



C305- Eastern Running Tunnels

I&M Close out report for Levelling points & 3D Prisms: Canary Wharf West India Dock Wall (Drive Y)

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This document has been reviewed by the following individual for coordination, compliance, integration and acceptance and is acceptable for transmission to the above stakeholder for the above stated purpose

Sign: _____ Role: _____ Name: _____ Date: _____

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2b. Review by Stakeholder (if required):

Stakeholder Organisation	Job Title	Name	Signature	Date	Acceptance
					<input type="checkbox"/>

3. Acceptance by Crossrail:

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Reviewed/Accepted by: (signature)	Print Name:	Position:	Date: 12/1/15		
[Redacted]	[Redacted]	[Redacted]			
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C305 Crossrail Eastern Running Tunnels

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Current Version of the Documents & Signatures :

Revision:	Date:	Prepared by:	Checked by:	Engineering Approved by:
1.0	15.12.2015	[Redacted]	[Redacted]	[Redacted]
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1. CLOSE OUT REPORT PURPOSE

As stated in the specification: C122-OVE-Z4-RSP-CR001-00007 Rev 7.0, the purpose of this close-out report is to summarise the data from the instrumentation included in this document and to relate the recorded movements to the construction activities which produce any observed changes. For construction activities it is intended excavation of the C305 twin bored tunnels and dewatering of cross passages; impacts from cross passage excavation or from other CRL contracts are not included in this report.

The long term readings have been used to demonstrate that the subsequent movement has reached an acceptably stable rate within the accuracy of the system in order to decommission and/or that C305 works are no longer impacting the area concerned.

As stated in the specifications the settlement rate of 2 mm/yr has been defined. Where this is not achieved this report seeks agreement from all parties that the rate is acceptably low enough to cease monitoring and decommission.

2. LOCATION OF THE WORKS

The instrumentation included in this report is situated along West India Quays adjacent to Canary Wharf Station. The instruments are located within Area 4, Area 5 and Area 6, along project chainage 82500 and 83400.

The Levelling Points, 3D Prisms and Retro targets were mainly installed along the edge of the quay as well as surrounding buildings.

See Appendix A for the instrument location.

3. DOCUMENTATION SUMMARY

CROSSRAIL NUMBER	DOCUMENT NAME	REASON FOR ISSUE
C305-DSJ-C2-GMS-CRG03-50015	Method Statement I&M Canary Wharf West India Dock Wall (83300-83100)	Main Method Statement
C305-DSJ-C2-CCN-CRG03-50010	Short Notice Change I&M Additional Studs & Prisms – West India Quay	Short Notice Change
C305-DSJ-C2-RGN-CRG03-50204	I&M Installation report for Canary Wharf West India Dock Wall (Drive Y)	Installation Report

4. SUMMARY OF INSTALLED INSTRUMENTATION ON SITE

The total number instruments installed as per method statement, SNC, PMIs and RFI, was:

- 40 – 3D Prisms
- 47 – Retro Targets
- 174 – Levelling Points

See Appendix B for further information of the installed instrumentation.

The average commissioning readings included in Appendix B have been used to calculate the relative movements provided in the graphs of this report. In some of them, new values were determined as a baseline according to the requirement of the client in CTC meeting. The dates of the new baselines are as follows:

- C305-LP060101 - C305- LP060110: 21st June 2013
- C305-LP060201 - C305- LP060251: 21st June 2013
- C305-LP060801 - C305- LP060853: 21st June 2013
- C305-LP061001 - C305- LP061031: 21st June 2013

5. CONSTRUCTION ACTIVITY

TBM PASSAGE

DRIVE Y	RINGS	PROJECT CHAINAGE	DATES
Eastbound	954 – 1310	83339 – 82505	13/05/2013 to 26/08/2013
Westbound	956 – 1313	83331 - 82505	06/06/2013 to 18/10/2013

Period of TBM transiting through Canary Wharf station box:

Eastbound Drive-Y Ring 1084 (chainage 83130) from 22.05.2013 to 04.07.2013
 Westbound Drive-Y Ring 1085 (chainage 83125) from 11.06.2013 to 30.07.2013

Other periods of TBM stoppage:

Eastbound Drive-Y Ring 1175 (chainage 82723) from 16.07.2013 to 30.07.2013
 Ring 1265 (chainage 82590) from 10.08.2013 to 22.08.2013
 Westbound Drive-Y Ring 1173 (chainage 82747) from 12.08.2013 to 27.08.2013
 Ring 1185 (chainage 82725) from 28.08.2013 to 25.09.2013
 Ring 1213 (chainage 82677) from 03.10.2013 to 07.10.2013

The periods of TBM passage and stoppage are related to the rings located close to the instrumentation included in this close out report.

DEWATERING

Canary Wharf It is understood that Canary Wharf dewatering systems were switched on throughout the monitoring period

6. METHODOLOGY

To determine the settlement rate the following methodology has been used. A Linear Regression has been applied for a defined period using long term readings after TBM construction. This uses the following formula.

$$b = \frac{\sum_{i=1}^n (X_i - \bar{X}_i) \cdot (Y_i - \bar{Y}_i)}{\sum_{i=1}^n (X_i - \bar{X}_i)^2}$$

Where:

B =gradient or slope

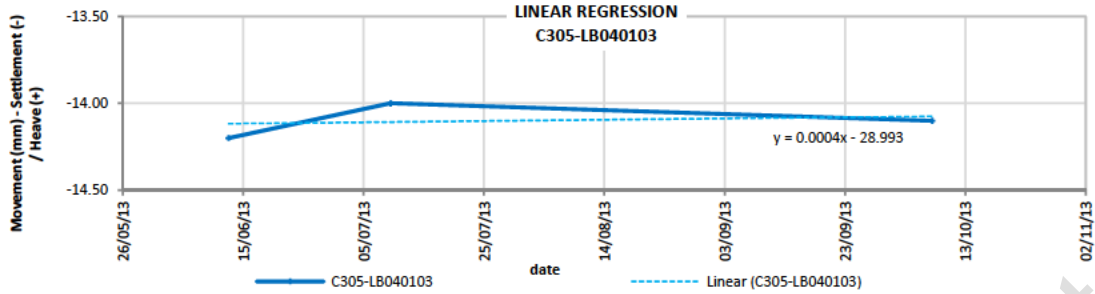
X (independent variable) = date

Y (dependent variable) = vertical movement

From this, the settlement rate per day can be calculated and rate per year determined (negative value is for settlement, positive is for heave). For these values, the percentage at or below 2 mm/yr will be used to determine the trend of the section/area being considered. Also for comparison, values at or below 3mm/year are presented to highlight that the rate is close to achieving the 2 mm/yr. Note the percentages of settlement rate presented in the sections below refer to values rounded to the nearest integer.

One example of this calculation can be seen below for one socket and its projection.

	Registered movement (mm)			RATE mm/year
	12/06/2013	09/07/2013	07/10/2013	
C305-LB040103	-14.20	-14.00	-14.10	0.146



CALCULATION - C305-LB040103

X_i	Y_i	$X_i - \bar{X}_i$	$Y_i - \bar{Y}_i$	$(X_i - \bar{X}_i)^2$	$(X_i - \bar{X}_i) \cdot (Y_i - \bar{Y}_i)$
12/06/2013	-14.2	-47.94	-0.10	2298.67	4.794
09/07/2013	-14	-21.03	0.10	442.17	-2.103
07/10/2013	-14.1	68.97	0.00	4757.17	0.000

\bar{X}_i	41485.53
\bar{Y}_i	-14.10
$\sum_{i=1}^n (X_i - \bar{X}_i)^2$	7498.00 (2)
$\sum_{i=1}^n (X_i - \bar{X}_i) \cdot (Y_i - \bar{Y}_i)$	2.692 (1)
m (SLOPE)	(1)/(2) 0.0004
Rate (mm/year)	m * 365 0.146

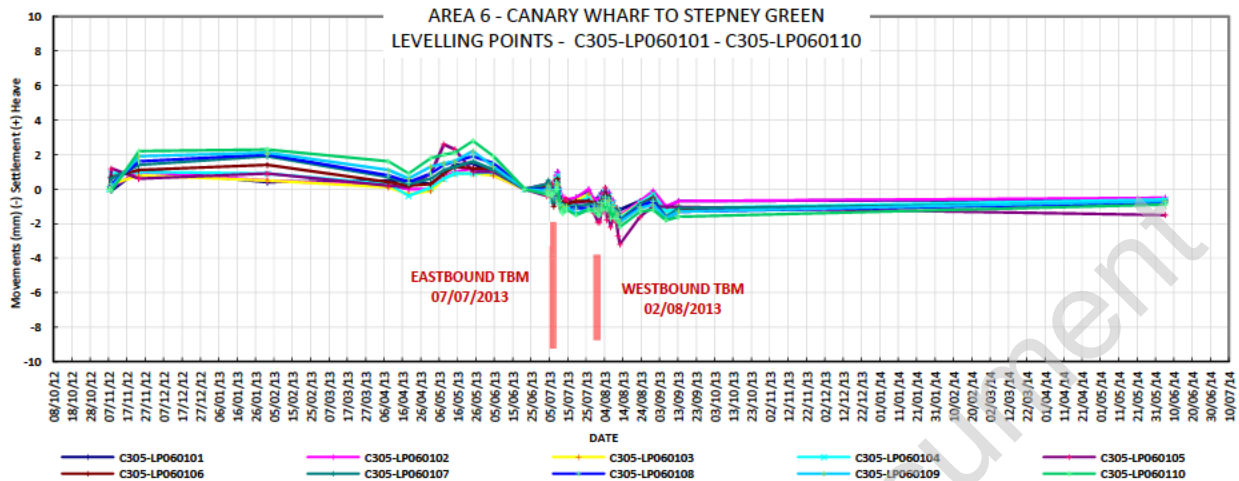
7. SUMMARY OF THE DATA

The methodology described for sockets in section 6, is applied here for levelling points.

Note: For the following data plots #N/A refers to instances where readings were not taken for that sensor (e.g. damaged sensor, no access, etc.).

LEVELLING POINTS

C305-LP060101 - C305-LP060110



As can be seen in the graph above the levelling points recorded a maximum settlement of -1mm during the Eastbound TBM transit and a maximum settlement of -2 mm in the C305-LP060105 during the Westbound TBM transit.

To analyse whether the rate of change in the data has reached an acceptably small rate, the last three readings were used to calculate the annual projection.

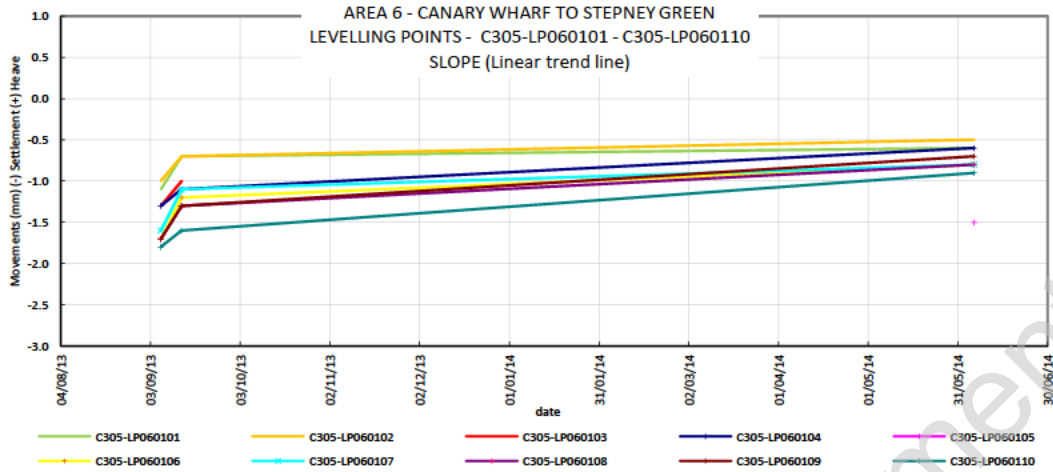
The table below shows the annual rate for the levelling points in this array.

	Registered movement (mm)			Rate (mm/year)
	06/09/2013	13/09/2013	05/06/2014	
C305-LP060101	-1.10	-0.70	-0.60	0.402
C305-LP060102	-1.00	-0.70	-0.50	0.475
C305-LP060103	-1.30	-1.00	#N/A	-
C305-LP060104	-1.30	-1.10	-0.60	0.803
C305-LP060105	#N/A	#N/A	-1.50	-
C305-LP060106	-1.70	-1.20	-0.80	0.913
C305-LP060107	-1.60	-1.10	-0.80	0.767
C305-LP060108	-1.70	-1.30	-0.80	0.949
C305-LP060109	-1.70	-1.30	-0.70	1.095
C305-LP060110	-1.80	-1.60	-0.90	1.095
	Rate less than -2.5 mm/year		% less 2 mm/ year	100.00%
	Rate greater than -3.5 mm/year		% less 3 mm/ year	100.00%

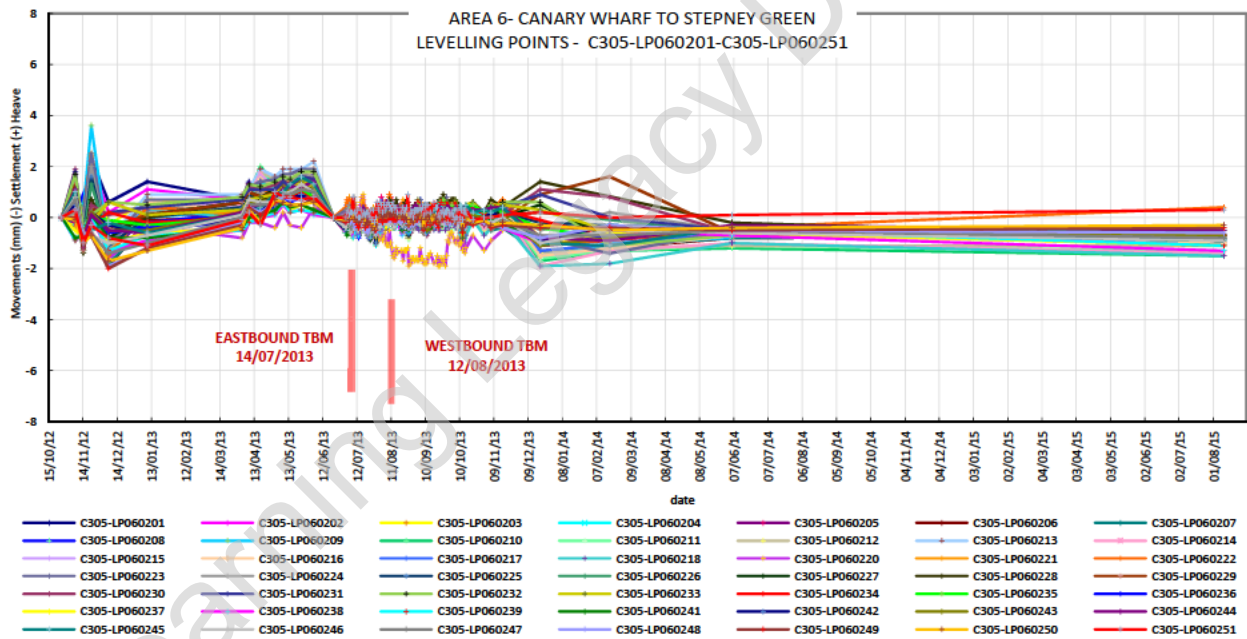
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2 mm/year is 100%.

The next plot shows the trend line adjustment for the levelling points in this array.



C305-LP060201 - C305-LP060251



As can be seen in the graph above the levelling points recorded a maximum settlement of -1mm during the Eastbound TBM transit and a maximum settlement of -2 mm in the C305-LP060220 during the Westbound TBM transit.

To analyse whether the rate of change in the data has reached an acceptably small rate, the last four readings were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

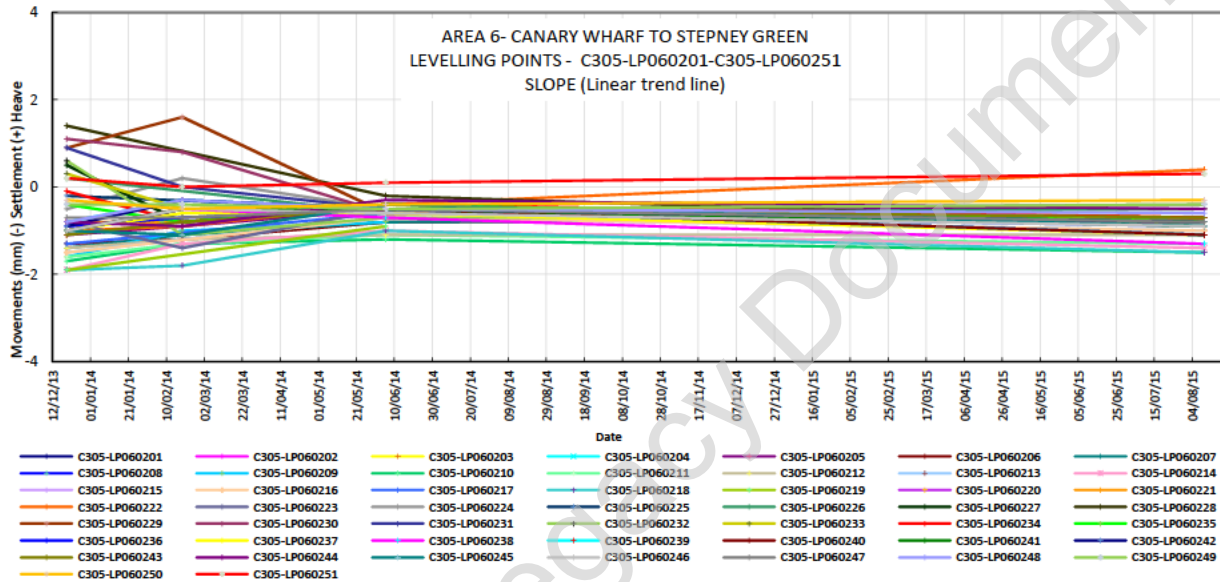
	Registered movement (mm)				Rate (mm/year)
	19/12/2013	18/02/2014	05/06/2014	10/08/2015	
C305-LP060201	#N/A	#N/A	#N/A	#N/A	-
C305-LP060202	#N/A	#N/A	#N/A	#N/A	-
C305-LP060203	#N/A	#N/A	#N/A	#N/A	-
C305-LP060204	#N/A	#N/A	#N/A	#N/A	-
C305-LP060205	-1.10	-0.90	-0.50	-0.50	0.304
C305-LP060206	-1.30	-1.20	-0.80	-0.70	0.335
C305-LP060207	-1.40	-1.10	-0.80	-0.70	0.345
C305-LP060208	#N/A	#N/A	#N/A	#N/A	-
C305-LP060209	-1.60	-1.00	-0.80	#N/A	1.606
C305-LP060210	-1.70	-1.30	-1.20	-1.50	0.001
C305-LP060211	-1.60	-1.30	-1.10	-1.30	0.090
C305-LP060212	-1.40	-1.20	-1.10	-1.10	0.128
C305-LP060213	-1.50	-1.20	-0.70	-1.00	0.201
C305-LP060214	-1.90	-1.30	-1.00	-1.40	0.122
C305-LP060215	#N/A	#N/A	#N/A	#N/A	-
C305-LP060216	-1.50	#N/A	-0.70	-1.00	0.183
C305-LP060217	-1.30	#N/A	-0.60	-0.90	0.146
C305-LP060218	-1.90	-1.80	-1.00	-1.50	0.178
C305-LP060220	#N/A	#N/A	#N/A	#N/A	-
C305-LP060221	-0.80	-0.80	-0.40	-0.70	0.039
C305-LP060222	-1.00	-0.90	-0.40	0.40	0.850
C305-LP060223	-0.80	-1.40	-0.50	-0.90	0.061
C305-LP060224	-0.50	0.20	-0.50	-0.40	-0.105
C305-LP060225	-0.20	#N/A	-0.50	#N/A	-0.657
C305-LP060226	0.20	#N/A	-0.60	-0.50	-0.329
C305-LP060227	0.50	-0.80	-0.40	#N/A	-1.570
C305-LP060228	1.40	#N/A	-0.20	-0.80	-1.168
C305-LP060229	0.90	1.60	-0.60	-0.80	-1.182
C305-LP060230	1.10	0.80	-0.60	-0.80	-1.056
C305-LP060231	0.90	0.00	-0.50	-0.70	-0.734
C305-LP060232	0.60	-1.10	-0.70	-0.70	-0.350
C305-LP060233	0.30	-0.50	-0.40	-0.80	-0.478
C305-LP060234	-0.10	-0.80	-0.40	-0.70	-0.202
C305-LP060235	-0.40	-0.80	-0.40	-0.80	-0.164
C305-LP060236	-0.90	-0.70	-0.50	-1.10	-0.205
C305-LP060237	-1.00	-0.60	-0.60	-1.10	-0.188
C305-LP060238	-1.00	-0.50	-0.70	-1.30	-0.337
C305-LP060239	-0.80	-0.30	-0.50	-1.10	-0.337
C305-LP060241	-1.00	-0.50	-0.50	-0.90	-0.089
C305-LP060242	-0.90	-0.30	-0.50	-0.80	-0.107
C305-LP060243	-1.10	-0.80	-0.50	-0.70	0.149
C305-LP060244	-0.80	-0.90	-0.30	-0.50	0.188
C305-LP060245	-1.00	-1.10	-0.40	-0.90	0.051
C305-LP060246	-1.00	-0.50	-0.60	-0.90	-0.082
C305-LP060247	-0.70	-0.70	-0.50	-0.80	-0.078
C305-LP060248	-0.80	-0.30	-0.50	-0.60	-0.011
C305-LP060249	-0.40	-0.40	-0.50	-0.40	0.006
C305-LP060250	-0.30	-0.50	-0.40	-0.30	0.055

	Registered movement (mm)				Rate (mm/year)
	19/12/2013	18/02/2014	05/06/2014	10/08/2015	
C305-LP060251	0.20	0.00	0.10	0.30	0.120
	Rate less than -2.5 mm/year		% less 2 mm/ year		100.00%
	Rate greater than -3.5 mm/year		% less 3 mm/ year		100.00%

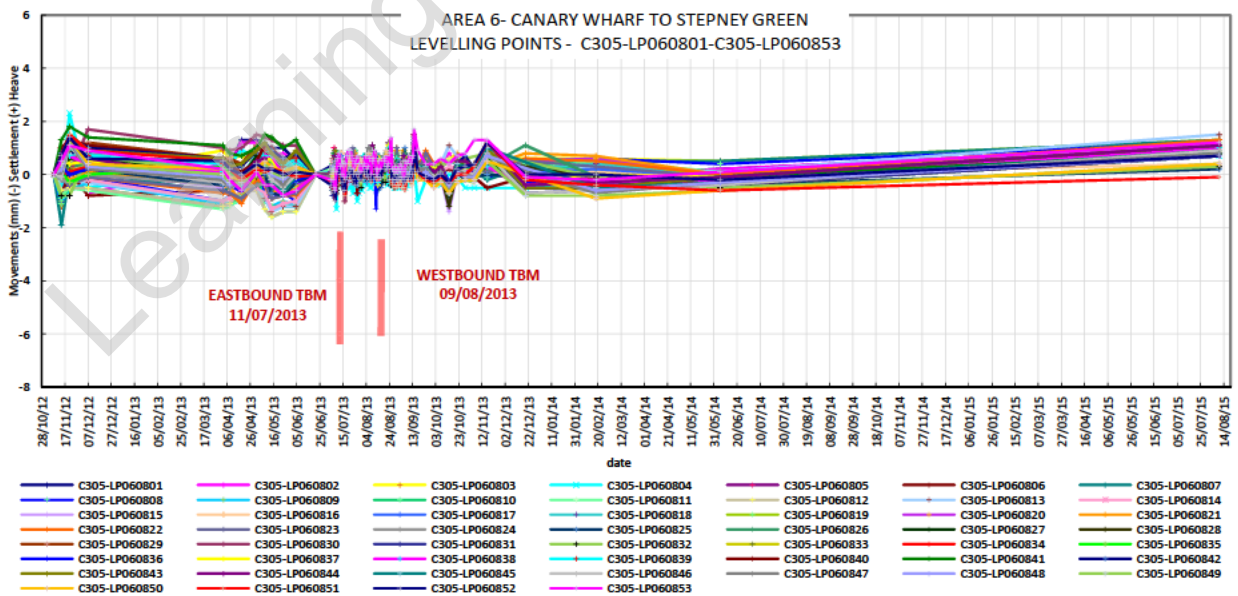
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2 mm/year is 100%.

The next plot shows the trend line adjustment for the levelling points in this array.



C305-LP060801 - C305-LP060853



As can be seen in the graph above the levelling points did not record any movement during TBMs transit.

To analyse whether the rate of change in the data has reached an acceptably small rate, the last four readings were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

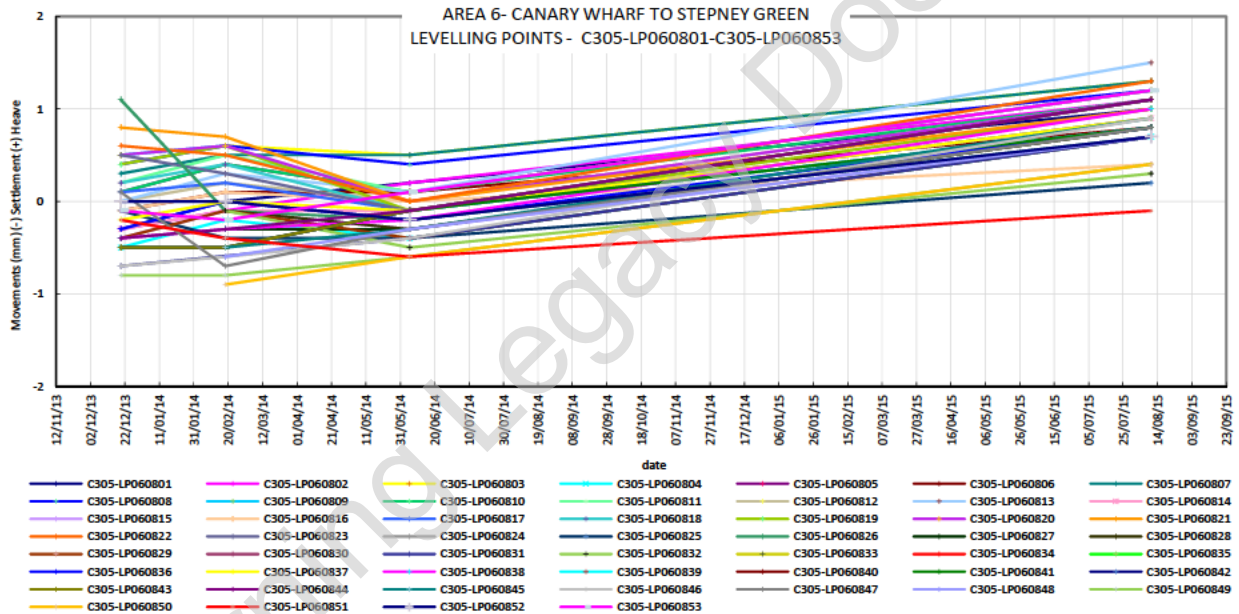
	Registered movement (mm)				Rate (mm/year)
	19/12/2013	18/02/2014	05/06/2014	10/08/2015	
C305-LP060801	-0.30	0.00	0.20	1.00	0.743
C305-LP060802	-0.30	-0.10	0.20	1.10	0.832
C305-LP060803	#N/A	0.60	0.50	1.30	0.548
C305-LP060804	-0.50	-0.20	-0.40	0.70	0.703
C305-LP060805	0.10	0.40	0.10	1.20	0.645
C305-LP060806	-0.10	0.10	0.10	0.80	0.526
C305-LP060807	0.30	0.50	0.50	1.30	0.591
C305-LP060808	0.40	0.60	0.40	1.20	0.473
C305-LP060809	0.50	0.60	#N/A	#N/A	-
C305-LP060810	0.10	0.40	0.10	1.10	0.579
C305-LP060811	0.20	0.50	0.10	1.20	0.586
C305-LP060812	0.00	0.20	0.00	1.10	0.669
C305-LP060813	0.00	0.30	0.10	1.50	0.899
C305-LP060814	-0.30	-0.10	-0.10	0.90	0.721
C305-LP060815	-0.40	-0.10	-0.30	0.70	0.638
C305-LP060816	-0.10	0.10	0.00	0.40	0.271
C305-LP060817	0.10	0.20	-0.10	0.80	0.445
C305-LP060818	0.20	0.40	-0.10	0.80	0.362
C305-LP060819	0.40	0.60	-0.10	1.00	0.375
C305-LP060820	0.50	0.60	0.00	1.10	0.399
C305-LP060821	0.80	0.70	0.00	1.00	0.207
C305-LP060822	0.60	0.50	0.00	1.30	0.520
C305-LP060823	0.50	0.30	-0.10	0.90	0.348
C305-LP060824	#N/A	#N/A	#N/A	#N/A	-
C305-LP060825	-0.10	-0.40	-0.40	0.20	0.288
C305-LP060826	1.10	-0.10	-0.20	0.70	0.115
C305-LP060827	#N/A	-0.30	-0.30	0.80	0.799
C305-LP060828	#N/A	-0.10	-0.30	0.80	0.703
C305-LP060829	-0.40	-0.10	-0.40	0.70	0.645
C305-LP060830	#N/A	#N/A	#N/A	#N/A	-
C305-LP060831	-0.70	#N/A	-0.40	0.70	0.869
C305-LP060832	#N/A	-0.10	-0.50	0.30	0.388
C305-LP060833	#N/A	#N/A	#N/A	#N/A	-
C305-LP060834	#N/A	#N/A	#N/A	#N/A	-
C305-LP060835	#N/A	#N/A	#N/A	#N/A	-
C305-LP060836	-0.30	0.00	-0.20	0.80	0.638
C305-LP060837	-0.20	0.00	-0.10	0.90	0.662
C305-LP060838	-0.40	-0.30	-0.20	1.00	0.876
C305-LP060839	#N/A	#N/A	#N/A	#N/A	-
C305-LP060840	#N/A	#N/A	#N/A	#N/A	-
C305-LP060841	-0.50	-0.50	-0.10	0.80	0.822
C305-LP060842	-0.50	-0.50	-0.10	1.10	1.018
C305-LP060843	-0.50	-0.50	-0.10	1.10	1.018
C305-LP060844	-0.40	-0.30	-0.10	1.10	0.935

	Registered movement (mm)				Rate (mm/year)
	19/12/2013	18/02/2014	05/06/2014	10/08/2015	
C305-LP060845	#N/A	-0.50	-0.30	0.90	0.969
C305-LP060846	-0.70	-0.60	-0.40	0.90	1.000
C305-LP060847	0.10	-0.70	-0.30	0.80	0.677
C305-LP060848	#N/A	-0.60	-0.30	0.70	0.872
C305-LP060849	-0.80	-0.80	-0.60	0.40	0.770
C305-LP060850	#N/A	-0.90	-0.60	0.40	0.872
C305-LP060851	-0.20	-0.40	-0.60	-0.10	0.140
C305-LP060852	0.00	0.00	-0.20	0.70	0.470
C305-LP060853	-0.10	-0.20	0.10	1.20	0.859
	Rate less than -2.5 mm/year		% less 2 mm/ year		100.00%
	Rate greater than -3.5 mm/year		% less 3 mm/ year		100.00%

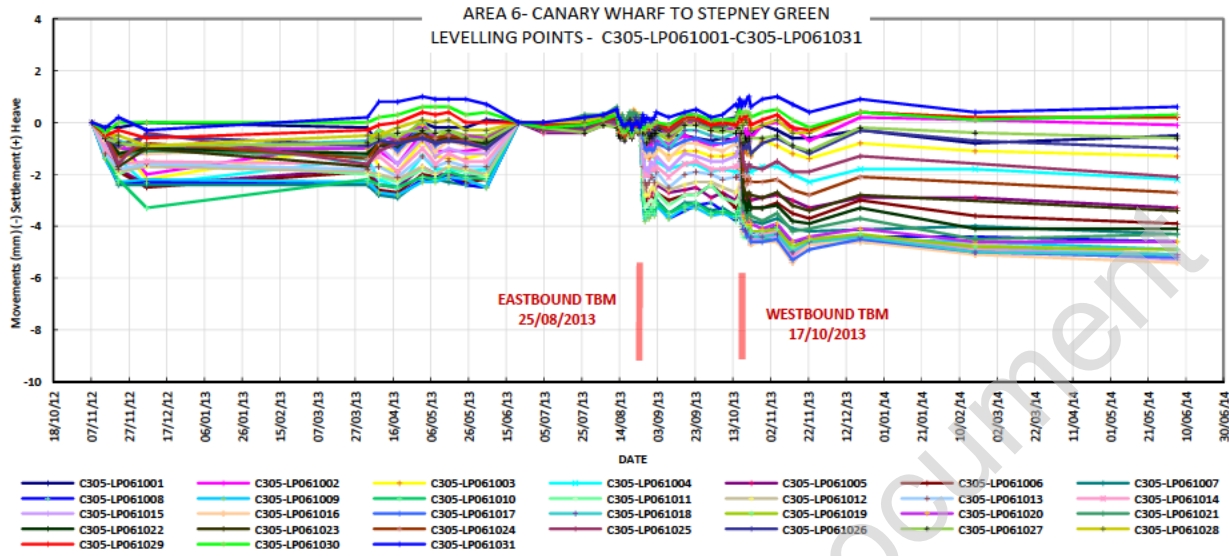
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2 mm/year is 100%.

The next plot shows the trend line adjustment for the levelling points in this array.



C305-LP061001 - C305-LP061031



As can be seen in the graph above the levelling points recorded a maximum settlement of -4mm during the Eastbound TBM transit and -2 mm settlement during the Westbound TBM transit.

To analyse whether the rate of change in the data has reached an acceptably small rate, the last four readings were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

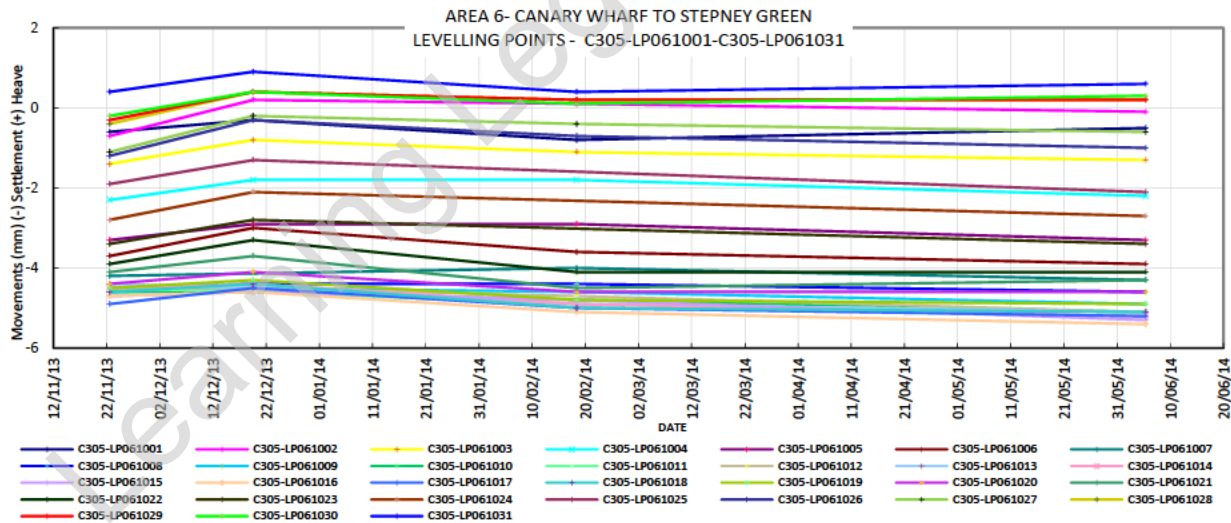
	Registered movement (mm)				Rate (mm/year)
	22/11/2013	19/12/2013	18/02/2014	05/06/2014	
C305-LP061001	-0.60	-0.30	-0.80	-0.50	-0.089
C305-LP061002	-0.70	0.20	0.10	-0.10	0.544
C305-LP061003	-1.40	-0.80	-1.10	-1.30	-0.250
C305-LP061004	-2.30	-1.80	-1.80	-2.20	-0.134
C305-LP061005	-3.30	-2.90	-2.90	-3.30	-0.260
C305-LP061006	-3.70	-3.00	-3.60	-3.90	-0.939
C305-LP061007	-4.20	#N/A	-4.00	-4.30	-0.217
C305-LP061008	-4.50	-4.40	-4.40	-4.60	-0.256
C305-LP061009	-4.60	-4.50	-4.60	-4.90	-0.655
C305-LP061010	-4.60	-4.60	-4.80	-5.10	-0.989
C305-LP061011	-4.50	-4.60	-4.90	-5.10	-1.132
C305-LP061012	-4.50	-4.50	-4.70	-5.10	-1.180
C305-LP061013	-4.40	-4.50	-4.90	-5.10	-1.340
C305-LP061014	-4.50	-4.40	-4.90	-5.20	-1.487
C305-LP061015	-4.70	-4.60	-4.80	-5.30	-1.245
C305-LP061016	-4.70	-4.60	-5.10	-5.40	-1.487

	Registered movement (mm)				Rate (mm/year)
	22/11/2013	19/12/2013	18/02/2014	05/06/2014	
C305-LP061017	-4.90	-4.50	-5.00	-5.20	-0.918
C305-LP061018	-4.60	-4.40	-5.00	-5.10	-1.187
C305-LP061019	-4.50	-4.30	-4.80	-4.90	-0.979
C305-LP061020	-4.40	-4.10	-4.60	-4.60	-0.662
C305-LP061021	-4.10	-3.70	-4.50	-4.30	-0.778
C305-LP061022	-3.90	-3.30	-4.10	-4.10	-0.908
C305-LP061023	-3.40	-2.80	#N/A	-3.40	-0.461
C305-LP061024	-2.80	-2.10	#N/A	-2.70	-0.340
C305-LP061025	-1.90	-1.30	#N/A	-2.10	-0.857
C305-LP061026	-1.20	-0.30	-0.70	-1.00	-0.271
C305-LP061027	-1.10	-0.20	-0.40	-0.60	0.336
C305-LP061028	-0.40	0.40	0.20	0.20	0.592
C305-LP061029	-0.30	0.40	0.20	0.20	0.466
C305-LP061030	-0.20	0.40	0.10	0.30	0.514
C305-LP061031	0.40	0.90	0.40	0.60	-0.028
Rate less than -2.5 mm/year			% less 2 mm/ year		100%
Rate greater than -3.5 mm/year			% less 3 mm/ year		100%

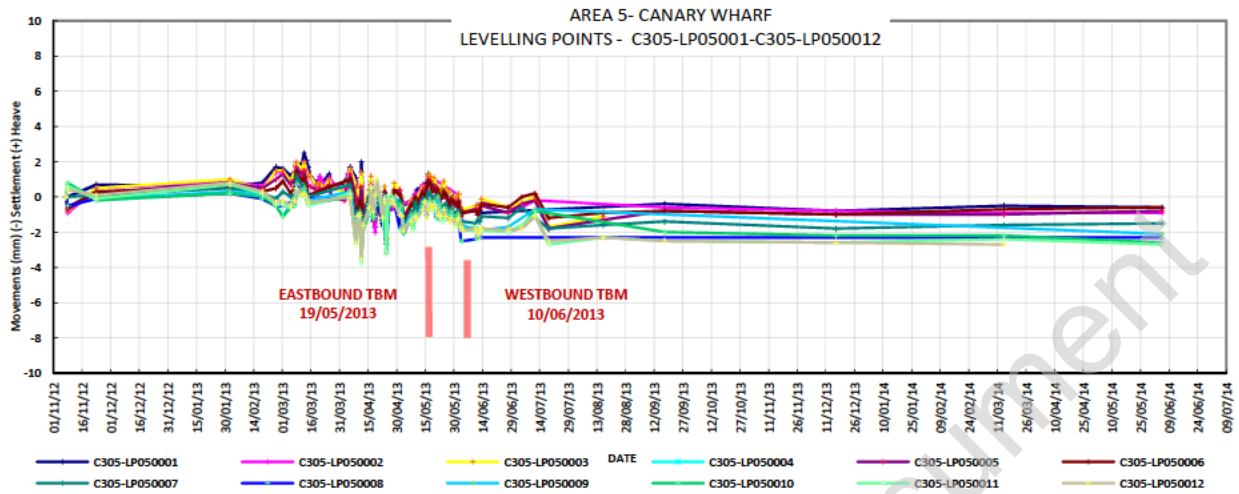
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2 mm/year is 100%.

The next plot shows the trend line adjustment for the levelling points in this array.



C305-LP050001 - C305-LP050012



As can be seen in the graph above the levelling points recorded a heave of +2 mm followed by -2 mm settlement during the Eastbound TBM transit and -1 mm settlement during the Westbound TBM transit.

To analyse whether the rate of change in the data has reached an acceptably small rate, the last four readings were used to calculate the annual projection.

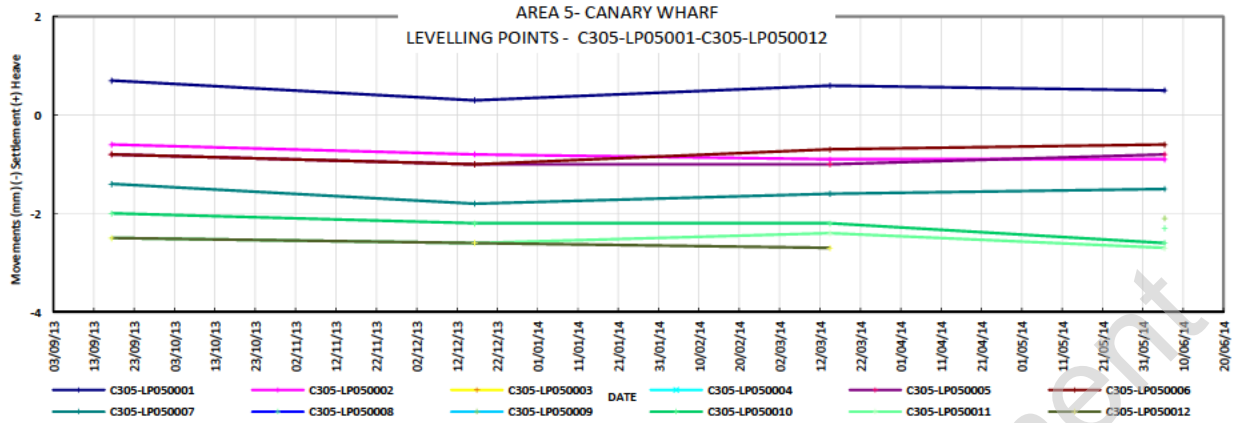
The table below shows the annual rate for the levelling points in this array.

	Registered movement (mm)				Rate (mm/year)
	17/09/2013	16/12/2013	14/03/2014	05/06/2014	
C305-LP050001	0.70	0.30	0.60	0.50	-0.089
C305-LP050002	-0.60	-0.80	-0.90	-0.90	0.544
C305-LP050003	#N/A	#N/A	#N/A	#N/A	-
C305-LP050004	#N/A	#N/A	#N/A	#N/A	-
C305-LP050005	-0.80	-1.00	-1.00	-0.80	-0.260
C305-LP050006	-0.80	-1.00	-0.70	-0.60	-0.939
C305-LP050007	-1.40	-1.80	-1.60	-1.50	-0.217
C305-LP050008	#N/A	#N/A	#N/A	-2.30	-
C305-LP050009	#N/A	#N/A	#N/A	-2.10	-
C305-LP050010	-2.00	-2.20	-2.20	-2.60	-0.989
C305-LP050011	-2.50	-2.60	-2.40	-2.70	-1.132
C305-LP050012	-2.50	-2.60	-2.70	#N/A	-1.180
	Rate less than -2.5 mm/year			% less 2 mm/ year	100%
	Rate greater than -3.5 mm/year			% less 3 mm/ year	100%

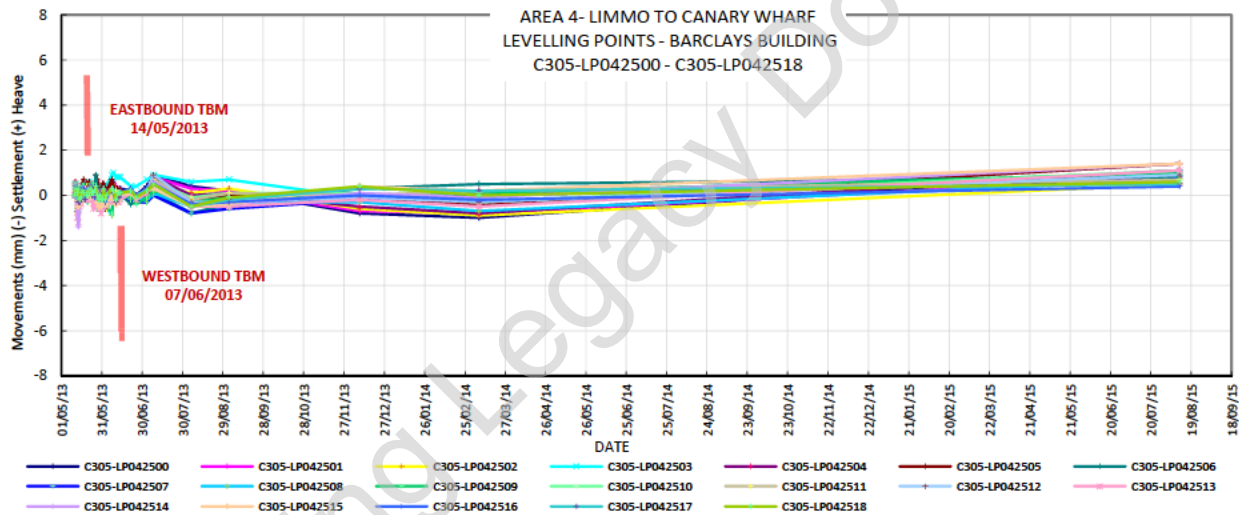
Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2 mm/year is 100%.

The next plot shows the trend line adjustment for the levelling points in this array.



C305-LP042500 - C305-LP042518



As can be seen in the graph above the levelling points did not record any movement during TBMs transit.

To analyse whether the rate of change in the data has reached an acceptably small rate, the last three readings were used to calculate the annual projection.

The table below shows the annual rate for the levelling points in this array.

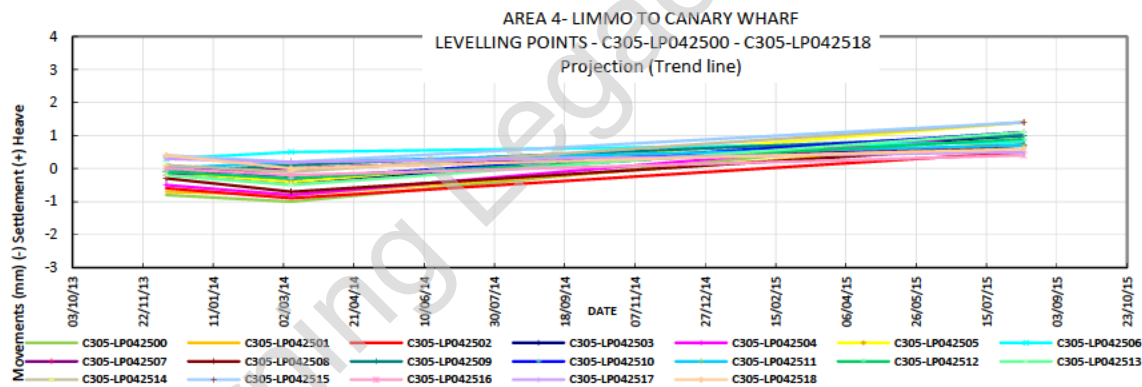
	Registered Movement (mm)			Rate (mm/year)
	08/12/2013	07/03/2014	10/08/2015	
C305-LP042500	-0.80	-1.00	1.10	1.252
C305-LP042501	-0.70	-0.80	0.80	0.975
C305-LP042502	-0.60	-0.90	0.50	0.770

	Registered Movement (mm)			Rate (mm/year)
	08/12/2013	07/03/2014	10/08/2015	
C305-LP042503	-0.10	-0.40	1.00	0.770
C305-LP042504	-0.50	-0.80	1.10	1.087
C305-LP042505	-0.10	-0.40	1.40	1.023
C305-LP042506	0.30	0.50	0.80	0.268
C305-LP042507	-0.20	0.00	0.70	0.522
C305-LP042508	-0.30	-0.70	0.70	0.731
C305-LP042509	-0.10	0.10	1.00	0.649
C305-LP042510	0.10	-0.30	1.10	0.731
C305-LP042511	0.00	0.20	0.70	0.395
C305-LP042512	-0.10	-0.30	0.90	0.682
C305-LP042513	-0.20	-0.50	1.10	0.896
C305-LP042514	0.10	-0.10	1.40	0.872
C305-LP042515	0.40	0.20	1.40	0.682
C305-LP042516	0.00	-0.20	0.40	0.302
C305-LP042517	0.30	0.20	0.50	0.151
C305-LP042518	0.40	0.00	0.60	0.224
	Rate less than -2.5 mm/year		% less 2 mm/ year	100.00%
	Rate greater than -3.5 mm/year		% less 3 mm/ year	100.00%

Note: All the movements are in mm. (-) Settlement / (+) Heave

The percentage of the levelling points with a settlement rate less than 2 mm/year is 100%.

The next plot shows the trend line adjustment for the levelling points in this array.



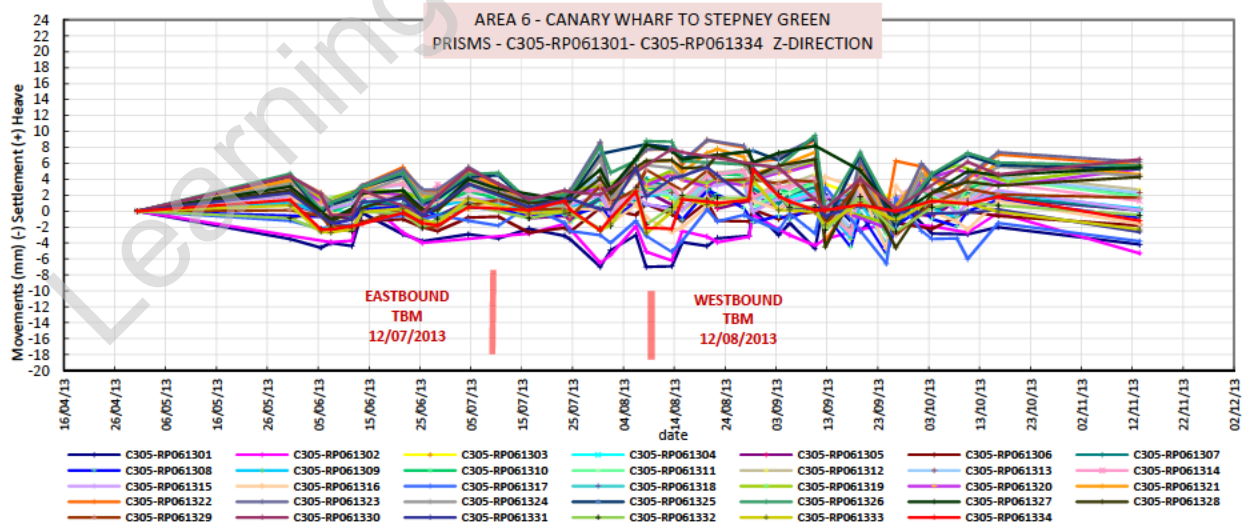
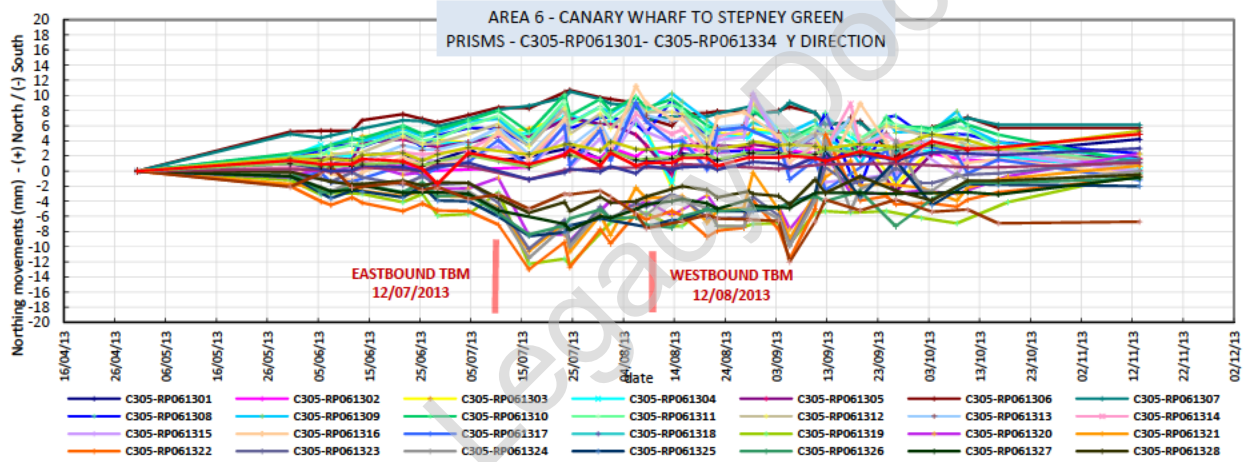
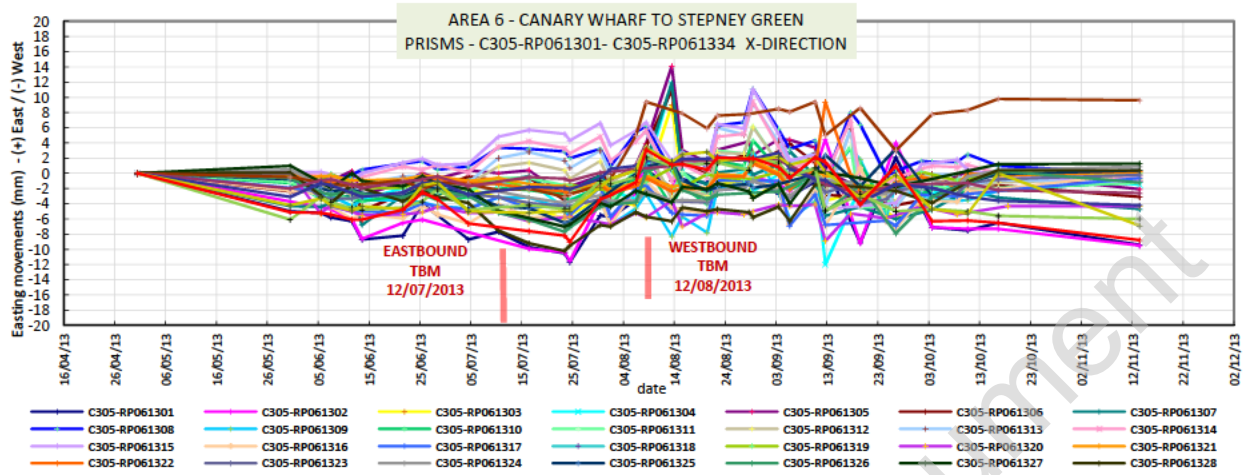
3D PRISMS

Please note the variability of the 3D prism readings shown in the charts below is mainly due to either limited or lost reference points.

Additionally, the accuracy of this monitoring system compared to the levelling points is lower.

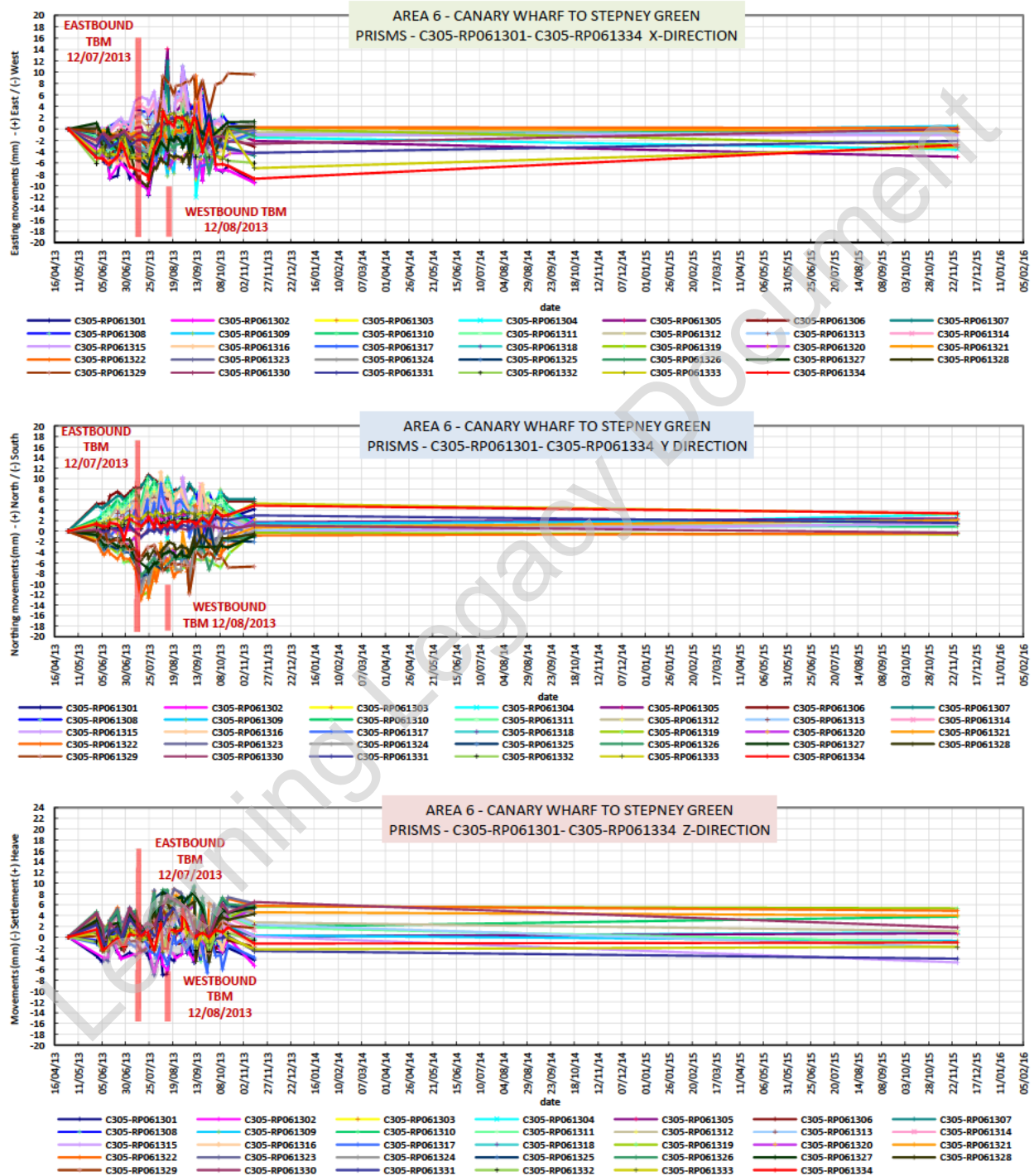
The prisms sections below do not present all the long term data due to issues with access and permissions.

C305-RP061301 - C305-RP061334

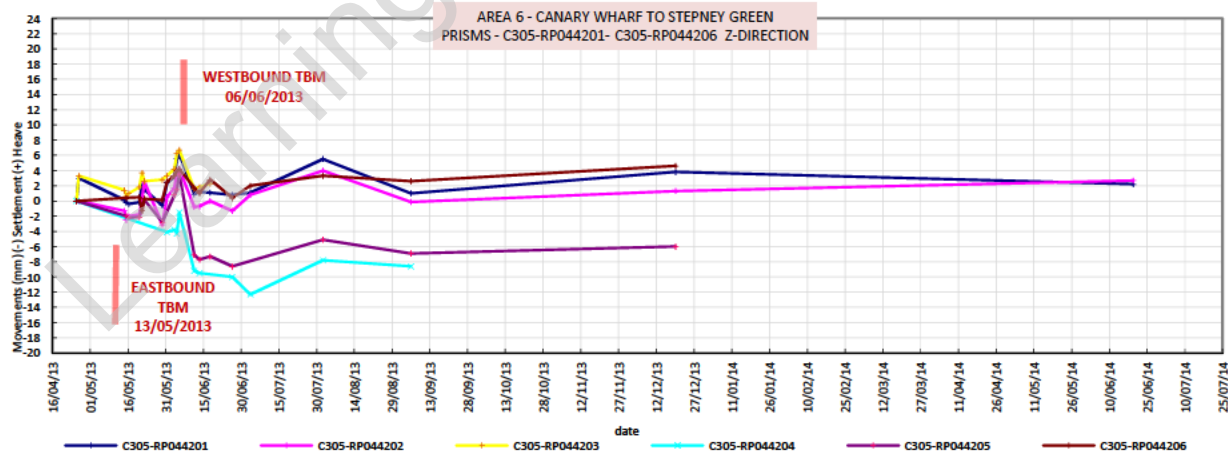
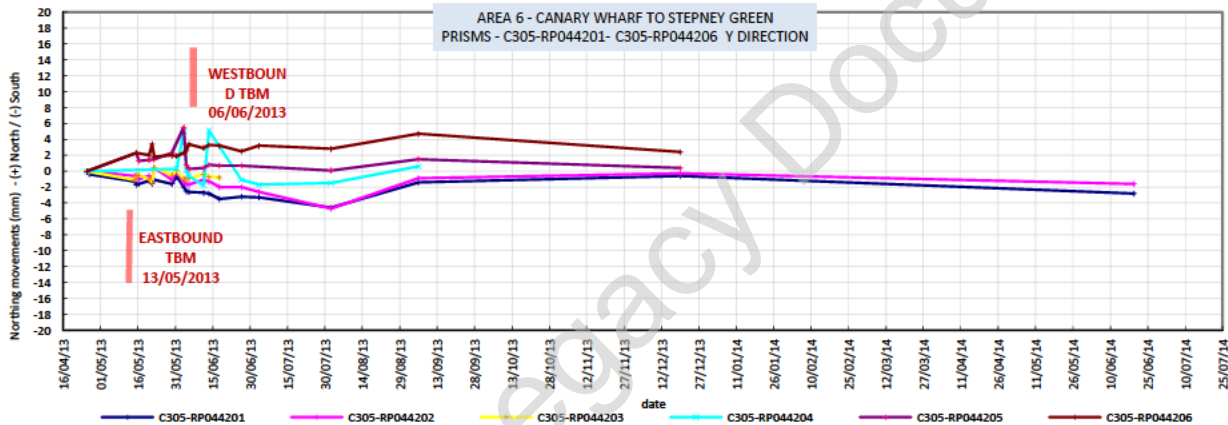
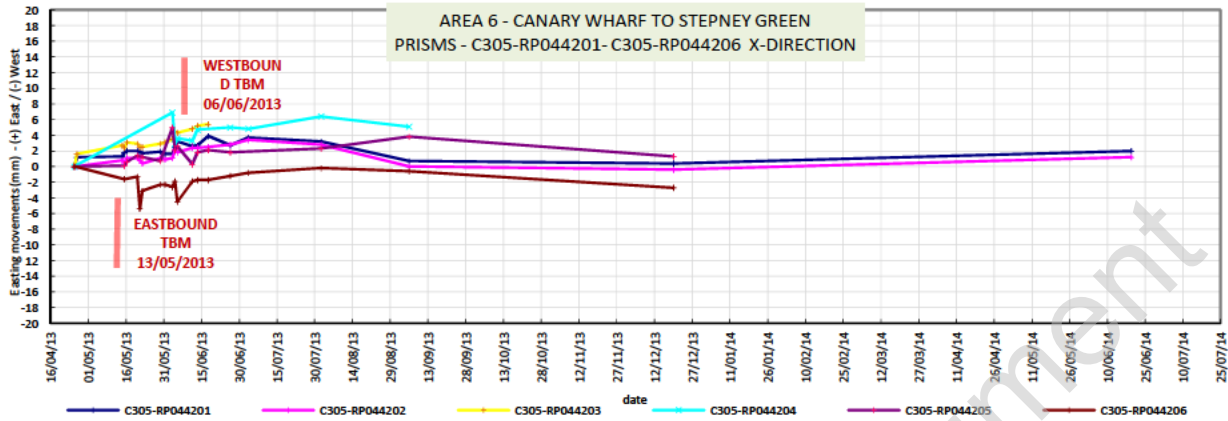


There is a range of movement observed due to the inherent noise in the system, which can be disregarded. No effect from TBMs crossing is perceptible.

Below, graphs show the updated readings including the data of 27/11/2015.



C305-RP044201 - C305-RP044206



Readings in Z direction show a settlement of -3 mm for the prisms C305-RP044204 and C305-RP044205 during the Eastbound TMB transit and -8 mm for the same prisms during the Westbound TMB transit.

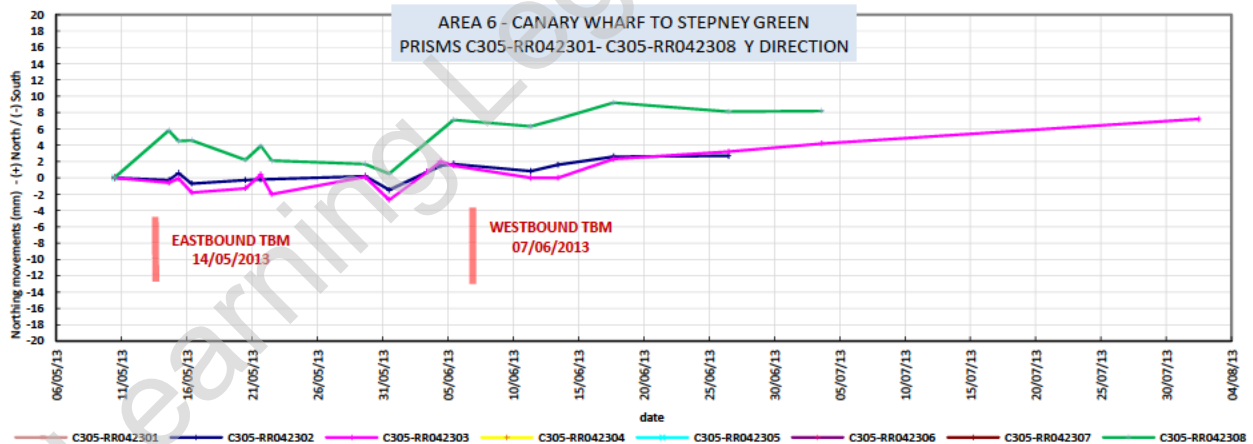
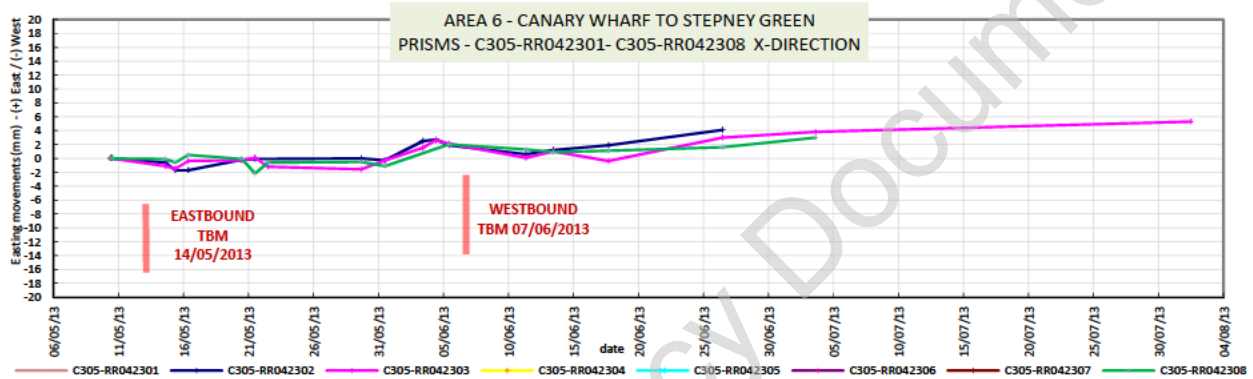
RETRO TARGETS

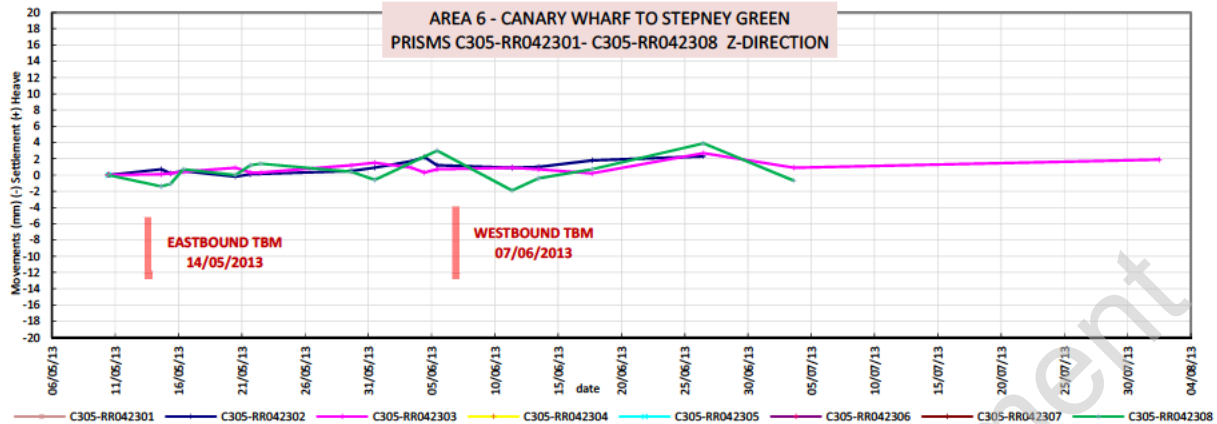
Please note the variability of the retro targets readings shown in the charts below is mainly due to either limited or lost reference points.

Additionally, the accuracy of this monitoring system compared to the levelling points is lower.

The retro target section below does not present all the long term data due to issues with access and permissions.

C305-RR042301 - C305-RR042308





Readings in Z direction show a settlement of -2 mm followed by a heave of +2 mm for the prisms C305-RP042308 during the Eastbound TMB transit and +4 mm followed by a settlement of -4 mm for the same prism during the Westbound TMB transit.

C305-RR069900 - C305-RR069939

For Retro Targets C305-RR069900 - C305-RR069939 on DLR 04 West India Quay, see document "C305 Monitoring Close Out Report DLR West India Quay (DLR/04) C305-XRL-C2-RGN-CR142-50001", where the monitoring for the asset has been closed out.

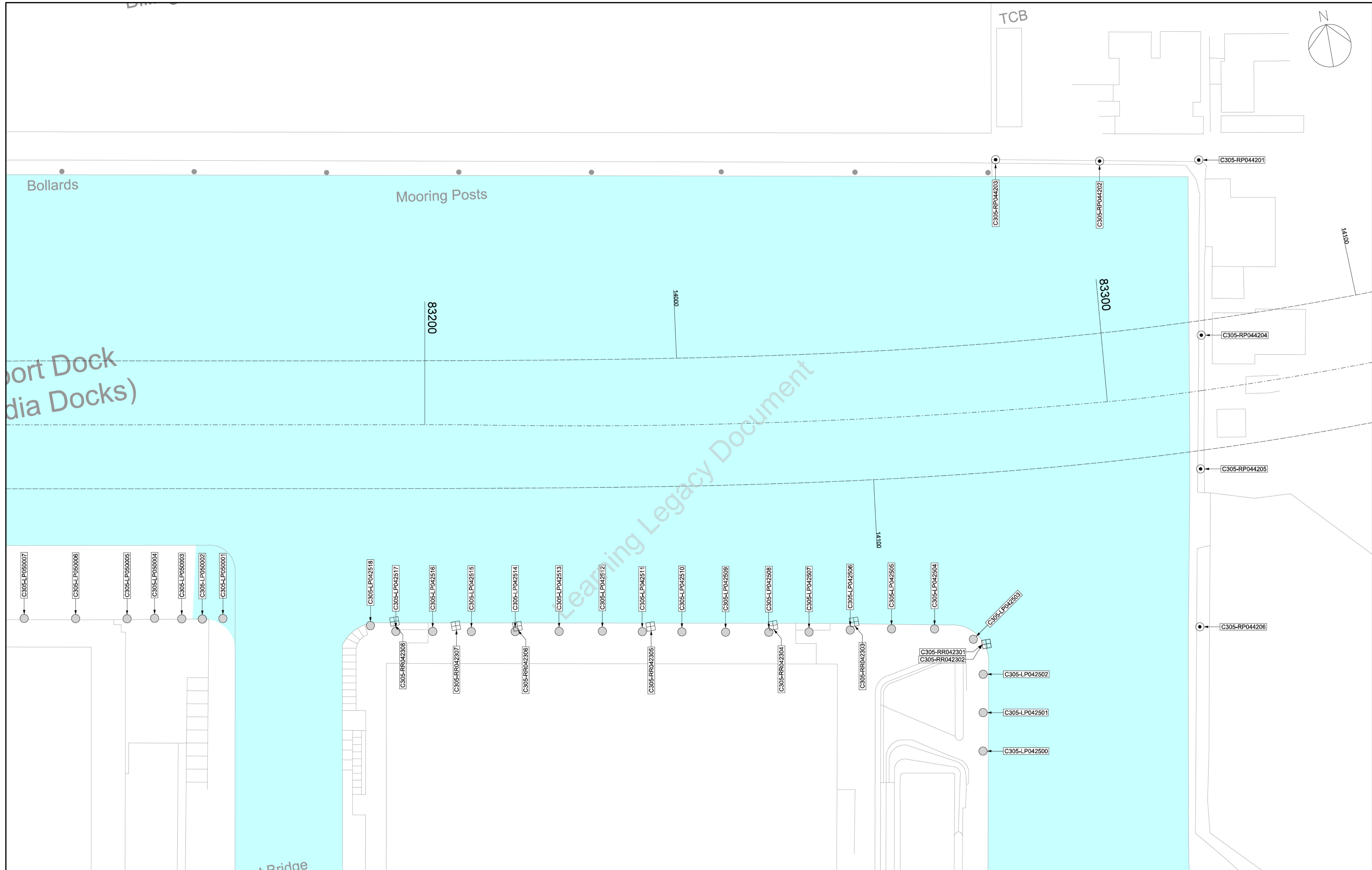
8. SUMMARY STATEMENT

The monitoring data related to the levelling points at West India Dock wall, presented in this close out report shows the following:

- The dewatering in Canary Wharf does not affect the readings of the instrumentation covered by this Close out report.
- Settlement rate has been demonstrated as less than 2 mm/year, acceptably low to cease monitoring and decommission.

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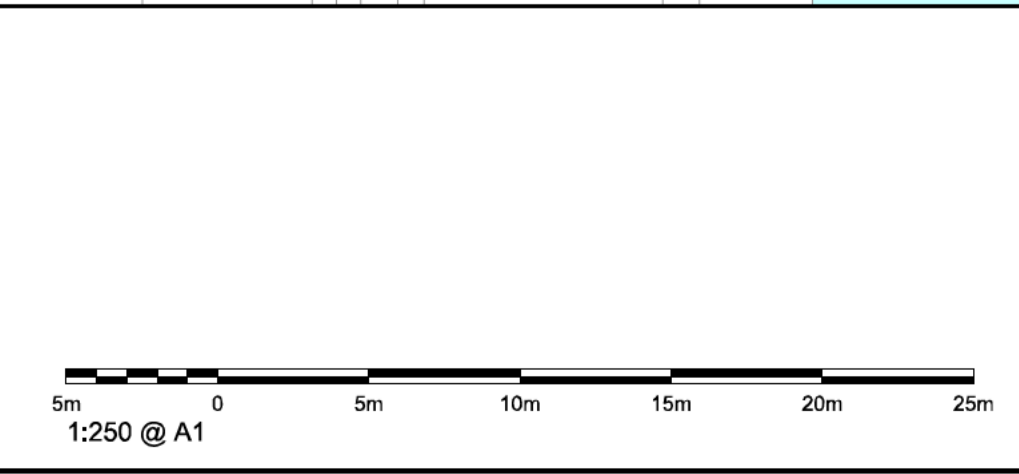
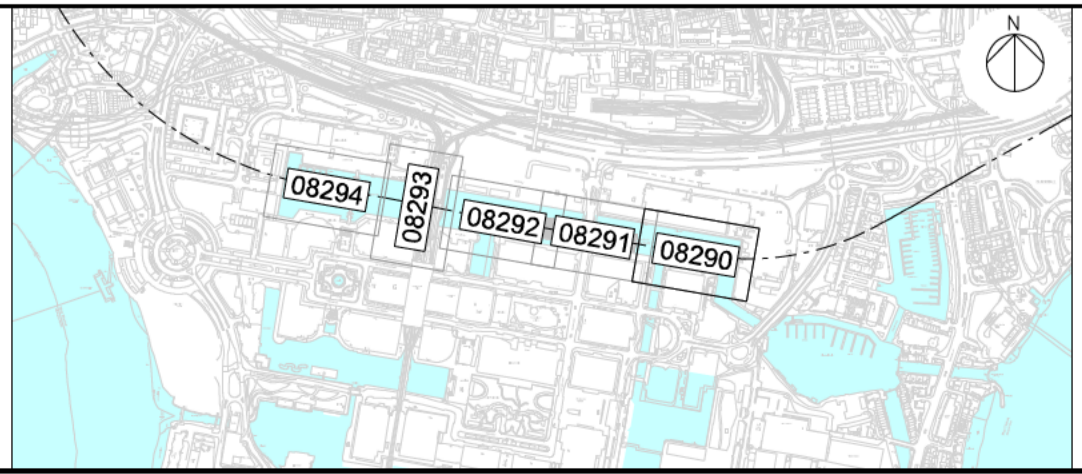
APPENDIX A: INSTRUMENT LOCATION



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P02	15/12/2015		MD	MD	MD	-

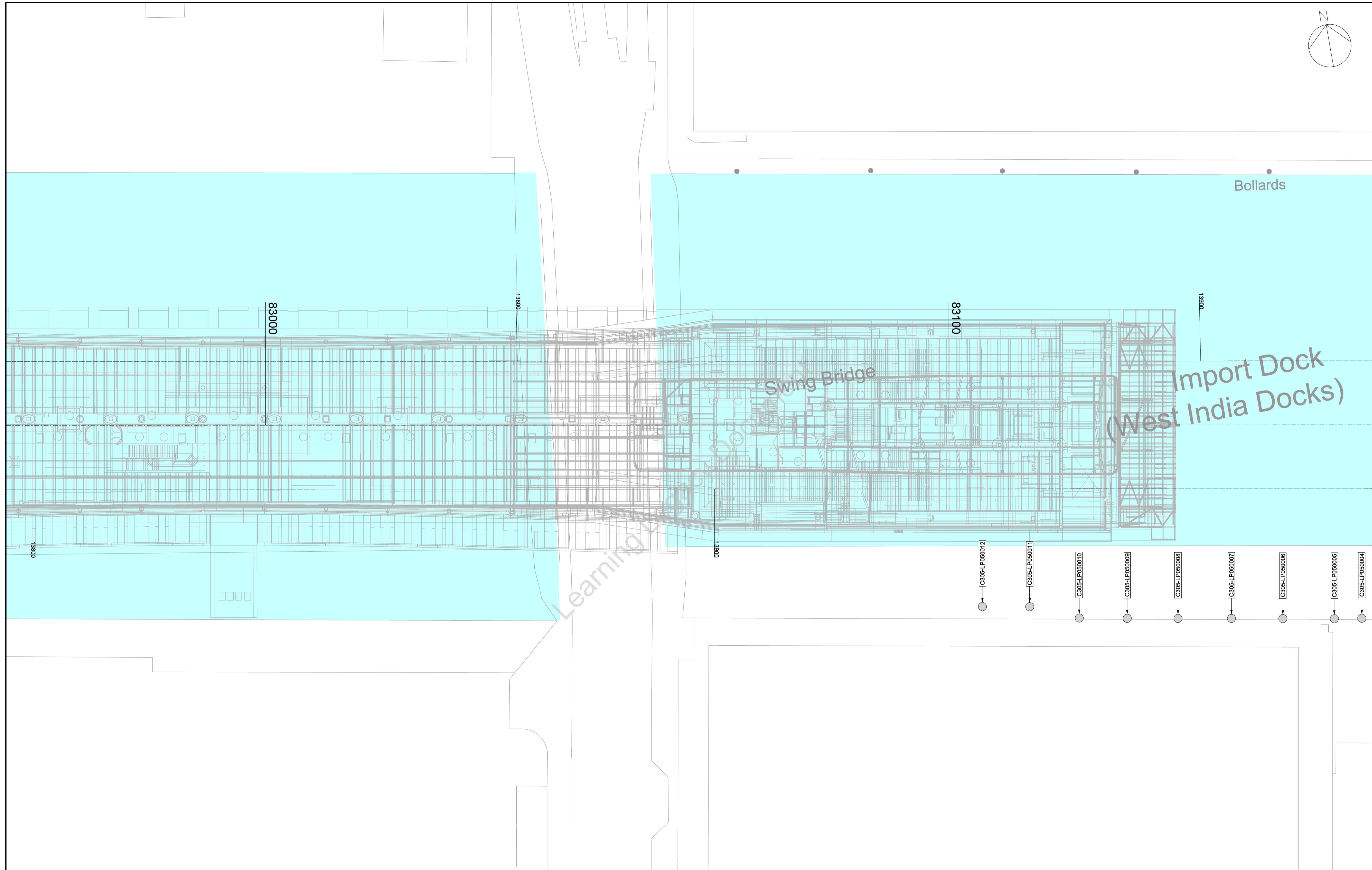
Notes

- Levelling Points
- 3D Prisms
- ⊠ Retro Targets



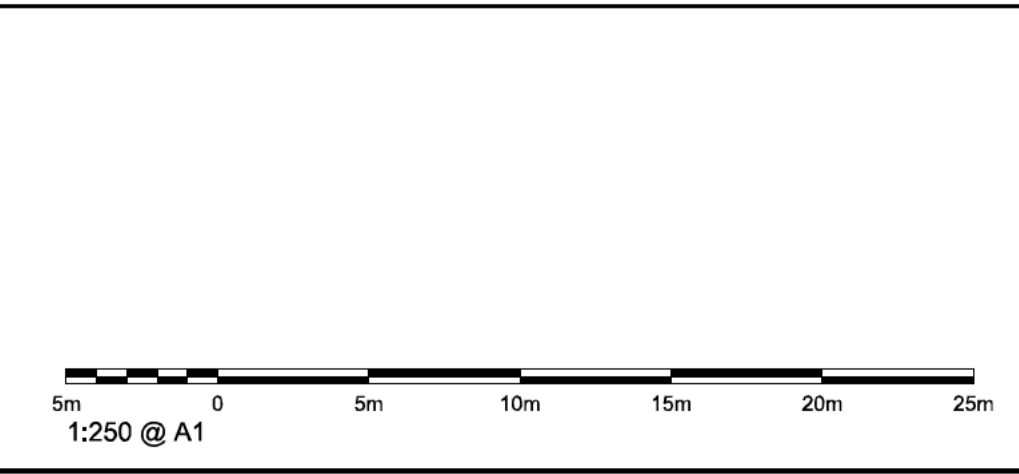
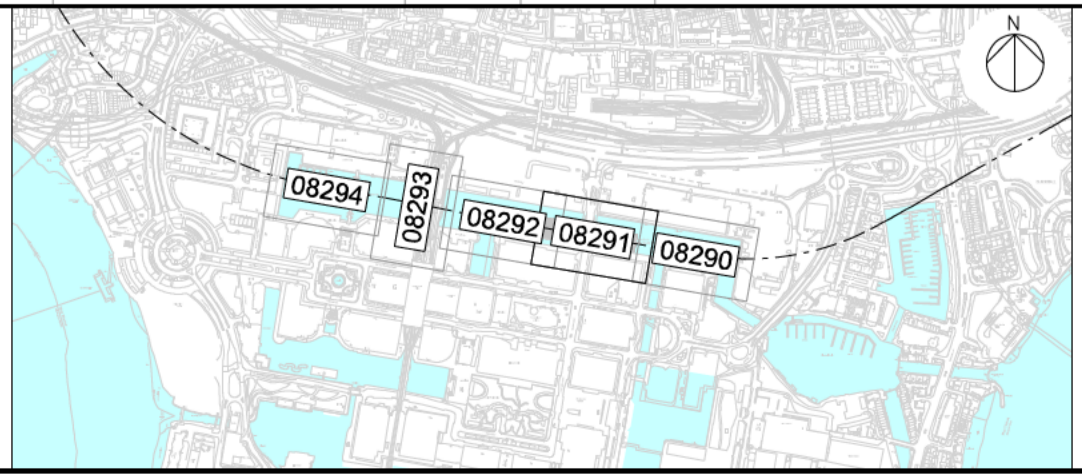
<p>Crossrail Limited 25 Canada Square Canary Wharf London E14 6LQ</p> <p>© Crossrail www.crossrail.co.uk</p>	<p>Contract: Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G</p> <p>Originator: Dragados Sisk Joint Venture</p> <p>Location: Crossrail Tunnels - Drive Y (Limmo Peninsula to Farringdon Stn)</p>	<p>By: M.DAVIS</p> <p>CHK: M.DAVIS</p> <p>App: M.DAVIS</p> <p>Auth: -</p>
	<p>Title: Instrumentation & Monitoring Installation Report for Drive Y Canary Wharf West India Dock Wall (Drive Y)</p>	<p>Rev: P02</p>
	<p>Drawing and CAD No: C305-DSJ-C2-RGN-CRG03-50204</p>	<p>Substability: S4</p>
	<p>Scale: 1:250 @ A1</p>	<p>Rev: P02</p>

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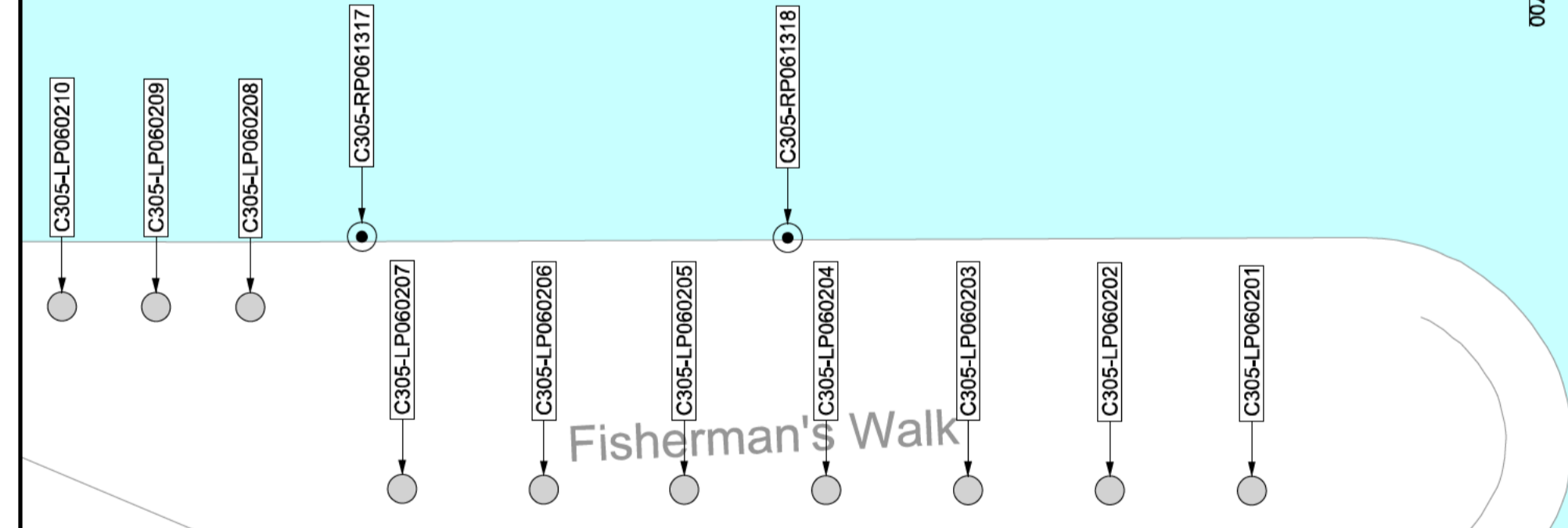
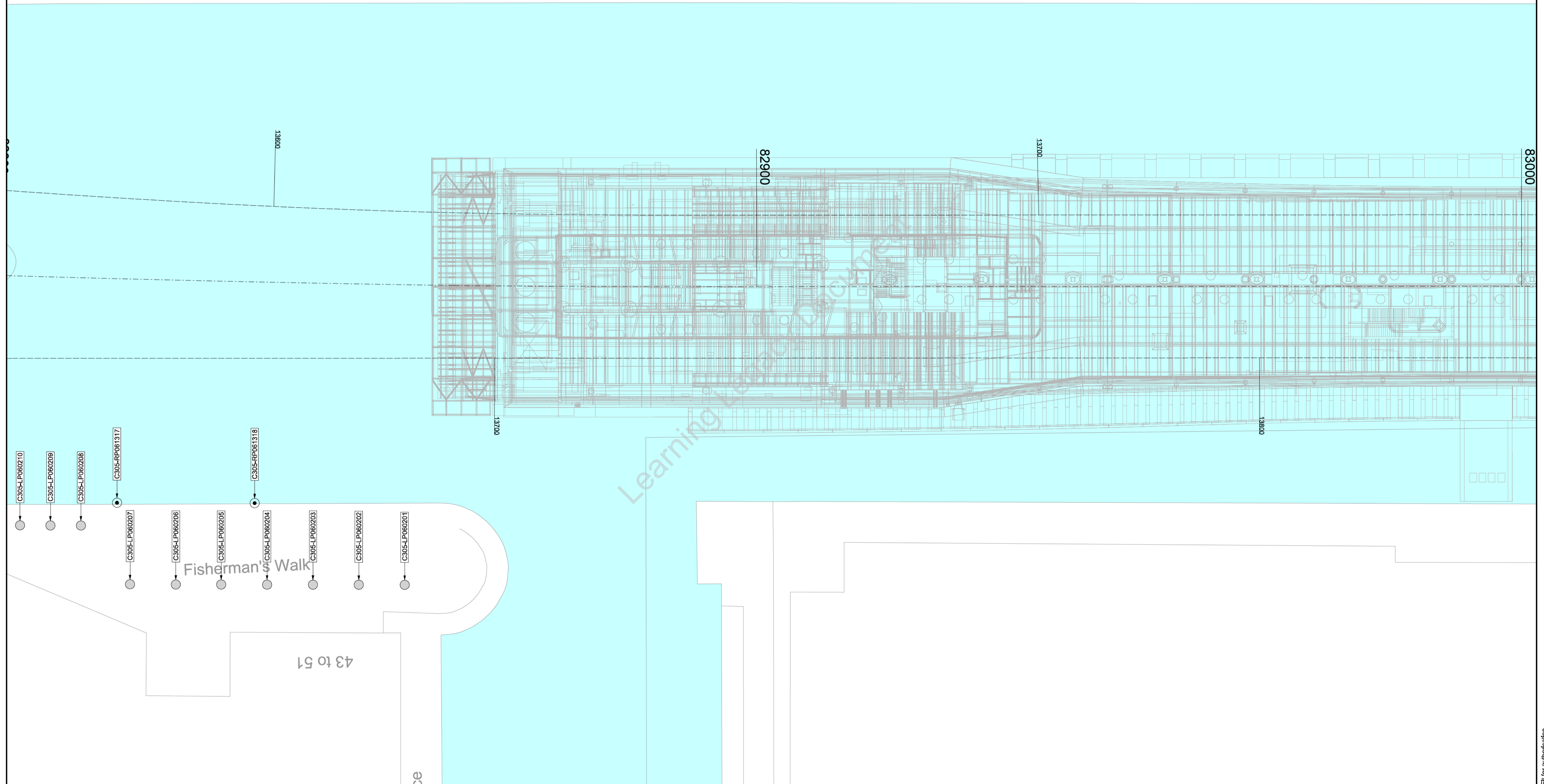
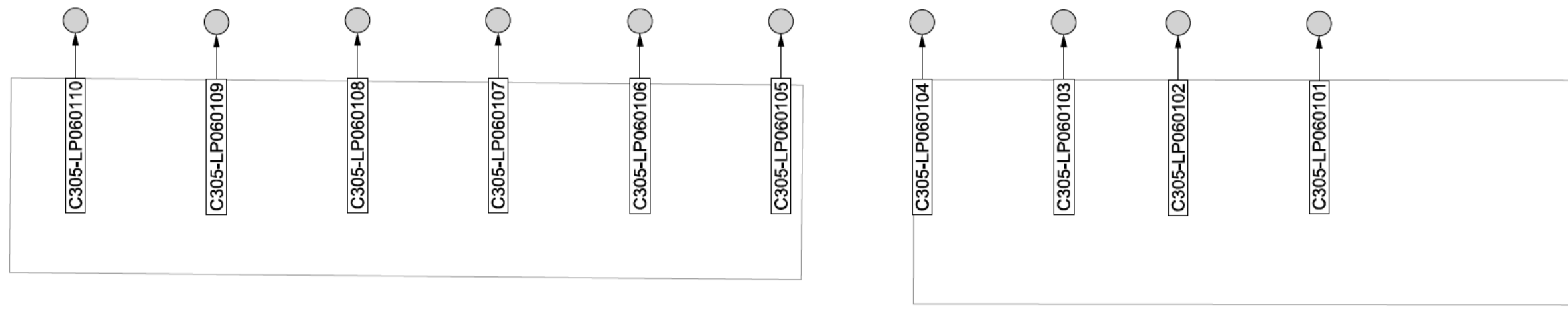
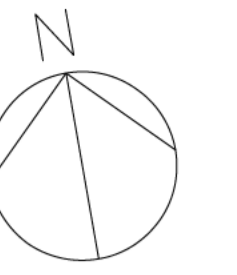
Rev.	Date	Description	By	Chkd	App	Auth
P01	20/11/2015	First Issue	MD	SD	SD	-
P02	15/12/2015	-	MD	MD	MD	-

- Notes**
- Levelling Points
 - 3D Prisms
 - ⊠ Retro Targets



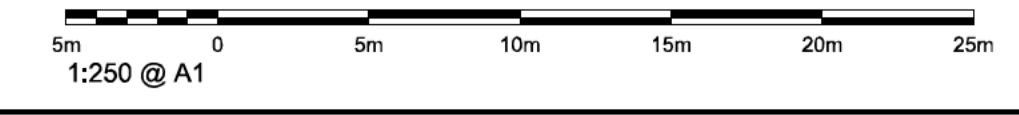
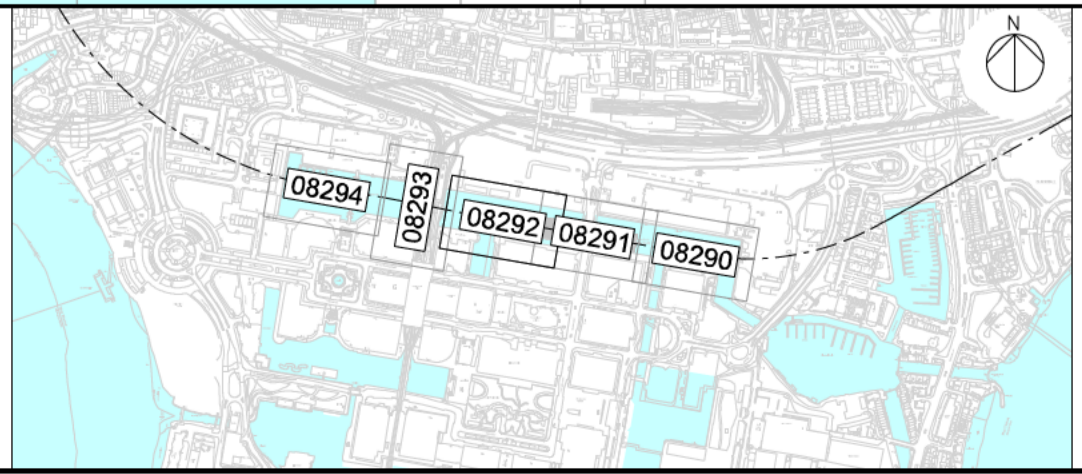
<p>Crossrail Limited 25 Canada Square Canary Wharf London E14 6LQ</p> <p>© Crossrail www.crossrail.co.uk</p>	<p>Contract: Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G</p> <p>Originator: Dragados Sisk Joint Venture</p> <p>Location: Crossrail Tunnels - Drive Y (Limmo Peninsula to Farringdon Stn)</p>	<p>By: M.DAVIS</p> <p>CHK: M.DAVIS</p> <p>APP: M.DAVIS</p> <p>Auth: -</p>
	<p>Title: Instrumentation & Monitoring Installation Report for Drive Y Canary Wharf West India Dock Wall (Drive Y)</p>	<p>Rev: P02</p>
	<p>Drawing and CAD No: C305-DSJ-C2-RGN-CRG03-50204</p>	<p>Submittal: S4</p>
	<p>Scale: 1:250 @ A1</p>	<p>Project No: C305-DSJ-C2-DDA-CRT00_ST006_1-08291</p>


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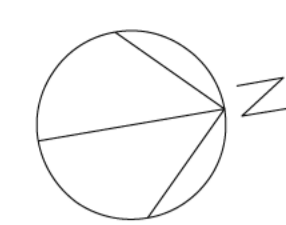
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- Notes
- Levelling Points
 - 3D Prisms
 - ⊠ Retro Targets



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	Originator: Dragados Sisk Joint Venture	CHK: S.DIRKWE
	Location: Crossrail Tunnels - Drive Y (Limmo Peninsula to Farringdon Stn)	App: S.DIRKWE
	Title: Instrumentation & Monitoring Installation Report for Drive Y Canary Wharf West India Dock Wall (Drive Y)	Auth: -
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Frobisher Passage

Fisherman's Walk

Traveling Crane

Station
West India Quay

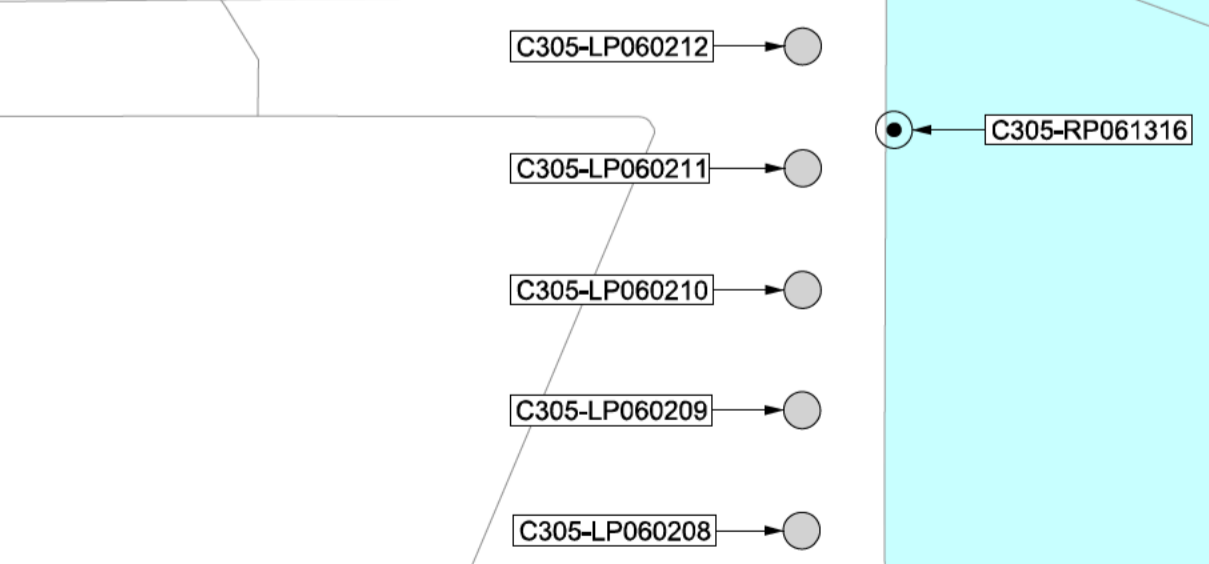
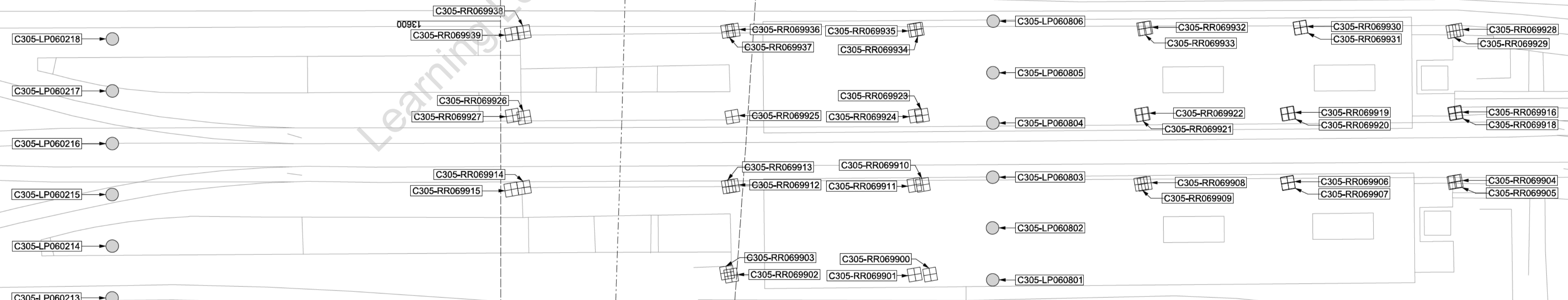
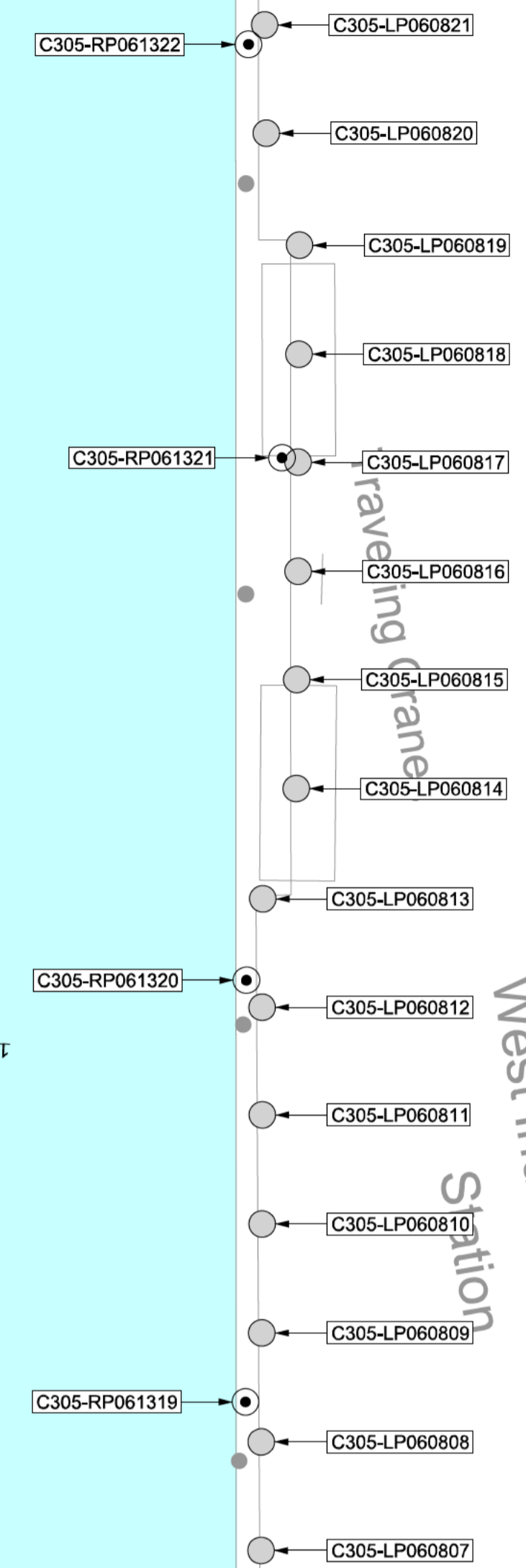
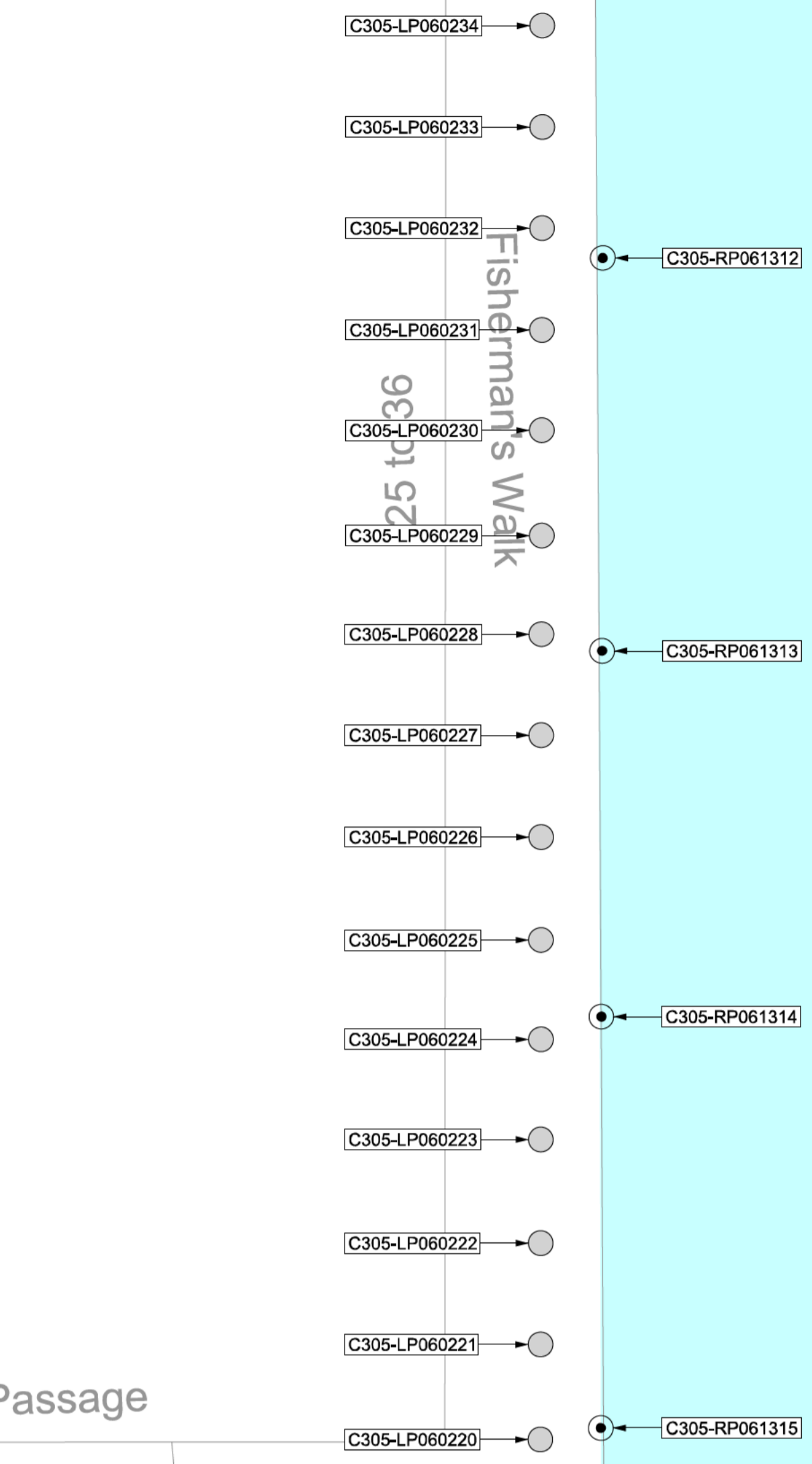
Hotel

82700

13600

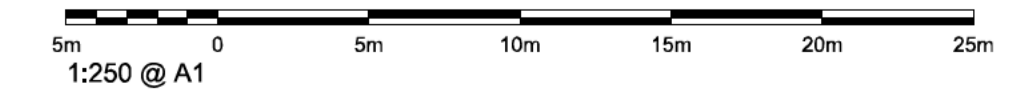
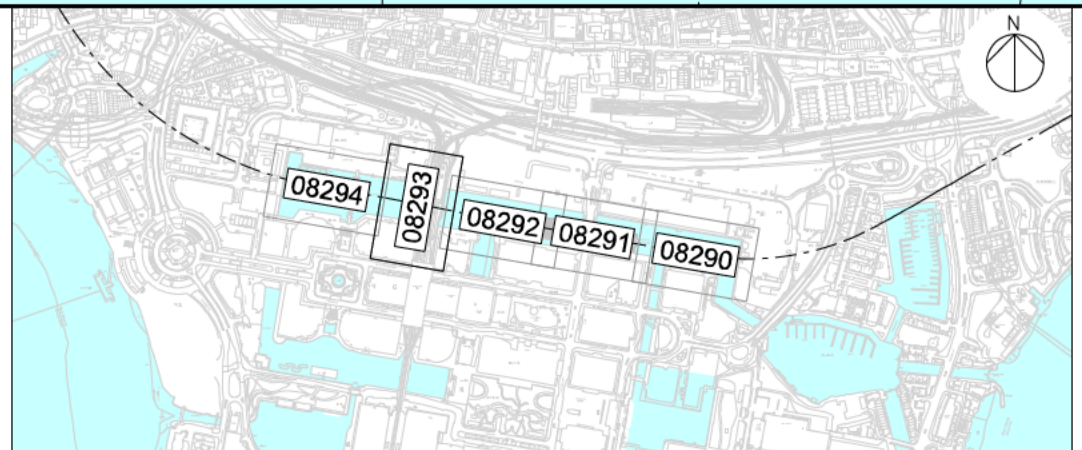
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Police Station
(below)



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- Notes
- Levelling Points
 - 3D Prisms
 - ⊠ Retro Targets





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Contract:
Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G

Originator:
Dragados Sisk Joint Venture

Location:
Crossrail Tunnels - Drive Y (Limmo Peninsula to Farringdon Stn)

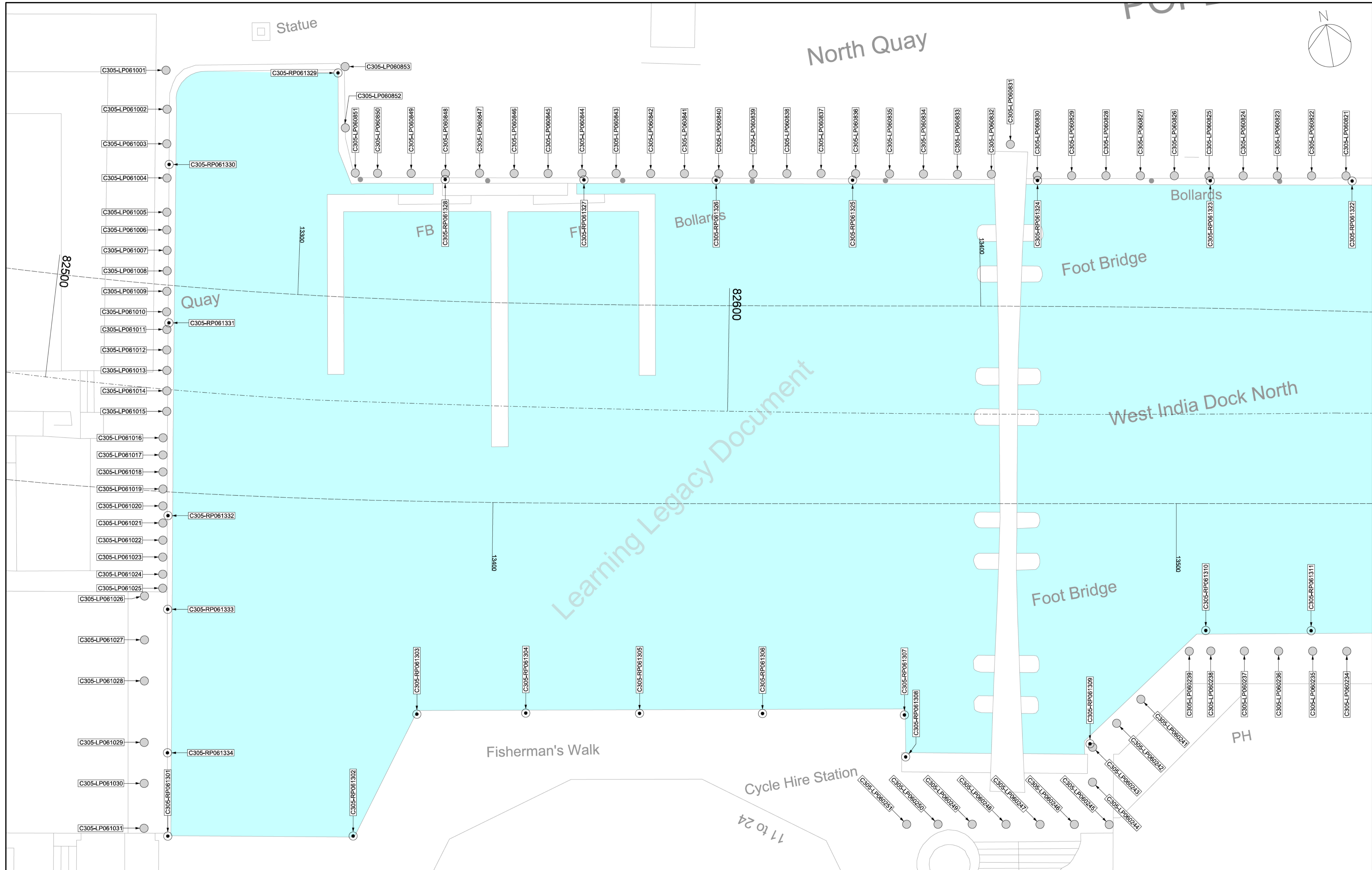
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Instrumentation & Monitoring
Installation Report for Drive Y Canary Wharf
West India Dock Wall (Drive Y)
C305-DSJ-C2-RGN-CRG03-50204

By: M.DAVIS
CHK: S.DIRKWE
APP: S.DIRKWE
Auth: -

Scale:
1:250 @ A1

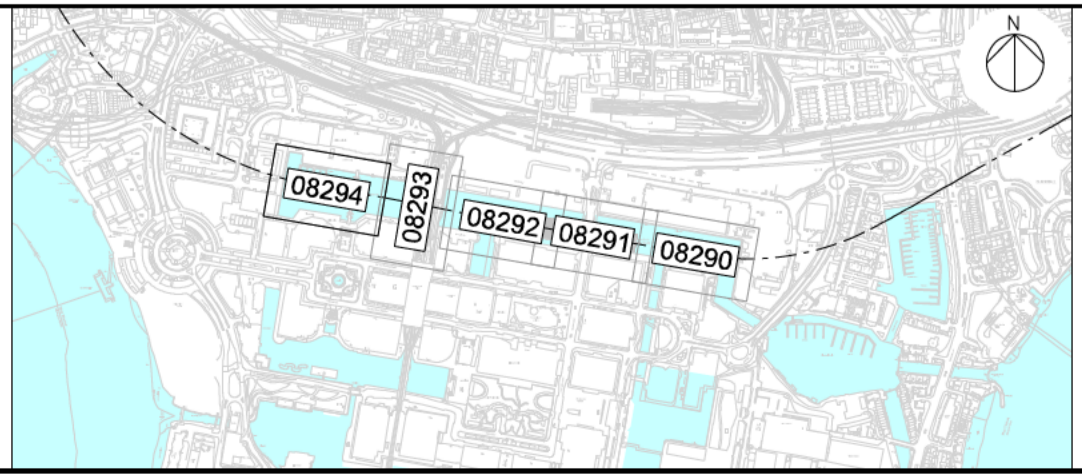
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C305-DSJ-C2-DDA-CRT00_ST006_1-08293

Rev: P01
Suitability: S4



Rev.	Date	Description	By	Chkd	App	Auth
P01	20/11/2015	First Issue	MD	SD	SD	-

- Notes
- Levelling Points
 - 3D Prisms
 - ⊕ Retro Targets



Scale: 1:250 @ A1

Contract: Tunnels East - Drive Y LIM to FAR & Drive Z SGJ to PML & Drive G

Originator: Dragados Sisk Joint Venture

Location: Crossrail Tunnels - Drive Y (Limmo Peninsula to Farringdon Stn)

Title: Instrumentation & Monitoring Installation Report for Drive Y Canary Wharf West India Dock Wall (Drive Y)

Project: C305-DSJ-C2-RGN-CRG03-50204

Scale: 1:250 @ A1

Drawing and CAD No: C305-DSJ-C2-DDA-CRT00_ST006_1-08294

Rev: P01

Submittal: S4

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E14 6LQ

By: M.DAVIS
Chk: S.DIRKWE
App: S.DIRKWE
Auth: -

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APPENDIX B: SUMMARY OF INSTRUMENTATION INSTALLED ON SITE

Learning Legacy Document

IRS Installation Record Sheets - Levelling points

Sensor Type	Sensor ID	Date Installation	Sub-Area	Status	SENSOR Location - GPS readings (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)	AVERAGE	10/05/2013	10/05/2013	10/05/2013
Levelling Point	C305-LP042500	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88279 8804	34907.9952	112.7702	112.7737	112.7739	112.7731	112.7741
Levelling Point	C305-LP042501	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88280 8523	34913.5447	112.6084	112.6122	112.6126	112.6122	112.6118
Levelling Point	C305-LP042502	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88281 8111	34919.0752	112.4547	112.4578	112.4583	112.4575	112.4576
Levelling Point	C305-LP042503	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88281 2794	34924.3622	112.3088	112.3126	112.3129	112.3122	112.3127
Levelling Point	C305-LP042504	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88275 9376	34926.8177	112.1464	112.1502	112.15	112.1505	112.1501
Levelling Point	C305-LP042505	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88269.7357	34927.8981	112.1358	112.1393	112.1396	112.1387	112.1396
Levelling Point	C305-LP042506	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88263.7447	34928.7696	112.1366	112.14	112.1397	112.1402	112.1401
Levelling Point	C305-LP042507	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88257.7624	34929.4952	112.1038	112.1071	112.1069	112.1076	112.1068
Levelling Point	C305-LP042508	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88251 9575	34930.4717	112.1109	112.114	112.1139	112.1146	112.1135
Levelling Point	C305-LP042509	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88245.7257	34931.5651	112.1102	112.113	112.1124	112.1136	112.113
Levelling Point	C305-LP042510	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88239.4317	34932.7001	112.1077	112.1096	112.109	112.1101	112.1097
Levelling Point	C305-LP042511	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88233.717	34933.7192	112.1085	112.1104	112.1106	112.1098	112.1108
Levelling Point	C305-LP042512	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88227 9814	34934.784	112.1063	112.108	112.1077	112.1084	112.1079
Levelling Point	C305-LP042513	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88221.7343	34935.8342	112.107	112.1084	112.1082	112.109	112.108
Levelling Point	C305-LP042514	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88215 3907	34936.8924	112.104	112.1055	112.1058	112.1051	112.1056
Levelling Point	C305-LP042515	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88209 0829	34937.9916	112.1077	112.1089	112.1088	112.1094	112.1085
Levelling Point	C305-LP042516	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88203.502	34938.9673	112.1008	112.1002	112.0996	112.1004	112.1006
Levelling Point	C305-LP042517	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88198.1843	34939.9003	112.1108	112.1105	112.111	112.1103	112.1102
Levelling Point	C305-LP042518	10/05/2013	Area 4 – Canary Wharf (Barclays building)	Installed	88194.6706	34941.3659	112.1273	112.1269	112.1273	112.1266	112.1268
								AVERAGE	26/10/2012	26/10/2012	26/10/2012
Levelling Point	C305-LP060201	20/10/2012	Area 5 – (*) South section of Quay	Installed	87859.8834	34989.4083	106.9228	106.9117	106.9112	106.9118	106.9121
Levelling Point	C305-LP060202	20/10/2012	Area 5 – (*) South section of Quay	Installed	87853.9712	34990.4392	106.9064	106.8959	106.8953	106.8963	106.8961
Levelling Point	C305-LP060203	20/10/2012	Area 5 – (*) South section of Quay	Installed	87848 067	34991.4654	106.9068	106.8955	106.8953	106.8959	106.8953
Levelling Point	C305-LP060204	20/10/2012	Area 5 – (*) South section of Quay	Installed	87842.1582	34992.4992	106.9038	106.8925	106.8926	106.8919	106.893
Levelling Point	C305-LP060205	20/10/2012	Area 5 – (*) South section of Quay	Installed	87836.2495	34993.5311	106.9	106.8907	106.8904	106.8908	106.8909
Levelling Point	C305-LP060206	20/10/2012	Area 5 – (*) South section of Quay	Installed	87830.4065	34994.5514	106.9016	106.8923	106.8927	106.892	106.8922
Levelling Point	C305-LP060207	20/10/2012	Area 5 – (*) South section of Quay	Installed	87824.5114	34995.6003	106.9823	106.8943	106.8937	106.8945	106.8947

Sensor Type	Sensor ID	Date Installation	Sub-Area	Status	SENSOR Location - GPS readings (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP060208	20/10/2012	Area 6 – South section of Quay	Installed	87819.4929	35004.266	106.8445	106.8363	106.8369	106.8361	106.8359
Levelling Point	C305-LP060209	20/10/2012	Area 6 – South section of Quay	Installed	87815.5669	35004.9556	106.8428	106.8355	106.8352	106.836	106.8353
Levelling Point	C305-LP060210	20/10/2012	Area 6 – South section of Quay	Installed	87811.6555	35005.6513	106.9232	106.8358	106.8355	106.836	106.8359
Levelling Point	C305-LP060211	20/10/2012	Area 6 – South section of Quay	Installed	87807.6931	35006.3437	106.9243	106.8373	106.8375	106.8372	106.8372
Levelling Point	C305-LP060212	20/10/2012	Area 6 – South section of Quay	Installed	87803.7198	35007.0287	106.8259	106.8193	106.8196	106.8187	106.8196
Levelling Point	C305-LP060213	20/10/2012	Area 6 – South section of Quay	Installed	87797.901	34992.0772	106.9895	106.9015	106.9009	106.9021	106.9015
Levelling Point	C305-LP060214	20/10/2012	Area 6 – South section of Quay	Installed	87792.9702	34992.947	106.94	106.8521	106.8517	106.8522	106.8524
Levelling Point	C305-LP060215	20/10/2012	Area 6 – South section of Quay	Installed	87788.0651	34993.7849	106.9176	106.8303	106.83	106.8306	106.8303
Levelling Point	C305-LP060216	20/10/2012	Area 6 – South section of Quay	Installed	87783.2168	34994.6381	106.912	106.8252	106.8249	106.8255	106.8252
Levelling Point	C305-LP060217	20/10/2012	Area 6 – South section of Quay	Installed	87778.2172	34995.5092	106.9281	106.8412	106.8409	106.8415	106.8412
Levelling Point	C305-LP060218	20/10/2012	Area 6 – South section of Quay	Installed	87773.2671	34996.3693	106.9552	106.8685	106.8682	106.869	106.8683
Levelling Point	C305-LP060220	20/10/2012	Area 6 – South section of Quay	Installed	87768.8762	35013.1126	106.9242	106.8389	106.8393	106.8385	106.8389
Levelling Point	C305-LP060221	20/10/2012	Area 6 – South section of Quay	Installed	87764.2679	35013.9239	106.9195	106.8337	106.8334	106.8343	106.8334
Levelling Point	C305-LP060222	20/10/2012	Area 6 – South section of Quay	Installed	87759.3577	35014.7778	106.9177	106.8319	106.8314	106.8323	106.832
Levelling Point	C305-LP060223	20/10/2012	Area 6 – South section of Quay	Installed	87754.3302	35015.6519	106.919	106.833	106.8336	106.8329	106.8325
Levelling Point	C305-LP060224	20/10/2012	Area 6 – South section of Quay	Installed	87749.4793	35016.496	106.9186	106.8328	106.8332	106.8325	106.8327
Levelling Point	C305-LP060225	20/10/2012	Area 6 – South section of Quay	Installed	87744.6606	35017.331	106.9158	106.834	106.8343	106.8334	106.8343
Levelling Point	C305-LP060226	20/10/2012	Area 6 – South section of Quay	Installed	87739.6765	35018.2045	106.9201	106.8339	106.8335	106.8341	106.8341
Levelling Point	C305-LP060227	20/10/2012	Area 6 – South section of Quay	Installed	87734.7276	35019.0648	106.9276	106.8419	106.8416	106.8422	106.8419
Levelling Point	C305-LP060228	20/10/2012	Area 6 – South section of Quay	Installed	87729.8398	35019.9204	106.922	106.8361	106.8355	106.8365	106.8363
Levelling Point	C305-LP060229	20/10/2012	Area 6 – South section of Quay	Installed	87725.0534	35020.7625	106.9163	106.8302	106.8297	106.8307	106.8302
Levelling Point	C305-LP060230	20/10/2012	Area 6 – South section of Quay	Installed	87719.9522	35021.6463	106.9192	106.8331	106.8329	106.8333	106.8331
Levelling Point	C305-LP060231	20/10/2012	Area 6 – South section of Quay	Installed	87715.0912	35022.4966	106.9164	106.83	106.8299	106.8302	106.8299
Levelling Point	C305-LP060232	20/10/2012	Area 6 – South section of Quay	Installed	87710.1531	35023.3552	106.9151	106.8283	106.8285	106.8282	106.8282
Levelling Point	C305-LP060233	20/10/2012	Area 6 – South section of Quay	Installed	87705.2546	35024.2073	106.9182	106.832	106.8324	106.8316	106.832
Levelling Point	C305-LP060234	20/10/2012	Area 6 – South section of Quay	Installed	87700.3328	35025.0603	106.9148	106.8286	106.8284	106.8288	106.8286
Levelling Point	C305-LP060235	20/10/2012	Area 6 – South section of Quay	Installed	87695.4192	35025.9268	106.9184	106.8326	106.8321	106.8328	106.8329
Levelling Point	C305-LP060236	20/10/2012	Area 6 – South section of Quay	Installed	87690.5045	35026.7773	106.9207	106.8343	106.8342	106.8347	106.834
Levelling Point	C305-LP060237	20/10/2012	Area 6 – South section of Quay	Installed	87685.5631	35027.6405	106.9287	106.8425	106.8426	106.8421	106.8428
Levelling Point	C305-LP060238	20/10/2012	Area 6 – South section of Quay	Installed	87680.726	35028.4803	106.9301	106.8439	106.8443	106.8433	106.8441
Levelling Point	C305-LP060239	20/10/2012	Area 6 – South section of Quay	Installed	87677.6227	35028.9901	106.8671	106.7943	106.7948	106.7938	106.7943
Levelling Point	C305-LP060241	20/10/2012	Area 6 – South section of Quay	Installed	87669.4425	35023.2672	106.7889	106.7845	106.7844	106.7851	106.784
Levelling Point	C305-LP060242	20/10/2012	Area 6 – South section of Quay	Installed	87665.3455	35020.4052	106.7923	106.7879	106.7881	106.7878	106.7878
Levelling Point	C305-LP060243	20/10/2012	Area 6 – South section of Quay	Installed	87661.2883	35017.555	106.7882	106.783	106.7825	106.7835	106.783

Sensor Type	Sensor ID	Date Installation	Sub-Area	Status	SENSOR Location - GPS readings (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP060244	20/10/2012	Area 6 – South section of Quay	Installed	87660.393	35012.5164	106.7993	106.794	106.7946	106.7934	106.794
Levelling Point	C305-LP060245	20/10/2012	Area 6 – South section of Quay	Installed	87661.7495	35005.9986	106.9215	106.916	106.9166	106.9155	106.9159
Levelling Point	C305-LP060246	20/10/2012	Area 6 – South section of Quay	Installed	87656.7255	35006.8814	106.9248	106.9191	106.9186	106.9192	106.9195
Levelling Point	C305-LP060247	20/10/2012	Area 6 – South section of Quay	Installed	87651.7697	35007.7437	106.9225	106.9171	106.917	106.9174	106.9169
Levelling Point	C305-LP060248	20/10/2012	Area 6 – South section of Quay	Installed	87646.8705	35008.605	106.9246	106.9192	106.9189	106.9197	106.919
Levelling Point	C305-LP060249	20/10/2012	Area 6 – South section of Quay	Installed	87642.0008	35009.4506	106.998	106.9252	106.9246	106.9257	106.9253
Levelling Point	C305-LP060250	20/10/2012	Area 6 – South section of Quay	Installed	87637.0661	35010.3122	107.0094	106.9368	106.9362	106.9369	106.9373
Levelling Point	C305-LP060251	20/10/2012	Area 6 – South section of Quay	Installed	87632.5463	35011.0831	107.0007	106.9332	106.933	106.9338	106.9328
								AVERAGE	07/11/2012	07/11/2012	07/11/2012
Levelling Point	C305-LP061001	21/10/2012	Area 6 – West section of Quay	Installed	87544.5418	35138.2931	105.4236	105.3452	105.3447	105.3457	105.3452
Levelling Point	C305-LP061002	21/10/2012	Area 6 – West section of Quay	Installed	87543.7119	35132.6447	105.5718	105.4937	105.4941	105.4933	105.4937
Levelling Point	C305-LP061003	21/10/2012	Area 6 – West section of Quay	Installed	87542.8238	35127.6657	105.5642	105.4864	105.4859	105.487	105.4863
Levelling Point	C305-LP061004	21/10/2012	Area 6 – West section of Quay	Installed	87542.0018	35122.7275	105.5553	105.4778	105.4779	105.4777	105.4778
Levelling Point	C305-LP061005	21/10/2012	Area 6 – West section of Quay	Installed	87541.12	35117.8018	105.5539	105.4764	105.4763	105.4767	105.4762
Levelling Point	C305-LP061006	21/10/2012	Area 6 – West section of Quay	Installed	87540.6742	35115.2555	105.5418	105.4643	105.4649	105.4637	105.4643
Levelling Point	C305-LP061007	21/10/2012	Area 6 – West section of Quay	Installed	87540.2044	35112.2945	105.5429	105.4655	105.4656	105.4653	105.4656
Levelling Point	C305-LP061008	21/10/2012	Area 6 – West section of Quay	Installed	87539.7004	35109.335	105.5398	105.4623	105.4626	105.4619	105.4624
Levelling Point	C305-LP061009	21/10/2012	Area 6 – West section of Quay	Installed	87539.1502	35106.3997	105.5397	105.462	105.4618	105.4624	105.4618
Levelling Point	C305-LP061010	21/10/2012	Area 6 – West section of Quay	Installed	87538.6047	35103.4455	105.542	105.4639	105.4633	105.4644	105.464
Levelling Point	C305-LP061011	21/10/2012	Area 6 – West section of Quay	Installed	87538.1945	35100.892	105.5404	105.4621	105.4624	105.4618	105.4621
Levelling Point	C305-LP061012	21/10/2012	Area 6 – West section of Quay	Installed	87537.6797	35097.9409	105.5429	105.4643	105.4648	105.4641	105.464
Levelling Point	C305-LP061013	21/10/2012	Area 6 – West section of Quay	Installed	87537.1821	35094.992	105.5404	105.4616	105.4614	105.4622	105.4612
Levelling Point	C305-LP061014	21/10/2012	Area 6 – West section of Quay	Installed	87536.6687	35092.0352	105.5388	105.4594	105.4589	105.46	105.4593
Levelling Point	C305-LP061015	21/10/2012	Area 6 – West section of Quay	Installed	87536.1404	35089.0887	105.5354	105.4556	105.4555	105.4557	105.4556
Levelling Point	C305-LP061016	21/10/2012	Area 6 – West section of Quay	Installed	87534.9431	35085.3578	105.4437	105.3636	105.3642	105.3634	105.3632
Levelling Point	C305-LP061017	21/10/2012	Area 6 – West section of Quay	Installed	87534.5138	35082.8914	105.5192	105.4389	105.4387	105.4393	105.4387
Levelling Point	C305-LP061018	21/10/2012	Area 6 – West section of Quay	Installed	87534.0816	35080.4405	105.6061	105.5256	105.5253	105.5261	105.5254
Levelling Point	C305-LP061019	21/10/2012	Area 6 – West section of Quay	Installed	87533.6516	35077.9845	105.7314	105.6508	105.6511	105.6505	105.6508
Levelling Point	C305-LP061020	21/10/2012	Area 6 – West section of Quay	Installed	87533.2228	35075.5384	105.8577	105.7772	105.7771	105.7774	105.7771
Levelling Point	C305-LP061021	21/10/2012	Area 6 – West section of Quay	Installed	87532.7906	35073.0779	105.993	105.9129	105.9125	105.9133	105.9129
Levelling Point	C305-LP061022	21/10/2012	Area 6 – West section of Quay	Installed	87532.3591	35070.6062	106.1184	106.0383	106.0386	106.0382	106.0381
Levelling Point	C305-LP061023	21/10/2012	Area 6 – West section of Quay	Installed	87531.9304	35068.1614	106.2475	106.1674	106.1677	106.1668	106.1677
Levelling Point	C305-LP061024	21/10/2012	Area 6 – West section of Quay	Installed	87531.4993	35065.696	106.3789	106.2984	106.298	106.2989	106.2983
Levelling Point	C305-LP061025	21/10/2012	Area 6 – West section of Quay	Installed	87531.149	35063.6825	106.4787	106.3984	106.3981	106.399	106.3981

Sensor Type	Sensor ID	Date Installation	Sub-Area	Status	SENSOR Location - GPS readings (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP061026	21/10/2012	Area 6 – West section of Quay	Installed	87528.3286	35063.0089	106.5215	106.4369	106.4373	106.4368	106.4366
Levelling Point	C305-LP061027	21/10/2012	Area 6 – West section of Quay	Installed	87527.2232	35056.685	106.5137	106.429	106.4286	106.4292	106.4292
Levelling Point	C305-LP061028	21/10/2012	Area 6 – West section of Quay	Installed	87526.1873	35050.7667	106.5114	106.426	106.4264	106.4254	106.4262
Levelling Point	C305-LP061029	21/10/2012	Area 6 – West section of Quay	Installed	87524.6316	35041.9035	106.5137	106.428	106.4279	106.4282	106.4279
Levelling Point	C305-LP061030	21/10/2012	Area 6 – West section of Quay	Installed	87523.6002	35035.9986	106.5244	106.4379	106.438	106.4373	106.4384
Levelling Point	C305-LP061031	21/10/2012	Area 6 – West section of Quay	Installed	87522.4668	35029.5336	106.5155	106.4284	106.4285	106.4283	106.4284
								AVERAGE	07/11/2012	07/11/2012	07/11/2012
Levelling Point	C305-LP060801	21/10/2012	Area 6 – North section of Quay	Installed	87810.6736	35076.1817	105.1532	105.0679	105.0682	105.0674	105.0681
Levelling Point	C305-LP060802	21/10/2012	Area 6 – North section of Quay	Installed	87805.7288	35077.0114	105.1427	105.0577	105.0571	105.0579	105.0581
Levelling Point	C305-LP060803	21/10/2012	Area 6 – North section of Quay	Installed	87800.9101	35077.8719	105.1545	105.0704	105.0698	105.0706	105.0708
Levelling Point	C305-LP060804	21/10/2012	Area 6 – North section of Quay	Installed	87795.7562	35078.7721	105.1375	105.0533	105.0535	105.0529	105.0535
Levelling Point	C305-LP060805	21/10/2012	Area 6 – North section of Quay	Installed	87790.9801	35079.6109	105.1347	105.05	105.0503	105.0499	105.0498
Levelling Point	C305-LP060806	21/10/2012	Area 6 – North section of Quay	Installed	87786.0714	35080.4817	105.1342	105.0511	105.0505	105.0515	105.0513
Levelling Point	C305-LP060807	21/10/2012	Area 6 – North section of Quay	Installed	87781.1156	35081.5177	105.4773	105.3951	105.3955	105.3948	105.395
Levelling Point	C305-LP060808	21/10/2012	Area 6 – North section of Quay	Installed	87776.1989	35082.3785	105.4733	105.3915	105.3919	105.3909	105.3917
Levelling Point	C305-LP060809	21/10/2012	Area 6 – North section of Quay	Installed	87771.2722	35083.2494	105.4732	105.3921	105.3916	105.3923	105.3924
Levelling Point	C305-LP060810	21/10/2012	Area 6 – North section of Quay	Installed	87766.3385	35084.1218	105.4816	105.4005	105.4004	105.4009	105.4002
Levelling Point	C305-LP060811	21/10/2012	Area 6 – North section of Quay	Installed	87761.4042	35084.9861	105.4738	105.393	105.3929	105.3936	105.3925
Levelling Point	C305-LP060812	21/10/2012	Area 6 – North section of Quay	Installed	87756.5284	35085.8157	105.4688	105.3882	105.3881	105.3885	105.388
Levelling Point	C305-LP060813	21/10/2012	Area 6 – North section of Quay	Installed	87751.6272	35086.6984	105.4836	105.4023	105.4022	105.4026	105.4021
Levelling Point	C305-LP060814	21/10/2012	Area 6 – North section of Quay	Installed	87746.8944	35089.0805	105.5174	105.4358	105.4356	105.4361	105.4357
Levelling Point	C305-LP060815	21/10/2012	Area 6 – North section of Quay	Installed	87741.9636	35089.9537	105.5247	105.4426	105.443	105.4425	105.4423
Levelling Point	C305-LP060816	21/10/2012	Area 6 – North section of Quay	Installed	87737.0779	35090.8627	105.5252	105.4422	105.4425	105.4421	105.442
Levelling Point	C305-LP060817	21/10/2012	Area 6 – North section of Quay	Installed	87732.1341	35091.7175	105.5189	105.4359	105.4362	105.4354	105.4361
Levelling Point	C305-LP060818	21/10/2012	Area 6 – North section of Quay	Installed	87727.2512	35092.6085	105.5207	105.4383	105.4378	105.4388	105.4383
Levelling Point	C305-LP060819	21/10/2012	Area 6 – North section of Quay	Installed	87722.3228	35093.4836	105.5304	105.4471	105.4474	105.4468	105.4471
Levelling Point	C305-LP060820	21/10/2012	Area 6 – North section of Quay	Installed	87716.9878	35092.8519	105.4914	105.4104	105.4103	105.4106	105.4103
Levelling Point	C305-LP060821	21/10/2012	Area 6 – North section of Quay	Installed	87712.0755	35093.6268	105.4876	105.404	105.4043	105.4038	105.4039
Levelling Point	C305-LP060822	21/10/2012	Area 6 – North section of Quay	Installed	87707.1195	35094.4881	105.4813	105.3978	105.3978	105.3972	105.3984
Levelling Point	C305-LP060823	21/10/2012	Area 6 – North section of Quay	Installed	87702.1734	35095.3497	105.4831	105.399	105.3988	105.3994	105.3988
Levelling Point	C305-LP060824	21/10/2012	Area 6 – North section of Quay	Installed	87697.248	35096.2004	105.4872	105.4031	105.4037	105.4025	105.4031
Levelling Point	C305-LP060825	21/10/2012	Area 6 – North section of Quay	Installed	87692.32	35097.0552	105.4913	105.4067	105.4073	105.4065	105.4063
Levelling Point	C305-LP060826	21/10/2012	Area 6 – North section of Quay	Installed	87687.3192	35097.9277	105.4928	105.408	105.4075	105.4086	105.4079
Levelling Point	C305-LP060827	21/10/2012	Area 6 – North section of Quay	Installed	87682.4277	35098.7717	105.4941	105.4088	105.4084	105.4093	105.4087

Sensor Type	Sensor ID	Date Installation	Sub-Area	Status	SENSOR Location - GPS readings (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP060828	21/10/2012	Area 6 – North section of Quay	Installed	87677.4626	35099.6347	105.4952	105.4092	105.4091	105.4097	105.4088
Levelling Point	C305-LP060829	21/10/2012	Area 6 – North section of Quay	Installed	87672.5187	35100.4961	105.5026	105.4161	105.4156	105.4167	105.416
Levelling Point	C305-LP060830	21/10/2012	Area 6 – North section of Quay	Installed	87667.5626	35101.3556	105.4953	105.4087	105.4083	105.4091	105.4087
Levelling Point	C305-LP060831	21/10/2012	Area 6 – North section of Quay	Installed	87664.4604	35106.5492	105.5787	105.4929	105.4931	105.4924	105.4932
Levelling Point	C305-LP060832	21/10/2012	Area 6 – North section of Quay	Installed	87660.9792	35102.7149	105.4999	105.4142	105.4138	105.4143	105.4145
Levelling Point	C305-LP060833	21/10/2012	Area 6 – North section of Quay	Installed	87656.0748	35103.5525	105.4943	105.4258	105.4257	105.4259	105.4258
Levelling Point	C305-LP060834	21/10/2012	Area 6 – North section of Quay	Installed	87651.1834	35104.4383	105.5019	105.4331	105.4325	105.4332	105.4336
Levelling Point	C305-LP060835	21/10/2012	Area 6 – North section of Quay	Installed	87646.3041	35105.3027	105.4985	105.4297	105.4293	105.4303	105.4295
Levelling Point	C305-LP060836	21/10/2012	Area 6 – North section of Quay	Installed	87641.4152	35106.1717	105.5026	105.4333	105.4332	105.4337	105.433
Levelling Point	C305-LP060837	21/10/2012	Area 6 – North section of Quay	Installed	87636.4401	35107.0782	105.489	105.422	105.4223	105.4214	105.4223
Levelling Point	C305-LP060838	21/10/2012	Area 6 – North section of Quay	Installed	87631.5019	35107.897	105.4826	105.4125	105.4126	105.4119	105.413
Levelling Point	C305-LP060839	21/10/2012	Area 6 – North section of Quay	Installed	87626.6113	35108.7083	105.4898	105.4193	105.4188	105.4197	105.4194
Levelling Point	C305-LP060840	21/10/2012	Area 6 – North section of Quay	Installed	87621.6772	35109.5887	105.4914	105.4204	105.4203	105.4209	105.42
Levelling Point	C305-LP060841	21/10/2012	Area 6 – North section of Quay	Installed	87616.7281	35110.4576	105.4801	105.4084	105.409	105.4078	105.4084
Levelling Point	C305-LP060842	21/10/2012	Area 6 – North section of Quay	Installed	87611.8664	35111.3133	105.4824	105.4111	105.411	105.4117	105.4106
Levelling Point	C305-LP060843	21/10/2012	Area 6 – North section of Quay	Installed	87606.875	35112.1891	105.4806	105.4091	105.4093	105.4087	105.4093
Levelling Point	C305-LP060844	21/10/2012	Area 6 – North section of Quay	Installed	87601.9612	35113.0467	105.4852	105.414	105.4135	105.4141	105.4144
Levelling Point	C305-LP060845	21/10/2012	Area 6 – North section of Quay	Installed	87597.0627	35113.8756	105.4722	105.4004	105.4003	105.4007	105.4002
Levelling Point	C305-LP060846	21/10/2012	Area 6 – North section of Quay	Installed	87592.1721	35114.7289	105.4792	105.4078	105.4079	105.4072	105.4083
Levelling Point	C305-LP060847	21/10/2012	Area 6 – North section of Quay	Installed	87587.1959	35115.6329	105.4862	105.4134	105.4138	105.413	105.4134
Levelling Point	C305-LP060848	21/10/2012	Area 6 – North section of Quay	Installed	87582.2705	35116.4469	105.4863	105.4141	105.4145	105.4138	105.414
Levelling Point	C305-LP060849	21/10/2012	Area 6 – North section of Quay	Installed	87577.3278	35117.3173	105.4899	105.4173	105.4169	105.4178	105.4172
Levelling Point	C305-LP060850	21/10/2012	Area 6 – North section of Quay	Installed	87572.4858	35118.167	105.4874	105.4146	105.4145	105.4146	105.4147
Levelling Point	C305-LP060851	21/10/2012	Area 6 – North section of Quay	Installed	87569.2705	35118.759	105.4809	105.4079	105.4076	105.408	105.4081
Levelling Point	C305-LP060852	21/10/2012	Area 6 – North section of Quay	Installed	87568.9729	35125.5122	105.5341	105.4605	105.461	105.4603	105.4602
Levelling Point	C305-LP060853	21/10/2012	Area 6 – North section of Quay	Installed	87570.4503	35134.357	105.5329	105.4602	105.4599	105.4605	105.4602
								AVERAGE	07/11/2012	07/11/2012	07/11/2012
Levelling Point	C305-LP050001	20/10/2012	Area 5 – (*) SE section of Quay	Installed	88173.5731	34946.0673	105.8457	105.805	105.8051	105.8047	105.8052
Levelling Point	C305-LP050002	20/10/2012	Area 5 – (*) SE section of Quay	Installed	88170.5891	34946.5139	105.8625	105.8231	105.8234	105.8229	105.823
Levelling Point	C305-LP050003	20/10/2012	Area 5 – (*) SE section of Quay	Installed	88167.6356	34947.0512	105.8622	105.8228	105.8222	105.8229	105.8233
Levelling Point	C305-LP050004	20/10/2012	Area 5 – (*) SE section of Quay	Installed	88163.7233	34947.8123	106.0677	No readings			
Levelling Point	C305-LP050005	20/10/2012	Area 5 – (*) SE section of Quay	Installed	88159.7451	34948.4267	105.8549	105.816	105.8166	105.8156	105.8158
Levelling Point	C305-LP050006	20/10/2012	Area 5 – (*) SE section of Quay	Installed	88152.3276	34949.7319	105.8485	105.8085	105.8084	105.8087	105.8084
Levelling Point	C305-LP050007	20/10/2012	Area 5 – (*) SE section of Quay	Installed	88144.9193	34951.0407	105.8561	105.8179	105.8175	105.818	105.8182

Sensor Type	Sensor ID	Date Installation	Sub-Area	Status	SENSOR Location - GPS readings (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
Levelling Point	C305-LP050008	20/10/2012	Area 5 - (*) SE section of Quay	Installed	88137.2092	34952.3717	105.8459	105.808	105.8086	105.8074	105.808
Levelling Point	C305-LP050009	20/10/2012	Area 5 - (*) SE section of Quay	Installed	88129.8835	34953.6602	105.849	105.811	105.8106	105.8111	105.8113
Levelling Point	C305-LP050010	20/10/2012	Area 5 - (*) SE section of Quay	Installed	88122.9821	34954.8892	105.8546	105.8165	105.8163	105.8166	105.8166
Levelling Point	C305-LP050011	20/10/2012	Area 5 - (*) SE section of Quay	Installed	88116.116	34957.7665	105.8547	105.8156	105.8154	105.8162	105.8152
Levelling Point	C305-LP050012	20/10/2012	Area 5 - (*) SE section of Quay	Installed	88109.2984	34958.9591	105.8561	105.8163	105.8165	105.816	105.8164
								AVERAGE	07/11/2012	07/11/2012	07/11/2012
Levelling Point	C305-LP060101	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87912.851	35073.954	105.309	105.2357	105.2355	105.2363	105.2353
Levelling Point	C305-LP060102	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87905.963	35075.176	105.297	105.2223	105.2224	105.2217	105.2228
Levelling Point	C305-LP060103	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87900.368	35076.186	105.306	105.2251	105.2253	105.2249	105.2251
Levelling Point	C305-LP060104	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87893.449	35077.38	105.301	105.2283	105.2287	105.2281	105.2281
Levelling Point	C305-LP060105	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87886.556	35078.615	105.403	105.3238	105.3239	105.3232	105.3243
Levelling Point	C305-LP060106	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87879.665	35079.817	105.318	105.2417	105.2423	105.2416	105.2412
Levelling Point	C305-LP060107	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87872.738	35081.054	105.33	105.2365	105.2369	105.236	105.2366
Levelling Point	C305-LP060108	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87865.847	35082.247	105.323	105.2255	105.2258	105.2251	105.2256
Levelling Point	C305-LP060109	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87858.944	35083.352	105.307	105.2301	105.2305	105.23	105.2298
Levelling Point	C305-LP060110	20/10/2012	Area 5 - (*) NE section of Quay	Installed	87852.058	35084.625	105.328	105.2348	105.2352	105.2345	105.2347

Sensor Type	Sensor ID	Sub-Area	Date Installation	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)				
									Eastings X	Northings Y	Elevation Z (mATD)
3D Prism	C305-RP044201	Billingsgate Market	15/04/2013	Installed	88325.73	34987.863	105.296	AVERAGE	88325.7300	34987.8633	105.2957
								25/04/2013	88325.7304	34987.8630	105.2960
								25/04/2013	88325.7300	34987.8638	105.2952
								25/04/2013	88325.7296	34987.8631	105.2959
3D Prism	C305-RP044202	Billingsgate Market	15/04/2013	Installed	88311.406	34990.166	105.501	AVERAGE	88311.4061	34990.1646	105.5010
								25/04/2013	88311.4056	34990.1651	105.5015
								25/04/2013	88311.4063	34990.1642	105.5004
								25/04/2013	88311.4064	34990.1645	105.5011
3D Prism	C305-RP044203	Billingsgate Market	15/04/2013	Installed	88296.44	34992.967	105.745	AVERAGE	88296.4398	34992.9667	105.7454
								25/04/2013	88296.4392	34992.9669	105.7449
								25/04/2013	88296.4403	34992.9661	105.7458

Sensor Type	Sensor ID	Sub-Area	Date Installation	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)		Eastings X	Northings Y	Elevation Z (mATD)
								25/04/2013	88296.4399	34992.9671	105.7455
3D Prism	C305-RP044204	Billingsgate Market	15/04/2013	Installed	88321.73	34962.533	105.268	AVERAGE	88321.7299	34962.5328	105.2676
								25/04/2013	88321.7301	34962.5324	105.2670
								25/04/2013	88321.7294	34962.5329	105.2682
								25/04/2013	88321.7302	34962.5331	105.2676
3D Prism	C305-RP044205	Billingsgate Market	15/04/2013	Installed	88318.291	34943.26	105.205	AVERAGE	88318.2911	34943.2601	105.2053
								25/04/2013	88318.2913	34943.2607	105.2059
								25/04/2013	88318.2909	34943.2599	105.2052
								25/04/2013	88318.2911	34943.2597	105.2048
3D Prism	C305-RP044206	Billingsgate Market	15/04/2013	Installed	88314.244	34920.515	105.258	AVERAGE	88314.2437	34920.5151	105.2579
								25/04/2013	88314.2442	34920.5147	105.2574
								25/04/2013	88314.2432	34920.5154	105.2581
								25/04/2013	88314.2437	34920.5152	105.2582
3D Prism	C305-RP061301	West India Dock	24/04/2013	Installed	87525.697	35027.807	106.432	AVERAGE	87525.6942	35027.8099	106.4315
								30/04/2013	87525.6948	35027.8104	106.4321
								30/04/2013	87525.6937	35027.8098	106.4309
								30/04/2013	87525.6941	35027.8095	106.4315
3D Prism	C305-RP061302	West India Dock	24/04/2013	Installed	87552.425	35023.198	106.83	AVERAGE	87552.4202	35023.2017	106.8334
								30/04/2013	87552.4206	35023.2013	106.8331
								30/04/2013	87552.4199	35023.2018	106.8338
								30/04/2013	87552.4201	35023.2020	106.8333
3D Prism	C305-RP061303	West India Dock	24/04/2013	Installed	87564.655	35039.182	106.876	AVERAGE	87564.6562	35039.1791	106.8748
								30/04/2013	87564.6565	35039.1787	106.8749
								30/04/2013	87564.6557	35039.1794	106.8747
								30/04/2013	87564.6564	35039.1792	106.8748
3D Prism	C305-RP061304	West India Dock	24/04/2013	Installed	87580.386	35036.623	106.869	AVERAGE	87580.3978	35036.6149	106.8717
								30/04/2013	87580.3983	35036.6146	106.8711
								30/04/2013	87580.3974	35036.6151	106.8721
								30/04/2013	87580.3977	35036.6150	106.8719
3D Prism	C305-RP061305	West India Dock	24/04/2013	Installed	87596.79	35033.738	106.867	AVERAGE	87596.7901	35033.7371	106.8668
								30/04/2013	87596.7895	35033.7368	106.8669
								30/04/2013	87596.7905	35033.7374	106.8664

Sensor Type	Sensor ID	Sub-Area	Date Installation	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)		Eastings X	Northings Y	Elevation Z (mATD)
								30/04/2013	87596.7903	35033.7371	106 8671
3D Prism	C305-RP061306	West India Dock	24/04/2013	Installed	87614.519	35030.651	106.878	AVERAGE	87614 5218	35030.6456	106 8797
								30/04/2013	87614 5223	35030.6455	106 8794
								30/04/2013	87614 5217	35030.6459	106 8799
								30/04/2013	87614 5214	35030.6454	106 8798
3D Prism	C305-RP061307	West India Dock	24/04/2013	Installed	87634.944	35026.907	106 87	AVERAGE	87634 9492	35026.9018	106 8697
								30/04/2013	87634 9486	35026.9024	106 8691
								30/04/2013	87634 9493	35026.9016	106 8700
								30/04/2013	87634 9497	35026.9014	106 8700
3D Prism	C305-RP061308	West India Dock	24/04/2013	Installed	87634 08	35020.827	106.866	AVERAGE	87634 0828	35020.8233	106 8682
								30/04/2013	87634 0831	35020.8235	106 8677
								30/04/2013	87634 0823	35020.8232	106 8688
								30/04/2013	87634 0830	35020.8232	106 8681
3D Prism	C305-RP061309	West India Dock	24/04/2013	Installed	87660.992	35018.119	106.837	AVERAGE	87660 9932	35018.1160	106 8381
								30/04/2013	87660 9934	35018.1157	106 8375
								30/04/2013	87660 9929	35018.1163	106 8382
								30/04/2013	87660 9933	35018.1160	106 8386
3D Prism	C305-RP061310	West India Dock	24/04/2013	Installed	87680.516	35031.57	106.845	AVERAGE	87680 5176	35031.5673	106 8469
								30/04/2013	87680 5182	35031.5669	106 8466
								30/04/2013	87680 5170	35031.5677	106 8473
								30/04/2013	87680 5176	35031.5673	106 8468
3D Prism	C305-RP061311	West India Dock	24/04/2013	Installed	87695.705	35028.91	106 84	AVERAGE	87695.7065	35028.9086	106 8416
								30/04/2013	87695.7070	35028.9082	106 8410
								30/04/2013	87695.7063	35028.9087	106 8419
								30/04/2013	87695.7062	35028.9089	106 8419
3D Prism	C305-RP061312	West India Dock	24/04/2013	Installed	87712.107	35026.051	106.844	AVERAGE	87712.1094	35026.0496	106 8444
								30/04/2013	87712.1097	35026.0500	106 8440
								30/04/2013	87712.1093	35026.0494	106 8446
								30/04/2013	87712.1092	35026.0494	106 8446
3D Prism	C305-RP061313	West India Dock	24/04/2013	Installed	87731.155	35022.723	106.838	AVERAGE	87731.1579	35022.7222	106 8379
								30/04/2013	87731.1574	35022.7228	106 8384
								30/04/2013	87731.1581	35022.7221	106 8378

Sensor Type	Sensor ID	Sub-Area	Date Installation	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)		Eastings X	Northings Y	Elevation Z (mATD)
								30/04/2013	87731.1582	35022.7217	106.8375
3D Prism	C305-RP061314	West India Dock	24/04/2013	Installed	87748.886	35019.622	106.847	AVERAGE	87748.8845	35019.6196	106.8465
								30/04/2013	87748.8851	35019.6195	106.8468
								30/04/2013	87748.8842	35019.6200	106.8464
								30/04/2013	87748.8842	35019.6193	106.8463
3D Prism	C305-RP061315	West India Dock	24/04/2013	Installed	87768.825	35016.144	106.848	AVERAGE	87768.8291	35016.1440	106.8468
								30/04/2013	87768.8292	35016.1446	106.8471
								30/04/2013	87768.8286	35016.1437	106.8463
								30/04/2013	87768.8295	35016.1437	106.8470
3D Prism	C305-RP061316	West India Dock	24/04/2013	Installed	87806.953	35009.536	106.851	AVERAGE	87806.9566	35009.5372	106.8493
								30/04/2013	87806.9561	35009.5378	106.8488
								30/04/2013	87806.9568	35009.5371	106.8495
								30/04/2013	87806.9569	35009.5367	106.8496
3D Prism	C305-RP061317	West India Dock	24/04/2013	Installed	87824.649	35006.394	106.851	AVERAGE	87824.6530	35006.3961	106.8507
								30/04/2013	87824.6528	35006.3963	106.8508
								30/04/2013	87824.6533	35006.3958	106.8502
								30/04/2013	87824.6529	35006.3962	106.8511
3D Prism	C305-RP061318	West India Dock	24/04/2013	Installed	87842.375	35003.282	106.847	AVERAGE	87842.3794	35003.2898	106.8453
								30/04/2013	87842.3789	35003.2902	106.8447
								30/04/2013	87842.3796	35003.2893	106.8454
								30/04/2013	87842.3797	35003.2899	106.8458
3D Prism	C305-RP061319	West India Dock	24/04/2013	Installed	87774.265	35081.977	105.538	AVERAGE	87774.2681	35081.9791	105.5369
								30/04/2013	87774.2679	35081.9793	105.5373
								30/04/2013	87774.2684	35081.9785	105.5368
								30/04/2013	87774.2680	35081.9795	105.5366
3D Prism	C305-RP061320	West India Dock	24/04/2013	Installed	87755.182	35085.321	105.557	AVERAGE	87755.1895	35085.3186	105.5564
								30/04/2013	87755.1894	35085.3181	105.5559
								30/04/2013	87755.1900	35085.3192	105.5566
								30/04/2013	87755.1891	35085.3185	105.5567
3D Prism	C305-RP061321	West India Dock	24/04/2013	Installed	87731.808	35091.022	105.481	AVERAGE	87731.8092	35091.0228	105.4802
								30/04/2013	87731.8093	35091.0232	105.4800
								30/04/2013	87731.8087	35091.0224	105.4806

Sensor Type	Sensor ID	Sub-Area	Date Installation	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)		Eastings X	Northings Y	Elevation Z (mATD)
								30/04/2013	87731 8096	35091.0228	105.4800
3D Prism	C305-RP061322	West India Dock	24/04/2013	Installed	87712 83	35092.741	105.556	AVERAGE	87712 8255	35092.7295	105 5580
								30/04/2013	87712 8256	35092.7292	105 5579
								30/04/2013	87712 8249	35092.7297	105 5581
								30/04/2013	87712 8260	35092.7296	105 5580
3D Prism	C305-RP061323	West India Dock	24/04/2013	Installed	87692.377	35096.303	105.556	AVERAGE	87692 3776	35096.3018	105 5564
								30/04/2013	87692 3778	35096.3015	105 5560
								30/04/2013	87692 3772	35096.3019	105 5568
								30/04/2013	87692 3778	35096.3020	105 5564
3D Prism	C305-RP061324	West India Dock	24/04/2013	Installed	87667.473	35100.659	105.561	AVERAGE	87667.4710	35100.6549	105 5627
								30/04/2013	87667.4708	35100.6551	105 5629
								30/04/2013	87667.4716	35100.6543	105 5624
								30/04/2013	87667.4706	35100.6553	105 5628
3D Prism	C305-RP061325	West India Dock	24/04/2013	Installed	87640 81	35105.309	105.578	AVERAGE	87640 8097	35105.3040	105 5792
								30/04/2013	87640 8094	35105.3035	105 5788
								30/04/2013	87640 8099	35105.3044	105 5798
								30/04/2013	87640 8098	35105.3041	105 5790
3D Prism	C305-RP061326	West India Dock	24/04/2013	Installed	87621.132	35108.71	105.564	AVERAGE	87621.1316	35108.7079	105 5633
								30/04/2013	87621.1311	35108.7077	105 5628
								30/04/2013	87621.1322	35108.7085	105 5639
								30/04/2013	87621.1315	35108.7075	105 5632
3D Prism	C305-RP061327	West India Dock	24/04/2013	Installed	87602.0781	35112.0554	105.5511	AVERAGE	87602 0781	35112.0554	105 5511
								30/04/2013	87602 0787	35112.0552	105 5516
								30/04/2013	87602 0777	35112.0558	105 5508
								30/04/2013	87602 0779	35112.0552	105 5509
3D Prism	C305-RP061328	West India Dock	24/04/2013	Installed	87582.076	35115.571	105.559	AVERAGE	87582 0712	35115.5710	105 5629
								30/04/2013	87582 0706	35115.5709	105 5627
								30/04/2013	87582 0716	35115.5713	105 5630
								30/04/2013	87582 0714	35115.5708	105 5630
3D Prism	C305-RP061329	West India Dock	24/04/2013	Installed	87569.273	35133.618	105.649	AVERAGE	87569 2711	35133.6216	105.6520
								30/04/2013	87569 2715	35133.6219	105.6517
								30/04/2013	87569 2705	35133.6210	105.6522

Sensor Type	Sensor ID	Sub-Area	Date Installation	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)		Eastings X	Northings Y	Elevation Z (mATD)
								30/04/2013	87569 2713	35133.6219	105.6521
3D Prism	C305-RP061330	West India Dock	24/04/2013	Installed	87542.64	35124.628	105.546	AVERAGE	87542.6427	35124.6310	105 5458
								30/04/2013	87542.6421	35124.6315	105 5462
								30/04/2013	87542.6432	35124.6307	105 5453
								30/04/2013	87542.6428	35124.6308	105 5459
3D Prism	C305-RP061331	West India Dock	24/04/2013	Installed	87538.664	35101.799	105.532	AVERAGE	87538.6655	35101.8017	105 5325
								30/04/2013	87538.6652	35101.8015	105 5324
								30/04/2013	87538.6660	35101.8019	105 5329
								30/04/2013	87538.6653	35101.8017	105 5322
3D Prism	C305-RP061332	West India Dock	24/04/2013	Installed	87533.716	35074.018	105.906	AVERAGE	87533.7212	35074.0143	105 9093
								30/04/2013	87533.7210	35074.0139	105 9096
								30/04/2013	87533.7218	35074.0149	105 9092
								30/04/2013	87533.7208	35074.0141	105 9091
3D Prism	C305-RP061333	West India Dock	24/04/2013	Installed	87531.333	35060.517	106.44	AVERAGE	87531 3337	35060.5197	106.4415
								30/04/2013	87531 3331	35060.5192	106.4421
								30/04/2013	87531 3340	35060.5200	106.4409
								30/04/2013	87531 3340	35060.5199	106.4415
3D Prism	C305-RP061334	West India Dock	24/04/2013	Installed	87527.723	35039.831	106.434	AVERAGE	87527.7226	35039.8344	106.4343
								30/04/2013	87527.7228	35039.8347	106.4342
								30/04/2013	87527.7221	35039.8339	106.4346
								30/04/2013	87527.7229	35039.8346	106.4341
Retro Target	C305-RR042301	Barclays Building	10/05/2013	Installed	88283.039	34923.357	110.274	AVERAGE	No readings		
Retro Target	C305-RR042302	Barclays Building	10/05/2013	Installed	88283.039	34923.357	112.324	AVERAGE	88283 0388	34923.3566	112 3240
								10/05/2013	88283 0386	34923.3565	112 3241
								10/05/2013	88283 0393	34923.3570	112 3234
								10/05/2013	88283 0385	34923.3563	112 3245
Retro Target	C305-RR042303	Barclays Building	10/05/2013	Installed	88264 52	34929.854	113.147	AVERAGE	88264 5203	34929.8535	113.1470
								10/05/2013	88264 5205	34929.8541	113.1471
								10/05/2013	88264 5201	34929.8532	113.1469
								10/05/2013	88264 5203	34929.8532	113.1470

Sensor Type	Sensor ID	Sub-Area	Date Installation	Status	SENSOR Location - GPS reading (m)			Commissioning Readings (m)			
					Eastings X	Northings Y	Elevation Z (mATD)		Eastings X	Northings Y	Elevation Z (mATD)
Retro Target	C305-RR042304	Barclays Building	10/05/2013	Installed	88252.749	34931.359	114.161	AVERAGE	88252.7489	34931.3587	114.1606
								10/05/2013	88252.7486	34931.3585	114.1610
								10/05/2013	88252.7490	34931.3593	114.1605
								10/05/2013	88252.7491	34931.3583	114.1603
Retro Target	C305-RR042305	Barclays Building	10/05/2013	Installed	88235.042	34934.254	114.372	AVERAGE	88235 0419	34934.2540	114 3723
								10/05/2013	88235 0424	34934.2536	114 3724
								10/05/2013	88235 0417	34934.2543	114 3720
								10/05/2013	88235 0416	34934.2541	114 3725
Retro Target	C305-RR042306	Barclays Building	10/05/2013	Installed	88215.841	34937.613	114.293	AVERAGE	88215 8407	34937.6134	114 2929
								10/05/2013	88215 8405	34937.6137	114 2928
								10/05/2013	88215 8411	34937.6129	114 2935
								10/05/2013	88215 8405	34937.6136	114 2924
Retro Target	C305-RR042307	Barclays Building	10/05/2013	Installed	88206.974	34939.223	114.233	AVERAGE	88206 9744	34939.2233	114 2329
								10/05/2013	88206 9739	34939.2229	114 2325
								10/05/2013	88206 9747	34939.2235	114 2330
								10/05/2013	88206 9746	34939.2235	114 2332
Retro Target	C305-RR042308	Barclays Building	10/05/2013	Installed	88198.241	34941.369	113.158	AVERAGE	88198 2414	34941.3690	113.1584
								10/05/2013	88198 2408	34941.3688	113.1585
								10/05/2013	88198 2418	34941.3696	113.1580
								10/05/2013	88198 2416	34941.3686	113.1587

Note: For Levelling points - the difference between the Elevation Z reading and Commissioning reading results from the use of a GPS and a manual level respectively.

All elevations or levels presented in this document are metres above tunnel datum (mATD).

(*) I&M: Additional Studs & Prisms – West India Quay, C305-DSJ-C2-CCN-CRG03-50010