



Bank Station Capacity Upgrade

1-6 Lombard Street Heritage Statement

September 2014

MAYOR OF LONDON





Bank Station Capacity Upgrade

1-6 Lombard Street Heritage Statement

In support of London Underground's
Listed Building Consent Application
for protective works

September 2014

Bank Station Capacity Upgrade Project
5th Floor
10 King William Street
London EC4N 7TW

LUL Document Reference:
LUL-8798-STT-G-002113

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Where assessments of works or costs identified in this Report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

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1 Introduction

- 1.1.1 This Statement has been prepared in support of an application for listed building consent made by London Underground Limited at 1-6 Lombard Street, London, EC3V 9AA. The application seeks consent for protective works intended to mitigate the effects of potential settlement caused by the Bank Station Capacity Upgrade (BSCU) tunnelling works.
- 1.1.2 The protective works described within this document have been guided by the current concept design stage of the BSCU project; the further details required by the condition suggested in Section 7 will be provided on completion of detailed design.
- 1.1.3 The works for which this application seeks to gain consent are:
- Consolidation of decorative plaster to ceiling/dome within the ground floor restaurant and temporary strengthening of cantilevered stair through the use of fixed props.
- 1.1.4 The location plan and listed building description for the building are provided in Appendices 1 and 2.
- 1.1.5 This application (and similar applications) for listed building consent are being submitted concurrently with an application to the Secretary of State under the Transport and Works Act (TWA) 1992 for an Order, to be known as the Bank Station Capacity Upgrade (BSCU) Order, and with a request for a direction (of deemed planning permission) under section 90(2A) of the Town and Country Planning Act 1990 to seek to ensure that the necessary approvals are secured to enable works necessary to mitigate predicted damage to listed buildings caused by ground settlement related to the proposed BSCU tunnelling.
- 1.1.6 The BSCU project involves a major upgrade of the Bank Monument Station Complex to provide greatly improved passenger access, circulation and interchange. It includes provision of a new passenger entrance with lifts and escalator connections; a new Northern Line passenger concourse using the existing southbound platform tunnel; a new Northern Line southbound running and platform tunnel; and new internal passenger connections between the Northern Line, the Docklands Light Railway (DLR) and the Central Line.
- 1.1.7 The new Station Entrance will open on to Cannon Street at the junction with Nicholas Lane. An entrance hall will provide circulation space, as well as accommodating staff facilities, plant rooms and associated retail space. New passenger lifts will link the entrance hall directly with the Northern Line and DLR providing step free access. Escalators will also connect the entrance hall with the Northern Line.

- 1.1.8 The existing southbound platform for the Northern Line will be converted into a new passenger concourse. A new southbound running and platform tunnel will be located to the west of the existing platform. New cross passages will connect the Northern Line concourses and platforms. New walkways and escalators will better connect the Northern Line, the DLR and the Central Line. In particular, a tunnelled passageway fitted with moving walkways and new escalators will greatly improve interchange between the Northern Line and the Central Line.
- 1.1.9 Works to divert and protect utilities and to protect listed and other buildings from ground settlement, will also be undertaken. The compulsory purchase and temporary use of land, the temporary stopping up of streets, street works and ancillary works will also be required.
- 1.1.10 Appendix 3 of this document contains plans showing the proposed BSCU works.

2 Heritage Planning Policy Context

The Planning (Listed Buildings and Conservation Areas) Act 1990

- 2.1.1 Section 66 of the Act establishes a general duty for a planning authority, in considering whether to grant consent for a development which affects a listed building, to have special regard to the desirability of preserving a listed building or its setting or any features of special architectural or historical interest which it possesses. A building is listed by virtue of its special architectural or historical interest (Section 1(1)).
- 2.1.2 Section 72 of the Act establishes a duty in the exercise of any function under the Act to pay special attention to the desirability of preserving or enhancing the character or appearance of a conservation area. A conservation area is an area of local interest designated principally by the Local Planning Authority.

The National Planning Policy Framework 2012

- 2.1.3 Section 12 of the National Planning Policy Framework (NPPF) deals with the consideration of cultural heritage assets and sets out the importance of being able to assess the impact of a development on the significance of heritage assets. Significance is defined in Annex 2 as the value of an asset because of its heritage interest. This interest may be archaeological, architectural, artistic or historic and can extend to its setting. The setting of a heritage asset is defined in Annex 2 as the surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. A designated heritage asset is recognised by the NPPF to be a World Heritage Site, Scheduled Monument, Listed Building, Protected

Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under the relevant legislation.

- 2.1.4 The NPPF recognises that a balance needs to be struck between the preservation of the significance of a heritage asset and delivering public benefit. With regard to designated assets, paragraph 132 states that the more important the asset, the greater the weight should be on its conservation. Distinction is drawn between those assets of highest significance and those of a lesser significance.
- 2.1.5 The NPPF identifies harm as being either substantial or less than substantial. Paragraph 133 states that where the proposal would lead to substantial harm to the significance of a designated asset consent should be refused unless the harm or loss is necessary to achieve substantial public benefit that outweighs that harm. In cases where less than substantial harm to the significance of a designated asset is anticipated, paragraph 134 requires that this harm should be weighed against the public benefits of the proposal. In respect of non-designated assets, paragraph 135 requires a balanced judgement having regard to the scale of any harm or loss and the significance of the asset.
- 2.1.6 In accordance with the NPPF, this heritage assessment sets out the significance of buildings likely to be affected by the BSCU works. The information provided in this assessment conforms to paragraph 128 of the NPPF, thus the level of detail provided is proportionate to the significance of the affected heritage assets and no more than is sufficient to understand the potential impact of the proposal on that significance.
- 2.1.7 Guidance on the application of heritage policy within the NPPF is provided within the PPS 5 Planning Practice Guide (English Heritage, 2010) and the on-line National Planning Policy Guidance (NPPG).

Regional Policy

The London Plan 2011

- 2.1.8 Policy 7.8 of the London Plan deals with heritage assets and archaeology and identifies the contribution that designated and non-designated heritage assets make to London's world class city status. The policy seeks to ensure the sensitive management and promotion of London's heritage assets through recognition of their positive role in place shaping.
- 2.1.9 "Draft Further Alterations to the London Plan" were published in July 2014. These proposed changes contain no update to policy 7.8 of the current London Plan.

Local Policy

The Unitary Development Plan 2002

- 2.1.10 Certain sections of the Unitary Development Plan (UDP) remain in force until the adoption of the Local Plan, which is anticipated to be in 2015, including Policies ENV10 and ENV11 which are of relevance to consideration of the BSCU works.
- 2.1.11 Policies ENV10 and ENV11 relate to conservation areas and listed buildings and recognise the contribution that historic buildings make to the character and ambience of the City of London. Policy ENV11 states that proposals to demolish buildings that make a positive contribution to the character or appearance of a conservation area will be resisted.

Core Strategy Development Plan 2011

- 2.1.12 One of the over-arching objectives of the Core Strategy as exemplified by Strategic Objective 3: City Culture and Heritage, is the promotion of a high quality of architecture and street scene appropriate to the City of London's position at the historic core of London.
- 2.1.13 Policy CS12 directly relates to cultural heritage, and aims to conserve or enhance the significance of the City's heritage assets and their settings, and provide an attractive environment for the City's communities and visitors, and sets out a number of ways in which this is to be achieved.

The City of London Corporation Supplementary Planning Documents (SPDs)

- 2.1.14 The City of London Corporation has prepared a number of SPDs including those that have been prepared in respect of some of the City of London's conservation areas including that prepared for the *Bank Conservation Area* in 2012.
- 2.1.15 The document provides detailed analysis of the development and architectural character of the conservation area as well as highlighting significant streets and buildings that contribute to the character of the conservation area and the setting of specific heritage assets.

3 Consultation

- 3.1.1 Discussions and formal consultations with English Heritage and the City of London Corporation have taken place during the design process of the BSCU project. Both have been consulted as to the scope and process of heritage and Building Damage Assessments, which are relevant to the Listed Building Consent now being sought. The approach is based on established best practice and both bodies have responded positively to the methodology of assessment of settlement impacts.
- 3.1.2 The City of London Corporation's Assistant Director (Conservation) and the English Heritage Inspector were consulted on the proposed protective measures and a draft of this Statement. Both were generally content with the proposals subject to receipt of further detail at the appropriate stage. Their comments on the draft Statement were incorporated and the list of proposed conditions refined and agreed.
- 3.1.3 The project team has been in consultation with the building owner since 2011 regarding the nature of the BSCU project and its potential interface with the building.

4 Summary Description and Statement of Significance

- 4.1.1 The statutory Listed Building Description is reproduced in Appendix 2 of this document.
- 4.1.2 This Grade II listed building is located within the Bank Conservation Area, which encompasses the heart of the City. The Bank Conservation Area is characterised as an area where buildings and streets are harmonised by their predominant use of solid masonry façades with regular punched openings, enriched by abundant classical modelling and surface detail (photo 1 in this document, a location plan of photographs can be found at Appendix 6) . The area is also defined by the design and use of buildings for banking and associated commercial activities. The site of 1-6 Lombard Street is bordered by King William Street to the north and north-east, St Swithin's Lane to the south-east, and Mansion House Place to the north-west and south (Appendix 1: Location Plan).



Photo 1: General view of 1-6 Lombard Street

- 4.1.3 1-6 Lombard Street dates from 1908 and 1915 and was designed by Dunn and Watson with W Curtis Green for the Scottish Provident Bank. The symmetrical stone façade is curved to follow the line of the street, and the building has five main storeys with two dormered roof storeys. It has 17 bays in all with slightly projecting end pavilions. The detail of the façade is classical, including giant Corinthian order columns which unite the second, third and fourth floors. The main entrance comprises a tall arched opening leading to a vaulted entrance turret flanked by further narrower openings matching those to the end pavilions. The building has two levels of basement.
- 4.1.4 Internally, the building has two distinct sections. The ground floor to the north-west contains a restaurant with a large central dome, and heavy plasterwork decoration. Areas of the plaster are currently in poor condition. The rest of the building houses office accommodation, and is centred on a cantilevered staircase of stone with an iron balustrade, set against a stone curtain wall with a hexagonal timber skylight above. To each stair landing are stone columns with foliate capitals. There are additional, secondary stone cantilevered stairs to the southern range of the building. The south-eastern corner of the building contains a small panelled room with plaster cornice. The entrance foyer has a carved stone cornice around a central dome, the decorative detail of which

echoes that of the columns to the stair landings. Excepting the plasterwork of the restaurant, the building as a whole is in good condition.

- 4.1.5 Appendix 4 of this document contains an article by Graham Ridout entitled 'Normal Services will be Maintained', dating from the time of modernisation works in 1986. This describes the works done at that time, and highlights the retention of historic elements, as well as the composition of modern fit out.
- 4.1.6 The significance of this building is predominantly architectural, and lies in its Portland stone façade, and retained internal features. Of primary significance within the main part of the building is the central stair, believed to have been retained or reinstated during the 1980s redevelopment, and other historic elements of the foyer including stone pilasters, coving and ceiling details. There is no heritage significance attached to the 1980s modernisation works, which include modern suspended ceilings and other finishes. The restaurant area with its dome and decorative plaster also contributes to the significance of the building due to the survival of original features, and its historic importance as a reminder of the original commercial use of the building.
- 4.1.7 The setting of the building comprises the streetscape of King William Street, the surrounding buildings, and Bank Junction which lies to the north and incorporates a number of architecturally significant buildings. The townscape setting contributes positively to the significance of 1-6 Lombard Street as a listed commercial building.

5 Predicted or possible impacts of proposed BSCU works upon 1-6 Lombard Street

- 5.1.1 It is proposed that the running tunnel and Central Line link tunnel will be constructed directly beneath 1-6 Lombard Street, from south-east to north-west. A plan showing the position of proposed and existing infrastructure in relation to 1-6 Lombard Street is appended at Appendix 3.
- 5.1.2 At the current concept design stage, a conservative, reasonable worst case geotechnical assessment ('Stage 2' Building Damage Assessment, included at Appendix 5) has been made, indicating that there may be a maximum predicted settlement of 43mm to the building and the calculated maximum tensile strain is 0.036%, with the greatest displacement occurring at the north and west, along the Mansion House Place and rear elevations.
- 5.1.3 The geotechnical assessment has been combined with a heritage and structural assessment, which has highlighted sensitivities in relation to the building, particularly in areas of heritage significance. The differential settlement of 20mm from the edges to the centre of the building raise the potential of damage to fragile decorative plaster in the restaurant area (shown in photo 2),

particularly around the dome, and possible distortion on opening up (i.e. localised removal of internal finishes such as plaster or floorboards to expose the structure behind for inspection) around the central cantilevered stair (photos 3 and 4).



Photo 2: Dome of restaurant with decorative plaster enrichment



Photo 3: Cantilevered main stair



Photo 4: View through well of stone cantilevered stair.

- 5.1.4 Further more detailed assessment will be undertaken at a 'Stage 3' Building Damage Assessment to be completed in February 2015, which is required to verify the results of previous assessment as the BSCU design develops

(detailed design), and further establish protective works design. The Stage 3 Building Damage Assessment will take into account the detailed design and refined tunnel and construction details. The process for the Stage 3 Building Damage Assessment is well established, and will include, as necessary, the following measures:

- desk top review of all available survey and structural information including previously unseen reports and measured survey plans;
- full, detailed visual structural survey to identify weaknesses and to inform detailed modelling and analysis;
- modelling and analysis of soil structure interaction to refine assessment of settlements and building strains;
- non-intrusive and intrusive surveys to better understand the building's sensitivities to predicted settlements and strains;
- material sampling of interior finishes to facilitate informed repair;
- recording of heritage features to facilitate informed repair;
- consideration of the potential pros and cons of physical protective works;
- protective works design; and
- formulation of a Monitoring Response Action Plan, which will detail trigger levels and appropriate actions in the event of a trigger being breached.

5.1.5 Method statements, specifications and full plans of protective works as found to be required will be produced following the Stage 3 Building Damage Assessment.

5.1.6 The Stage 2 Building Damage Assessment report concluded that predicted settlement is high along the Mansion House Place and rear elevations, with differential settlement highest at the centre of the building and reducing to its edges. It is likely that cracks will be concentrated on the particularly sensitive areas of the building, the cantilevered stair and restaurant decorative plaster. In particular distortion due to differential settlement may loosen the structural members of the stair, causing minor separation at the joints. The restaurant plaster is currently in poor condition, which may exacerbate its sensitivity to movement causing existing areas of damage to worsen.

5.1.7 It is considered that the impacts of the predicted settlements are such that they could be detrimental to the heritage significance of 1-6 Lombard Street. Therefore, proposals for protective works are outlined within the following section, and the impacts of these protective measures discussed. Further

investigation of sensitive elements, including survey and examination of survey plans, will continue to be undertaken during the detailed design of the BSCU project, and the impacts reviewed and clarified at this time.

6 Proposed protective works and impacts of those works

- 6.1.1 The specific interventions requiring listed building consent are described below. The proposed protective works have been designed on the basis of information available at the present concept design stage and the Stage 2 Building Damage Assessment.
- 6.1.2 Whilst the proposals are currently at concept design level of detail, the need to protect listed buildings from the impacts of settlement resulting from the works has been recognised. Therefore, as a precautionary measure a 'worst case' approach has been taken in respect of the assessment of impact from the proposed works, based on the current scheme design stage.
- 6.1.3 The next design stage will include refined geotechnical modelling and building assessment as part of the Stage 3 Building Damage Assessment. This further work may reduce or remove the need for the proposed protective works. If the protective works are required, they will be designed in detail. The detailed information required by the condition in Section 7 will be provided for approval by the Local Planning Authority.

Works that require Listed Building Consent

- 6.1.4 Subject to further structural investigation, the cantilevered stair may require the provision of a propping mechanism to provide stability in the event of movement relative to the curtain wall or between stair treads. These works are likely to consist of temporary braces fixed into the stone curtain wall at all levels (a plan of the stair and wall in relation to the foyer is shown in Appendix 7).
- 6.1.5 Following non-intrusive survey to the decorative plaster ceilings of the restaurant, those areas that are at risk of damage due to their current condition and the level of predicted movement will be consolidated by securing loose enrichments. The consolidation will be enabled by utilising a variety of methods ranging from crack filling, localised grouting of voids to insertion of stainless steel fixings anchored to timber substrates. This will be a permanent work to the listed building.

Impact of the works

- 6.1.6 The level of material impact from the proposed strengthening of the cantilevered stair is dependent on the location of the temporary strengthening. Due to the construction of the stair, the fixing of proposed temporary

strengthening will be predominantly to the finely jointed curtain wall. This will involve the loss of some historic material, though it is proposed that all evidence of temporary fixings be hidden on completion. Therefore, whilst there will be a slight permanent change to the historic fabric of the building in fixing areas, the visual impact will be temporary. Making-good in areas of fixing will be on a like for like basis, with replacement stone used where required, reducing long term aesthetic impact.

- 6.1.7 The consolidation of the decorative plaster to the restaurant will have a beneficial impact to the significance of the listed building, as the plaster is currently in poor condition. Should anchors be necessary to secure plaster enrichments, there will be a permanent change to the materials of the building, but these will not be detectable on completion of the works, and will not detract from the significance of the building. In addition, there will be a short term aesthetic impact while repair works are undertaken. Overall, it is considered that the proposed works will secure the continued historic value of the decorative plaster and therefore be beneficial.
- 6.1.8 Appendices 7 and 8 contains annotated plans and photographs showing the location of proposed works.
- 6.1.9 The proposed protective works will have no impact on the setting of the listed building, as they relate only to the interior of the building. There will also be no impact on the Bank Conservation Area resulting from the protective works.
- 6.1.10 In relation to the NPPF, the works will not have a detrimental effect on the significance of the building though there will be some permanent change to the fabric, and result in less than substantial harm to the heritage asset. Where decorative plaster is consolidated, this will have a beneficial effect. In relation to local policy, the protective works will achieve the objective of conserving the City's heritage assets.

Justification for the works

- 6.1.11 The BSCU project involves a major upgrade of the Bank Monument Station Complex which is currently one of the most congested on the London Underground network. The overarching aim is that Transport for London continues to provide a fit-for-purpose public transport station complex to support the City of London. It shall do this by:
- increasing the capacity of Bank Underground Station so that it is able to handle present and forecast demand, and thereby support the economic growth of the city;
 - minimising passenger journey time through the station, and thereby reduce crowding;

- improving the quality of access, interchange and ambience, including the provision of step-free access routes from street level to Northern Line trains and provide step-free interchange between Northern Line and Dockland Light Railway (DLR) trains; and
 - improving emergency fire and evacuation protection measures.
- 6.1.12 The BSCU project is an important element of works planned as part of Transport for London's 10 year Investment Programme which will contribute to the achievement of the economic growth of London as set out in the Mayor's London Plan and Transport Strategy. The significant public and economic benefit of the BSCU works as described in Section 1 and illustrated in Appendix 3 justifies the impacts outlined in this Statement.
- 6.1.13 The proposals contained within this document are intended to mitigate adverse impacts of the BSCU works related to settlement at 1-6 Lombard Street. The protective works proposals themselves will result in a change to historic building fabric to a small extent. However, the protective works are intended to prevent damage to the listed building and enable the building to retain its heritage significance.
- 6.1.14 It is considered that the proposed protective works will constitute less than substantial harm to the listed building. The NPPF states that "where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal". The public benefits of the BSCU are significant both locally and in the wider London context.

7 Proposed conditions

- 7.1.1 The following conditions have been agreed with City of London officers and the English Heritage Inspector:

Time Limit for Commencement of Development

1. The works shall commence not later than five years beginning with the date of this consent.

Reason: To comply with the requirements of section 18(1) of the Planning (Listed Buildings and Conservation Areas) Act 1990.

Approval of Details

2. The works shall not commence until the following details have been submitted to and approved in writing by the Local Planning Authority:
 - a) A report, including an engineering statement, detailing the results of structural assessment and investigations into the condition of the building to confirm the need for and suitability of the protective works;
 - b) Detailed survey drawings and/or photographs showing, by means of hatching and/or annotations, the areas to be affected by the protective works;
 - c) Photographic/condition survey of the relevant parts of the building; and
 - d) Details of the proposed protective works, including plans of locations and specification of methods.

Reason: To protect the listed structure and retain the aesthetic, architectural or historic significance of the listed building.

Temporary Works

3. Any temporary protective works shall be removed within six months of the monitoring data showing that ground movement has effectively ceased.

Reason: To protect the listed structure and retain the aesthetic, architectural or historic significance of the listed building and its setting.

Monitoring

4. A report summarising the ground movement effects in the vicinity of the building shall to be submitted to the Local Planning Authority within six months of the monitoring data showing that ground movement has effectively ceased.

Reason: To protect the listed structure and retain the aesthetic, architectural or historic significance of the listed building.

Making Good

5. All work of making good shall match the existing adjacent work with regard to the methods used and materials, colour, texture and profile, unless shown otherwise on the drawings or other documentation hereby approved or required by any conditions(s) attached to this permission.

Reason: To ensure a satisfactory appearance and finish to retain the aesthetic, architectural or historic significance of the listed building.

Approved Drawings

6. The works shall not be carried out other than in accordance with the approved drawings and particulars as set out in the Heritage Statement September 2014 including Appendices or as approved under conditions of this Listed Building Consent.

Reason: To ensure that the development is in compliance with details and particulars which have been approved by the Secretary of State for Transport and the Local Planning Authority.

8 Conclusion

- 8.1.1 Modelling of likely settlement and strains on the basis of the concept design stage to date, combined with heritage and structural assessment of 1-6 Lombard Street, predicts potential settlement of up to 43mm to the north and west of the building and a calculated maximum tensile strain of 0.036%, as a result of the new infrastructure being constructed directly below the building.
- 8.1.2 It is considered that the stone cantilevered stair and the decorative plaster within the restaurant may be sensitive to the predicted settlement, and therefore protective works are proposed to provide additional support to these features. The detailed design of these works will be informed by non-invasive and invasive survey and monitoring works.
- 8.1.3 It is acknowledged that these protective works will lead to a temporary adverse impact on the significance of the building, but that this impact will be outweighed by the benefits of the protective works in providing structural support and preventing damage to the remaining historic elements of the building.
- 8.1.4 All making good to the internal appearance of the building will follow the principle of like for like repair, and there will be no long term impact to the building beyond a small material change to the stone stair and curtain wall which will not devalue its aesthetic, architectural or historic significance. The impact of the works will constitute 'less than substantial harm' as defined by the NPPF.

References

English Heritage National Heritage List

The Buildings of England, London 1: The City of London, Bradley and Pevsner, (1997), p537

Building Damage Assessment Report 'A7' (2014)

Alan Baxter Associates 'Gazetteer' (2012)

Ridout, G, 'Normal services will be maintained', Building, 5 September 1986

Information available through the City of London Planning Portal relating to LBC application of 2010, Pringle, Richards, Sharratt Ltd

Appendices

Appendix 1: Location Plan



Appendix 2: Listed Building Description

List entry Number: 1286139

Location: 1-6, LOMBARD STREET EC3

Greater London Authority City and County of the City of London

Grade: II

Date first listed: 10-Nov-1977

UID: 199585

Details LOMBARD STREET EC3 1. 5002 (South Side) Nos 1 to 6 (consec) TQ 3281 SE 10/N/43

2. 1908 and 1915 by Dunn and Watson with W Curtis Green. Symmetrical stone facade convex curved to follow line of street; 5 main storeys and 2 dormered roof storeys; 17 bays (3+11+3) with end pavilions of slight projection; tall channelled arcuated base embracing lower 2 storeys, each arch containing iron railings to basement windows and stone balustrades to mezzanine (1st) floor windows; giant Corinthian order uniting 2nd, 3rd and 4th floors with attached unfluted columns and richly carved entablature with dentilled and modillioned cornice and lion masks in the cyma; crowning balustrade with plain dies, turned balusters and moulded capping. The end pavilions emphasized by tripartite treatment with central ground floor opening flanked by Byzantine columns carrying an enriched lintol and cornice; channelled quoin piers to upper storeys.

Central tripartite feature to main facade with tall arched opening leading to coffered turret vaulted entrance flanked by 2 storey narrower openings matching those to end pavilions. Balconies with iron balustrades to all 3rd floor windows; the slated roof not prominent behind crowning balustrade. To the left of the symmetrical 17 bay facade a lower 4 storeyed corner block, circular on plan and containing another entrance. Facade returns to St Swithin's Lane.

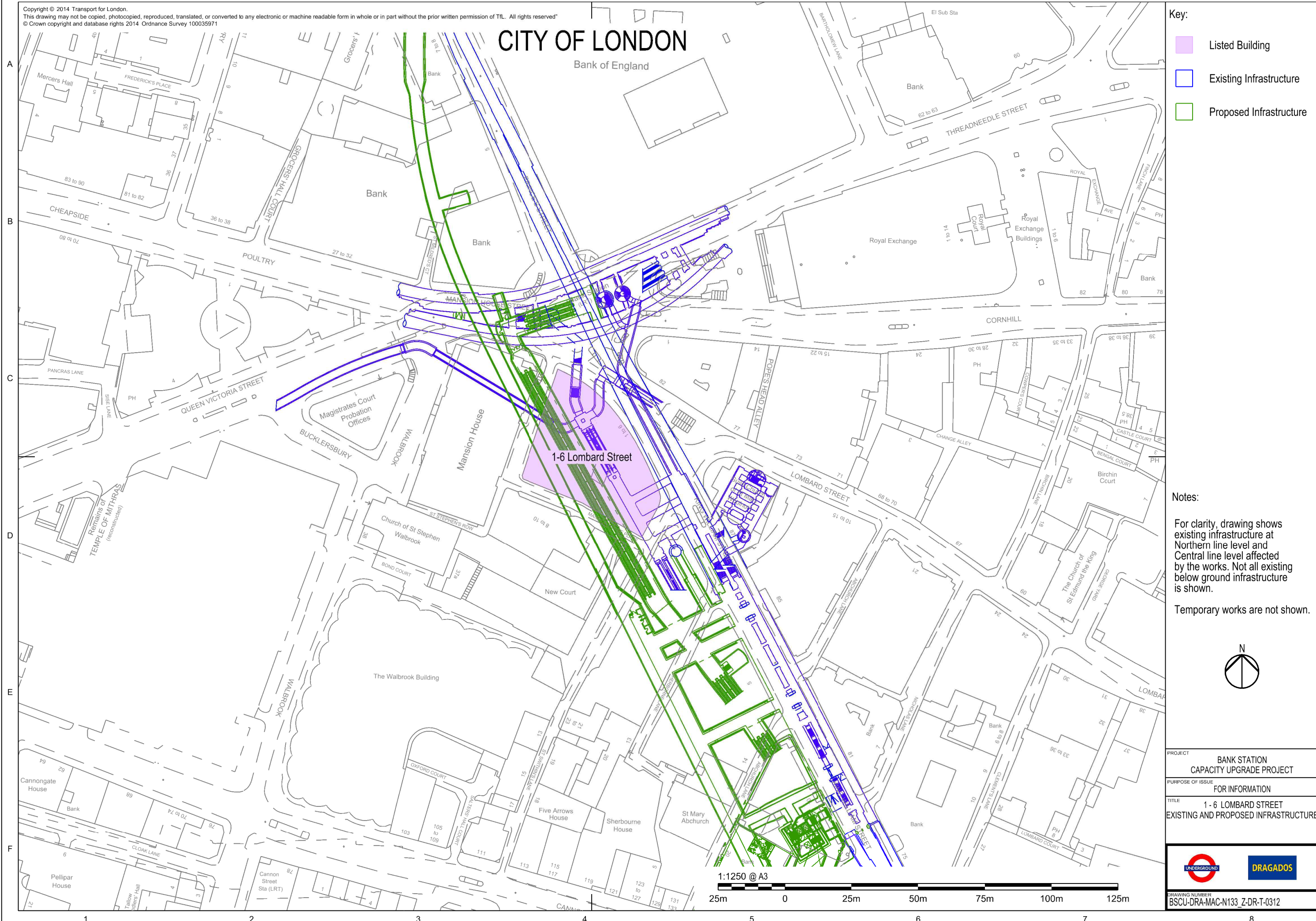
Listing NGR: TQ3270481062

National Grid Reference: TQ 32715 81066

Appendix 3: Extent of BSCU works

CITY OF LONDON

Bank of England

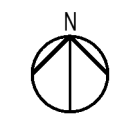


- Key:**
- Listed Building
 - Existing Infrastructure
 - Proposed Infrastructure

Notes:

For clarity, drawing shows existing infrastructure at Northern line level and Central line level affected by the works. Not all existing below ground infrastructure is shown.

Temporary works are not shown.



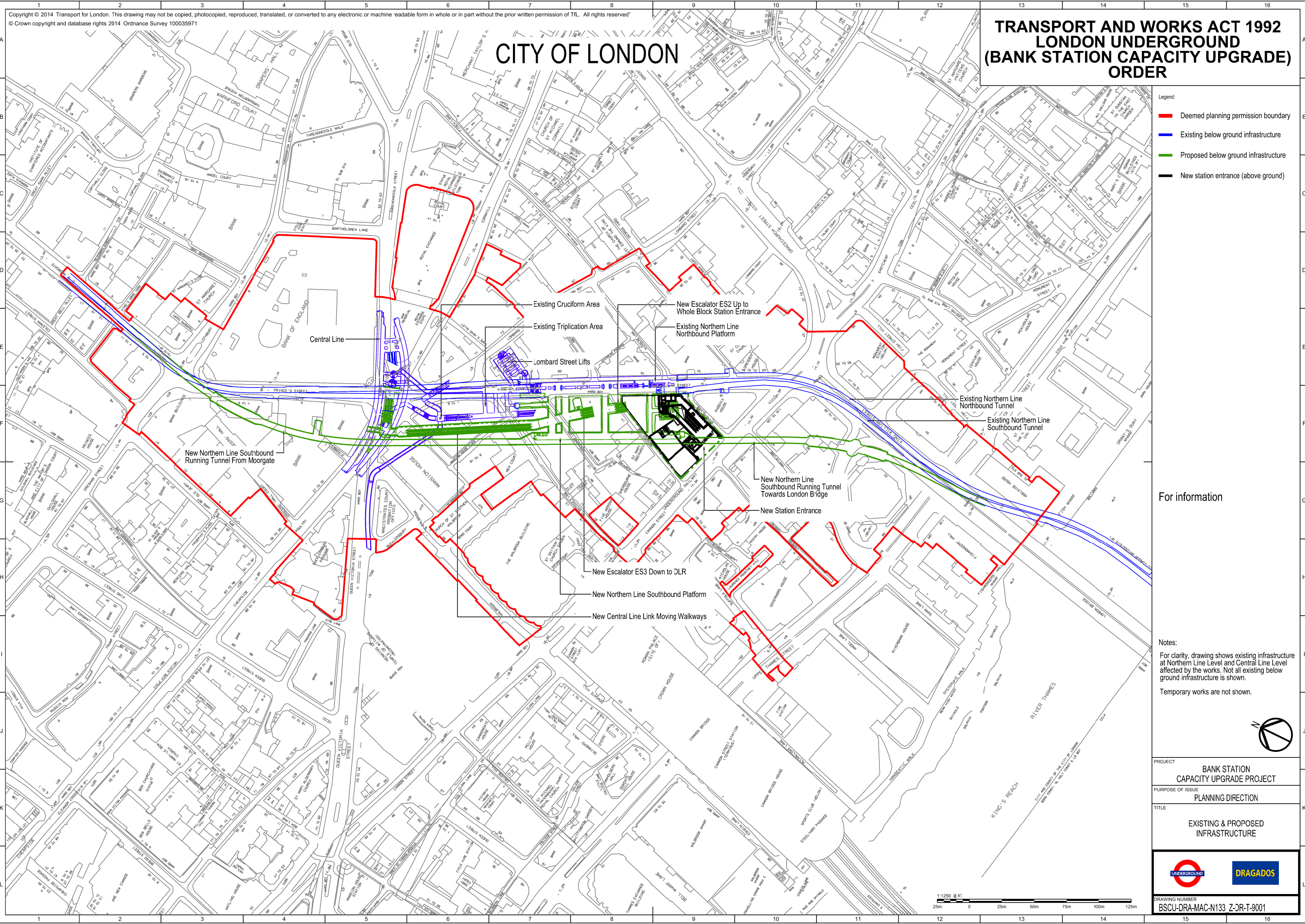
PROJECT	BANK STATION CAPACITY UPGRADE PROJECT
PURPOSE OF ISSUE	FOR INFORMATION
TITLE	1 - 6 LOMBARD STREET EXISTING AND PROPOSED INFRASTRUCTURE

DRAWING NUMBER
BSCU-DRA-MAC-N133_Z-DR-T-0312

TRANSPORT AND WORKS ACT 1992 LONDON UNDERGROUND (BANK STATION CAPACITY UPGRADE) ORDER

CITY OF LONDON

- Legend:
- Deemed planning permission boundary
 - Existing below ground infrastructure
 - Proposed below ground infrastructure
 - New station entrance (above ground)

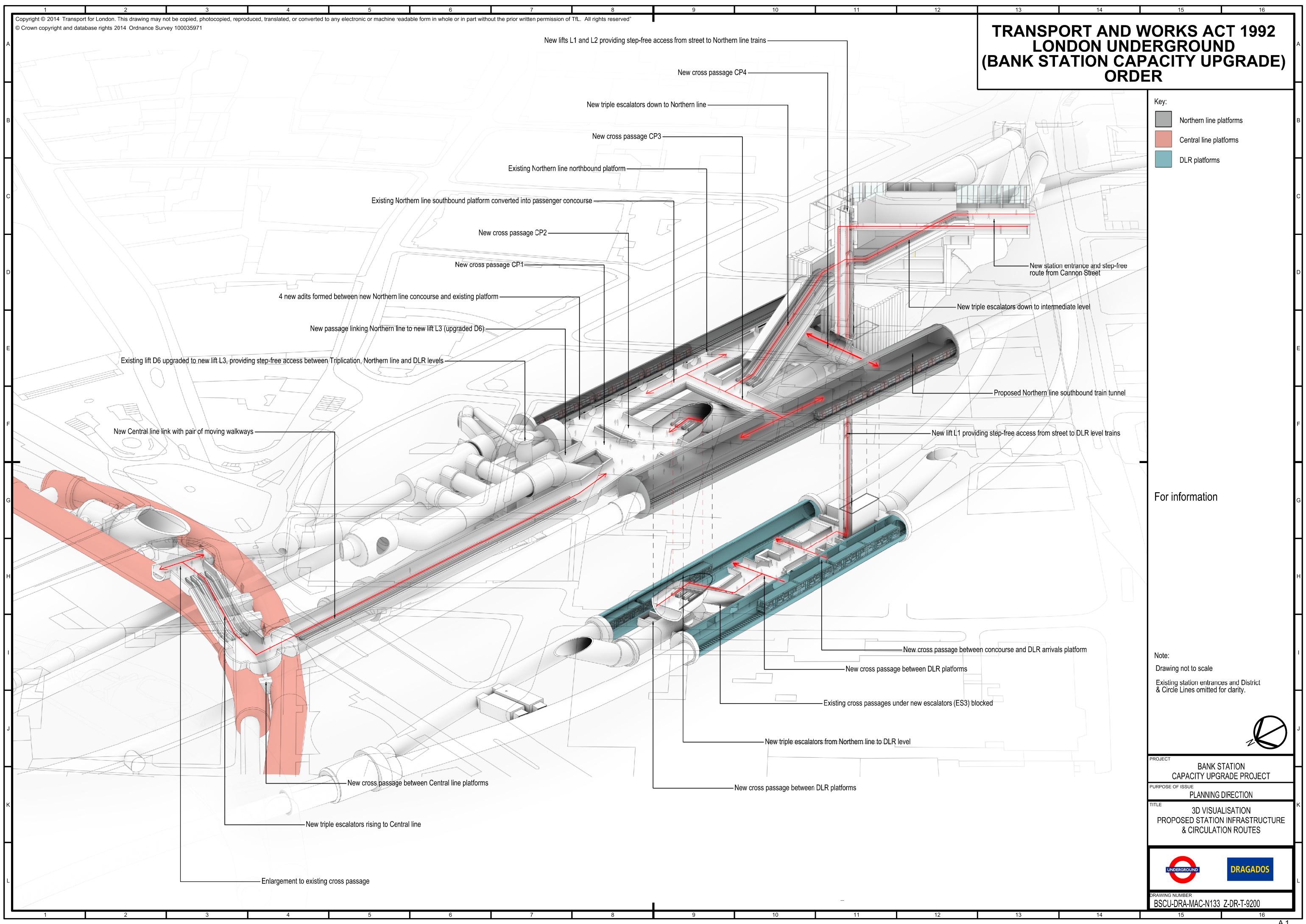


For information

Notes:
 For clarity, drawing shows existing infrastructure at Northern Line Level and Central Line Level affected by the works. Not all existing below ground infrastructure is shown.
 Temporary works are not shown.

PROJECT	BANK STATION CAPACITY UPGRADE PROJECT
PURPOSE OF ISSUE	PLANNING DIRECTION
TITLE	EXISTING & PROPOSED INFRASTRUCTURE
DRAWING NUMBER	BSCU-DRA-MAC-N133 Z-JR-T-9001

TRANSPORT AND WORKS ACT 1992 LONDON UNDERGROUND (BANK STATION CAPACITY UPGRADE) ORDER



- Key:
- Northern line platforms
 - Central line platforms
 - DLR platforms

For information

Note:
 Drawing not to scale
 Existing station entrances and District & Circle Lines omitted for clarity.



PROJECT	BANK STATION CAPACITY UPGRADE PROJECT
PURPOSE OF ISSUE	PLANNING DIRECTION
TITLE	3D VISUALISATION PROPOSED STATION INFRASTRUCTURE & CIRCULATION ROUTES



DRAWING NUMBER
 BSCU-DRA-MAC-N133 Z-DR-T-9200

**Appendix 4: Article:
'Normal services will be maintained', 1986**



NORMAL SERVICES WILL BE MAINTAINED

It's business as usual for tenants occupying half of 1-6 Lombard Street while the remainder of the building is being gutted and refurbished. *Graham Ridout* reports on the mass of temporary services needed to keep the bankers happy during a £7 million refurbishment.

Refurbishment contracts can be relied on to throw up the odd surprise. The £7 million refurbishment of 1-6 Lombard Street in the heart of the City of London is no exception.

Outside the seven-storey stone-clad neo-classical block there is nothing to suggest that an extensive gutting and rebuilding process is going on inside, bar a scaffold tucked away from general view in one corner.

Inside, there is plainly a race

on to complete the works in time. You have to pick your way carefully: debris from a gutted section and new materials for the rebuilding work litter the floors.

Further, almost everywhere are dust-sheeted or partitioned-off areas festooned with cables or temporary services slung on steel trestles or hangers. It all looks as if things have got out of hand, with contractor G E Wallis struggling against an unequal task.

However, Wallis's contracts

manager, Roy Gilbert, is able to report, with an air of relief: "So far, at least, we have managed to meet every deadline for the staged completion of sections of the work."

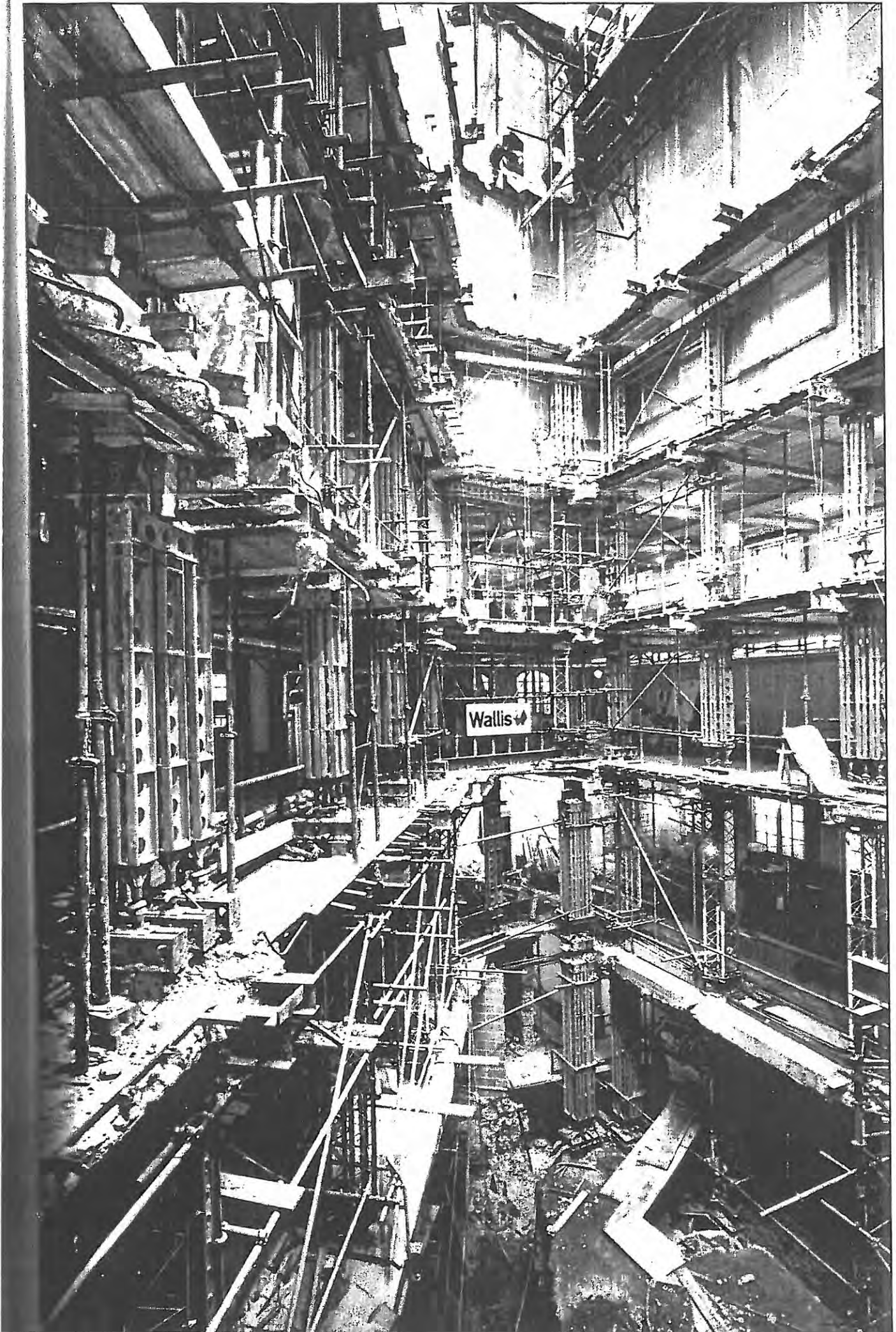
The complexity of installing new services while other services in the partly-tenanted building are maintained, is daunting.

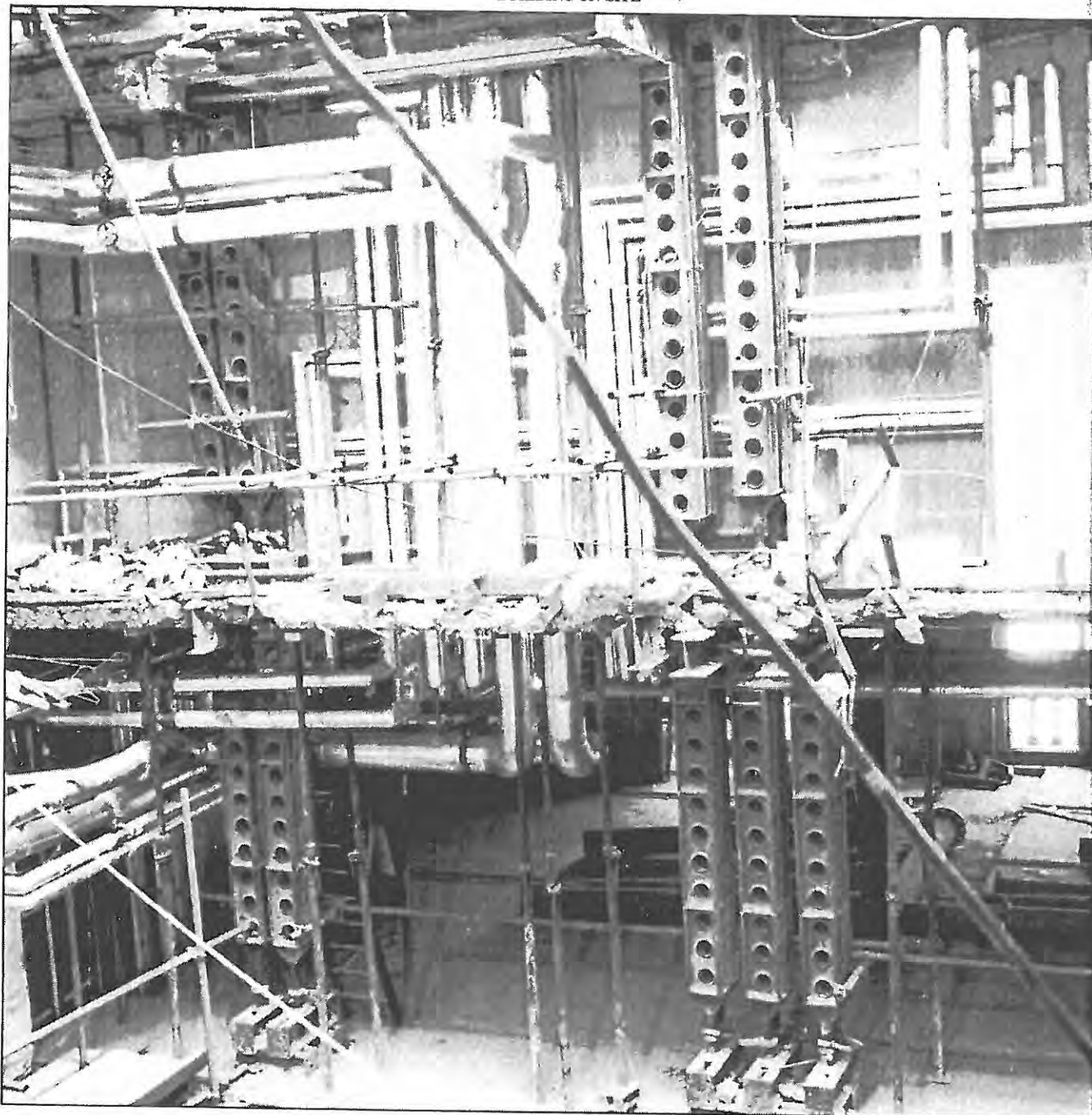
"There are between 500 and 600 drawings for the services alone," explains Steve Thompson of M & E consultants

FHP Partnership. When the two-year contract for the Scottish Provident Institution is completed next March, the building will have "all the plant and services expected in the electronic age of the 1990s," he adds.

A serene exterior (*above*) conceals furious activity (*right*) in the major refurbishment of 1-6 Lombard Street, City of London.

BUILDING ON SITE





► Before work began, the multi-tenanted block had a hotch-potch of services, with virtually no attempt made to integrate anything. One result was an unsightly mess of pipes and ducts running full height within the light well of the wedge-shaped block.

"For years, the light well had been little more than a glorified service duct," says Maurice Graville, of Jones Lang Wootton's building surveying office. Jones Lang Wootton acts as property manager for the building's owner, Scottish Provident Institution, which is also one of the tenants.

The opportunity to refurbish part of the building arose when one of the tenants moved out. The scope of the refurbishment increased when another tenant departed just as work began.

About half the 12 000 m² building is being revamped.

The old light well is being filled in from top to bottom, which will create around 100 m² of new lettable floor space or plant room on every storey.

The decision to fill in the light well, although an attractive move commercially, added complications for the services consultant and the contractors.

Originally, JLW and FHP Partnership set up a task force to prepare a design based on filling in only the two lower floors of the light well. This received planning consent. All the time, however, JLW remained reasonably confident that once permission was given to span across the lower levels, this would be followed by consent to go right to the top.

"I suppose we were always

optimistic about getting consent, although the impending abolition of the GLC certainly delayed things," adds JLW's Richard Hughes. The additional consent took about a year to obtain. Meanwhile, JLW and FHP designed and scheduled the services installation and some of the refurbishment into a preliminary works contract.

This laid the foundation for a smooth transition to the main contract works after full planning consent was received.

Most of the advance works centred on fitting out the basement plant room. "This is my pride and joy," says Steve Thompson, as he parts a polythene dust sheet to reveal the subterranean plant room—a mass of plant and pipework. "If only you knew the amount of work which went into getting this

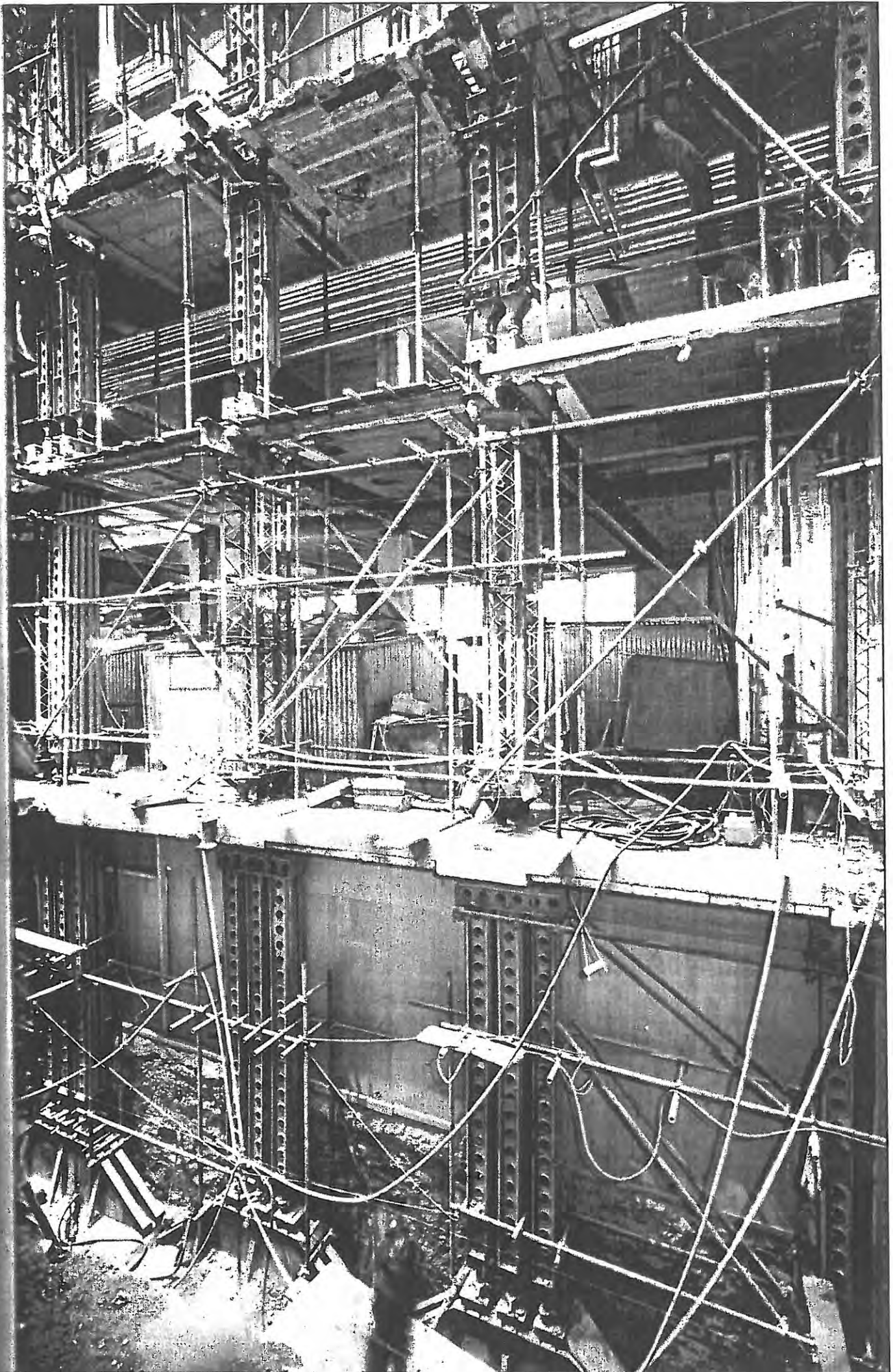
completed," he sighs.

In the plant areas, and to a lesser degree throughout the building, temporary service connections are almost everywhere to be seen. What must have been like during the fitting-out of the basement and during the demolition of the light well is best left to the imagination.

Before the light well flank walls, all of them loadbearing, could be demolished, a careful re-routing plan was thought out

RMD Slimshore light-duty props (above) support floors, temporary partition wall and services; Slimshores and Light Trishore medium-duty props replace light well wall (right).

BUILDING ON SITE



BUILDING ON SITE

► for the services. All the relocated services were hung on a double-faced plywood screen, insulated with rockwool between 100 mm timber studding. This partition was insulated as it acted, albeit only temporarily, as an external wall to the still operating offices.

At the same time, a new strip foundation was being concreted to take a new steel frame. This bore the light well infill slabs as well as the loading of existing floors which relied for support on the flank walls due for demolition.

Heavy duty temporary support towers were brought to site to prop the existing steel floor beams, which were gingerly exposed and stiffened before demolition and tying-in to the new steel frame.

With this preparatory work done, Wallis had three weekends to rip out the old services in the light well and to divert and reconnect them on to the hangers fixed to the plywood partition wall.

"I can't begin to describe the work. We had people going flat out from 6pm on a Friday through to 8am on the Monday," notes Wallis's Roy Gilbert. "During this time we had to take down, reposition and reconnect the plumbing of part of the toilet blocks on each floor – and it all had to be back ready for use by 8am Monday."

It seemed touch-and-go as to whether the work would be completed on time. But, says JLW's architect, Richard Hughes: "We have managed, throughout the contract, to maintain the tenants' services whenever they have needed them."

No mean feat: all the more onerous as all the existing tenants are financial institutions with dealing rooms within the building. The tenants seemed to appreciate the problems – no substantial complaints against the workforce were reported. Site agent Peter Rapo explains that he made a point of regularly letting the occupiers know exactly where and when work could affect them.

Throughout the project, the existing tenants required means of escape, which necessitated a tunnel of timber studwork going right through the middle of the works.

In spite of an extensive

The refurbishment division of RMD, Walsall, designed and supplied propping systems, including (top) Heavy Trishore heavy-duty supports.

pre-contract survey, it is reported that existing services were found "popping up all over the place", with "telecommunications cabling running through almost any hole". Primary services which affect the dealing rooms or computer equipment are worked on at weekends.

"We are constantly stripping out old services, replacing them with new, or tapping into the new system," continues Richard Hughes.

The way the demolition of the light well flank walls is described by those on site gives the impression that this was something of an anti-climax. The hard work had gone into accommodating the services alterations beforehand.

There are, of course, still plenty of services to be run and

existing ones to be tidied up, but the M & E work has turned the corner. One of the next key operations will be to commission the rooftop plant and chiller towers.

To keep the air conditioning in continuous use has called for the meticulous juggling of old, temporary and permanent installations. A graphic example of this is the work involving the chiller towers, which have been located temporarily on a steel sub-frame cantilevered out over the street at fourth floor level.

Lifting the chiller towers from the street level to the rear part of the building with a 250t telescopic crane was "like playing three-dimensional chess", Roy Gilbert says. The chess game is due to continue any week now, when the chillers are lifted from their temporary

location to a point even further away, right on top of the building.

Another 'dimensional' game going on inside the building: squeezing all the services into the new raised floor and suspended ceiling voids. A minimum headroom of 2.575 is called for, though sometimes this is impossible because of sheer congestion in the ceiling void.

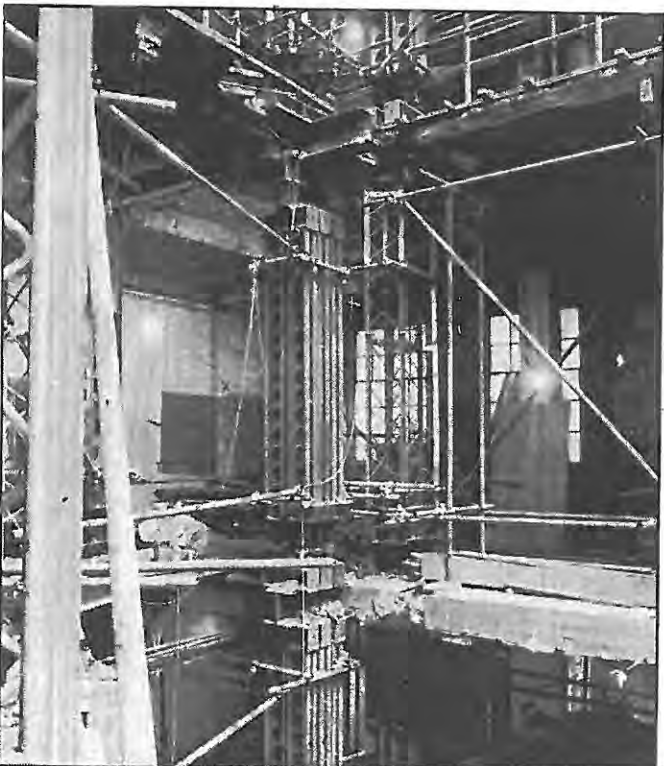
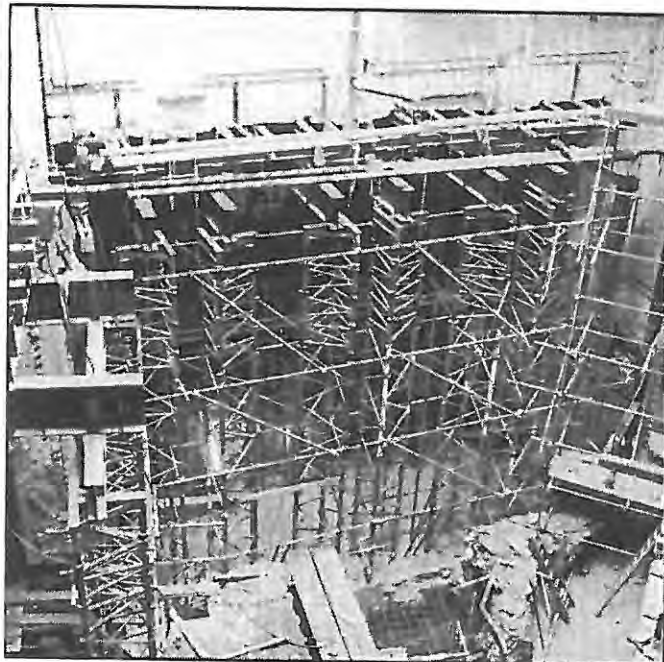
Much of the existing building of hollow clay pot floor construction. This is also creating extra work because of its limited load bearing capacity. A new steel grillage is being fitted on which to hang all the services.

No let-up in the round-the-clock working is intended until the contract reaches its scheduled completion next spring, reckons JLW, whose view is that the way the services alterations and the contract have been run have proved effective.

Richard Hughes says that employing a separate consult or management contractor to handle the contract was not viable: "A single-discipline firm couldn't cope."

He explains: "You need many arms to tackle this type of work. You need someone who is able to take on board the existing tenants – our experience with leases puts us in the position of knowing what we can and can do."

"You have also got to know and consult with investment people. Our agencies know what is a viable thing to include without making the letting rate leap upwards. And finally, we have got our own in-house design team with whom we liaise." ●



Scottish Provident Building 1-6 Lombard Street, London EC3

client
Scottish Provident Institution
construction manager
JLW Building Surveying Services
contractor
G E Wallis (part of the French Kie Group)
building services consultant
FHP Partnership
construction cost consultant
Mercer & Miller
structural engineer
A D de Vine & Associates
form of contract
JCT 63 with amendments
contract value
approx £7 million
contract period
101 weeks: April 1985-March 1986
subcontractors
How Group (Southern), mechanic and electrical work


Appendix 5: Building Damage Assessment Report


Bank Station Capacity Upgrade Building Damage Assessment Report


Building A7

1 – 6 Lombard Street

URS-8798-RPT-G-001171

Prepared by: Lisa Perkins
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Revision	Date	Summary of changes
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For the status of this document, please refer to the Building Damage Assessment Report Register (URS-8798-RGT-001229)

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- Olly Newman Dragados

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1 Introduction

This report summarises the results of a Stage 2 damage assessment for 1-6 Lombard Street, Ref A7.

Stage 2 damage assessments are undertaken for all buildings within the Stage 1 predicted Greenfield ground surface 1mm settlement contour induced by the construction of the Bank Station Capacity Upgrade (BSCU.)

The purpose of the assessment is to determine the potential effect the works will have on the building. This report describes the engineering and heritage assessments undertaken for the building and concludes whether mitigation is likely to be needed and if a further (Stage 3) assessment is recommended in order to verify this..

2 The Building

2.1 General Information

Located next to Mansion House, 1-6 Lombard Street is at the junction between King William Street and Lombard Street. The building is 7 storeys high with the top two storeys consisting of a setback dormer on the roof. The original building was renovated in the mid-eighties in order to generate more office space with only the entrance hall and eastern end of the building being retained from the original office space. It has been assumed that the building sits on a raft foundation^[7,8]. General building information used in the assessment has been acquired as part of the structural desktop appraisal. This information is presented in Table 1.

Category	Building Information
BSCU Reference	A7
Location	Lombard street
Address	1-6 Lombard street
Building Type	Steel framed / load bearing masonry
Construction Age	1905-1908, 1985(Refurbishment)
No. of Storeys	7
Basements	1
Eaves Level (mATD)	136.3
Foundation Type	Raft
Ground Level (mATD)	114.2
Listed Grade	II

Note: Levels given are in metres above Tunnel Datum, m ATD.
 Tunnel Datum is 100m below Ordnance Survey Datum at Newlyn

Table 1: General building information

A general view of the building exterior is shown in Plate 1. A location plan showing the building in relation to the proposed BSCU works is presented in Figure 2.



Plate 1: General view

2.2 Building Description

1-6 Lombard Street dates from 1908 and 1915 and was designed by Dunn and Watson with W Curtis Green. The symmetrical stone façade is curved to follow the line of the street, and the building has five main storeys with two dormered roof storeys. It has 17 bays in all with slightly projecting end pavilions. The detail of the façade is classical, including giant Corinthian order columns which unite the second, third and fourth floors. The main entrance comprises a tall arched opening leading to a vaulted entrance turret flanked by further narrower openings matching those to the end pavilions.

Internally, the building has two distinct sections. That to the north-west contains a restaurant with a large central dome, and heavy plasterwork decoration. The rest of the building houses office accommodation, and is centred on a cantilevered staircase of stone and an iron balustrade, with a hexagonal timber skylight above. To each stair landing are stone columns with foliate capitals. There are additional, secondary stone cantilevered stairs to the southern range of the building. The south-eastern corner of the building contains a small panelled room with plaster cornice. The entrance foyer has a carved stone cornice around a central dome, the decorative detail of which echoes that of the columns to the stair landings. The basement contains a large Chubb safe, not presently in use.

3 Methodology

This building damage assessment is undertaken in accordance with LU Works Information WI2300^[1] and LU Civil Engineering - Common Requirements S1050^[2].

The analysis methodology applies to ground-bearing buildings which will be affected by ground movements resulting from the construction of the BSCU. The engineering assessment calculates the potential impact of ground movements and assigns a damage category to the building based on a numeric scale. Additionally, for listed buildings, a heritage assessment is carried out which considers the sensitivity of the structure and the sensitivity of its particular features; a heritage sensitivity score is assigned. The heritage sensitivity score is added to the damage category to obtain the total score. If the total score is 3 or more, a more detailed Stage 3 assessment is triggered.

Oasys Xdisp is used to analyse the Greenfield ground movement in terms of settlement and horizontal displacement. Subsurface tunnelling induced ground movement profiles are determined in accordance with the methodology described by Mair et al^[3 & 4].

Movements resulting from the Whole Block Scheme (WBS) and shaft excavations have been calculated using LU Guidance Document G0058^[5].

The building is modelled as a simple elastic beam which is conservatively assumed to follow the Greenfield ground displacements. The beam is divided into hogging and sagging segments. The tensile strains within each segment are calculated based on the distortion associated with differential settlement (which is characterised by deflection ratio) and the distortion associated with differential horizontal displacement (characterised by horizontal strain).

Xdisp provides a method for calculating the maximum tensile strain within the building superstructure associated with these movements, in accordance with the assessment methodology described by Mair et al^[4]. This strain is used to determine the damage category based on the classification system proposed by Burland^[6] and in accordance with LU Civil Engineering Common Requirements S1050^[2]. The categories are presented in Table 2.

Damage Category	Description of Degree of Damage	Description of Typical Damage and likely forms of Repair for Typical Masonry Buildings.	Approx. Crack Width (mm)	Max. Tensile Strain %
0	Negligible	Hairline cracks.		< 0.05
1	Very slight	Fine cracks easily treated during normal redecoration. Perhaps isolated slight fracture in building. Cracks in exterior visible upon close inspection.	0.1 to 1.0	0.05 to 0.075
2	Slight	Cracks easily filled. Redecoration probably required. Several slight fractures inside building. Exterior cracks visible; some repainting may be required for weather-tightness. Doors and windows may stick slightly.	1 to 5	0.075 to 0.15
3	Moderate	Cracks may require cutting out and patching. Recurrent cracks can be masked by suitable linings. Tuck pointing and possible replacement of a small amount of exterior brickwork may be required. Doors and windows sticking. Utility services may be interrupted. Weather tightness often impaired.	5 to 15 or a number of cracks > 3	0.15 to 0.3
4	Severe	Extensive repair required involving removal and replacement of walls especially over doors and windows. Window and door frames distorted. Floor slopes noticeably. Walls lean or bulge noticeably. Some loss of bearing in beams. Utility services disrupted.	15 to 25 but also depends on number of cracks	> 0.3
5	Very severe	Major repair required involving partial or complete reconstruction. Beams lose bearing, walls lean badly and require shoring. Windows broken by distortion. Danger of instability.	Usually > 25 but depends on number of cracks	
Note: Please refer LU Civil Engineering - Common Requirements S1050 ^[2] .				

Table 2: Building damage classification

4 Input Data

The magnitude and distribution of ground movements and degree of building damage is calculated based on the following input data:

- The Xdisp model coordinates and levels are based on the 3D model (20130212DSPITT Scheme R09);
- Four construction stages are considered in accordance with the proposed programme (November 2013) as illustrated in Figure 1;
- Trough width parameter constant, $K=0.5$ is used in accordance with W12300^[1].

The input data for the building, tunnels and shaft excavation are summarised in Table 3, Table 4 and Table 5 respectively.

Location	Foundation level (mATD)	Building Height above foundation level (m)	E/G
1-6 Lombard Street	106.4 ^[7]	29.9	2.6

Note: Where E / G is the ratio of Young's modulus to shear modulus of the deep beam that is to represent the building.

Table 3: Building data

Tunnel Item	Level of axis (mATD)	External diameter (m)	Volume Loss (%)
Running tunnels	Inclined (82.8 to 85.8)	5.4	1.5
Square works adits	75.8 to 95.3	4.1 to 7.8	2.5
Platform enlargement	85.6	7.4 to 11.2	1.5
Escalator barrels	Inclined	8.3 to 8.4	1.5
Central Line Connection	Inclined (87.6 to 89.2)	8.6	1.5

Table 4: Tunnel data

Excavation	Excavation Base Level (mATD)
Grout Shaft at King William Street	97
Whole Block Scheme Box excavation	73
Arthur Street Shaft	81

Table 5: Excavation data

The distance of building 1-6 Lombard Street (A7) relative to the excavation elements listed in Table 5 is reasonably large so this building is unlikely to be affected by their construction.

The Xdisp model filenames used to undertake this assessment are:

- A7 - Stage 4
- A7 - Stage 3
- A7 - Stage 2
- A7 - Stage 1

5 Results

5.1 Engineering Assessment

The sections through the building which have been analysed are shown on plan in Figure 3.

Assessment has been undertaken at three intermediate construction stages and at the end of construction when all major elements of the works including shaft and tunnels have been completed. The damage category assigned to the building is based on the construction stage at which the potential impact on the building is most severe.

The maximum settlement and tensile strain calculated for each of the analysis sections at the most onerous intermediate construction stage and at the end of construction are presented in Table 6 and Table 7 respectively.

Section	Maximum Settlement (mm)	Maximum Tensile Strains (%)
A7 (line 1)	43	0.036
A7 (line 2)	32	0.034
A7 (line 3)	40	0.022

Table 6: Building response at most onerous intermediate stage - Construction Stage 3

Section	Maximum Settlement (mm)	Maximum Tensile Strains (%)
A7 (line 1)	43	0.032
A7 (line 2)	34	0.034
A7 (line 3)	41	0.021

Table 7: Building response at end of construction stage

The results of the assessment show that the intermediate construction Stage 3 is the critical stage for this building. At this stage, A7 line 1 experiences the most onerous combined tensile strain. The orientation is shown in Figure 3. The vertical and horizontal Greenfield ground movements along section line 1 are shown in Figure 4. The relative position of the building and tunnels along A7 line 1 is shown in Figure 5. The calculated strains are summarised in Table 8.

Line #	Strains in section (Curvature)	Position from start (m)	Length (m)	Average* Horizontal Strain (%)	Maximum Tensile Strains (%)	Damage Category
(Line 1)	Hogging	0.0	14.3	0.014	0.018	Negligible
	Sagging	14.3	28.7	-0.041	0.036	Negligible

Note: * Tensile horizontal strains are +ve. Compressive horizontal strains are -ve.

Table 8: Section analysed, results for worst case tensile strain

The Stage 2 engineering assessment has predicted that the maximum tensile strain falls within damage category 0. This corresponds to negligible damage in accordance with Table 2.

The maximum settlement of the building at foundation level at the end of construction is 43mm.

5.2 Heritage Assessment

Following site inspection, assessment has been made using the scoring methodology set out in Table 9.

Score	Structure (Sensitivity of the structure to ground movements and interaction with adjacent buildings)	Heritage features (Sensitivity to calculated movement of particular features within the building)	Condition (Factors which may affect the sensitivity of structural or heritage features)
0	Masonry buildings with lime mortar and regular openings, not abutted by other buildings, and therefore similar to the buildings on which the original Burland assessment was based.	No particular sensitive features	Good/Fair - not affecting the sensitivity of structural or heritage features
1	Buildings not complying with categories 0 or 2, but still with some sensitive structural features in the zone of settlement e.g.: cantilever stone staircases, long walls without joints or openings, existing cracks where further movements are likely to concentrate, mixed foundations	Brittle finishes, e.g. faience or tight-jointed stonework, which are susceptible to small structural movements and difficult to repair invisibly.	Poor - may change the behaviour of a building in cases of movement. Poor condition of heritage features and finishes. Evidence of previous movement.
2	Buildings which, by their structural form, will tend to concentrate all their movements in one location (e.g.: a long wall without joints and with a single opening).	Finishes which if damaged will have a significant effect on the heritage value of the building, e.g. Delicate frescos, ornate plasterwork ceilings.	Very poor – parlous condition of heritage features and finishes, severe existing damage to structure including evidence of ongoing movement. Essentially buildings where even very small movements could lead to significant damage.

Table 9: Heritage and structural scoring methodology

The results of the heritage assessment carried out for the building are summarised in Table 10.

Sensitivity of the structure
<p>The Mansion House Place elevation is irregular, the central portion extending to only one storey in height, while the front and rear portions extend to the buildings full height. Based on the predicted settlements this arrangement will tend to focus strains to either end of the single storey portion, where cracks are likely to form in the fine jointed ashlar. In addition bottle baluster balustrades are present in this area, the stability of which is sensitive to movement which may crack the balustrade, leaving the balusters potentially unstable.</p> <p>The building contains two significant stone “cantilever” staircases. The main stair is curved on plan and extends from ground to sixth floor and is supported by a tightly jointed masonry wall. The rear escape stair extends from basement to sixth floor, is square on plan and is more utilitarian in nature. It is thought to have been altered during the various refurbishments.</p> <p>Both stairs rely on the treads being soundly locked into the supporting wall to resist torsion, while transmitting vertical load down from tread to tread onto the landings below. The closely jointed masonry supporting the main stair has numerous fine cracks running through both the joints and the stone units. The treads appear to be in good condition and no obvious signs of displacement or deflection are present.</p> <p>Some cracking was observed to the lower levels of the Lombard Street elevation at both the left and right hand ends. This may be the result of previous movement. The effects of new movement are likely to be concentrated at these locations.</p> <p>It is noted that modern interventions have included the infilling of lightwells to provide additional office space. It is understood that these additions are supported on columns founded on the original raft foundation and as such will behave monolithically with the original building structure.</p> <p>Score: 2 – The irregularity of the Mansion House Place façade may concentrate all movements, making this elevation structurally sensitive. In addition the fine jointed ashlar, bottle baluster balustrades and the two “cantilever” stairs are considered sensitive to the degree of movement predicted by the settlement analysis. Movement causing cracks within the masonry of the stair or balustrade could cause the integrity of the structure to be compromised.</p> <p>The existing cracks in the Lombard Street elevation are also vulnerable to the effects of the predicted movement.</p>
Sensitivity of the heritage
<p>There are two main areas of heritage sensitivity within the building. The first is concentrated on the decorative plaster ceilings and cornices of the restaurant area, which are also in poor condition. These surfaces are brittle, and may crack as a result of settlement, leading to loss of historic material and at worst failure of sections of surface plaster. The second is the stonework of the central stair and foyer, which currently show some fine cracks; the decorative elements of this stonework may be difficult to repair in the event of damage, and cracking as a result of the BSCU Works may lead to widening of existing cracks as well as within joints.</p> <p>The exterior cladding to the Mansion House Place façade is of high quality, but does not show the decorative detail of the Lombard Street elevation, which will experience smaller movements. Cracking of the stone masonry elements, whilst unlikely to cause loss of historic fabric and are repairable, risk a permanent impact on aesthetic value of the building.</p> <p>Score: 1 – Damage to the areas of heritage sensitivity, which are comprised of brittle finishes, may cause a permanent aesthetic impact, and there may be loss of historic fabric to the plaster of the restaurant area.</p>
Sensitivity of the condition
<p>In general the building is in good condition, excepting the interior finishes to the restaurant which show fine cracking and flaking, and some fine stone cracking to the central stair and externally on the façade.</p> <p>Score: 1 – the condition of the plasterwork within the restaurant exacerbates its fragility and sensitivity to the predicted movements</p>

Table 10: Heritage and structural assessment

5.3 Total Score

The total score is the summation of the damage category, structural sensitivity, heritage sensitivity and condition sensitivity scores:

The damage category is 0

The structural sensitivity score is 2

The heritage sensitivity score is 1

The condition sensitivity score is 1

The total score for this building is 4

6 Conclusion

The Stage 2 engineering assessment has predicted that the maximum tensile strain falls within damage category 0 for 1-6 Lombard Street. However, specific heritage and structural assessment taking into account the location and extent of settlement and tensile strains indicates that the building has a high level of structural and heritage sensitivity to movement in certain locations. This assessment has determined that the building has a total score of 4.

It is recommended that a Stage 3 assessment is undertaken to further consider the potential damage to the structural form.

There are areas of structural and heritage sensitivity which are brittle, and settlement generated by the BSCU Works is likely to be concentrated at these sensitive areas.

The BSCU Environmental Statement considers the mitigation that could be needed, however, it is recommended that Stage 3 assessment is undertaken to verify how heritage finishes and features may respond and whether such mitigation is required.

7 References

- [1] LU Works Information WI 2300 Ground Movement version 3, 19-07-13.
- [2] LU Category 1 Standard: S1050 Civil Engineering - Common Requirements, Issue No. A7, Nov. 2013.
- [3] Mair R J, Taylor R N and Bracegirdle A (1993). Subsurface settlement profiles above tunnels in clays. *Géotechnique* 43, No. 2, pp. 315-320.
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- [7] A.D de VINE & Associates drawing - A.D de VINE & Associates - 1985
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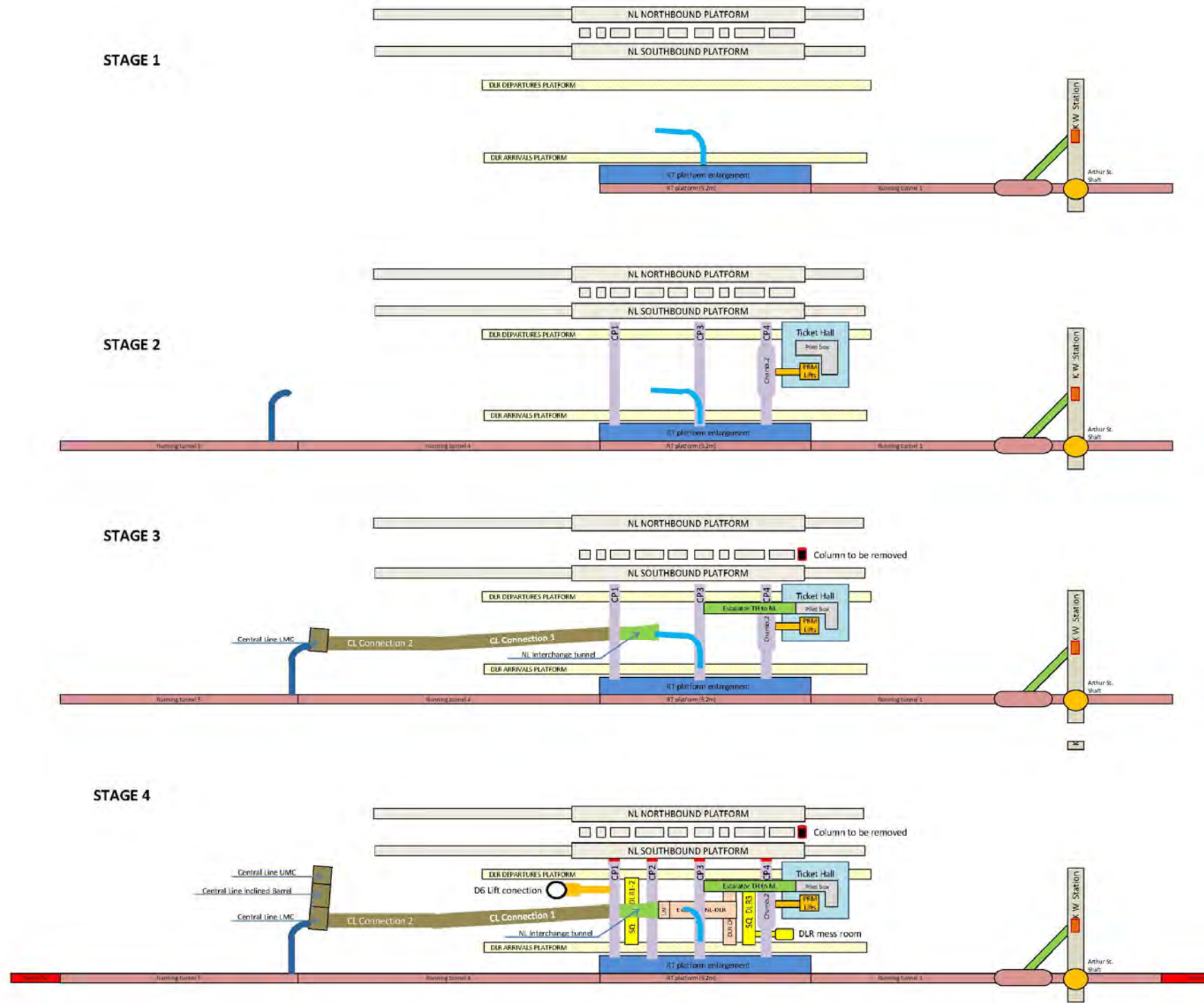


Figure 1: Construction Stage model

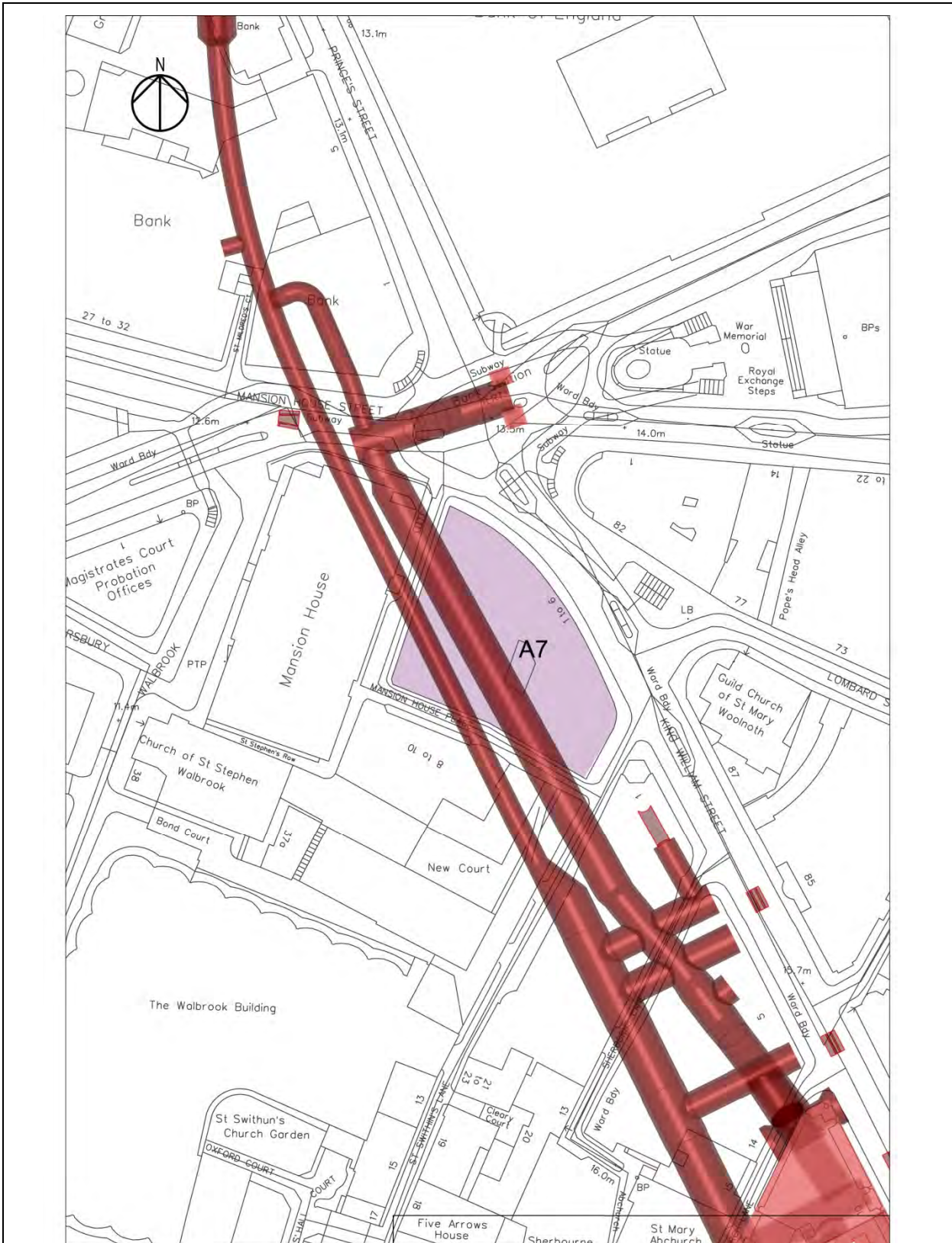


Figure 2: Location plan showing building location in relation to BSCU works

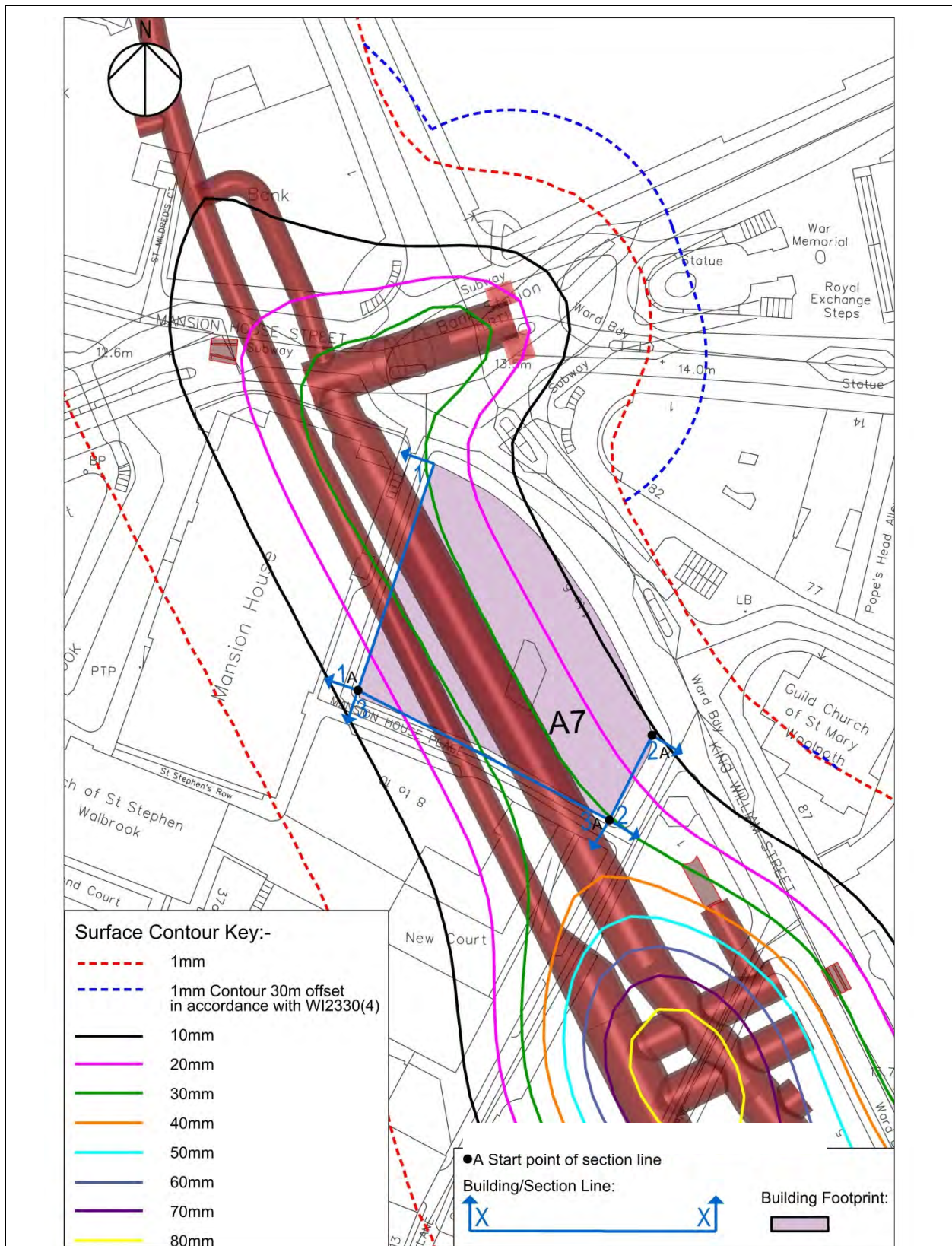


Figure 3: Building location, sections analysed and Settlement Contours at stage of worst case for tensile strains

Sub-Structure Displacements

Structure 8: A7-(1-6 Lombard Street) - W/Sub 56, Offset 1: 0.000m

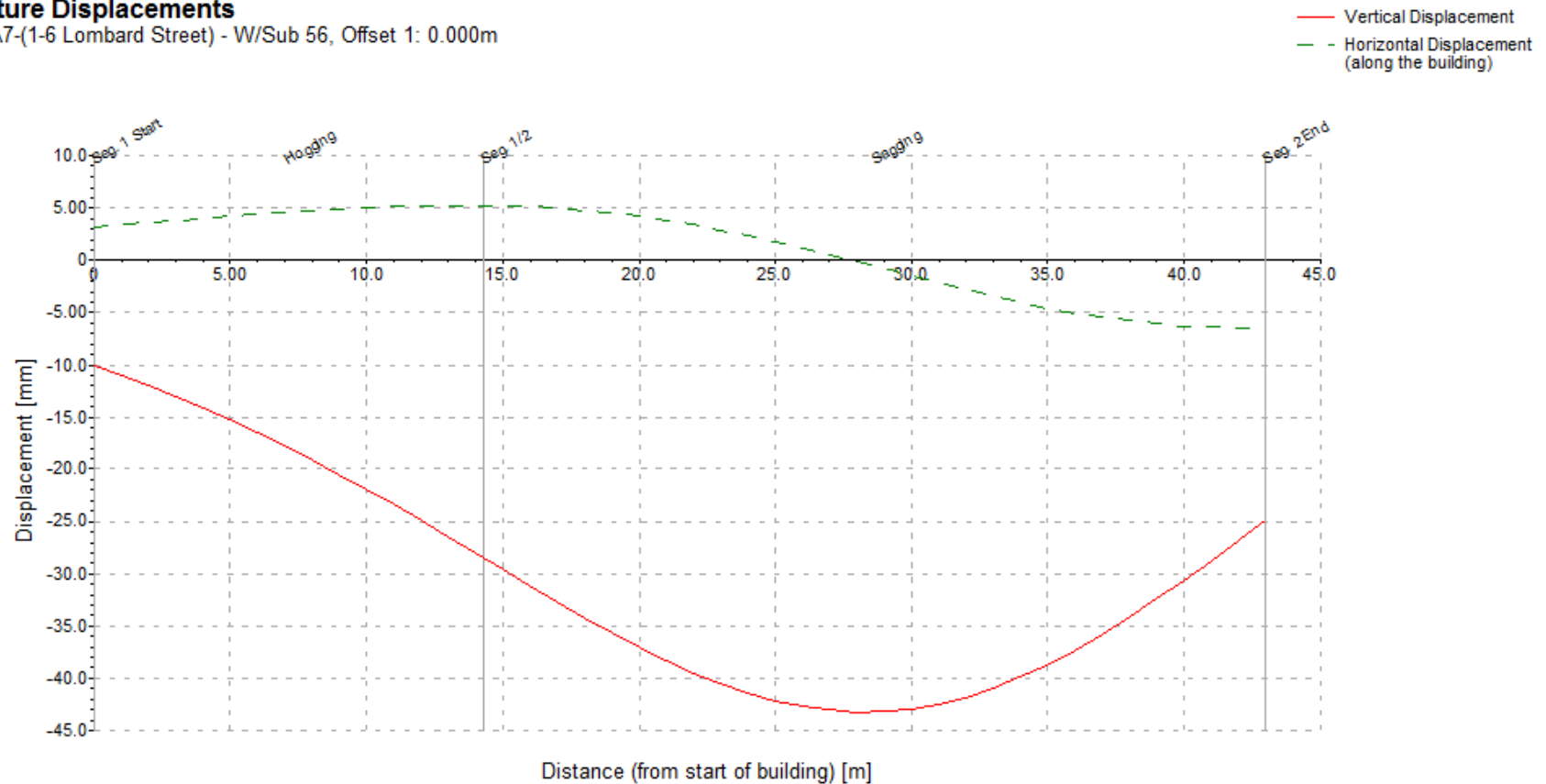
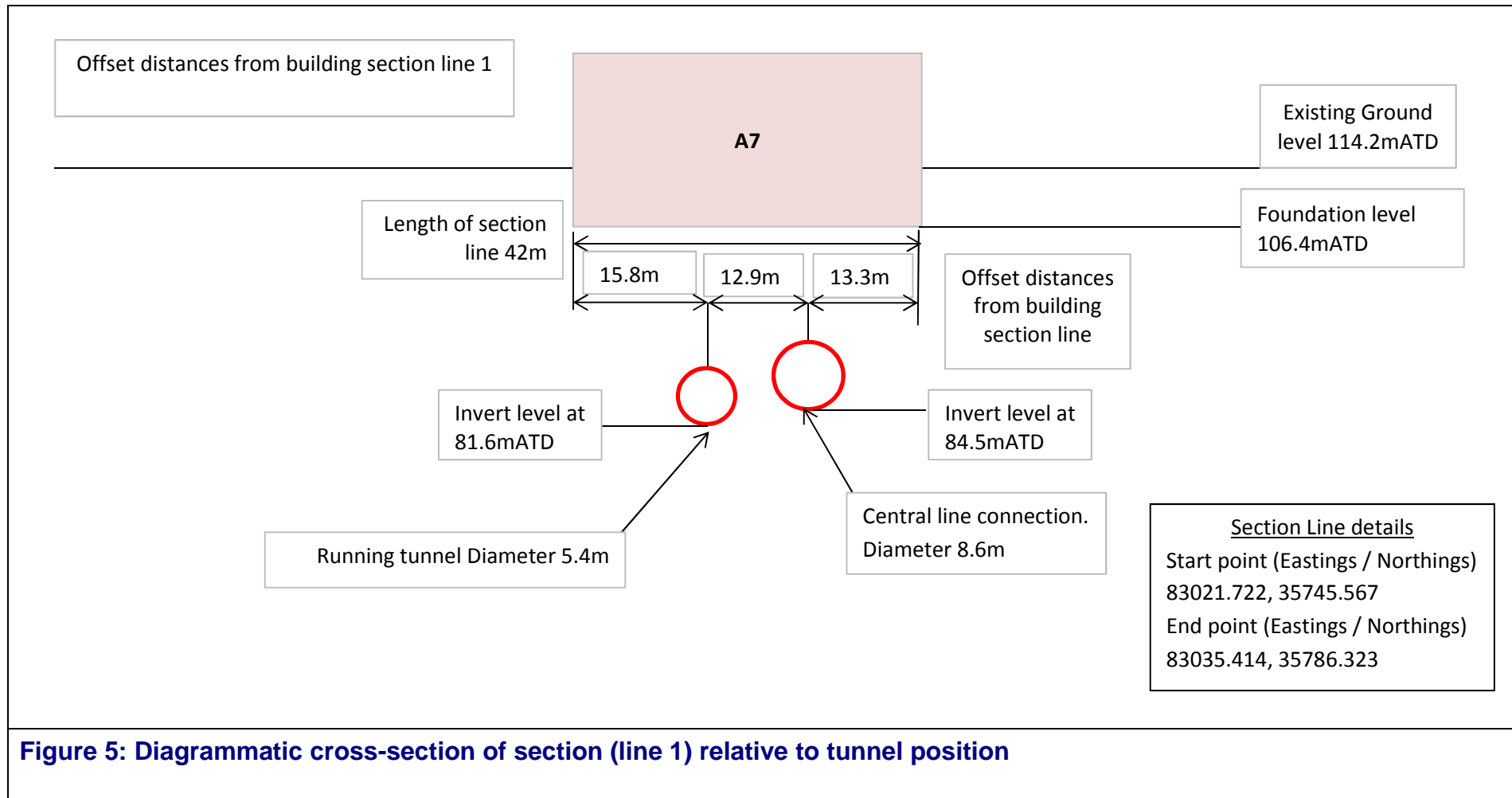


Figure 4: Building displacement at founding level at stage 3 (line 1) of worst case for tensile strains



Appendix 6: Photo Locator

Mansion House Place

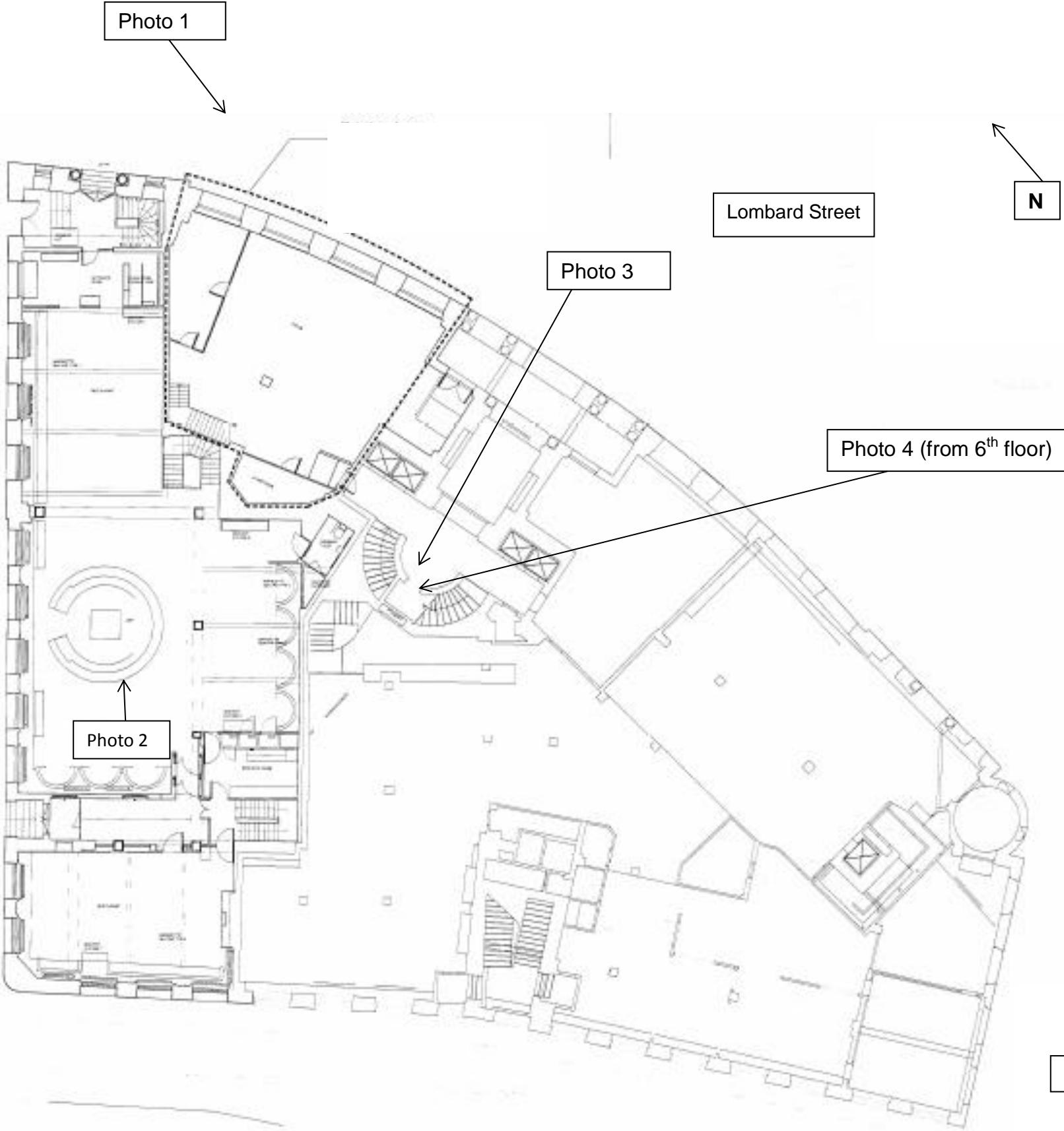


Photo 1

Lombard Street

N

Photo 3

Photo 4 (from 6th floor)

Photo 2

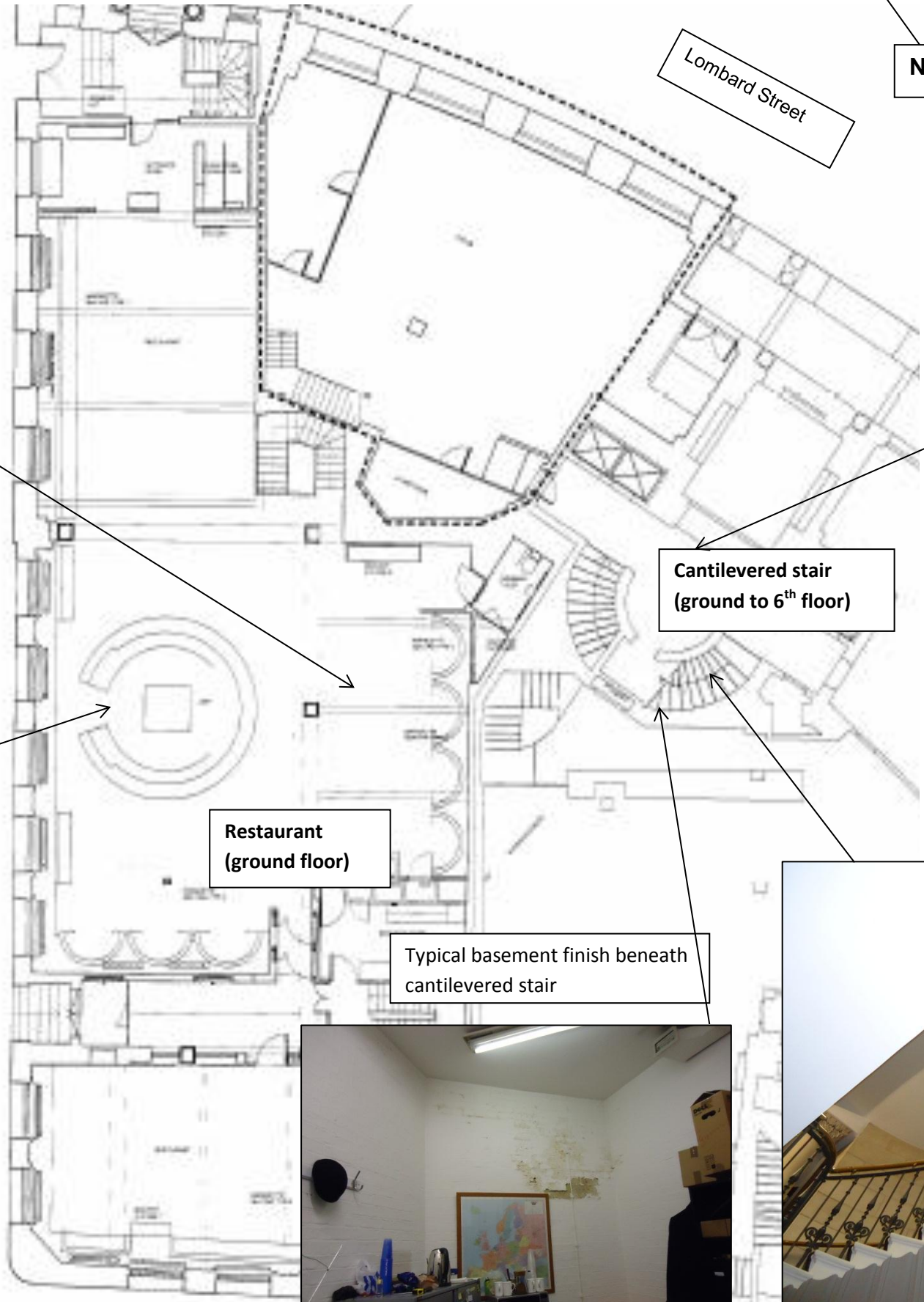
St Swithin's Lane

Appendix 7: Areas of interest potentially affected by ground movement



Decorative ceiling plaster within restaurant

Mansion House Place



Typical stair landing detail, showing stone wall and shallow stair treads



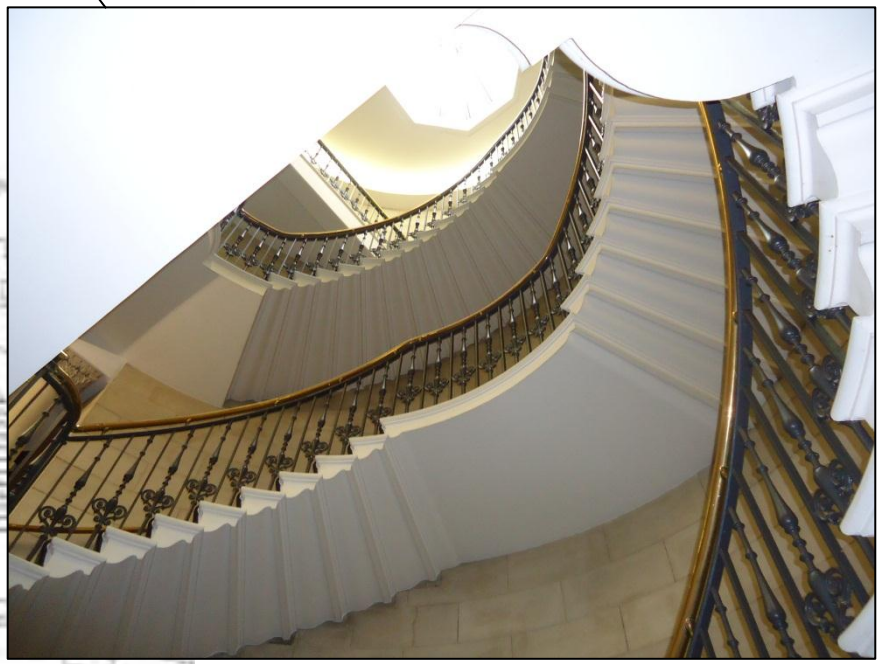
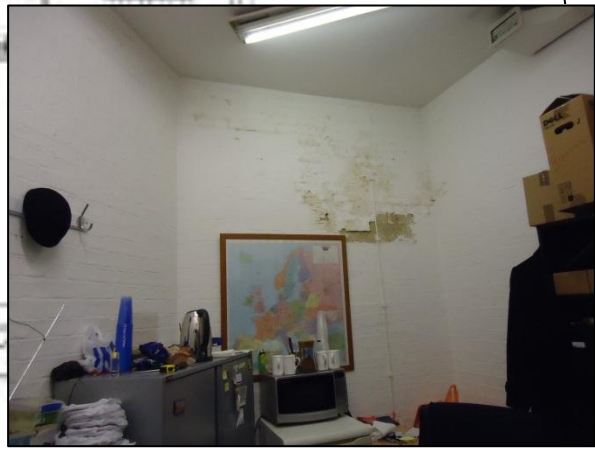
Large dome in restaurant with plaster enrichments to rim, in poor condition

Restaurant (ground floor)

Cantilevered stair (ground to 6th floor)

View up through stair well, showing underside of stair and banisters

Typical basement finish beneath cantilevered stair



Appendix 8: Areas to be affected by protective works

Mansion House Place

Restaurant
(ground floor)

Cantilevered stair
(ground to 6th
floor)

St Swithin's Lane

Lombard Street

N

