

UCL Student Centre

Movement monitoring

Curtins Ref: LO1254A

Revision: 02

Issue Date: 19 August 2015

Client Name: University College London

Site Address:

Gower Street, vacant site between No 26 and Bloomsbury Theatre



Rev	Description	Issued by	Checked	Date
00	Preliminary issue for comment	SS	SS	10/07/2015
01	Issue for comment	SS	SS	04/08/2015
02	Updated to suit revised Ground movement and damage assessment report	SS	SS	19/08/2015

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Author	Signature	Date
Stefano Strazzullo BEng(Hons) Associate		19/08/2015

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1.0 Introduction

Due to the close proximity of the Bloomsbury Theatre, Georgian Terrace at No. 26 and the ACBE the method of construction, type of retaining wall, propping, monitoring and excavation sequencing have been assessed, with the Contractor responsible to undertake the final design of the wall, propping, excavation sequence and relevant monitoring of movement to the adjacent properties.

The foundations have been designed with the intent to minimise ground movements and anticipate their likely consequences to the neighbouring buildings.

The potential risks have been identified together with the methodology to minimise them, however some residual risks remain during the construction of the basement as ground movements will be unavoidable and whilst it cannot be eliminated it can be managed.

The magnitude of the movement of the perimeter wall to the basement and effect to existing building will vary around the perimeter of the basement as the distance, loads and construction of the existing buildings differ. The movement cannot be predicted accurately as it will depend on a number of factors including ground conditions, the chosen method and sequence of construction and the response of the existing buildings to the movement.

To understand the effects of the movements it is essential that a condition survey of the adjacent buildings is carried out before the excavation commences. As with all excavations adjacent to existing buildings, the installation of a monitoring system is to be provided by the contractor together with a detailed methodology of recording and monitoring the results agreed prior to the commencement of any ground works.

This system will provide useful information on how excavation is affecting the buildings and will provide an early warning of excessive deflections. A proposal for the minimum monitoring requirements is given on drawing LO1254-S-M01. This will need to be reviewed by the Contractor to make adjustments as he feels necessary to be fully satisfied that these will be adequate. Monitoring equipment should be installed as soon as the Contractor takes possession of the site to enable baseline conditions to be established before any piling or excavation works begin. A minimum of 20% of the monitoring stations should be accessible after completion of the works to allow for ongoing monitoring should it be deemed necessary.

The construction of a deep basement will result in unavoidable movement of the ground caused by the change in pressure within the soil matrix and the effect of introducing ground works such as piled walls. The ground movement will cause movement of the existing foundations adjacent to the new excavation, the magnitude of movement reducing with distance from the excavation.

Predicted ground movements have been estimated using the procedure outlined CIRIA report C580.

These expected settlement of the ground around the excavation is dependent on the design of the basement structure, the construction techniques used, the sequencing of works and the quality of the workmanship.

The contractor is responsible for all of these and the design must set an acceptable level of movement that will limit the damage to adjacent structures at the end of the defects period to Damage Category Classification 2 (Slight damage) as defined by Burland, 2001 (1)

Whilst movement from the flow of ground water should be relatively small in comparison to those described above as the majority of the excavation occurs in cohesive material it should be considered. The SI report shows a perched water table within the Taplow Gravels. Most of the flow from this should be cut off by the secant pile wall however should dewatering be necessary it would be advisable to monitor the water table outside of the excavation by, for instance, the installation of a standpipe.

1. Burland, J. B. Standing, J. R. Jardine, F. M. Building response to tunnelling: case studies from construction of the Jubilee Extension, London. Volume 1: Projects and methods, CIRIA Special publication 200, CIRIA and Thomas Telford, London, Sections: 3.3.4, 3.4, 3.5, 3.6. The key table is also included in the CIRIA report C580.

2.0 Target Points

The following monitoring methods are proposed for the site:

1. Settlement points to be installed around the perimeter of the secant pile wall before the works commence. These are then monitored during construction in order to both confirm the movement predictions are correct and to give a warning in the event that they are likely to be exceeded to allow the construction procedure to be modified if necessary.

It is proposed that 4 settlement points on the south boundary along No 26, 3 settlement points on the footpath along Gordon Street and 4 settlement points adjacent to the “node” stair on the north boundary are monitored.

2. Inclinometers to be installed on the piles along the perimeter of the excavation, minimum three per side, final location to be agreed with the contractor.
3. Tilt meters attached to the façade of the existing buildings around the perimeter of the excavation, proposed three each on the façades of the Bloomsbury Theatre, ACBE and No 26.

All the proposed monitoring points above summarised on plan on drawing LO1254 – S-M01 in Appendix A.

3.0 Trigger Levels

The movement will be monitored using a staged trigger level with a traffic light warning system based on the final movements expected and proposed mitigation measures to control further movement. The minimum trigger levels are to be set as shown in the table below but the final system used by the contractor is to be submitted for approval in advance of commencing works on site.

It should be noted that the structures that bound the site perimeter vary and therefore so does their susceptibility to movement during the installation of the wall and the subsequent excavation.

Trigger Level	% of anticipated maximum overall movement	Suggested action
1	50	Notify the structural engineer and provide proposals on how the work will continue
2	75	Notify the structural engineer and provide proposals on how the work will continue with the inclusion of further measures taken, such as increasing the occurrence of the measuring.
3	100	Stop work. Assess safety on site. Notify the structural engineer and provide proposals on how the work will continue, such as installing additional temporary propping.

From the Ground movement assessment report the predicted values of horizontal and vertical movement vary around the perimeter therefore it is proposed that different trigger levels will be adopted in each location to suit the predicted ground movement.

Based on a notional predicted settlement of 20mm proposed trigger levels would be as follows:

	1	2	3
Maximum predicted settlement 20mm	10mm	15mm	20mm

The “Amber” level triggers an immediate review of the situation and proposals on any modification to the works, the “Red” level triggers immediate action as agreed at the “Amber” stage.

4.0 Monitoring Frequency

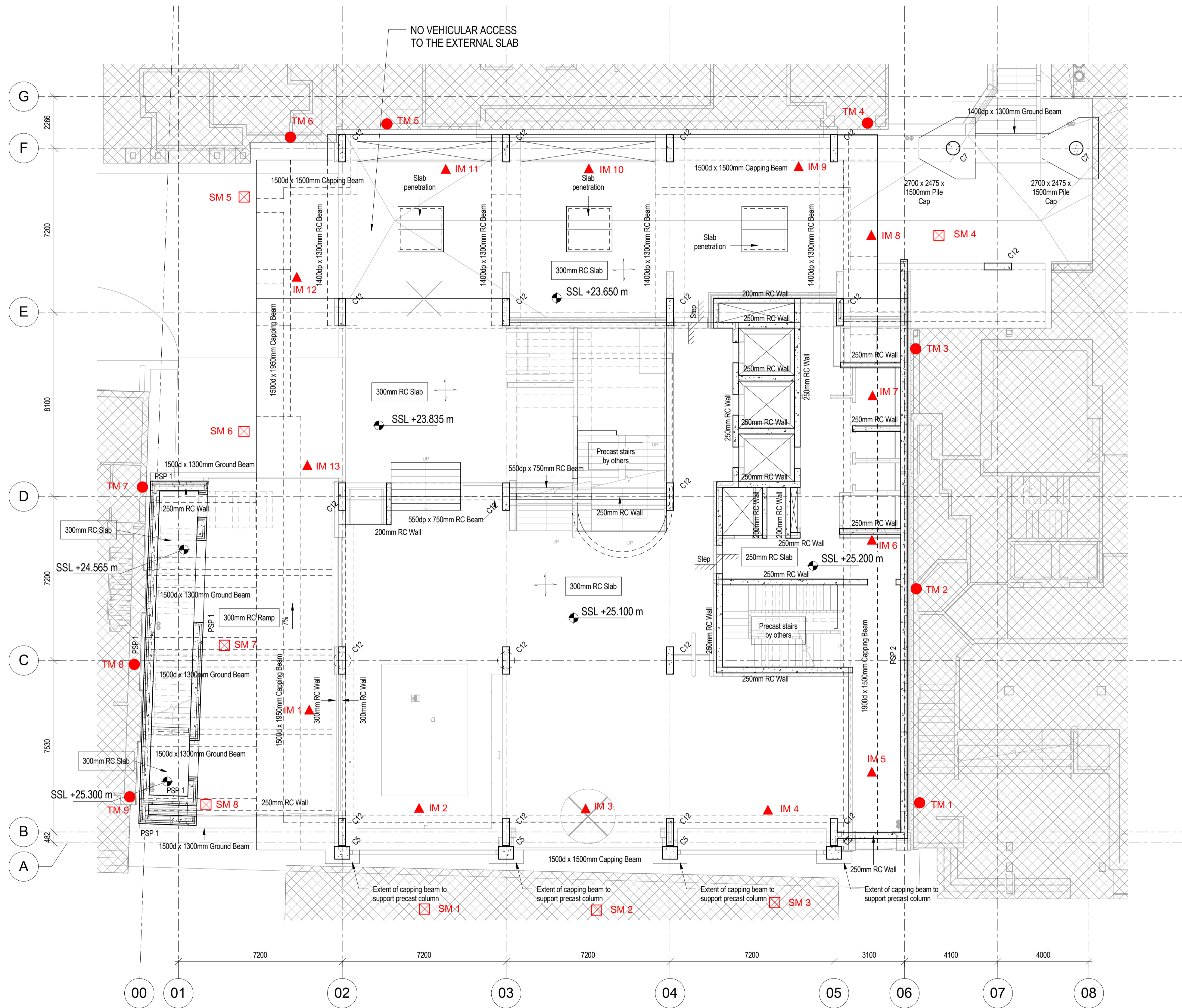
It is proposed that monitoring of movement will continue throughout the construction period and at least till the end of the defects liability period. For this reason all monitoring stations must be installed, protected and maintained throughout.

The proposed monitoring frequency is on a daily basis during the piling operations and basement excavation, to be reduced to once a week following the completion of the basement slab until all parties are satisfied that no further movement is taking place.

Appendix A – Proposed Monitoring

1. This drawing is to be read in conjunction with all relevant Architects and Engineers drawings, details and specifications.
2. Do not scale this drawing. All details and dimensions are to be checked by the contractor and fabricator onsite prior to commencement of construction/fabrication. Any discrepancies are to be reported to the Engineer. Any existing dimensions noted on this drawing are to be checked by the contractor prior to commencement of works.
3. Any ambiguities, omissions and errors on the drawings, shall be brought to the Engineers attention immediately.

- ▲ IM Inclinerometers with the piles to full depth. Final locations to be agreed with the Contractor.
- ☒ SM Settlement monitoring point.
- TM Tilt meters attached to the facade of the existing buildings.



GA GROUND FLOOR LEVEL

1 : 100

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curtins consulting
 Curtins Consulting Ltd
 40 Compton Street, London, EC1V 0BD
 t: 020 7324 2240 f: 020 7324 2241
 e: london@curtins.com www.curtins.com

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Status: **STAGE 3**

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1 : 100	A1	15.07.15	AL	SS

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Birmingham

2 The Wharf
Bridge Street
Birmingham B1 2JS
T. 0121 643 4694
birmingham@curtins.com

Bristol

3/8 Redcliffe Parade West
Bristol
BS1 6SP
T. 0117 925 2825
bristol@curtins.com

Cardiff

3 Cwrt-y-Parc
Earlswood Road
Cardiff
CF14 5GH
T. 029 2068 0900
cardiff@curtins.com

Douglas

Varley House
29-31 Duke Street
Douglas Isle of Man
IM1 2AZ
T. 01624 624 585
douglas@curtins.com

Edinburgh

35 Manor Place
Edinburgh
EH3 7DD
T. 0131 225 2175
edinburgh@curtins.com

Kendal

28 Lower Street
Kendal
Cumbria LA9 4DH
T. 01539 724 823
kendal@curtins.com

Leeds

Woodside Mews
Clayton Wood Close
Leeds LS16 6QE
T. 0113 274 8509
leeds@curtins.com

Liverpool

Curtin House
Columbus Quay
Riverside Drive
Liverpool L3 4DB
T. 0151 726 2000
liverpool@curtins.com

London

Units 5/6
40 Compton Street
London
EC1V 0BD
T. 020 73242240
london@curtins.com

Manchester

10 Oxford Court
Bishopsgate
Manchester M2 3WQ
T. 0161 236 2394
manchester@curtins.com

Nottingham

7 College Street
Nottingham
NG1 5AQ
T. 0115 941 5551
nottingham@curtins.com

