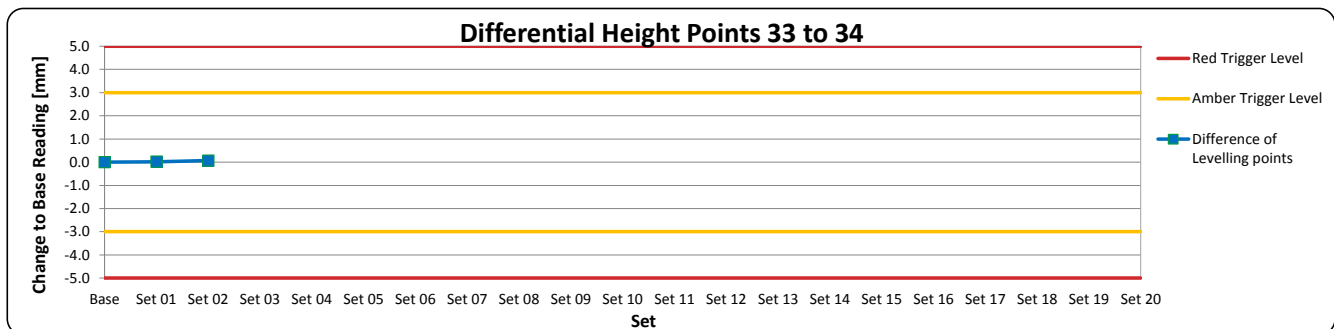
Project: 100 Avenue Road Development, London
 Job Description: Level Deformation Monitoring
 Monitoring Location: Swiss Cottage Underground Station
 Project Reference: SAL-1311-01
 Sheet Reference: SAL-1311-01-01 Set 02 Rev0 - Levelling - Sectional Graphs

Survey Date: 20/02/2016



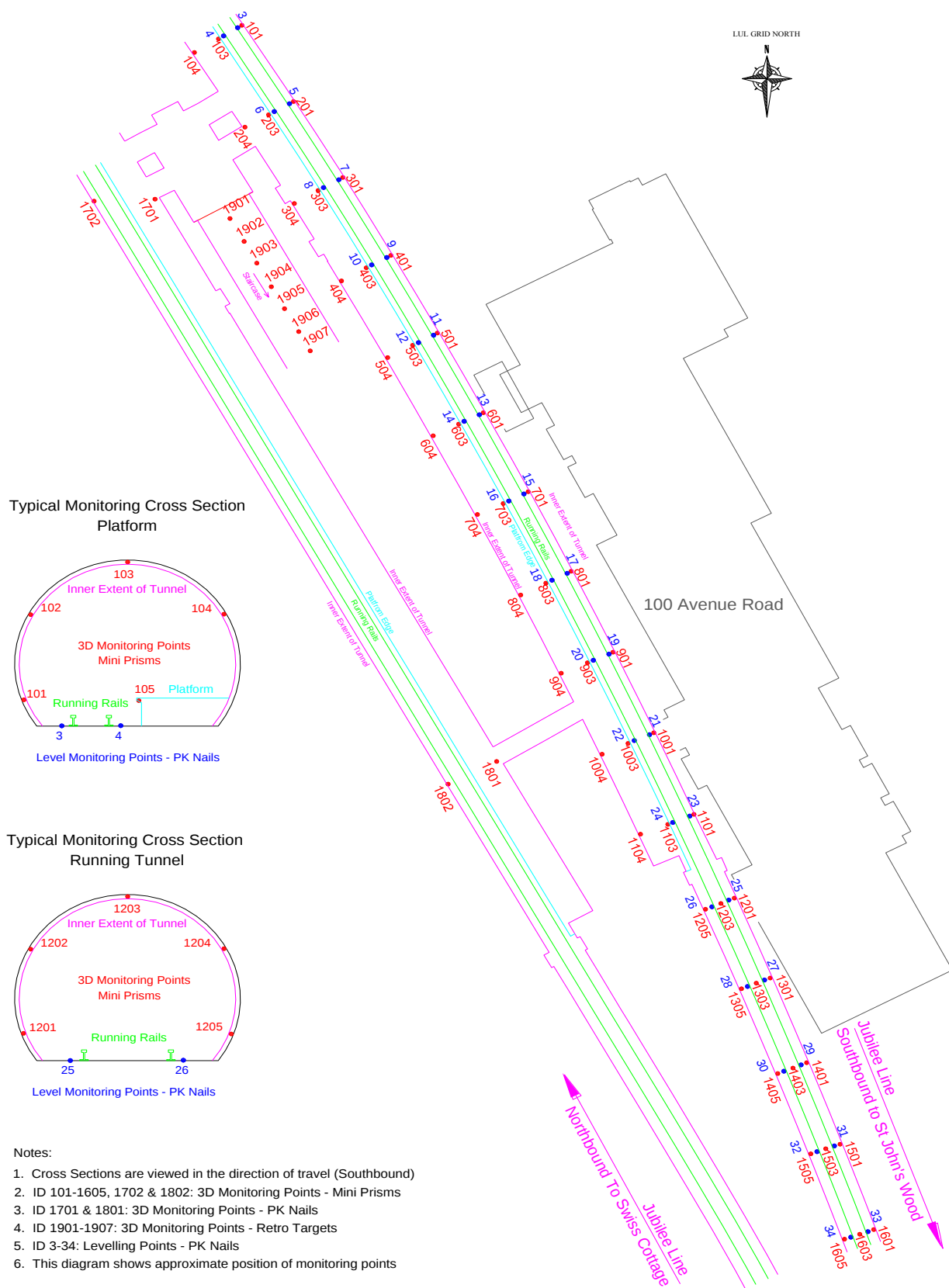


Project: 100 Avenue Road Development, London
Job Description: Level Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL-1311-01-01 Set 02 Rev0 - Levelling - Sectional Graphs

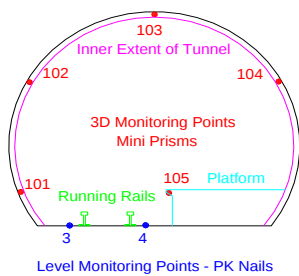


Project: 100 Avenue Road Development, London
 Job Description: Level Deformation Monitoring
 Monitoring Location: Swiss Cottage Underground Station
 Project Reference: SAL-1311-01
 Sheet Reference: SAL-1311-01 - Diagram Rev0

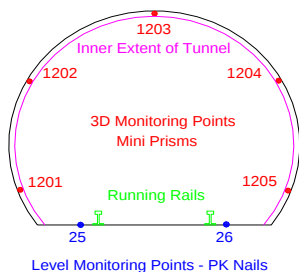
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 Tel: 0845 450 4210 - email: sal.office@sal.uk.com - Web: www.sal.uk.com
 Survey Date: 24/11/2014



Typical Monitoring Cross Section Platform



Typical Monitoring Cross Section Running Tunnel



Notes:

1. Cross Sections are viewed in the direction of travel (Southbound)
2. ID 101-1605, 1702 & 1802: 3D Monitoring Points - Mini Prisms
3. ID 1701 & 1801: 3D Monitoring Points - PK Nails
4. ID 1901-1907: 3D Monitoring Points - Retro Targets
5. ID 3-34: Levelling Points - PK Nails
6. This diagram shows approximate position of monitoring points

Project: 100 Avenue Road Development, London

Job Description: 3D Deformation Monitoring

Monitoring Location: Swiss Cottage Underground Station

Client: Capita

Address: 65 Gresham Street
London
EC2V 7NQ

Project Reference: SAL-1311-01

Report Ref.: SAL-1311-01-02 Set 02 Rev0 - 3D Monitoring

Survey Date: 20/02/2016

REPORT BY SURVEY ASSOCIATES LTD



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Project: 100 Avenue Road Development, London
Job Description: 3D Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL-1311-01-02 Set 02 - Content

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Survey Date: 20/02/2016

Content of Monitoring Report:

Section	Content
1	Remarks
2	Base Results - 3D Monitoring
3	Results - 3D Monitoring
4	Results - Perpendicular Tunnel Movement
5	Graphs - Perpendicular Tunnel Movement
6	Graphs - Vertical Tunnel Movement
7	Diagram of Monitoring Points.
8	

Project: 100 Avenue Road Development, London
Job Description: 3D Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL-1311-01-02 Set 02 - Remarks

Survey Associates Limited

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Survey Date: 20/02/2016

Remarks:

Reference	Remarks
1	The locations of the Monitoring Points are detailed on diagram SAL-1311-01 Diagram Rev0 attached at the end of this report.
2	3D Monitoring Points are represented by Leica Mini Prisms (Run. Tunnel, Platform) and by Sokkia Retro Targets (Staircase).
3	All Co-ordinates on the "LUL" Results and Graphs Sheet are related to LUL Grid and Datum System.
4	All Co-ordinates on the "Local" Results and Graphs Sheet are related to Grid set parallel to the Tunnel Outline.
5	The estimated accuracy of the 3D monitoring is +/- 1mm relative to Control Points.
6	The Base Set of coordinates is mean of 2 independent sets for all Monitoring Points.
7	The 3D Monitoring consists of multiple observations to each Monitoring Point for each set.
8	Perpendicular movement represents horizontal movement of Development relative to the Tunnel Centerline.

Project: 100 Avenue Road Development, London
Job Description: 3D Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL 1371-01 - Base Results - LUL Grid

Survey Date: 24/11/2015

	Base Readigs Set A			Base Readigs Set B			Diff Set A to Mean			Diff Set B to Mean			Mean Base Readings		
	20/11/2015			24/11/2015											
Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]
101	77080.5593	39201.7824	140.6709	77080.5594	39201.7828	140.6708	0.1	0.2	0.0	-0.1	-0.2	0.0	77080.5593	39201.7826	140.6708
102	77080.1685	39201.6171	143.9774	77080.1684	39201.6174	143.9776	0.0	0.1	0.1	0.0	-0.1	-0.1	77080.1684	39201.6173	143.9775
103	77078.0066	39200.2306	145.0922	77078.0064	39200.2310	145.0924	-0.1	0.2	0.1	0.1	-0.2	-0.1	77078.0065	39200.2308	145.0923
104	77076.0047	39198.9154	143.8160	77076.0046	39198.9157	143.8159	-0.1	0.2	-0.1	0.1	-0.2	0.1	77076.0047	39198.9156	143.8160
105	77078.2701	39200.3192	140.9368	77078.2699	39200.3196	140.9367	-0.1	0.2	0.0	0.1	-0.2	0.0	77078.2700	39200.3194	140.9368
201	77085.9259	39193.2241	140.7208	77085.9260	39193.2243	140.7208	0.1	0.1	0.0	-0.1	-0.1	0.0	77085.9259	39193.2242	140.7208
202	77085.5412	39193.0164	143.9859	77085.5413	39193.0167	143.9862	0.0	0.1	0.1	0.0	-0.1	-0.1	77085.5413	39193.0166	143.9860
203	77083.3368	39191.7330	145.1088	77083.3367	39191.7331	145.1091	-0.1	0.0	0.2	0.1	0.0	-0.2	77083.3368	39191.7331	145.1089
204	77081.3095	39190.4669	143.8328	77081.3092	39190.4669	143.8330	-0.2	0.0	0.1	0.2	0.0	-0.1	77081.3093	39190.4669	143.8329
205	77083.5613	39191.8874	140.9775	77083.5612	39191.8876	140.9775	-0.1	0.1	0.0	0.1	-0.1	0.0	77083.5612	39191.8875	140.9775
301	77091.0416	39184.7099	140.7664	77091.0418	39184.7098	140.7664	0.1	-0.1	0.0	-0.1	0.1	0.0	77091.0417	39184.7099	140.7664
302	77090.6394	39184.5321	144.0455	77090.6397	39184.5319	144.0456	0.1	-0.1	0.0	-0.2	0.1	0.0	77090.6395	39184.5320	144.0455
303	77088.3432	39183.1860	145.1602	77088.3433	39183.1857	145.1604	0.1	-0.1	0.1	-0.1	0.1	-0.1	77088.3432	39183.1859	145.1603
304	77086.2827	39181.9900	143.7902	77086.2827	39181.9898	143.7903	0.0	-0.1	0.0	0.0	0.1	0.0	77086.2827	39181.9899	143.7902
305	77088.6269	39183.4106	141.0208	77088.6272	39183.4104	141.0207	0.1	-0.1	0.0	-0.1	0.1	0.0	77088.6270	39183.4105	141.0208
401	77096.0275	39175.9706	140.8140	77096.0280	39175.9704	140.8142	0.2	-0.1	0.1	-0.2	0.1	-0.1	77096.0278	39175.9705	140.8141
402	77095.6032	39175.7898	144.0871	77095.6036	39175.7894	144.0871	0.2	-0.2	0.0	-0.2	0.2	0.0	77095.6034	39175.7896	144.0871
403	77093.3116	39174.5228	145.2027	77093.3119	39174.5225	145.2028	0.1	-0.2	0.1	-0.1	0.1	-0.1	77093.3117	39174.5226	145.2028
404	77091.2946	39173.2681	143.9364	77091.2948	39173.2677	143.9365	0.1	-0.2	0.0	-0.1	0.2	0.0	77091.2947	39173.2679	143.9364
405	77093.5821	39174.7868	141.0574	77093.5824	39174.7865	141.0574	0.1	-0.1	0.0	-0.1	0.1	0.0	77093.5822	39174.7867	141.0574
501	77100.8464	39167.2497	140.8456	77100.8467	39167.2494	140.8458	0.1	-0.2	0.1	-0.1	0.2	-0.1	77100.8466	39167.2495	140.8457
502	77100.4578	39167.0509	144.1276	77100.4582	39167.0506	144.1278	0.2	-0.1	0.1	-0.2	0.1	-0.1	77100.4580	39167.0508	144.1277
503	77098.1857	39165.8255	145.2707	77098.1858	39165.8252	145.2710	0.1	-0.1	0.2	-0.1	0.1	-0.2	77098.1858	39165.8254	145.2709
504	77095.9507	39164.6311	143.8145	77095.9510	39164.6308	143.8148	0.1	-0.1	0.1	-0.1	0.1	-0.1	77095.9508	39164.6309	143.8146
505	77098.4336	39166.0225	141.0828	77098.4339	39166.0221	141.0831	0.1	-0.2	0.1	-0.1	0.2	-0.1	77098.4338	39166.0223	141.0829

Project: 100 Avenue Road Development, London
Job Description: 3D Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL 1371-01 - Base Results - LUL Grid

Survey Date: 24/11/2015

	Base Readings Set A			Base Readings Set B			Diff Set A to Mean			Diff Set B to Mean			Mean Base Readings		
	20/11/2015			24/11/2015											
Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]
601	77105.6330	39158.2915	140.8857	77105.6330	39158.2920	140.8857	0.0	0.3	0.0	0.0	-0.3	0.0	77105.6330	39158.2918	140.8857
602	77105.2129	39158.1276	144.1614	77105.2128	39158.1283	144.1613	0.0	0.3	0.0	0.0	-0.3	0.0	77105.2129	39158.1279	144.1613
603	77102.8738	39156.9156	145.2918	77102.8738	39156.9161	145.2918	0.0	0.3	0.0	0.0	-0.3	0.0	77102.8738	39156.9159	145.2918
604	77100.5009	39156.3472	143.9886	77100.5008	39156.3478	143.9886	-0.1	0.3	0.0	0.1	-0.3	0.0	77100.5008	39156.3475	143.9886
605	77103.2195	39157.0813	141.1190	77103.2200	39157.0816	141.1196	0.3	0.1	0.3	-0.3	-0.1	-0.3	77103.2197	39157.0814	141.1193
701	77110.2324	39149.4131	140.9115	77110.2324	39149.4134	140.9114	0.0	0.1	0.0	0.0	-0.1	0.0	77110.2324	39149.4132	140.9115
702	77109.8305	39149.2348	144.1890	77109.8304	39149.2353	144.1890	0.0	0.3	0.0	0.0	-0.3	0.0	77109.8304	39149.2350	144.1890
703	77107.4923	39148.1073	145.3104	77107.4920	39148.1078	145.3101	-0.1	0.2	-0.1	0.1	-0.3	0.1	77107.4921	39148.1075	145.3102
704	77105.3706	39146.9875	144.0248	77105.3705	39146.9878	144.0248	-0.1	0.2	0.0	0.1	-0.2	0.0	77105.3705	39146.9877	144.0248
705	77107.8250	39148.1883	141.1551	77107.8249	39148.1887	141.1550	0.0	0.2	0.0	0.0	-0.2	0.0	77107.8250	39148.1885	141.1550
801	77114.6952	39140.4967	140.9555	77114.6951	39140.4971	140.9554	-0.1	0.2	0.0	0.1	-0.2	0.0	77114.6952	39140.4969	140.9554
802	77114.2933	39140.3267	144.2315	77114.2931	39140.3271	144.2315	-0.1	0.2	0.0	0.1	-0.2	0.0	77114.2932	39140.3269	144.2315
803	77111.9254	39139.1245	145.3559	77111.9251	39139.1250	145.3559	-0.1	0.2	0.0	0.1	-0.2	0.0	77111.9253	39139.1247	145.3559
804	77109.8248	39138.0242	144.0473	77109.8246	39138.0246	144.0472	-0.1	0.2	0.0	0.1	-0.2	0.0	77109.8247	39138.0244	144.0472
805	77112.2776	39139.2782	141.1863	77112.2775	39139.2784	141.1862	0.0	0.1	0.0	0.0	-0.1	0.0	77112.2776	39139.2783	141.1863
901	77119.0442	39131.3739	140.9850	77119.0442	39131.3741	140.9849	0.0	0.1	-0.1	0.0	-0.1	0.0	77119.0442	39131.3740	140.9849
902	77118.6235	39131.2357	144.2543	77118.6234	39131.2360	144.2544	0.0	0.1	0.1	0.1	-0.1	-0.1	77118.6234	39131.2358	144.2543
903	77116.2264	39130.2247	145.3729	77116.2262	39130.2249	145.3730	-0.1	0.1	0.1	0.1	-0.1	-0.1	77116.2263	39130.2248	145.3729
904	77114.0801	39129.1795	144.0834	77114.0798	39129.1796	144.0834	-0.1	0.1	0.0	0.1	-0.1	0.0	77114.0800	39129.1795	144.0834
905	77116.5600	39130.3726	141.2122	77116.5599	39130.3728	141.2121	-0.1	0.1	0.0	0.1	-0.1	0.0	77116.5599	39130.3727	141.2121
1001	77123.2284	39122.3794	141.0049	77123.2287	39122.3792	141.0049	0.2	-0.1	0.0	-0.2	0.1	0.0	77123.2286	39122.3793	141.0049
1002	77122.7963	39122.1678	144.2782	77122.7965	39122.1674	144.2784	0.1	-0.2	0.1	-0.1	0.2	-0.1	77122.7964	39122.1676	144.2783
1003	77120.5152	39121.1813	145.3921	77120.5153	39121.1811	145.3922	0.0	-0.1	0.1	0.0	0.1	-0.1	77120.5152	39121.1812	145.3921
1004	77118.2847	39120.0852	144.0864	77118.2846	39120.0849	144.0864	0.0	-0.1	0.0	0.0	0.1	0.0	77118.2847	39120.0851	144.0864
1005	77120.7505	39121.3225	141.2416	77120.7506	39121.3221	141.2416	0.0	-0.2	0.0	0.0	0.2	0.0	77120.7505	39121.3223	141.2416

Project: 100 Avenue Road Development, London
Job Description: 3D Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL 1371-01 - Base Results - LUL Grid

Survey Date: 24/11/2015

	Base Readigs Set A			Base Readigs Set B			Diff Set A to Mean			Diff Set B to Mean			Mean Base Readings		
	20/11/2015			24/11/2015											
Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]
1101	77127.3244	39113.1760	141.0425	77127.3246	39113.1759	141.0424	0.1	-0.1	-0.1	-0.1	0.1	0.1	77127.3245	39113.1760	141.0424
1102	77126.8890	39112.9743	144.3152	77126.8892	39112.9741	144.3152	0.1	-0.1	0.0	-0.1	0.1	0.0	77126.8891	39112.9742	144.3152
1103	77124.5422	39111.9107	145.4292	77124.5422	39111.9104	145.4292	0.0	-0.2	0.0	0.0	0.2	0.0	77124.5422	39111.9105	145.4292
1104	77122.1192	39111.5075	144.1431	77122.1193	39111.5071	144.1431	0.1	-0.2	0.0	-0.1	0.2	0.0	77122.1193	39111.5073	144.1431
1105	77124.8075	39112.2233	141.2729	77124.8075	39112.2230	141.2728	0.0	-0.1	-0.1	0.0	0.1	0.1	77124.8075	39112.2231	141.2729
1201	77131.6041	39103.7766	141.2918	77131.6038	39103.7773	141.2918	-0.1	0.3	0.0	0.1	-0.3	0.0	77131.6039	39103.7769	141.2918
1202	77131.4981	39103.7466	143.1386	77131.4977	39103.7470	143.1389	-0.2	0.2	0.1	0.2	-0.2	-0.1	77131.4979	39103.7468	143.1387
1203	77130.0624	39103.1510	143.9505	77130.0620	39103.1515	143.9507	-0.2	0.3	0.1	0.2	-0.3	-0.1	77130.0622	39103.1512	143.9506
1204	77128.7022	39102.5709	143.1547	77128.7020	39102.5714	143.1549	-0.1	0.3	0.1	0.1	-0.3	-0.1	77128.7021	39102.5711	143.1548
1205	77128.7004	39102.5534	141.1232	77128.7002	39102.5540	141.1235	-0.1	0.3	0.1	0.1	-0.3	-0.1	77128.7003	39102.5537	141.1233
1301	77135.2717	39094.7632	141.2301	77135.2715	39094.7638	141.2301	-0.1	0.3	0.0	0.1	-0.3	0.0	77135.2716	39094.7635	141.2301
1302	77135.2009	39094.7538	143.2109	77135.2007	39094.7542	143.2110	-0.1	0.2	0.1	0.1	-0.2	-0.1	77135.2008	39094.7540	143.2109
1303	77133.7629	39094.1817	144.0130	77133.7628	39094.1823	144.0130	0.0	0.3	0.0	0.0	-0.3	0.0	77133.7628	39094.1820	144.0130
1304	77132.4154	39093.6306	143.1905	77132.4152	39093.6309	143.1906	-0.1	0.2	0.0	0.1	-0.2	0.0	77132.4153	39093.6308	143.1905
1305	77132.3979	39093.6082	141.1438	77132.3977	39093.6088	141.1439	-0.1	0.3	0.0	0.1	-0.3	0.0	77132.3978	39093.6085	141.1439
1401	77139.1219	39085.2655	141.3774	77139.1217	39085.2658	141.3774	-0.1	0.2	0.0	0.1	-0.2	0.0	77139.1218	39085.2657	141.3774
1402	77138.9909	39085.2291	143.2351	77138.9907	39085.2295	143.2350	-0.1	0.2	0.0	0.1	-0.2	0.0	77138.9908	39085.2293	143.2351
1403	77137.5125	39084.6740	144.0142	77137.5123	39084.6745	144.0142	-0.1	0.2	0.0	0.1	-0.2	0.0	77137.5124	39084.6742	144.0142
1404	77136.1499	39084.1329	143.2031	77136.1496	39084.1333	143.2031	-0.1	0.2	0.0	0.1	-0.2	0.0	77136.1498	39084.1331	143.2031
1405	77136.1547	39084.1264	141.1589	77136.1545	39084.1268	141.1588	-0.1	0.2	0.0	0.1	-0.2	0.0	77136.1546	39084.1266	141.1588
1501	77142.5378	39076.1698	141.3267	77142.5376	39076.1704	141.3266	-0.1	0.3	-0.1	0.1	-0.3	0.1	77142.5377	39076.1701	141.3266
1502	77142.4607	39076.1495	143.2894	77142.4605	39076.1498	143.2893	-0.1	0.2	0.0	0.1	-0.2	0.1	77142.4606	39076.1496	143.2894
1503	77141.0567	39075.6344	144.0750	77141.0564	39075.6347	144.0750	-0.2	0.1	0.0	0.1	-0.1	0.0	77141.0566	39075.6345	144.0750
1504	77139.5731	39075.0779	143.2423	77139.5729	39075.0781	143.2423	-0.1	0.1	0.0	0.1	-0.1	0.0	77139.5730	39075.0780	143.2423
1505	77139.5951	39075.0773	141.1998	77139.5948	39075.0776	141.1997	-0.2	0.2	-0.1	0.2	-0.2	0.1	77139.5950	39075.0774	141.1997

Project: 100 Avenue Road Development, London
Job Description: 3D Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL 1371-01 - Base Results - LUL Grid

Survey Date: 24/11/2015

	Base Readings Set A			Base Readings Set B			Diff Set A to Mean			Diff Set B to Mean			Mean Base Readings		
	20/11/2015			24/11/2015											
Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]
1601	77146.0362	39066.5410	141.3693	77146.0362	39066.5412	141.3691	0.0	0.1	-0.1	0.0	-0.1	0.1	77146.0362	39066.5411	141.3692
1602	77145.9540	39066.5348	143.3097	77145.9540	39066.5349	143.3098	0.0	0.1	0.0	0.0	-0.1	0.0	77145.9540	39066.5349	143.3098
1603	77144.5470	39066.0585	144.1032	77144.5467	39066.0588	144.1036	-0.1	0.1	0.2	0.1	-0.1	-0.2	77144.5468	39066.0587	144.1034
1604	77143.0640	39065.5282	143.3141	77143.0638	39065.5283	143.3142	-0.1	0.0	0.0	0.1	0.0	0.0	77143.0639	39065.5282	143.3141
1605	77143.0181	39065.4844	141.3573	77143.0175	39065.4845	141.3571	-0.3	0.0	-0.1	0.3	0.0	0.1	77143.0178	39065.4845	141.3572
1701	77071.5795	39182.3104	141.0818	77071.5795	39182.3104	141.0818	0.0	0.0	0.0	0.0	0.0	0.0	77071.5795	39182.3104	141.0818
1702	77065.1924	39182.0650	142.0370	77065.1924	39182.0650	142.0370	0.0	0.0	0.0	0.0	0.0	0.0	77065.1924	39182.0650	142.0370
1801	77106.9472	39119.1545	141.3065	77106.9469	39119.1542	141.3063	-0.2	-0.2	-0.1	0.2	0.2	0.1	77106.9470	39119.1543	141.3064
1802	77101.8522	39116.5973	142.2752	77101.8519	39116.5973	142.2751	-0.1	0.0	0.0	0.1	0.0	0.0	77101.8520	39116.5973	142.2751
1901	77079.3527	39180.1352	141.2476	77079.3527	39180.1354	141.2478	0.0	0.1	0.1	0.0	-0.1	-0.1	77079.3527	39180.1353	141.2477
1902	77080.8290	39177.5246	142.8602	77080.8291	39177.5245	142.8602	0.0	0.0	0.0	0.0	0.0	0.0	77080.8290	39177.5245	142.8602
1903	77082.1862	39175.0849	144.6449	77082.1864	39175.0849	144.6449	0.1	0.0	0.0	-0.1	0.0	0.0	77082.1863	39175.0849	144.6449
1904	77083.6352	39172.4578	146.2436	77083.6353	39172.4578	146.2437	0.0	0.0	0.1	0.0	0.0	-0.1	77083.6353	39172.4578	146.2436
1905	77085.0072	39170.0270	148.0248	77085.0072	39170.0269	148.0250	0.0	0.0	0.1	0.0	0.0	-0.1	77085.0072	39170.0269	148.0249
1906	77086.4723	39167.4045	149.6276	77086.4724	39167.4045	149.6276	0.0	0.0	0.0	0.0	0.0	0.0	77086.4724	39167.4045	149.6276
1907	77087.6693	39165.1983	151.2325	77087.6695	39165.1986	151.2325	0.1	0.1	0.0	-0.1	-0.1	0.0	77087.6694	39165.1984	151.2325

Project: 100 Avenue Road Development, London

Job Description: 3D Deformation Monitoring

Monitoring Location: Swiss Cottage Underground Station

Project Reference: SAL-1311-01

Sheet Reference: SAL-1311-01-02 Set 02 - Monitoring Results - LUL Grid

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Survey Date: 20/02/2016

	Mean Base Readings			Set 01			Diff Set 01 to Base			Set 02			Diff Set 02 to Base			Set 03			Diff Set 03 to Base			Set 04			Diff Set 04 to Base		
				21/01/2016						20/02/2016																	
Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]
101	77080.5593	39201.7826	140.6708	77080.5587	39201.7821	140.6705	-0.6	-0.5	-0.3	77080.5597	39201.7828	140.6709	0.4	0.3	0.1												
102	77080.1684	39201.6173	143.9775	77080.1683	39201.6169	143.9769	-0.1	-0.4	-0.6	77080.1687	39201.6173	143.9773	0.3	0.0	-0.2												
103	77078.0065	39200.2308	145.0923	77078.0064	39200.2304	145.0917	-0.1	-0.4	-0.6	77078.0068	39200.2307	145.0920	0.3	-0.1	-0.3												
104	77076.0047	39198.9156	143.8160	77076.0045	39198.9151	143.8156	-0.1	-0.5	-0.4	77076.0050	39198.9155	143.8159	0.3	0.0	-0.1												
105	77078.2700	39200.3194	140.9368	77078.2698	39200.3188	140.9367	-0.2	-0.6	-0.1	77078.2702	39200.3192	140.9370	0.2	-0.2	0.2												
201	77085.9259	39193.2242	140.7208	77085.9251	39193.2241	140.7199	-0.9	-0.1	-0.9	77085.9255	39193.2246	140.7194	-0.4	0.4	-1.4												
202	77085.5413	39193.0166	143.9860	77085.5410	39193.0164	143.9853	-0.3	-0.1	-0.8	77085.5414	39193.0166	143.9858	0.1	0.0	-0.2												
203	77083.3368	39191.7331	145.1089	77083.3362	39191.7328	145.1082	-0.5	-0.2	-0.7	77083.3367	39191.7331	145.1087	-0.1	0.0	-0.2												
204	77081.3093	39190.4669	143.8329	77081.3090	39190.4666	143.8321	-0.3	-0.3	-0.8	77081.3095	39190.4670	143.8326	0.2	0.1	-0.3												
205	77083.5612	39191.8875	140.9775	77083.5614	39191.8870	140.9764	0.1	-0.5	-1.1	77083.5616	39191.8876	140.9772	0.4	0.1	-0.3												
301	77091.0417	39184.7099	140.7664	77091.0413	39184.7098	140.7658	-0.4	-0.1	-0.5	77091.0418	39184.7098	140.7662	0.1	0.0	-0.2												
302	77090.6395	39184.5320	144.0455	77090.6392	39184.5315	144.0450	-0.3	-0.5	-0.6	77090.6394	39184.5320	144.0454	-0.1	0.1	-0.1												
303	77088.3432	39183.1859	145.1603	77088.3428	39183.1856	145.1597	-0.4	-0.3	-0.6	77088.3431	39183.1859	145.1601	-0.1	0.1	-0.2												
304	77086.2827	39181.9899	143.7902	77086.2823	39181.9896	143.7897	-0.4	-0.3	-0.6	77086.2826	39181.9900	143.7901	-0.1	0.1	-0.1												
305	77088.6270	39183.4105	141.0208	77088.6266	39183.4103	141.0204	-0.4	-0.2	-0.4	77088.6270	39183.4107	141.0208	0.0	0.2	0.0												

Project: 100 Avenue Road Development, London

Job Description: 3D Deformation Monitoring

Monitoring Location: Swiss Cottage Underground Station

Project Reference: SAL-1311-01

Sheet Reference: SAL-1311-01-02 Set 02 - Monitoring Results - LUL Grid

Survey Associates Limited

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Survey Date: 20/02/2016

Mean Base Readings				Set 01			Diff Set 01 to Base			Set 02			Diff Set 02 to Base			Set 03			Diff Set 03 to Base			Set 04			Diff Set 04 to Base		
				21/01/2016						20/02/2016																	
Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]
401	77096.0278	39175.9705	140.8141	77096.0274	39175.9702	140.8140	-0.4	-0.3	-0.1	77096.0278	39175.9705	140.8144	0.0	0.0	0.3												
402	77095.6034	39175.7896	144.0871	77095.6029	39175.7892	144.0869	-0.5	-0.4	-0.2	77095.6034	39175.7894	144.0873	0.0	-0.2	0.2												
403	77093.3117	39174.5226	145.2028	77093.3113	39174.5222	145.2025	-0.4	-0.4	-0.3	77093.3116	39174.5226	145.2028	-0.2	0.0	0.1												
404	77091.2947	39173.2679	143.9364	77091.2941	39173.2675	143.9363	-0.5	-0.4	-0.2	77091.2944	39173.2679	143.9366	-0.3	0.0	0.2												
405	77093.5822	39174.7867	141.0574	77093.5819	39174.7863	141.0576	-0.4	-0.4	0.1	77093.5822	39174.7865	141.0579	0.0	-0.1	0.4												
501	77100.8466	39167.2495	140.8457	77100.8462	39167.2492	140.8457	-0.4	-0.3	0.0	77100.8465	39167.2496	140.8460	0.0	0.0	0.4												
502	77100.4580	39167.0508	144.1277	77100.4575	39167.0503	144.1276	-0.5	-0.5	-0.1	77100.4580	39167.0505	144.1279	-0.1	-0.2	0.2												
503	77098.1858	39165.8254	145.2709	77098.1855	39165.8251	145.2706	-0.2	-0.3	-0.2	77098.1859	39165.8253	145.2712	0.1	-0.1	0.3												
504	77095.9508	39164.6309	143.8146	77095.9503	39164.6306	143.8147	-0.5	-0.3	0.0	77095.9507	39164.6307	143.8150	-0.1	-0.2	0.4												
505	77098.4338	39166.0223	141.0829	77098.4336	39166.0219	141.0831	-0.2	-0.4	0.2	77098.4337	39166.0222	141.0837	0.0	-0.1	0.7												
601	77105.6330	39158.2918	140.8857	77105.6329	39158.2919	140.8859	-0.1	0.1	0.2	77105.6330	39158.2920	140.8855	0.0	0.3	-0.1												
602	77105.2129	39158.1279	144.1613	77105.2128	39158.1280	144.1614	0.0	0.1	0.0	77105.2129	39158.1280	144.1610	0.1	0.1	-0.3												
603	77102.8738	39156.9159	145.2918	77102.8737	39156.9160	145.2917	-0.1	0.1	-0.1	77102.8739	39156.9160	145.2915	0.2	0.1	-0.3												
604	77100.5008	39156.3475	143.9886	77100.5007	39156.3477	143.9885	-0.1	0.2	-0.1	77100.5008	39156.3476	143.9883	0.0	0.1	-0.3												
605	77103.2197	39157.0814	141.1193	77103.2187	39157.0811	141.1187	-1.1	-0.4	-0.6	77103.2189	39157.0811	141.1184	-0.9	-0.3	-0.9												

Project: 100 Avenue Road Development, London

Job Description: 3D Deformation Monitoring

Monitoring Location: Swiss Cottage Underground Station

Project Reference: SAL-1311-01

Sheet Reference: SAL-1311-01-02 Set 02 - Monitoring Results - LUL Grid

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				21/01/2016						20/02/2016																	
Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]
701	77110.2324	39149.4132	140.9115	77110.2323	39149.4135	140.9114	-0.1	0.3	0.0	77110.2324	39149.4135	140.9111	0.0	0.3	-0.3												
702	77109.8304	39149.2350	144.1890	77109.8304	39149.2351	144.1889	0.0	0.1	-0.1	77109.8305	39149.2352	144.1886	0.1	0.2	-0.4												
703	77107.4921	39148.1075	145.3102	77107.4921	39148.1077	145.3100	0.0	0.2	-0.3	77107.4922	39148.1078	145.3098	0.1	0.3	-0.4												
704	77105.3705	39146.9877	144.0248	77105.3705	39146.9878	144.0244	0.0	0.2	-0.4	77105.3705	39146.9878	144.0242	0.0	0.2	-0.5												
705	77107.8250	39148.1885	141.1550	77107.8250	39148.1886	141.1550	0.0	0.1	0.0	77107.8250	39148.1888	141.1549	0.0	0.3	-0.2												
801	77114.6952	39140.4969	140.9554	77114.6950	39140.4965	140.9560	-0.2	-0.4	0.6	77114.6939	39140.4967	140.9556	-1.2	-0.2	0.2												
802	77114.2932	39140.3269	144.2315	77114.2932	39140.3269	144.2310	0.0	0.0	-0.5	77114.2933	39140.3269	144.2308	0.1	0.0	-0.7												
803	77111.9253	39139.1247	145.3559	77111.9252	39139.1248	145.3554	-0.1	0.1	-0.5	77111.9253	39139.1248	145.3552	0.1	0.1	-0.7												
804	77109.8247	39138.0244	144.0472	77109.8246	39138.0244	144.0468	-0.1	0.0	-0.4	77109.8247	39138.0244	144.0466	0.0	0.0	-0.6												
805	77112.2776	39139.2783	141.1863	77112.2775	39139.2785	141.1861	-0.1	0.2	-0.2	77112.2775	39139.2786	141.1858	0.0	0.3	-0.4												
901	77119.0442	39131.3740	140.9849	77119.0447	39131.3735	140.9839	0.5	-0.5	-1.0	77119.0448	39131.3734	140.9837	0.6	-0.5	-1.2												
902	77118.6234	39131.2358	144.2543	77118.6233	39131.2360	144.2532	-0.1	0.2	-1.1	77118.6233	39131.2360	144.2531	-0.1	0.2	-1.2												
903	77116.2263	39130.2248	145.3729	77116.2260	39130.2252	145.3720	-0.3	0.4	-0.9	77116.2261	39130.2251	145.3719	-0.2	0.4	-1.1												
904	77114.0800	39129.1795	144.0834	77114.0797	39129.1798	144.0825	-0.3	0.2	-0.9	77114.0798	39129.1797	144.0823	-0.2	0.2	-1.1												
905	77116.5599	39130.3727	141.2121	77116.5599	39130.3727	141.2111	0.0	0.1	-1.1	77116.5600	39130.3727	141.2109	0.1	0.1	-1.2												

Project: 100 Avenue Road Development, London

Job Description: 3D Deformation Monitoring

Monitoring Location: Swiss Cottage Underground Station

Project Reference: SAL-1311-01

Sheet Reference: SAL-1311-01-02 Set 02 - Monitoring Results - LUL Grid

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				21/01/2016						20/02/2016																	
Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]
1001	77123.2286	39122.3793	141.0049	77123.2283	39122.3798	141.0040	-0.3	0.5	-0.9	77123.2284	39122.3796	141.0038	-0.2	0.3	-1.1												
1002	77122.7964	39122.1676	144.2783	77122.7962	39122.1678	144.2773	-0.2	0.2	-1.0	77122.7963	39122.1677	144.2772	-0.1	0.1	-1.1												
1003	77120.5152	39121.1812	145.3921	77120.5151	39121.1814	145.3912	-0.2	0.2	-0.9	77120.5151	39121.1813	145.3911	-0.2	0.1	-1.1												
1004	77118.2847	39120.0851	144.0864	77118.2844	39120.0854	144.0854	-0.2	0.3	-1.0	77118.2845	39120.0854	144.0853	-0.2	0.3	-1.1												
1005	77120.7505	39121.3223	141.2416	77120.7503	39121.3227	141.2406	-0.2	0.4	-1.0	77120.7504	39121.3225	141.2405	-0.1	0.2	-1.1												
1101	77127.3245	39113.1760	141.0424	77127.3242	39113.1763	141.0424	-0.3	0.3	-0.1	77127.3243	39113.1760	141.0421	-0.2	0.1	-0.3												
1102	77126.8891	39112.9742	144.3152	77126.8888	39112.9747	144.3149	-0.3	0.4	-0.3	77126.8888	39112.9746	144.3148	-0.3	0.4	-0.4												
1103	77124.5422	39111.9105	145.4292	77124.5419	39111.9111	145.4289	-0.3	0.5	-0.4	77124.5419	39111.9110	145.4287	-0.3	0.5	-0.5												
1104	77122.1193	39111.5073	144.1431	77122.1190	39111.5077	144.1427	-0.3	0.4	-0.4	77122.1190	39111.5075	144.1426	-0.3	0.2	-0.5												
1105	77124.8075	39112.2231	141.2729	77124.8073	39112.2235	141.2727	-0.2	0.3	-0.2	77124.8073	39112.2233	141.2725	-0.2	0.1	-0.3												
1201	77131.6039	39103.7769	141.2918	77131.6033	39103.7773	141.2925	-0.6	0.4	0.7	77131.6039	39103.7772	141.2924	0.0	0.2	0.6												
1202	77131.4979	39103.7468	143.1387	77131.4974	39103.7471	143.1389	-0.6	0.3	0.1	77131.4980	39103.7471	143.1391	0.1	0.3	0.4												
1203	77130.0622	39103.1512	143.9506	77130.0617	39103.1516	143.9509	-0.5	0.4	0.3	77130.0623	39103.1517	143.9512	0.1	0.5	0.6												
1204	77128.7021	39102.5711	143.1548	77128.7016	39102.5715	143.1549	-0.5	0.4	0.1	77128.7022	39102.5716	143.1551	0.1	0.5	0.3												
1205	77128.7003	39102.5537	141.1233	77128.6998	39102.5542	141.1236	-0.5	0.5	0.2	77128.7004	39102.5542	141.1238	0.1	0.5	0.5												

Project: 100 Avenue Road Development, London

Job Description: 3D Deformation Monitoring

Monitoring Location: Swiss Cottage Underground Station

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Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]
1301	77135.2716	39094.7635	141.2301	77135.2712	39094.7639	141.2304	-0.5	0.4	0.3	77135.2717	39094.7639	141.2306	0.1	0.4	0.4												
1302	77135.2008	39094.7540	143.2109	77135.2003	39094.7541	143.2111	-0.5	0.2	0.1	77135.2010	39094.7542	143.2113	0.2	0.2	0.3												
1303	77133.7628	39094.1820	144.0130	77133.7619	39094.1820	144.0137	-1.0	0.0	0.6	77133.7628	39094.1822	144.0133	-0.1	0.3	0.2												
1304	77132.4153	39093.6308	143.1905	77132.4148	39093.6309	143.1907	-0.5	0.2	0.2	77132.4154	39093.6310	143.1908	0.1	0.2	0.3												
1305	77132.3978	39093.6085	141.1439	77132.3974	39093.6088	141.1440	-0.5	0.3	0.2	77132.3979	39093.6089	141.1443	0.1	0.4	0.4												
1401	77139.1218	39085.2657	141.3774	77139.1214	39085.2660	141.3777	-0.4	0.3	0.2	77139.1221	39085.2660	141.3777	0.3	0.3	0.3												
1402	77138.9908	39085.2293	143.2351	77138.9906	39085.2294	143.2352	-0.1	0.1	0.2	77138.9911	39085.2296	143.2353	0.3	0.3	0.3												
1403	77137.5124	39084.6742	144.0142	77137.5121	39084.6744	144.0142	-0.3	0.1	0.0	77137.5126	39084.6745	144.0145	0.2	0.2	0.2												
1404	77136.1498	39084.1331	143.2031	77136.1495	39084.1332	143.2031	-0.3	0.2	0.0	77136.1500	39084.1334	143.2033	0.2	0.3	0.2												
1405	77136.1546	39084.1266	141.1588	77136.1543	39084.1269	141.1590	-0.3	0.2	0.1	77136.1549	39084.1269	141.1590	0.3	0.3	0.1												
1501	77142.5377	39076.1701	141.3266	77142.5376	39076.1701	141.3267	-0.1	0.0	0.1	77142.5380	39076.1703	141.3267	0.3	0.2	0.1												
1502	77142.4606	39076.1496	143.2894	77142.4606	39076.1497	143.2893	0.0	0.1	-0.1	77142.4610	39076.1497	143.2894	0.4	0.1	0.0												
1503	77141.0566	39075.6345	144.0750	77141.0565	39075.6347	144.0748	0.0	0.1	-0.2	77141.0569	39075.6346	144.0748	0.3	0.0	-0.2												
1504	77139.5730	39075.0780	143.2423	77139.5730	39075.0780	143.2421	0.0	0.0	-0.2	77139.5732	39075.0782	143.2422	0.2	0.2	0.0												
1505	77139.5950	39075.0774	141.1997	77139.5949	39075.0775	141.1997	0.0	0.1	-0.1	77139.5952	39075.0776	141.1997	0.3	0.2	0.0												

Project: 100 Avenue Road Development, London

Job Description: 3D Deformation Monitoring

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				21/01/2016						20/02/2016																	
Ref.	E [m]	N [m]	L [m]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]	E [m]	N [m]	L [m]	ΔE [mm]	ΔN [mm]	ΔL [mm]
1601	77146.0362	39066.5411	141.3692	77146.0363	39066.5416	141.3692	0.1	0.5	0.0	77146.0365	39066.5412	141.3691	0.3	0.1	0.0												
1602	77145.9540	39066.5349	143.3098	77145.9541	39066.5347	143.3098	0.1	-0.1	0.0	77145.9543	39066.5349	143.3096	0.4	0.0	-0.2												
1603	77144.5468	39066.0587	144.1034	77144.5472	39066.0586	144.1031	0.3	-0.1	-0.3	77144.5472	39066.0588	144.1031	0.4	0.1	-0.3												
1604	77143.0639	39065.5282	143.3141	77143.0640	39065.5283	143.3139	0.1	0.1	-0.2	77143.0641	39065.5283	143.3138	0.3	0.1	-0.3												
1605	77143.0178	39065.4845	141.3572	77143.0177	39065.4846	141.3572	-0.1	0.1	0.0	77143.0181	39065.4846	141.3571	0.4	0.1	-0.1												
1701	77071.5795	39182.3104	141.0818	77071.5799	39182.3093	141.0815	0.4	-1.0	-0.3	77071.5800	39182.3100	141.0817	0.5	-0.3	-0.1												
1702	77065.1924	39182.0650	142.0370	77065.1924	39182.0650	142.0367	0.1	0.0	-0.3	77065.1925	39182.0652	142.0371	0.2	0.2	0.1												
1801	77106.9470	39119.1543	141.3064	77106.9468	39119.1544	141.3065	-0.2	0.1	0.1	77106.9471	39119.1546	141.3068	0.0	0.3	0.4												
1802	77101.8520	39116.5973	142.2751	77101.8516	39116.5977	142.2747	-0.5	0.4	-0.4	77101.8519	39116.5977	142.2748	-0.1	0.4	-0.3												
1901	77079.3527	39180.1353	141.2477	77079.3526	39180.1348	141.2473	-0.1	-0.5	-0.4	77079.3527	39180.1356	141.2476	0.0	0.3	-0.2												
1902	77080.8290	39177.5245	142.8602	77080.8288	39177.5241	142.8599	-0.2	-0.4	-0.3	77080.8290	39177.5250	142.8603	0.0	0.5	0.1												
1903	77082.1863	39175.0849	144.6449	77082.1862	39175.0844	144.6444	-0.1	-0.5	-0.5	77082.1864	39175.0852	144.6446	0.1	0.3	-0.3												
1904	77083.6353	39172.4578	146.2436	77083.6351	39172.4569	146.2430	-0.2	-0.8	-0.6	77083.6355	39172.4580	146.2434	0.2	0.3	-0.3												
1905	77085.0072	39170.0269	148.0249	77085.0069	39170.0260	148.0240	-0.3	-1.0	-0.8	77085.0074	39170.0271	148.0242	0.2	0.1	-0.6												
1906	77086.4724	39167.4045	149.6276	77086.4717	39167.4035	149.6268	-0.7	-1.0	-0.8	77086.4725	39167.4042	149.6270	0.1	-0.3	-0.6												
1907	77087.6694	39165.1984	151.2325	77087.6687	39165.1974	151.2316	-0.7	-1.0	-0.9	77087.6694	39165.1982	151.2316	0.1	-0.3	-0.8												

Project: 100 Avenue Road Development, London
Job Description: 3D Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL-1311-01-02 Set 02 - Perpendicular Tunnel Movement

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Survey Date: 20/02/2016

Point Ref.	Base Set	Set 01	Set 02	Set 03	Set 04	Set 05	Set 06	Set 07	Set 08	Set 09	Set 10
	24/11/2015	21/01/2016	20/02/2016								
101	0.0 mm	-0.8 mm	0.5 mm								
102	0.0 mm	-0.3 mm	0.3 mm								
103	0.0 mm	-0.3 mm	0.2 mm								
104	0.0 mm	-0.4 mm	0.3 mm								
105	0.0 mm	-0.5 mm	0.1 mm								
201	0.0 mm	-0.8 mm	-0.1 mm								
202	0.0 mm	-0.3 mm	0.1 mm								
203	0.0 mm	-0.6 mm	0.0 mm								
204	0.0 mm	-0.5 mm	0.2 mm								
205	0.0 mm	-0.1 mm	0.4 mm								
301	0.0 mm	-0.4 mm	0.1 mm								
302	0.0 mm	-0.5 mm	-0.1 mm								
303	0.0 mm	-0.5 mm	-0.1 mm								
304	0.0 mm	-0.5 mm	0.0 mm								
305	0.0 mm	-0.4 mm	0.1 mm								
401	0.0 mm	-0.5 mm	0.0 mm								
402	0.0 mm	-0.6 mm	-0.1 mm								
403	0.0 mm	-0.6 mm	-0.2 mm								
404	0.0 mm	-0.6 mm	-0.2 mm								
405	0.0 mm	-0.5 mm	-0.1 mm								
501	0.0 mm	-0.5 mm	0.0 mm								
502	0.0 mm	-0.7 mm	-0.2 mm								
503	0.0 mm	-0.3 mm	0.1 mm								
504	0.0 mm	-0.6 mm	-0.2 mm								
505	0.0 mm	-0.4 mm	-0.1 mm								
601	0.0 mm	-0.1 mm	0.2 mm								
602	0.0 mm	0.0 mm	0.1 mm								
603	0.0 mm	0.0 mm	0.2 mm								
604	0.0 mm	0.0 mm	0.1 mm								
605	0.0 mm	-1.1 mm	-0.9 mm								

Project: 100 Avenue Road Development, London
Job Description: 3D Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL-1311-01-02 Set 02 - Perpendicular Tunnel Movement

Survey Date: 20/02/2016

Point Ref.	Base Set	Set 01	Set 02	Set 03	Set 04	Set 05	Set 06	Set 07	Set 08	Set 09	Set 10
	24/11/2015	21/01/2016	20/02/2016								
701	0.0 mm	0.1 mm	0.2 mm								
702	0.0 mm	0.0 mm	0.2 mm								
703	0.0 mm	0.1 mm	0.2 mm								
704	0.0 mm	0.0 mm	0.0 mm								
705	0.0 mm	0.1 mm	0.1 mm								
801	0.0 mm	-0.4 mm	-1.2 mm								
802	0.0 mm	0.0 mm	0.1 mm								
803	0.0 mm	0.0 mm	0.1 mm								
804	0.0 mm	0.0 mm	0.0 mm								
805	0.0 mm	0.0 mm	0.1 mm								
901	0.0 mm	0.2 mm	0.2 mm								
902	0.0 mm	0.0 mm	0.0 mm								
903	0.0 mm	-0.1 mm	0.0 mm								
904	0.0 mm	-0.2 mm	-0.1 mm								
905	0.0 mm	0.0 mm	0.1 mm								
1001	0.0 mm	0.0 mm	0.0 mm								
1002	0.0 mm	-0.1 mm	0.0 mm								
1003	0.0 mm	-0.1 mm	-0.1 mm								
1004	0.0 mm	-0.1 mm	0.0 mm								
1005	0.0 mm	0.0 mm	0.0 mm								
1101	0.0 mm	-0.1 mm	-0.2 mm								
1102	0.0 mm	0.0 mm	-0.1 mm								
1103	0.0 mm	0.0 mm	0.0 mm								
1104	0.0 mm	-0.1 mm	-0.1 mm								
1105	0.0 mm	0.0 mm	-0.1 mm								
1201	0.0 mm	-0.3 mm	0.1 mm								
1202	0.0 mm	-0.3 mm	0.2 mm								
1203	0.0 mm	-0.3 mm	0.3 mm								
1204	0.0 mm	-0.2 mm	0.3 mm								
1205	0.0 mm	-0.2 mm	0.3 mm								

Project: 100 Avenue Road Development, London
Job Description: 3D Deformation Monitoring
Monitoring Location: Swiss Cottage Underground Station
Project Reference: SAL-1311-01
Sheet Reference: SAL-1311-01-02 Set 02 - Perpendicular Tunnel Movement

Survey Date: 20/02/2016

Point Ref.	Base Set	Set 01	Set 02	Set 03	Set 04	Set 05	Set 06	Set 07	Set 08	Set 09	Set 10
	24/11/2015	21/01/2016	20/02/2016								
1301	0.0 mm	-0.2 mm	0.3 mm								
1302	0.0 mm	-0.3 mm	0.3 mm								
1303	0.0 mm	-0.8 mm	0.1 mm								
1304	0.0 mm	-0.3 mm	0.2 mm								
1305	0.0 mm	-0.3 mm	0.2 mm								
1401	0.0 mm	-0.2 mm	0.4 mm								
1402	0.0 mm	-0.1 mm	0.4 mm								
1403	0.0 mm	-0.2 mm	0.3 mm								
1404	0.0 mm	-0.2 mm	0.3 mm								
1405	0.0 mm	-0.2 mm	0.4 mm								
1501	0.0 mm	-0.1 mm	0.3 mm								
1502	0.0 mm	0.0 mm	0.4 mm								
1503	0.0 mm	0.0 mm	0.3 mm								
1504	0.0 mm	0.0 mm	0.3 mm								
1505	0.0 mm	0.0 mm	0.3 mm								
1601	0.0 mm	0.3 mm	0.4 mm								
1602	0.0 mm	0.0 mm	0.3 mm								
1603	0.0 mm	0.3 mm	0.4 mm								
1604	0.0 mm	0.1 mm	0.3 mm								
1605	0.0 mm	0.0 mm	0.4 mm								
1701	0.0 mm	-0.1 mm	0.3 mm								
1702	0.0 mm	0.1 mm	0.3 mm								
1801	0.0 mm	-0.2 mm	0.1 mm								
1802	0.0 mm	-0.2 mm	0.1 mm								
1901	0.0 mm	-0.3 mm	0.2 mm								
1902	0.0 mm	-0.4 mm	0.2 mm								
1903	0.0 mm	-0.3 mm	0.3 mm								
1904	0.0 mm	-0.5 mm	0.3 mm								
1905	0.0 mm	-0.7 mm	0.3 mm								
1906	0.0 mm	-1.0 mm	-0.1 mm								
1907	0.0 mm	-1.1 mm	-0.1 mm								