



Work Area: SMM
Work Type: I&M
Originator Company: GEOCISA UK

C435

Farringdon Main Station

CRL Lead reviewer: [Redacted]
CRL Reviewer:

Monitoring Close-Out Report:

Automated Total Station ATS 09 and 3D Targets read by ATS 09.

CRL Document Number: C435-BFK-C2-RGN-M123-51643

Supplier Document Number: N/A

Contract MDL reference C13.012

1. Contractor Document Submittal History:

Revision:	Date:	Prepared by:	Checked by:	Approved by:	Reason for issue:
1.0	25-04-2016	[Redacted]	[Redacted]	[Redacted]	For acceptance
2.0	25-05-2016	[Redacted]	[Redacted]	[Redacted]	For acceptance
3.0	20-06-2016	[Redacted]	[Redacted]	[Redacted]	For acceptance

2a. Stakeholder Review Required? YES NO

Stakeholder submission required: LU NR DLR RIL LO Other: _____

Purpose of submission: For no objection For information

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: _____

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

2b. Review by Stakeholder (if required):

Stakeholder Organisation	Job Title	Name	Signature	Date	Acceptance
					<input type="checkbox"/>
			compliance with their contractual obligations and does not constitute ds or materials developed or selected by the designer/supplier.		<input type="checkbox"/>
		[Redacted]			<input type="checkbox"/>

15/10/2016

3. Acceptance by Crossrail:

Contents

A.	INTRODUCTION	3
B.	INSTRUMENTS	3
B.1	DESCRIPTION OF THE INSTRUMENTS	3
B.2	LOCATION OF THE INSTRUMENTS	5
C.	MOVEMENTS	5
C.1	MOVEMENTS RESULTING FROM CONSTRUCTION ACTIVITIES	5
C.1.1	Relevant Crossrail (BFK) Works	5
C.1.2	Resulting Movements	6
C.2	TRIGGER BREACHES	8
C.3	SIGNIFICANT ISSUES WITH THE INSTRUMENTATION	9
C.4	RESIDUAL RISKS	10
D.	CONCLUSIONS	10

APPENDIX A: DRAWINGS.

APPENDIX B: GRAPHS.

APPENDIX C: GLOSSARY.

A. INTRODUCTION

In line with the C122 – M&W Specification KX10 – Instrumentation & Monitoring C122-OVE-Z4-RSP-CR001-00007, this close out report aims to address the following points in relation to the instrumentation defined in Section B.

- Identify movements observed by the relevant instruments;
- Relate these movements to construction activities, where applicable.
- Identify trigger breaches that may have occurred.
- Demonstrate that the rate of change of the data is either in line with the required rate or such that residual risks are minimal.
- Identify any such residual risks should there be considered to be any.

Based on the above points, this close out reports will provide justification for the decommissioning of the instruments.

B. INSTRUMENTS

B.1 Description of the Instruments

This Close-Out Report relates the eastern Charterhouse Street area, consisting of 3D Targets read by ATS 09 and 1No. Automated Total Station (ATS 09) located on the 71-72 Long Lane roof. See Table 1 below with details.

ATS 20 CODE	LOCATION	COORDINATES	
		X (m)	Y (m)
C435-AT00009	71-72 Long Lane	82328.942	36485.820

AREA	PRISM CODE	LOCATION	COORDINATES		ELEVATION (mATD)
			EASTING X (m)	NORTHING Y (m)	
C435 MONITORING AREA	C435-RP00901	EAST MARKET SOUTH ELEVATION	82207.5653	36441.0074	126.0439
	C435-RP00902	EAST MARKET SOUTH ELEVATION	82219.3307	36446.9525	126.0495
	C435-RP00903	EAST MARKET SOUTH ELEVATION	82231.0974	36452.9167	126.0594
	C435-RP00904	EAST MARKET SOUTH ELEVATION	82242.8531	36458.8903	126.0573
	C435-RP00905	EAST MARKET SOUTH ELEVATION	82254.674	36464.9168	126.0529
	C435-RP00906	EAST MARKET SOUTH ELEVATION	82266.3913	36470.8819	126.0515
	C435-RP00915	23-28 CHARTERHOUSE SQUARE	82285.1225	36574.7362	121.6518
	C435-RP00916	23-28 CHARTERHOUSE SQUARE	82284.93	36574.7718	141.5128
	C435-RP00917	23-28 CHARTERHOUSE SQUARE	82276.7418	36571.3054	122.1349
	C435-RP00919	23-28 CHARTERHOUSE SQUARE	82260.6944	36568.4679	122.0242
	C435-RP00920	23-28 CHARTERHOUSE SQUARE	82260.8436	36568.4288	141.49.83
	C435-RP00921	23-28 CHARTERHOUSE SQUARE	82250.3745	36580.3554	121.9259
C435-RP00922	23-28 CHARTERHOUSE SQUARE	82245.6244	36586.0032	121.8694	
PREVIOUS C430 MONITORING AREA	C435-RP00923	40-42 FOX AND NOT STREET	82243.1005	36579.9745	119.8024
	C435-RP00924	40-42 FOX AND NOT STREET	82246.7074	36575.7612	119.8285
	C435-RP00949	40-42 FOX AND NOT STREET	82251.965	36567.265	129.8460
	C435-RP00950	40-42 FOX AND NOT STREET	82252.409	36569.109	129.777
	C435-RP00951	40-42 FOX AND NOT STREET	82246.662	36575.781	130.1443
C435-RP00952	40-42 FOX AND NOT STREET	82243.12	36579.916	129.7610	

AREA	PRISM CODE	LOCATION	COORDINATES		ELEVATION (mATD)
			EASTING X (m)	NORTHING Y (m)	
C435 MONITORING AREA	C435-RP00925	40-42 FOX AND NOT STREET	82252.4924	36569.0153	120.0498
	C435-RP00926	40-42 FOX AND NOT STREET	82251.8358	36567.1675	119.9264
PREVIOUS C430 MONITORING AREA	C435-RP00928	18-19 LONG LANE	82338.2572	36507.4164	121.5674
	C435-RP00929	18-19 LONG LANE	82338.2104	36507.3722	134.4362
PREVIOUS C430 MONITORING AREA	C435-RP00930	18-19 LONG LANE	82333.1064	36504.7857	121.5598
	C435-RP00931	18-19 LONG LANE	82332.7879	36504.6219	134.4019
	C435-RP00932	18-19 LONG LANE	82330.4474	36503.4247	121.5424
	C435-RP00933	18-19 LONG LANE	82330.4332	36503.423	134.1430
	C435-RP00934	18-19 LONG LANE	82328.765	36506.2784	121.5540
	C435-RP00935	18-19 LONG LANE	82328.8201	36506.076	134.1677
	C435-RP00936	18-19 LONG LANE	82325.8326	36513.0719	121.5523
	C435-RP00937	18-19 LONG LANE	82325.8316	36513.0144	134.1633
	C435-RP00938	18-19 LONG LANE	82323.3649	36519.9937	121.5809
	C435-RP00939	18-19 LONG LANE	82323.3586	36519.974	134.1619
	C435-RP00940	18-19 LONG LANE	82320.9124	36526.9274	121.5675
	C435-RP00942	18-19 LONG LANE	82317.9815	36534.6851	121.6800
	C435-RP00943	18-19 LONG LANE	82317.9485	36534.6889	128.7994
	C435-RP00944	3 HAYNE STREET	82317.5616	36534.5501	120.3301
	C435-RP00945	3 HAYNE STREET	82316.8892	36537.3517	120.3532
C435-RP00946	3 HAYNE STREET	82315.5723	36542.2457	120.4125	
C435-RP00947	3 HAYNE STREET	82315.5258	36542.2956	126.2652	

Table 1: Details 3D Targets read by ATS 09 and ATS 09.

At the moment, this area monitored by these prisms should be in a Long Term basis with readings every three months but as per C435-PMI-00549 the Long Term Monitoring has been ceased in this area and subsequently all monitoring associated is no longer done by BFK. Note this PMI does not cover the East Market and buildings affected by Hayne Street Shaft excavation works.

These prisms read by ATS 09 and the ATS 09 itself is shown in the following documents:

Drawings:

- C435-BFK-C2-DWG-M123-50045. 3D Targets Installed for Farringdon Station

Installation Reports:

- C435-BFK-C2-RGN-M123-50012 Installation Report: Automated Total Station Installation at 71-72 Long Lane (ATS 09)
- C435-BFK-C2-RGN-M123-50071 Installation Report of 3D Targets read by ATS 09
- C430-LOS-C-RGN-M123-50018 Installation Report – Asset Protection Outside Site Boundaries - ETH

B.2 Location of the Instruments

As you can see from the Figure 1 below, the instruments described in Section B.1 are located in the eastern Charterhouse Street, Hayne Street and Long Lane areas. A drawing showing the location of these devices can be found in the Appendix A.

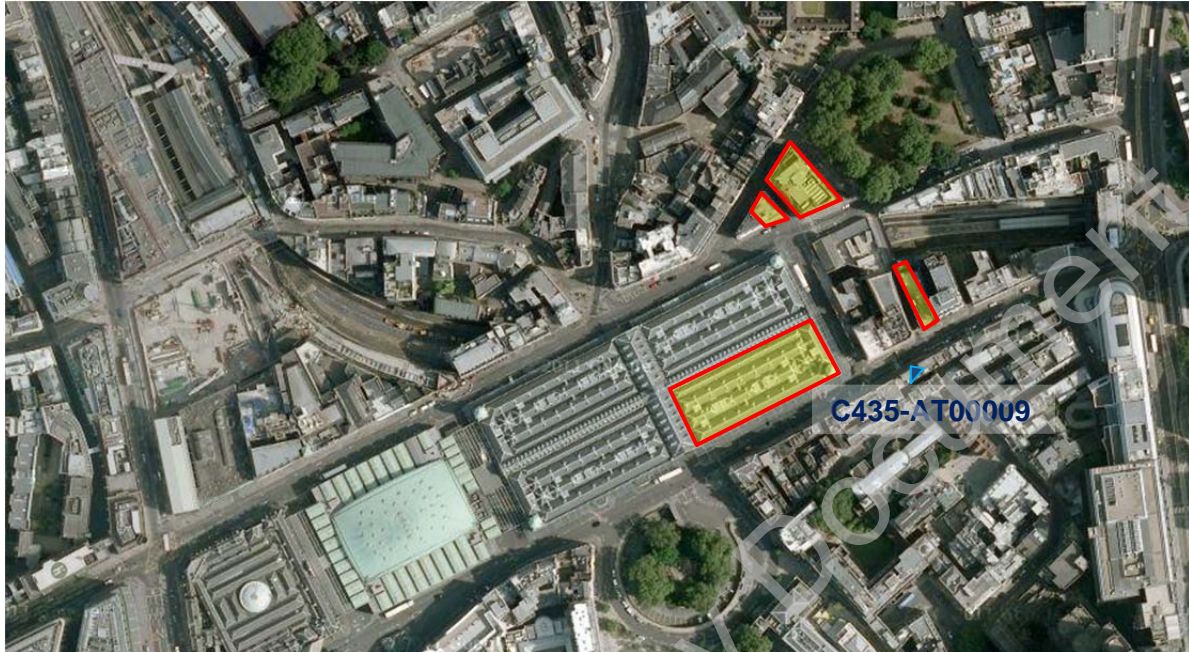


Figure 1 – Map showing the Location of ATS 09 and 3D Targets read by ATS 09.

C. MOVEMENTS

C.1 Movements Resulting from Construction Activities

C.1.1 Relevant Crossrail (BFK) Works

The construction activities associated with these instruments are related to Crossrail tunneling works. See below Table 2 for dates.

ACTIVITY	START DATE	END DATE
Moorgate Spur Shaft No. 2 TAM Installation	01/05/2013	16/07/2013
Moorgate Spur Shaft No. 2 Pre-Treatment works	29/07/2013	02/09/2013
Charterhouse Street Shaft TAM Installation	27/06/2013	30/10/2013
Charterhouse Street Shaft Pre-Treatment works	27/09/2013	08/11/2013
In-tunnel Grouting	19/11/2014	24/11/2014
C300-WB TBM passage	30/09/2013	07/10/2013
SCL-PTW enlargement	24/07/2014	06/10/2014
C300-EB TBM passage	16/01/2014	23/01/2014
SCL-PTE enlargement	17/08/2014	18/01/2015
SCL-STE1	13/02/2015	02/03/2015
C305-WB TBM passage	21/05/2015	23/05/2015
C305-EB TBM passage	08/05/2015	12/05/2015
SCL-STE2	02/02/2015	12/02/2015

ACTIVITY	START DATE	END DATE
SCL-VA2	16/04/2015	02/05/2015
SCL-CP8	16/06/2015	22/06/2015
SCL-CP9	10/06/2015	15/06/2015
SCL-RTE2	18/10/2014	11/11/2014
SCL-CP6	12/11/2104	22/11/2014
SCL-CP7	23/02/2015	26/02/2015
SCL-CH2E	15/01/2015	05/03/2015
SCL-CH2 Phase2	15/05/2015	28/05/2015
SCL-ES2	04/06/2015	21/09/2015
ETH-Excavation works	26/04/2013	29/08/2014
Hayne Street Shaft	19/11/2015	04/02/2016

Table 2 – Construction Activities associated with prisms read by ATS09

C.1.2 Resulting Movements

- East Market (Long Lane facade):

Monitoring data for these prisms is presented in Appendix B.

- Compensation Grouting works: approximately 6mm heave was recorded during Moorgate Spur Shaft No.2 TAM Installation from 01/05/2013 to 16/07/2013.
- Maximum Longitudinal displacement 1-2mm.
- Maximum Transversal displacement 4mm
- Maximum Settlement captured was -2mm

- 23-28 Charterhouse Square:

Monitoring data for these prisms is presented in Appendix B.

- Around 8mm settlement produced because of the EB TBM passage from 16/01/2014 to 23/01/2014.
- During the PTE enlargement and RTE2, a total of 25mm settlement was captured by these 3D Targets from 17/08/2014 to 18/01/2015.
- During the STE2 and CH2E, a settlement of 5mm was captured by these devices from 15/01/2015 to 05/03/2015.
- CP8 and ES2 caused until 8mm settlement from 04/06/2015 to 21/09/2015.
- 5mm settlement recorded as a residual settlement after last excavation activity taking place until 21/09/2015, showing a trend of settlement still ongoing when last monitoring reading was taken on 13/04/2016.
- 4mm heave was captured during Moorgate Spur Shaft No.2 TAM Installation works from 01/05/2013 to 16/07/2013.
- Compensation Grouting carried out in October 2014 caused until 16mm heave.
- Compensation Grouting carried out in February 2015 caused 6mm heave.
- 8mm heave was recorded because of the in-tunnel grouting works carried out in November 2014.
- Maximum Longitudinal displacement -38mm
- Maximum Transversal displacement -20mm
- Maximum Settlement captured -32mm

- 40-42 Fox and Knot:

Monitoring data for these prisms is presented in Appendix B.

- Around 8mm settlement produced because of the EB TBM passage from 16/01/2014 to 23/01/2014.
- During the CP6 and RTE2, a total of 4mm settlement was captured by these 3D Targets from 18/10/2014 to 22/11/2014.
- During the PTE enlargement, a settlement of 20mm was captured by these devices from 17/08/2014 to 18/01/2015.
- During the CH2E and CP7 excavation works, 10mm settlement was recorded from 15/01/2015 to 05/03/2015.
- ES2 caused until 8mm settlement from 04/06/2015 to 21/09/2015.
- 2mm settlement recorded as a residual settlement after last excavation activity taking place until 21/09/2015, showing a trend of settlement still ongoing when last reading was taken on 13/04/2016.
- 4mm heave was captured during Moorgate Spur Shaft No.2 TAM Installation works from 01/05/2013 to 16/07/2013.
- Compensation Grouting works carried out in October 2014 caused until 16mm of heave.
- 8mm heave was recorded because of the in-tunnel grouting works carried out in November 2014.
- Maximum Longitudinal displacement -32mm
- Maximum Transversal displacement -12mm
- Maximum Settlement captured -30mm

- 18-19 Long Lane:

Monitoring data for these prisms is presented in Appendix B.

- 3mm settlement recorded in these buildings during ETH excavation works from 26/04/2013 to 29/08/2014.
- During STE1 activity, settlement of 4mm was recorded in this area from 13/02/2015 to 02/03/2015.
- Hayne Street shaft excavation works caused until 4mm settlement from 19/11/2015 to 04/02/2016, showing stable conditions when last monitoring reading was taken on 12/01/2016.
- Maximum Longitudinal displacement +12mm
- Maximum Transversal displacement -14mm
- Maximum Settlement captured -18mm

- 2-3 Hayne Street:

Monitoring data for these prisms is presented in Appendix B.

- During the EB TBM passage, the movement recorded by these devices was negligible.
- WB TBM passage caused around 2mm settlement in the area from 30/09/2013 to 07/10/2013.
- During the STE1 excavation, a settlement of 8mm was captured by these 3D Targets from 13/02/2015 to 02/03/2015.
- Hayne Street Shaft caused 4mm settlement from 19/11/2015 to 04/02/2016, showing stable conditions when last monitoring reading was taken on 13/04/2016.
- 2mm settlement recorded during CHS shaft TAM installation from 27/06/2013 to 30/10/2013.
- Up to 4mm heave was recorded as result of CHS shaft Pre-Treatment works from 27/09/2013 to 08/11/2013.
- Compensation Grouting carried out in July 2014 caused 3mm heave.
- Compensation Grouting carried out in January 2015 caused 3mm heave.
- Maximum Longitudinal displacement +/-6mm
- Maximum Transversal displacement +/-4mm
- Maximum Settlement captured -24mm

C.2 Trigger Breaches

The Instrumentation and Monitoring Plan: Farringdon Station Ground Movement and Asset Protection C122-OVE-C2-RGN-M123-50013 outlines the triggers associated with the works. Green trigger is less (80%) that the predicted movement.

In this case, buildings are in Charterhouse Shaft and Moorgate Spur Shafts No.1, and No.2. ZOI, so the trigger values associated to this building are:

- DEFAULT ALERT (in any direction): 10mm

Triggers associated to monitoring installed in the 18-19 Long Lane buildings outside compensation grouting area are as follow:

- DEFAULT ALERT (in any direction): 10mm
- GREEN: 24mm settlement
- AMBER: 30mm settlement
- RED: 38mm settlement

No triggers breached. The Table 3 below shows the default alerts breached.

MONITORING GROUP (Location)	POINT ID	TYPE	DIRECTION	DATE OF LAST READING	LAST READING VALUE (mm)	TRIGGER LEVEL	
						WORST HISTORICAL STATUS	CURRENT STATUS
EAST MARKET	C435-RP00901	AUTOMATIC RP	Settlement	13/04/2016 14:00	1.3	Clear	Clear
	C435-RP00902	AUTOMATIC RP	Settlement	13/04/2016 14:00	0.9	Clear	Clear
	C435-RP00903	AUTOMATIC RP	Settlement	13/04/2016 14:00	0.5	Clear	Clear
	C435-RP00904	AUTOMATIC RP	Settlement	13/04/2016 14:00	0	Clear	Clear
	C435-RP00905	AUTOMATIC RP	Settlement	13/04/2016 14:00	-0.3	Clear	Clear
	C435-RP00906	AUTOMATIC RP	Settlement	13/04/2016 14:00	-1.3	Clear	Clear
23-28 CHARTERHOUSE SQUARE	C435-RP00915	AUTOMATIC RP	Settlement	16/11/2015 16:00	-20.7	Default Alert	Default Alert
	C435-RP00916	AUTOMATIC RP	Settlement	13/04/2016 14:00	-24.6	Default Alert	Default Alert
	C435-RP00917	AUTOMATIC RP	Settlement	26/10/2015 10:00	-22	Default Alert	Default Alert
	C435-RP00919	AUTOMATIC RP	Settlement	13/01/2016 10:00	-29.7	Default Alert	Default Alert
	C435-RP00920	AUTOMATIC RP	Settlement	09/02/2016 16:00	-30.7	Default Alert	Default Alert
	C435-RP00921	AUTOMATIC RP	Settlement	22/04/2015 22:00	-15.4	Default Alert	Default Alert
40-42 FOX and KNOT	C435-RP00922	AUTOMATIC RP	Settlement	15/01/2016 08:00	-13.9	Default Alert	Default Alert
	C435-RP00923	AUTOMATIC RP	Settlement	07/03/2016 10:00	-15	Default Alert	Default Alert
	C435-RP00924	AUTOMATIC RP	Settlement	13/04/2016 14:00	-21.7	Default Alert	Default Alert
	C435-RP00925	AUTOMATIC RP	Settlement	13/04/2016 14:00	-28.9	Default Alert	Default Alert
	C435-RP00926	AUTOMATIC RP	Settlement	07/03/2016 10:00	-28.4	Default Alert	Default Alert
	C435-RP00949	AUTOMATIC RP	Settlement	07/03/2016 10:00	-28.7	Default Alert	Default Alert
18-19 LONG LANE	C435-RP00950	AUTOMATIC RP	Settlement	13/04/2016 14:00	-28.5	Default Alert	Default Alert
	C435-RP00951	AUTOMATIC RP	Settlement	13/04/2016 14:00	-20.3	Default Alert	Default Alert
	C435-RP00952	AUTOMATIC RP	Settlement	07/03/2016 10:00	-14.6	Default Alert	Default Alert
	C435-RP00928	AUTOMATIC RP	Settlement	13/04/2016 14:00	-7.4	Clear	Clear
	C435-RP00929	AUTOMATIC RP	Settlement	13/04/2016 14:00	-6.6	Clear	Clear
	C435-RP00930	AUTOMATIC RP	Settlement	23/09/2014 17:00	-6.6	Clear	Clear
2-3 HAYNE STREET	C435-RP00931	AUTOMATIC RP	Settlement	13/04/2016 14:00	-4	Clear	Clear
	C435-RP00932	AUTOMATIC RP	Settlement	23/09/2014 17:00	-15.8	Default Alert	Default Alert
	C435-RP00933	AUTOMATIC RP	Settlement	13/04/2016 14:00	-5.1	Clear	Clear
	C435-RP00934	AUTOMATIC RP	Settlement	13/04/2016 14:00	-11.8	Default Alert	Default Alert
	C435-RP00935	AUTOMATIC RP	Settlement	13/04/2016 14:00	-12.1	Default Alert	Default Alert
	C435-RP00936	AUTOMATIC RP	Settlement	13/04/2016 14:00	-11.5	Default Alert	Default Alert
	C435-RP00937	AUTOMATIC RP	Settlement	13/04/2016 14:00	-11.9	Default Alert	Default Alert
	C435-RP00938	AUTOMATIC RP	Settlement	13/04/2016 14:00	-14.8	Default Alert	Default Alert
	C435-RP00939	AUTOMATIC RP	Settlement	13/04/2016 14:00	-15.8	Default Alert	Default Alert
	C435-RP00940	AUTOMATIC RP	Settlement	13/04/2016 14:00	-23.3	Default Alert	Default Alert
	C435-RP00942	AUTOMATIC RP	Settlement	13/04/2016 14:00	-20.9	Default Alert	Default Alert
	C435-RP00943	AUTOMATIC RP	Settlement	13/04/2016 14:00	-21.3	Default Alert	Default Alert
	C435-RP00944	AUTOMATIC RP	Settlement	13/04/2016 14:00	-20.9	Default Alert	Default Alert
	C435-RP00945	AUTOMATIC RP	Settlement	13/04/2016 14:00	-20.4	Default Alert	Default Alert
C435-RP00946	AUTOMATIC RP	Settlement	13/04/2016 14:00	-16.9	Default Alert	Default Alert	
C435-RP00947	AUTOMATIC RP	Settlement	13/04/2016 14:00	-17.6	Default Alert	Default Alert	

Table 3 – Default alerts breached by the prisms read by ATS09.

C.3 Significant issues with the Instrumentation

Prisms from C435-R00915 to 00922 installed to control the 23-28 Charterhouse Square have discontinuously been losing the line of sight from the ATS from April 2015 onwards as result of refurbishment works by building scaffolding externally.

C435-RP00930 and 00932 installed on the 18-19 Long Lane building recorded their last measure in September 2014, when they were disabled after being recording an anomalous behaviour.

As a handover took place from the C430 contract, several prisms used to be read manually by C430 started to be read automatically by the C435 ATS 09. These prisms remained being read manually keeping the old C430 codes as verification of the automatic system, using as well new C435 codes for those automatic readings. For this reason, devices installed to control the 40-42 Fox and Knot, 2-3 Hayne Street and 18-19 Long Lane buildings are named twice following the next relationship:

C430 CODE	C435 CODE
C430-RP26001	C435-RP00942
C430-RP26002	C435-RP00940
C430-RP26003	C435-RP00938
C430-RP26004	C435-RP00936
C430-RP26005	C435-RP00934
C430-RP26006	C435-RP00932
C430-RP26007	C435-RP00930
C430-RP26008	C435-RP00928
C430-RP26021	C435-RP00943
C430-RP26023	C435-RP00939
C430-RP26024	C435-RP00937
C430-RP26025	C435-RP00935
C430-RP26026	C435-RP00933
C430-RP26027	C435-RP00931
C430-RP26028	C435-RP00929
C430-RP23023	C435-RP00949
C430-RP23024	C435-RP00950
C430-RP23025	C435-RP00951
C430-RP23026	C435-RP00952

C.4 Residual Risks

The rate of settlement for all instrumentation within this report has been analysed and in all cases the rate is less than 2mm/year.

D. CONCLUSIONS

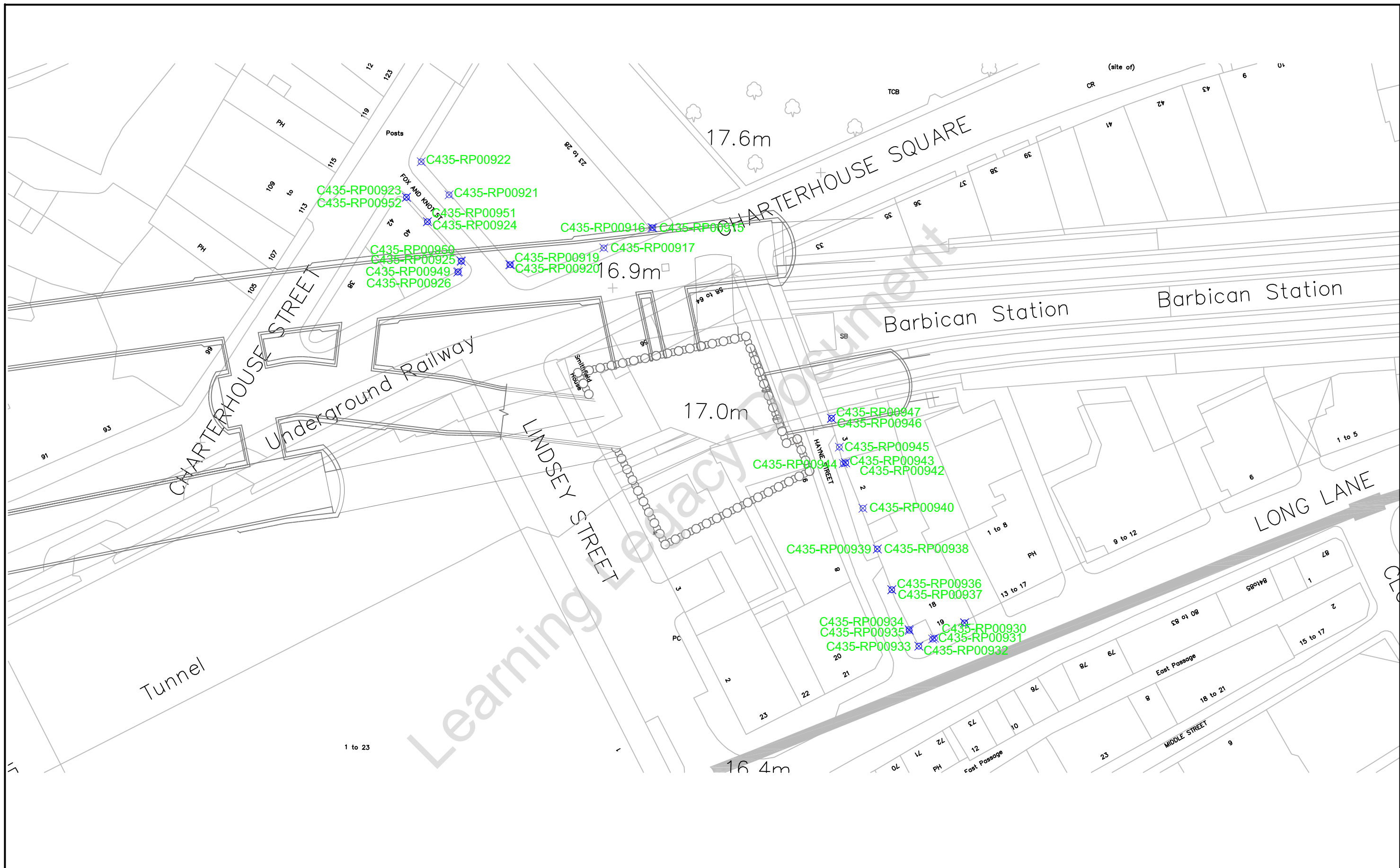
No triggers breached, monitoring stable. No residual risks remain. Long term monitoring to be completed by Crossrail.

As per C435-PMI-00549 the Long Term Monitoring has been ceased in this area and subsequently all monitoring associated is no longer undertaken by BFK. The last measurement carried out for these devices on 25/11/2015.

Learning Legacy Document

APPENDIX A: DRAWINGS

Learning Legacy Document



Learning Legacy Document

Rev.	Date	Description	By	Chkd	App	Auth


Notes:






C/ Los Llanos de Jerez 10-12
28823- MADRID
www.geocisa.com

Scale : @ A3

Contract : BORED TUNNELS (ALIGNMENT AND TRACK)		By : [REDACTED]	
Originator : OVE ARUP & PARTNERS LIMITED		Chk : [REDACTED]	
Location : CROSSRAIL GENERAL		App : [REDACTED]	
Title : 3D TARGETS INSTALLED FOR FARRINGTON STATION		Auth : 	
Drg No : C435-BFK-C2-DWG-M123-50045	Rev :	Suit :	

\$P.bys\$

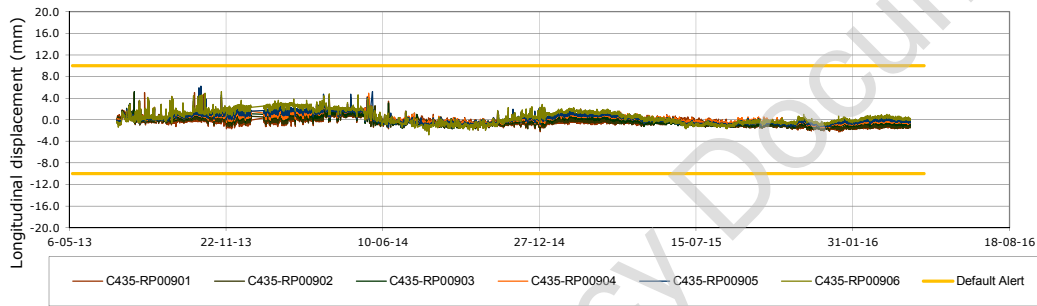
APPENDIX B: GRAPHS

Learning Legacy Document

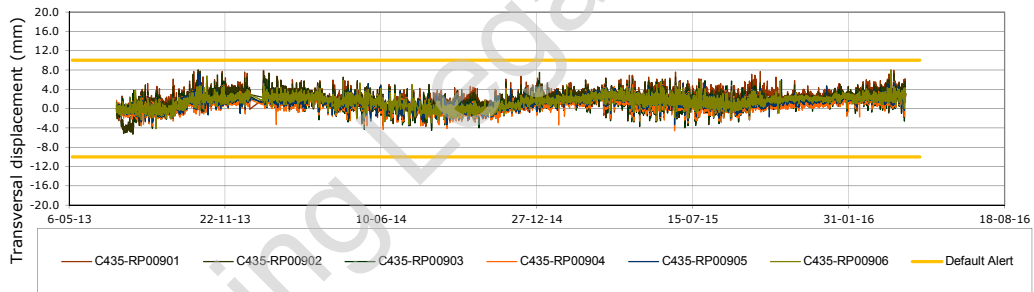
REPORT Automatic Prisms
AREA Farringdon Station
DEVICE 3D Target



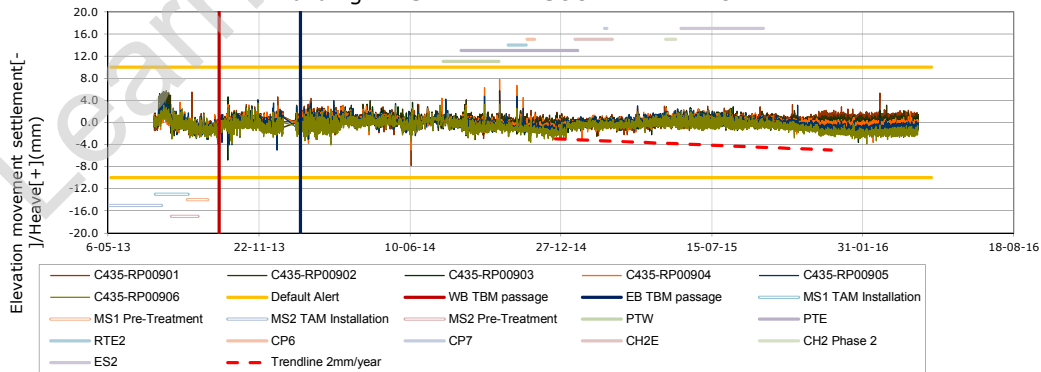
Building: EAST MARKET SOUTH ELEVATION



Building: EAST MARKET SOUTH ELEVATION

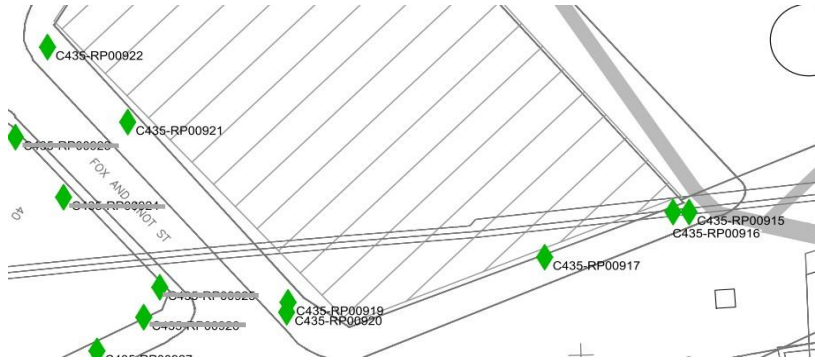


Building: EAST MARKET SOUTH ELEVATION

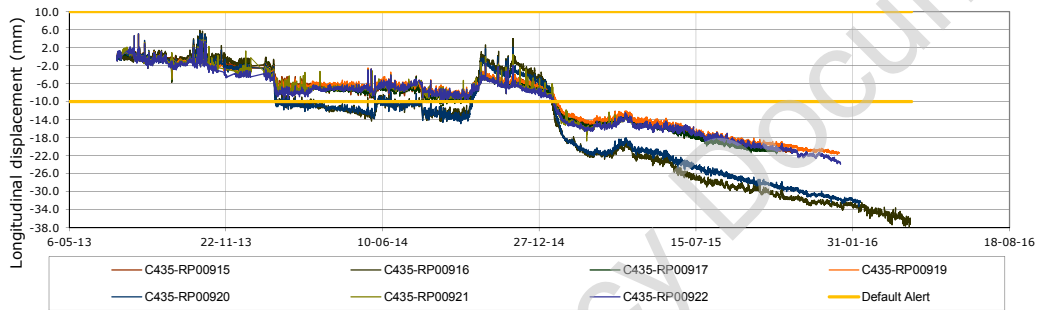


REMARKS:

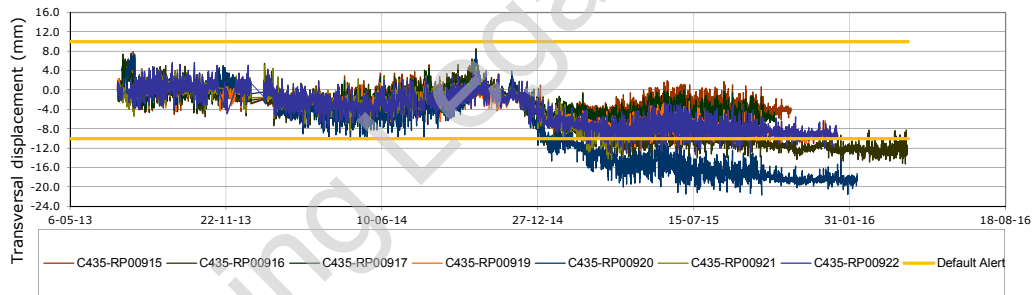
REPORT Automatic Prisms
 AREA Farringdon Station
 DEVICE 3D Target



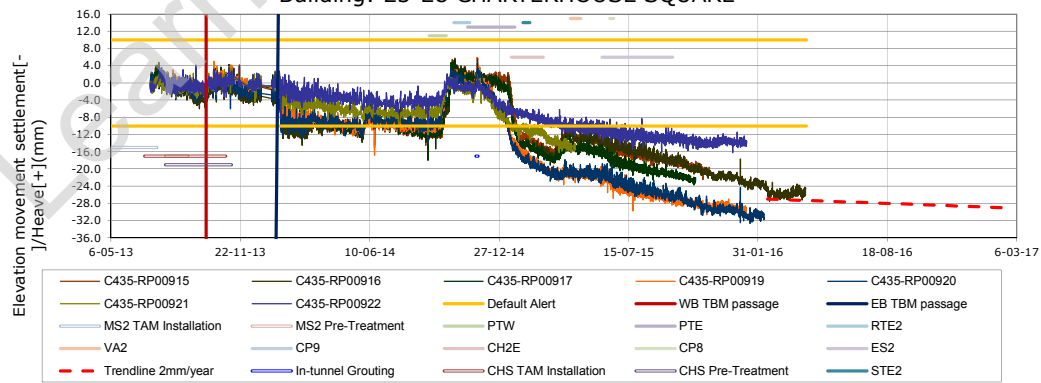
Building: 23-28 CHARTERHOUSE SQUARE



Building: 23-28 CHARTERHOUSE SQUARE

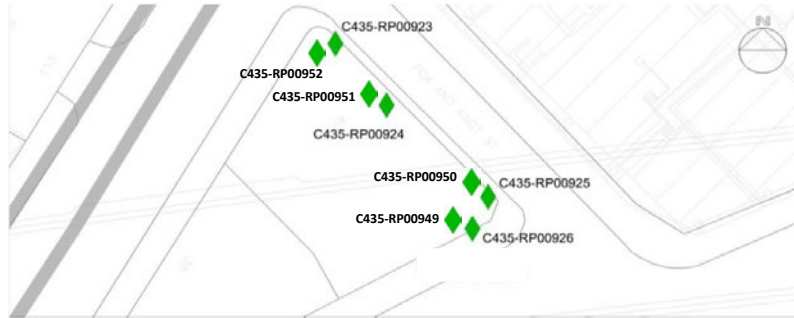


Building: 23-28 CHARTERHOUSE SQUARE

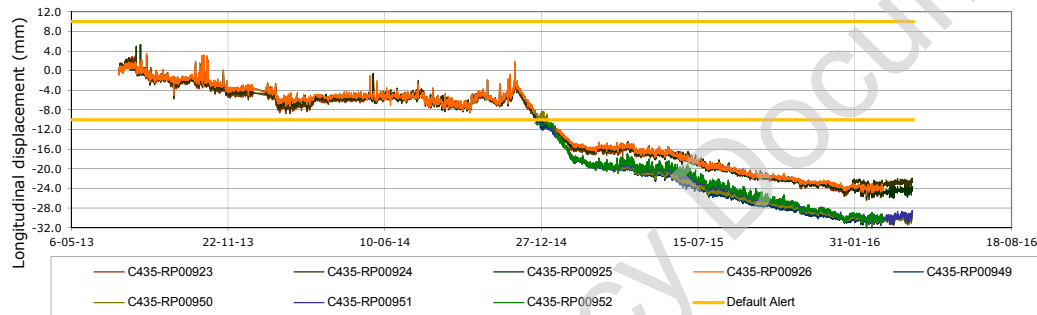


REMARKS:

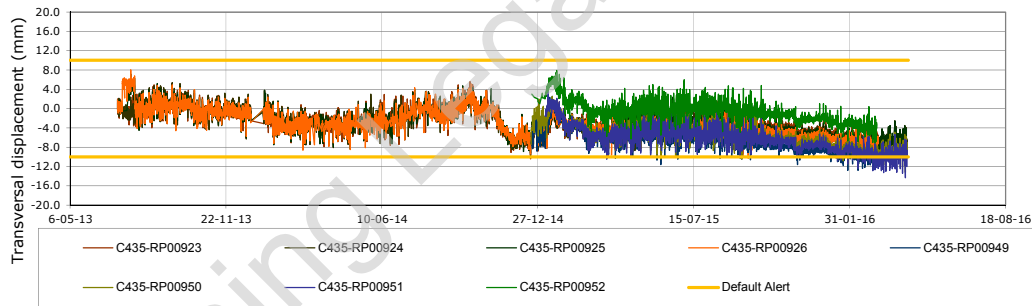
REPORT Automatic Prisms
 AREA Farringdon Station
 DEVICE 3D Target



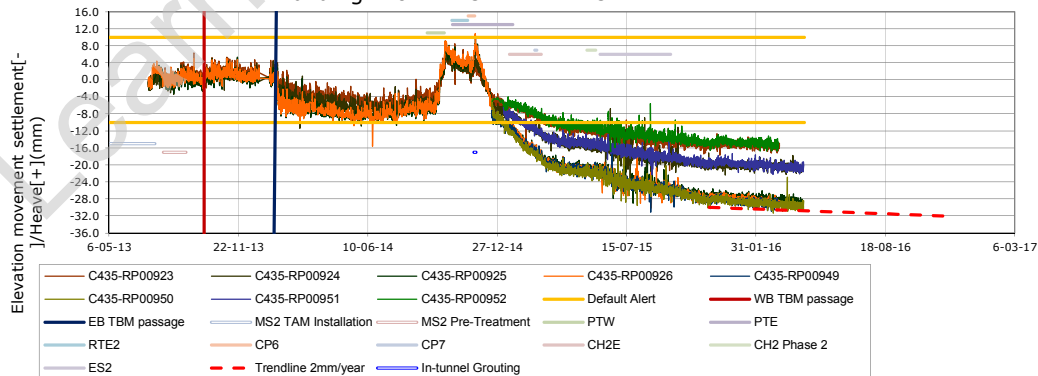
Building: 40-42 FOX AND KNOT



Building: 40-42 FOX AND KNOT



Building: 40-42 FOX AND KNOT



REMARKS:

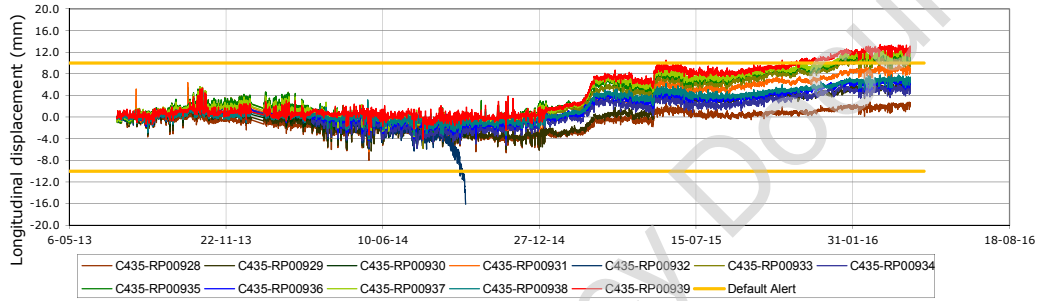


GEOCISA UK

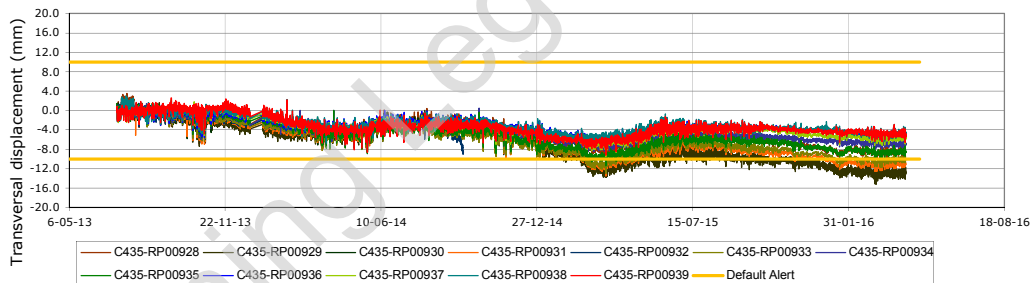
REPORT Automatic Prisms
AREA Farringdon Station
DEVICE 3D Target



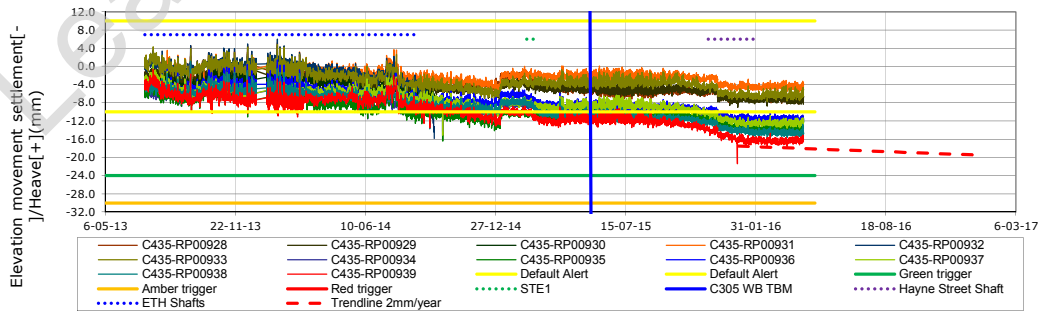
Building: 18-19 LONG LANE



Building: 18-19 LONG LANE



Building: 18-19 LONG LANE



REMARKS:

[Empty box for remarks]

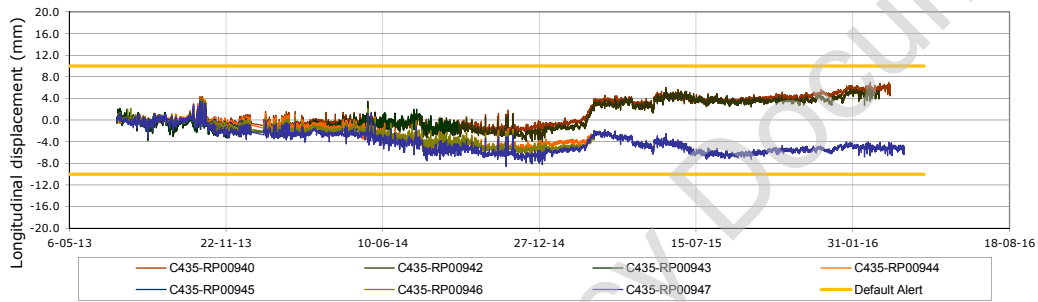


GEOCISA UK

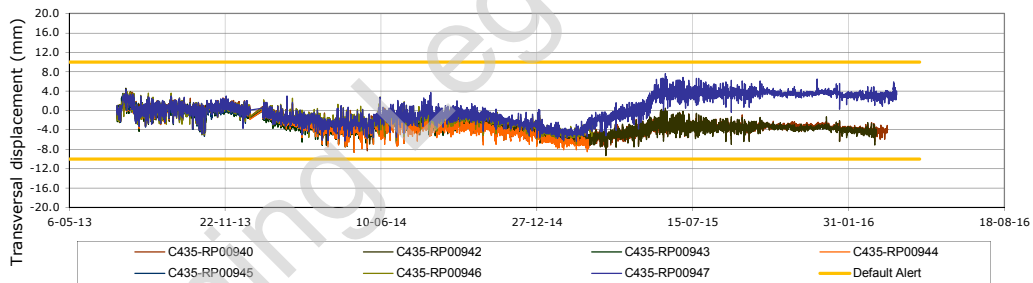
REPORT Automatic Prisms
 AREA Farringdon Station
 DEVICE 3D Target



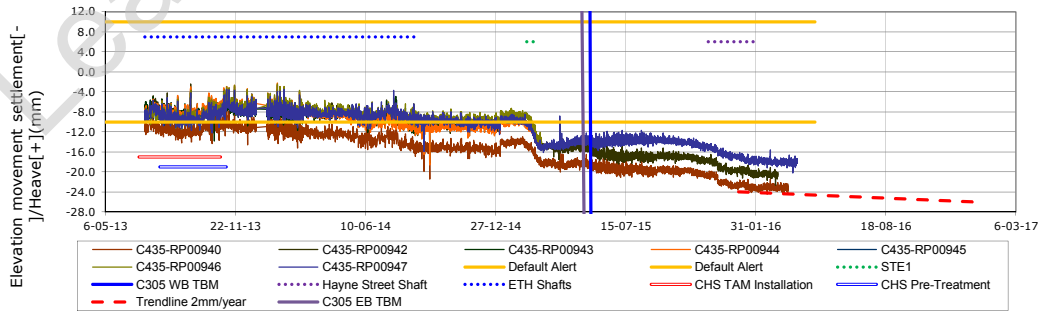
Building: 2-3 HAYNE STREET



Building: 2-3 HAYNE STREET



Building: 2-3 HAYNE STREET



REMARKS:

[Empty box for remarks]

APPENDIX C: GLOSSARY

- ATS Automatic Total Station.
- ETH Eastern Ticket Hall.
- WB Westbound.
- TBM Tunnel Boring Machine.
- EB Eastbound.
- PTW Platform Tunnel West.
- PTE Platform Tunnel East.
- CP Cross passages.
- CH Concourse Hall.
- VA Ventilation Adit
- STE Stub Tunnel East
- STW Stub Tunnel West
- RTE Running Tunnel East.
- ES Escalator Shaft.
- CHS Charterhouse Street.
- TaM Tube a Manchette.

Learning Legacy Document