Bank Station Capacity Upgrade

The Mansion House Heritage Statement

September 2014

MAYOR OF LONDON

TRANSPORT FOR LONDON

EVERY JOURNEY MATTERS

Bank Station Capacity Upgrade

The Mansion House
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-002111

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The methodology adopted and the sources of information used by URS in providing its services are outlined in this Report. The work described in this Report was undertaken during May 2014 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances.

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Certain statements made in the Report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the Report, such forward-looking statements by their nature involve risks and uncertainties.

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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 the Mansion House, London, EC4N 8BH. The application seeks consent for protective works 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:

> Adjustment and enhancement of existing internal structural ties; temporary removal for specialist repair/conservation of a section of stained glass from the eastern window of the Egyptian Hall and installation of a temporary replica panel; and consolidation of vulnerable decorative plaster in the principal and second floor reception rooms in the north and central areas of the building.

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. The purpose of this listed building consent application is to seek the necessary approval to enable works that may be necessary to mitigate predicted damage to this listed building 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 extent of the 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 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 and the proposed protective works.

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 There have been detailed consultations since July 2011 with key members of the Mansion House team (including The Keeper, City Surveyor and Head of Facilities) regarding the potential impacts of the work on the Mansion House and the protective works required. This has involved meetings, site visits, surveys (including heritage and noise assessments and external ground investigations). Discussions will continue through the design stage with a view to minimising the impact on the fabric of the Mansion House and its ceremonial functions. Where practical, protective works will be incorporated in the City of London Corporation's rolling maintenance and repair programme.

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 The Mansion House is a Grade I listed building, designed by George Dance the Elder and constructed between 1739 and 1753. It is located within the Bank Conservation Area, which encompasses the heart of the City. The building is rectangular, bounded by Mansion House Street to the north, St Stephen's Row to the south, Mansion House Place to the east and Walbrook to the west.

Photo 1: The Mansion House, general view

4.1.3 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. The character and appearance of the area is also defined by the design and use of buildings for banking and associated commercial activities.

4.1.4 The Mansion House is five storeys high with an attic and basement. The building reflects the classical style to its northern elevation with a rusticated ground storey and order of Corinthian columns and pilasters through two main storeys with an attic and entablature above. There are large round arched openings to the east and west elevations which also show paired pilasters under a heavy cornice, with an attic storey above. The southern elevation, of brick, is largely blank, with three sash windows at second floor level, one of which is a fire escape with a metal stair.

4.1.5 The form of the interior has been altered, predominantly due to the later roofing of internal courtyards and historic changes to the roofline. Even so, the building retains much of its rich original decoration, formed of delicate and finely worked plaster, timber and marble, and also contains 19th century sculpture. Of great value are the ballroom to the north which contains a bracketed balcony, and the Egyptian Hall to the south with its stained glass windows. There are timber stairs to each end of the building, the one to the north being carved and highly decorative.

4.1.6 Appendix 4 illustrates the section of the building.

4.1.7 The building has undergone extensive alterations in the 1790s, 1840s, 1860s and 1990s. The early alterations were mainly changes to the roof structure, with the removal of the rear transverse attic and grand staircase in 1795. General refurbishment and repair work occurred in 1931, with further restoration required to repair damage sustained in World War II. In 1993 the detonation of a bomb in the City of London at Bishopsgate also caused damage to the stained glass windows.

4.1.8 In the 1990s, prior to the construction of the DLR, protective measures were carried out to mitigate potential damage. These included the installation of internal tie rods throughout the north end of the building and the strengthening of the Ballroom balconies bridging the full height windows. These works were followed by major refurbishment works that included the replacement of the courtyard roof.

4.1.9 The Mansion House is listed Grade I meaning that it is of “exceptional interest”. The building is of evidential, historical, aesthetic and communal significance that is both national and internationally relevant. The significance is reflected in: the quality and importance of the building’s design by prominent architects of the time; its physical and internal decorative evolution over time as its use has developed; the role of the building as the official residence of the Lord Mayor of London and its contribution to the ceremonial life of the City of London including influential economic and political speechmaking; the contribution of the building to the character and appearance of the Bank Conservation Area dominated by monumental buildings in the classical style; and the setting of adjacent designated buildings.

4.1.10 The Mansion House is an integral part of the historic townscape of prominent stone buildings within this area of the City and with Bank Junction at its core. Its setting incorporates Bank Junction, the Bank of England and other ceremonial landmarks such as St. Paul’s Cathedral which form elements within annual processional routes, and this setting contributes positively to the building’s significance.

5 Predicted or possible impacts of proposed BSCU works upon the Mansion House

5.1.1 It is proposed that the new running tunnel and Central Line Link tunnel will be constructed directly beneath part of the Mansion House, at the north-east corner of the building. A plan showing the position of existing and proposed infrastructure in relation to the Mansion House is included in Appendix 3.

5.1.2 At the current concept design stage, a conservative, reasonable worst case geotechnical assessment (‘Stage 2’ Building Damage Assessment located at Appendix 5) has been made which indicates that there may be a maximum

predicted settlement of 46mm to the building, with the greatest settlement concentrated at the corner of Mansion House Street and Mansion House Place. The calculated maximum tensile strain is 0.039%.

5.1.3 The geotechnical assessment has been combined with a heritage and structural assessment, which has highlighted sensitivities in relation to the building. The predicted differential settlement of 46mm is not evenly distributed across the building - in the north-east corner of the building there will be a steeper differential gradient whilst at the south-west corner of the building there will be a flatter differential gradient. This differential settlement raises the potential of damage to sensitive areas of the building.

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 north façade of the Mansion House is punctuated by regular window openings at the first, second and third floor level. At the north end of the east elevation is a large full height window that represents a line of potential structural weakness which may be sensitive to predicted movement (refer to photo 2, location identified on the photograph location sheet at Appendix 8).

5.1.7 The raised portico located adjacent to the line of the new tunnels may also be sensitive to structural movement. However, as noted above in paragraph 4.1.8, prior to the construction of the main DLR tunnels in the 1990s, the portico, along with the north end of the building generally, was strengthened by the addition of a network of structural ties. The adequacy of the existing structural ties for the BSCU works will be assessed in the Stage 3 Building Damage Assessment. Plans indicating the location of the structural ties are contained in Appendix 6.

Photo 2: North-east corner of the Mansion House with red lines indicating potential structural weakness

5.1.8 At the southern end of the building on the east and west elevations, are full height windows to the Egyptian Hall. These windows contain fine stained glass. Some panels in the stained glass windows were damaged by a bomb blast in 1993. The window is currently in need of repair, and without protective works, there could be some damage. In the worst case this damage could include cracking to the stained glass to the eastern window and to the stonework at the top of the window arch.

5.1.9 A survey of the Egyptian Hall stained glass windows was undertaken by a specialist conservator in July 2014. This found that:

"the bowing to this [east] window is bordering on severe in places. The copper ties are stretched to their limit and any further movement mainly to the central section depicting the death of Wat Tyler at Smithfield would snap the ties completely and the bowing would progress rapidly causing cracking to the glass and damage to the solder joints. If the predicted movement to this window is of 1 - 2mm, mitigation works are recommended".

5.1.10 The full survey report is appended in Appendix 7.

5.1.11 Heavy plasterwork to ceilings within the ground and first floor principal reception rooms, in the north and central areas of the building, may have a limited tolerance to further settlement. The effects of settlement in the worst case may result in some cracking of historic plaster.

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 stage, 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 assessment of the 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 Detailed checking and monitoring of the existing structural ties will be undertaken necessitating the lifting of internal floor finishes for inspection. If the structural ties are found to be slack or to be not functioning as intended, they will be enhanced as appropriate by the installation of structural ties, strain gauges, tightening and/or augmentation. This will enable the ties to function as intended to limit lateral movement.

6.1.5 Following a survey undertaken in July 2014 to assess its condition and resilience to predicted movement, the topmost section of the large stained glass window at the eastern end of the Egyptian Hall (refer to photo 3) will be temporarily removed for specialist repair and conservation. During the period of its removal a temporary replica panel will be inserted in its place. These works to remove and replace the panel will be programmed in detailed consultation with the Mansion House team so that they have minimal impact on the operation of the Mansion House, particularly its ceremonial functions. It is estimated that removal of the window will take approximately one week, and the conservation and return of the stained glass panel will take approximately three months, occurring before tunnelling works which could impact the building commence.

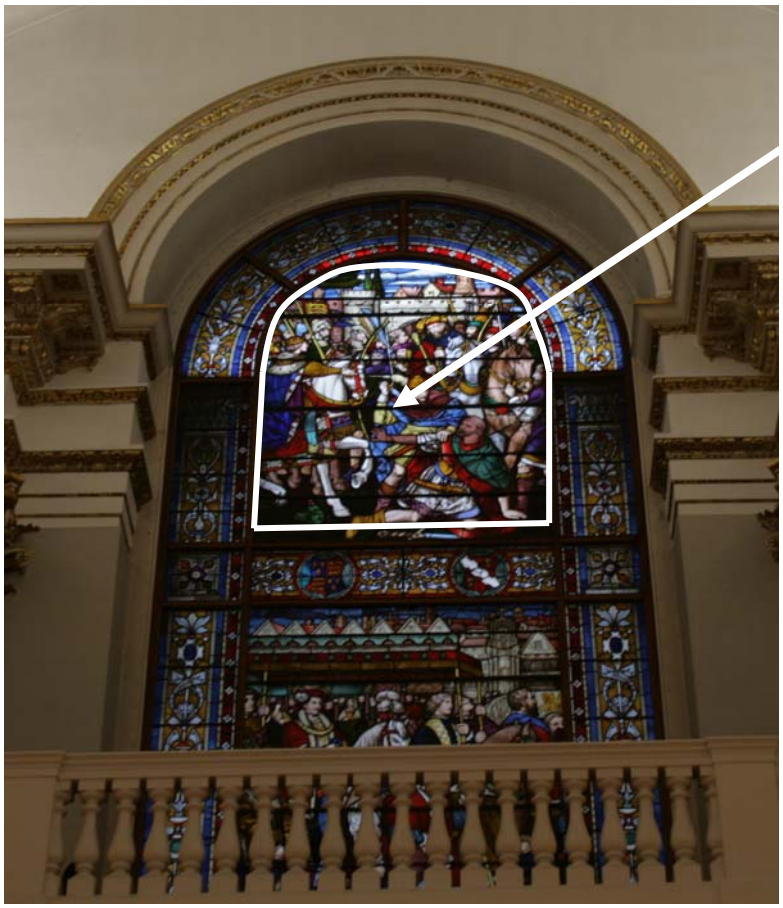


Photo 3: Stained glass window at the eastern end of the Egyptian Hall

6.1.6 Following non-invasive survey, any loose decorative plaster enrichments that are at risk of damage due to predicted movement will be consolidated by utilising a variety of methods ranging from crack filling, localised grouting of voids to insertion of stainless steel fixings anchored to timber substrates (refer to photo 4).

6.1.7 Appendices 9 and 10 of this document show the areas to be affected by the protective works.

Photo 4: Example of heavy plaster enrichments to walls and ceilings that are at risk of damage due to predicted movement

Impact of the works

6.1.8 The lifting of internal floor finishes to inspect, modify and monitor the existing structural ties at the north end of the building may temporarily affect the use of specific areas of the building whilst these works are carried out. This will not affect the significance and ceremonial use of the building as it will be programmed in consultation with the Mansion House team.

6.1.9 The temporary removal of an upper portion of the Egyptian Hall stained glass window will have a temporary adverse impact on the significance of the building. However, the panel is at a height where the detail of the stained glass is not easily seen from ground level (as shown in photo 5). Therefore, the visual impact on the significance of the building will be mitigated by the temporary installation of a replica panel. The conservation of the stained glass panel will also have a beneficial impact on the aesthetic significance of the building as the condition of the window will be improved, reducing the risk of failure or damage for many years to come.

Photo 5: View of eastern Egyptian Hall window from ground (principal) floor level

6.1.10 The consolidation of heavy plaster enrichments to walls and ceilings will require scaffold access and will therefore potentially have a temporary adverse impact on the significance and use of the affected areas of the building. However, this type of work is undertaken by the Mansion House maintenance teams on a regular basis. These protective measures will be scheduled in consultation with the Mansion House so that they are completed as part of the existing programme of ongoing repair and maintenance, with minimal impact on the use of the building.

6.1.11 This work, and the above mentioned repair of the stained glass panel to the eastern Egyptian Hall window, will also have a permanent beneficial impact on the aesthetic significance of the building as the condition of the decorative ceilings will be improved, reducing the risk of failure or damage for many years to come.

6.1.12 In relation to the NPPF, the works will not have a significant effect on the heritage value of the building, and result in less than substantial harm to the heritage asset. Furthermore, adverse impacts should be considered alongside the beneficial impacts of conservation of the Egyptian Hall stained glass panel and plaster enrichments. In relation to local policy, the protective works will achieve the object of conserving the City's heritage assets.

Justification for the works

6.1.13 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 DLR trains; and
- improving emergency fire and evacuation protection measures.

6.1.14 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.

6.1.15 The proposals contained within this document are intended to mitigate adverse impacts of the BSCU works related to settlement at the Mansion House. The protective works 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.

6.1.16 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 Stage 2 Building Damage Assessment modelling of likely horizontal and vertical strains (calculated maximum tensile strain of 0.039%) combined with assessment of the Mansion House predicts potential settlement of up to 46mm at the north-eastern end of the building, as a result of the new infrastructure being constructed directly below the building.

8.1.2 The architectural design of the Mansion House suggests that these strains may be concentrated principally at the location of full height windows along the east elevation of the building, which represent specific weak points within the structure. Review of protective measures installed in the 1990s and on-site assessment of the risks to the Mansion House from potential ground movement has highlighted the eastern stained glass window to the Egyptian Hall as being vulnerable to movement. Whilst there are existing structural building ties, these require checking to confirm their performance. There are also areas of heavy

decorative plasterwork which may be sensitive to ground movement if they are loose or previously damaged.

8.1.3 Works requiring Listed Building Consent to mitigate the impact of potential settlement are proposed. The detailed design of these works will be informed by non-invasive and invasive survey. The proposed works will mitigate the impact of the predicted ground settlement resulting from the BSCU tunnelling works by: checking and monitoring existing structural ties to confirm they are performing as intended; temporarily removing an upper panel of an important stained glass window within the Egyptian Hall for conservation; and consolidating plasterwork prior to potential settlement to prevent failure.

8.1.4 The temporary impacts will be outweighed by the lasting benefits of the repair works and the resulting sustainable preservation of the building and its historic finishes. It is acknowledged that these works will lead to a temporary adverse impact on the significance of the Mansion House but the temporary works will programmed in detailed consultation with the Mansion House team and will not affect the ceremonial use of the venue. 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, p.317-21

Building Damage Assessment Report: A6 (2014)

Bank Station Heritage Building Gazetteer, Alan Baxter Associates and Mott MacDonald (2013)

Mansion House Heritage and Structural Impact Report, Alan Baxter Associates for Mott MacDonald (2012)

Phase 3 Potential Damage Assessment of the Mansion House, Mott MacDonald (2012)

Mansion House Volume 8A of the Environmental Statement: Summary of the Protective Works for the Construction of the Docklands Light Railway Extension to Bank, Alan Baxter Associates

Plans and elevations showing existing ties, Alan Baxter Associates

Plans and sections showing levels, Alan Baxter Associates

Structural drawings – sections, plans and part plans, Alan Baxter Associates

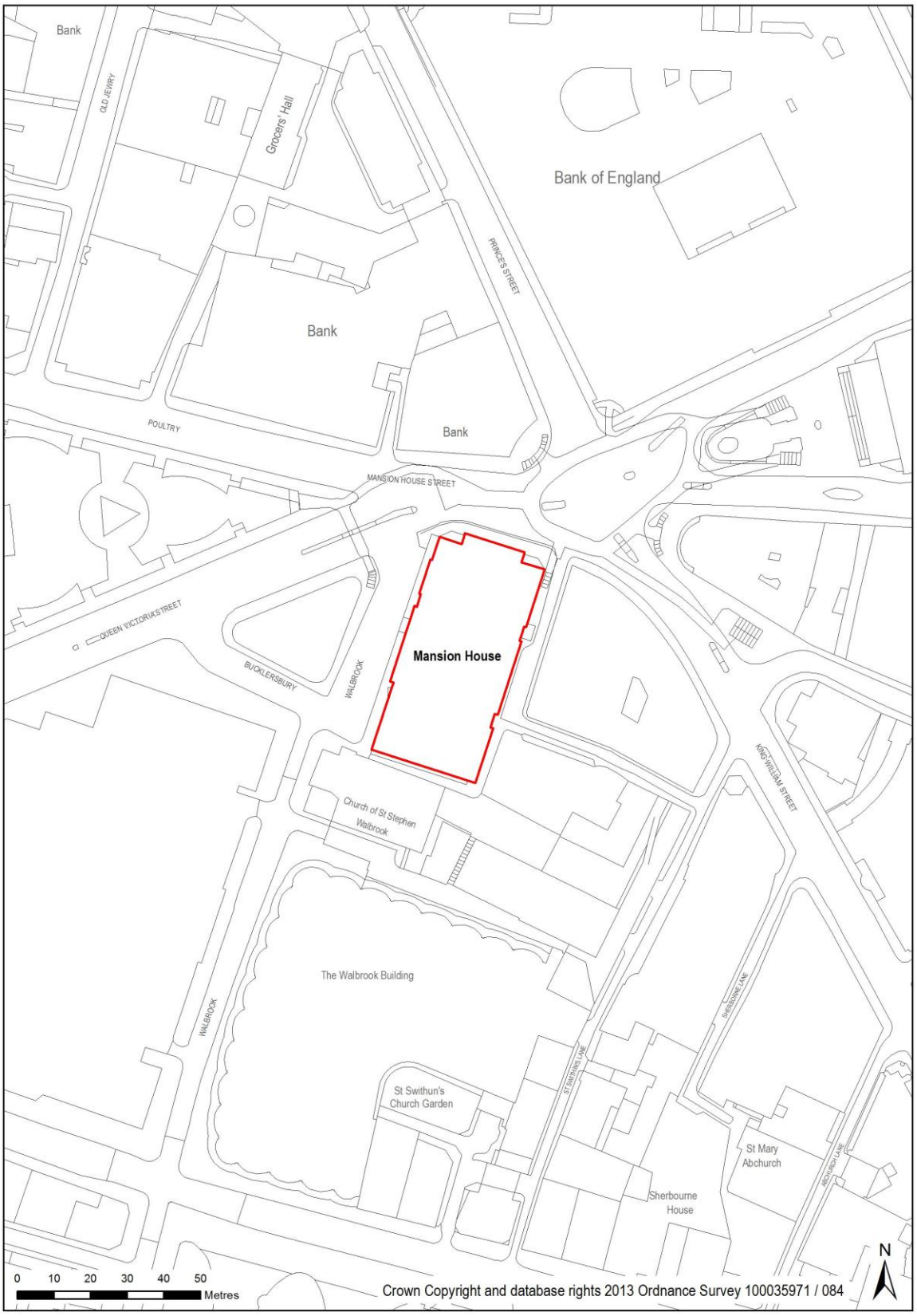
Main floor beam stiffening details, Alan Baxter Associates

Tie details, Alan Baxter Associates

Site survey and estimate for repairs to the Mansion House stained glass windows, Chapel Studio, July 2014

Appendices

Appendix 1: Location Plan



Appendix 2: Listed Building Description

List entry Number: 1064604

Location: MANSION HOUSE, MANSION HOUSE STREET EC2

Grade: I

Date first listed: 04-Jan-1950

UID: 199614

MANSION HOUSE STREET EC2 1. 5002 (South Side) Mansion House TQ 3281 SE 10/259 4.1.50. -

I GV

1739 to 53, by Dance the Elder. Monumental, classical building with rusticated ground storey and order of Corinthian columns and pilasters through 2 main storeys plus attic above entablature. Altered roof storey behind crowning balustrade/parapet. Narrow north front has 8-columned portico with richly carved tympanum to pediment. Balustraded steps at either side (altered in C19). Long returns to east and west relatively plain but for pilastered end pavilions with large, round-arched windows above Venetian openings. Small Doric portico to west at ground floor level, now main entrance. South elevation entirely plain of yellow brick above ground storey. Numerous iron escape staircases. Ground floor windows have decorative C19 iron grilles.

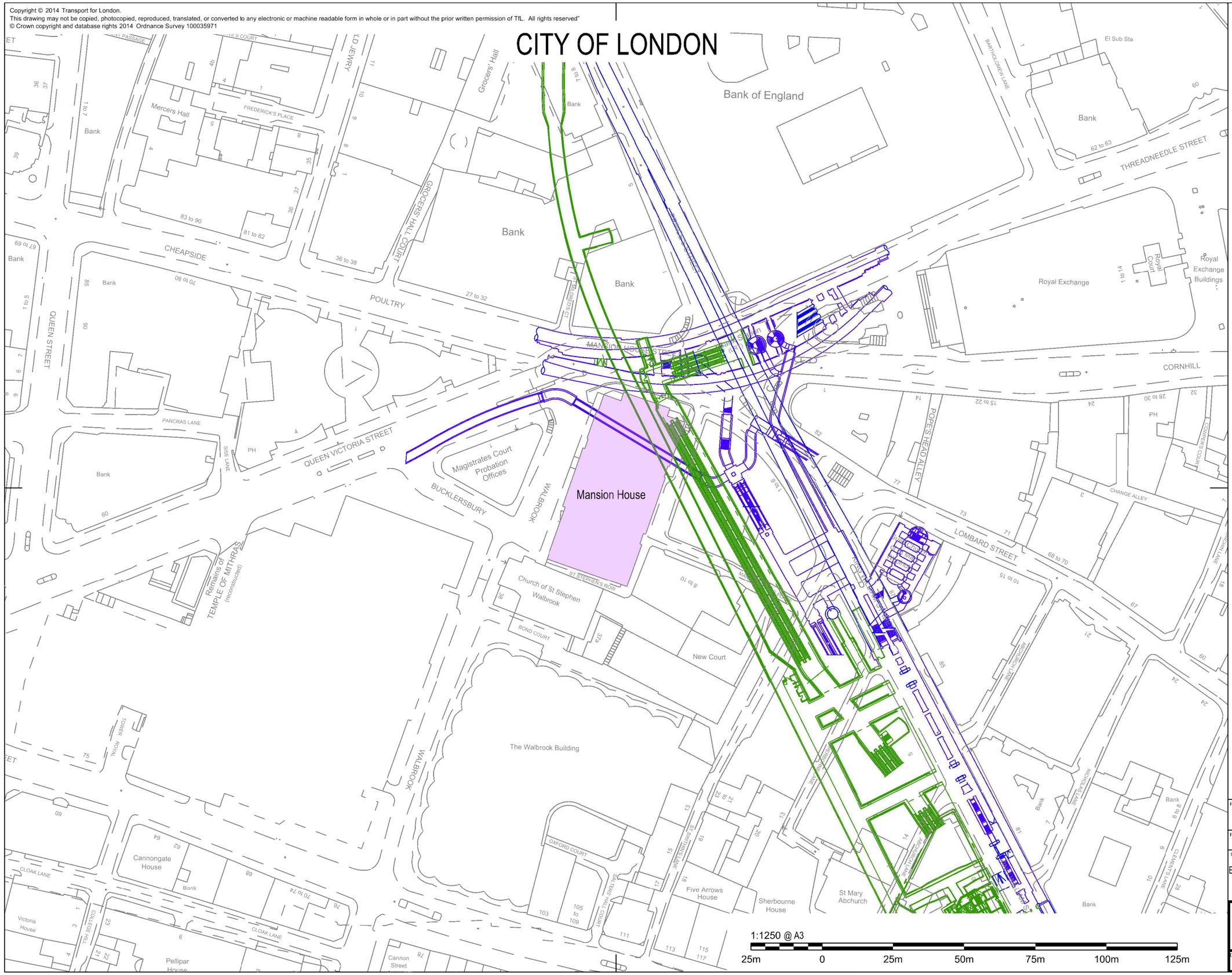
Interior has been altered, especially roofing of courtyard, but retains much of its exceptionally rich original decoration. Two staircases, two largest rooms are ballroom to north, and Egyptian hall to south rising through whole height of building. Much C19 sculpture.

Listing NGR: TQ3266481066

National Grid Reference: TQ 32669 81070

Appendix 3: Extent of BSCU works

CITY OF LONDON



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.

N

PROJECT
BANK STATION
CAPACITY UPGRADE PROJECT

PURPOSE OF ISSUE
FOR INFORMATION

TITLE
MANSION HOUSE
EXISTING AND PROPOSED INFRASTRUCTURE

DRAWING NUMBER
BSCU-DRA-MAC-N133_Z-DR-T-0311

A 3

CITY OF LONDON

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

Existing Cruciform Area

Existing Triplication Area

Central Line

Lombard Street Lifts

New Escalator ES2 Up to Whole Block Station Entrance

Existing Northern Line Northbound Platform

Existing Northern Line Northbound Tunnel

Existing Northern Line Southbound Tunnel

New Northern Line Southbound Running Tunnel From Moorgate

New Northern Line Southbound Running Tunnel Towards London Bridge

New Station Entrance

New Escalator ES3 Down to DLR

New Northern Line Southbound Platform

New Central Line Link Moving Walkways

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.

1:1250 @ A1

25m 0 25m 50m 75m 100m 125m

PROJECT
BANK STATION
CAPACITY UPGRADE PROJECT

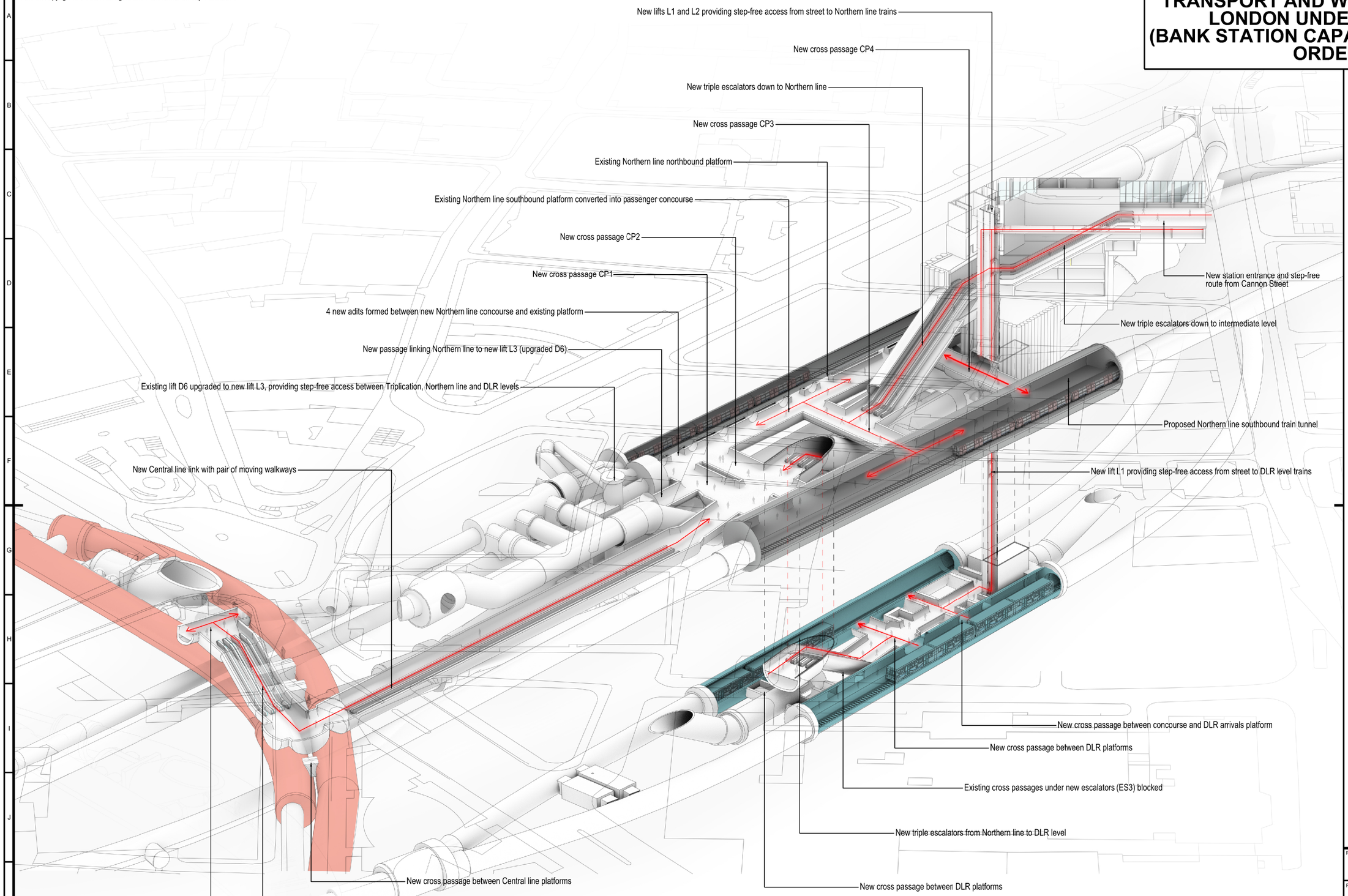
PURPOSE OF ISSUE
PLANNING DIRECTION

TITLE
EXISTING & PROPOSED
INFRASTRUCTURE

DRAWING NUMBER
BSCU-DRA-MAC-N133_Z-DR-T-9001

A 1

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

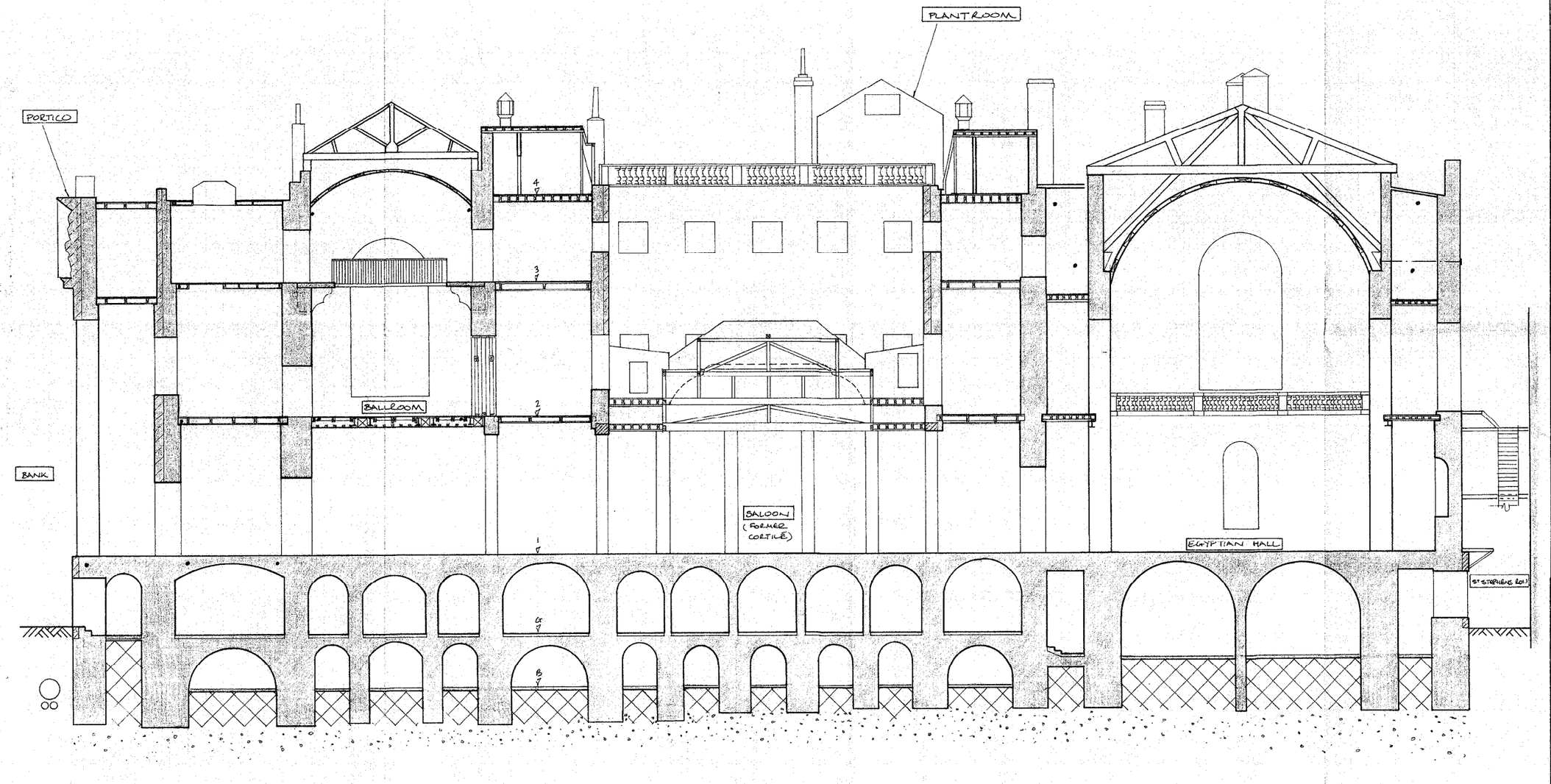
PURPOSE OF ISSUE
PLANNING DIRECTION

TITLE
3D VISUALISATION
PROPOSED STATION INFRASTRUCTURE
& CIRCULATION ROUTES

DRAWING NUMBER
BSCU-DRA-MAC-N133_Z-DR-T-9200

A 1

Appendix 4: Existing building section



Notes:

1) THIS DRAWING HAS BEEN TRACED FROM CITY OF LONDON SURVEY DRAWINGS & VARIOUS RECORD DRAWINGS OF THE EXISTING STRUCTURE

2) REFER TO DRG Nos C669/01/03-08 FOR PLANS SHOWING THE RECORD DRAWINGS FROM OPENING UP WORKS AT EACH FLOOR LEVEL

3) REFER TO DRG Nº C669/01/03 FOR KEY TO SYMBOLS

FOR INFORMATION ONLY
THIS IS NOT
A WORKING DRAWING

Rev:	Date:	Amendment:
	31.8.89	ISSUED TO CLIENT FOR ARCHIVING.
	6.8.91	ISSUED TO CONTRACT.
-	25.3.91	ISSUED TO TENDER

ALAN BAXTER & ASSOCIATES
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Job:

MANSION HOUSE

Drg. Title:

SECTION A-A
EXISTING STRUCTURE.

Scale:	Date:	Drawn:
1:100	OCT 89	H. SANTIAGO
		Checked: ST

Drg. No. C669/01/09 Rev. /

Appendix 5: Building Damage Assessment Report

LUL Bank Project Office
10 King William Street
London EC4 N7TW

Bank Station Capacity Upgrade

Building Damage Assessment Report

Building A6

Mansion House

URS-8798-RPT-G-001170

Prepared by: Lisa Perkins
Assistant Geotechnical Engineer

Checked by: Annaliza Khoo
Principal Geotechnical Engineer

Approved by: John Chantler
Technical Director

L. Perkins 21/07/14

21/07/14

21/07/14

Document Owner	
Company:	URS
Role:	Designer

LUL Bank Project Office
10 King William Street
London EC4 N7TW

Document History

Revision	Date	Summary of changes
1.0	March 2014	Issue to Heritage
2.0	May 2014	For Approval
3.0	July 2014	TWAO Issue

For the status of this document, please refer to the Building Damage Assessment Report Register (URS-8798-RGT-001229)

Consultation:

• Ela Palmer	URS Heritage
• Brian Lyons	Dr.Sauer
• Keith Bowers/Neil Moss/Paul Dryden	London Underground
• Olly Newman	Dragados

Contents

FIGURES

TABLES

1 Introduction

This report summarises the results of a Stage 2 damage assessment for Mansion House.

Stage 2 damage assessments are undertaken for all buildings within the Stage 1 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 impact that the Works will have on the building. This report describes the updated 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

Mansion House is 5 storeys high with an attic and basement. It is a standalone building located at the junction between Queen Victoria Street and King William Street. It is a Grade I listed building and was designed by George Dance. Its construction began in 1739. In plan, the building is approximately 30m by 60m and it is approximately 17.5m tall (from GL to eaves). Throughout its life the building has undergone extensive alterations. These alterations took place in the 1790s, 1840s, 1860s and 1990s. The early alterations were mainly changes to the roof structure, with the removal of the transverse attic and grand staircase. In the 1990s, the alterations and strengthening works consisted of protective measures to protect/repair damage caused by the construction of the Dockland Light Railway (DLR). These works included the installation of internal tie rods and ties to prevent the main portico from becoming detached from the main building. This was followed in 1991-1993 by a major refurbishment which included the replacement of the courtyard roof. General refurbishment and repair work occurred in 1931, with further restoration required to repair damage sustained in WWII.

Originally it was understood that the building was founded on timber piles with planking support walls. Underpinning and strengthening works were subsequently carried out on several occasions including the reported reinforcement of the timber piles in 1868, as well as underpinning in 1901. However, trial pits were dug to investigate the building foundations as part of a condition survey in 1985 [7]; the investigations revealed no evidence of timber piles and planking. Therefore, it is assumed that the foundation level of Mansion House (BSCU reference A6) is at 106mATD[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	A6
Location	Mansion House
Address	Mansion House
Building Type	Load bearing brickwork/stone cladding
Construction Age	1739-1758
No. of Storeys	5
Basements	1
Eaves Level (mATD)	131.0
Foundation Type	Strip
Ground Level (mATD)	113.5
Listed Grade	I
Note: Levels given are in metres above Tunnel Datum, mATD. 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

The Mansion House, by George Dance the Elder, was constructed between 1739 and 1758. The building reflects the classical style to its northern elevation with a rusticated ground storey and order of Corinthian columns and pilasters through two main storeys with an attic and entablature above. There are large round arched openings to the east and west elevations which also show paired pilasters under a heavy cornice, with an attic storey above. The southern elevation, of brick, is blank.

The form of the interior has been altered, predominantly in the later roofing of internal courtyards and historic changes to the roofline. Even so, the building retains much of its rich original decoration, formed of delicate and finely worked plaster, timber and marble, and also contains 19th century sculpture. Of great value are the ballroom to the north which contains a bracketed balcony, and Egyptian room to the south with its stained glass windows. There are timber stairs to each end of the building, the one to the north being carved and highly decorative

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 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. This strain is used to determine the damage category based on the classification system proposed by Burland[6] and in accordance with S1050 Civil Engineering – Common Requirements[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 to LU S1050 Civil Engineering - Common Requirements[2]				

Table 2: Building damage classification

4 Input Data

The magnitude and distribution of ground movements and degree of building damage are 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 WI2300.

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

Location	Foundation level (mATD)	Building Height above foundation level (m)	E/G
Mansion House	106*	25	2.6
Note: Where E / G is the ratio of Young's modulus to shear modulus of the deep beam representing the building. * Known level [8].			

Table 3: Building data

Tunnel Item	Level of axis (mATD)	External diameter (m)	Volume Loss (%)
Running tunnels	84	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

Construction of Central Line cross-passage CP1 will commence after the completion of Northern Line to Central Line escalator barrels, at construction stage 4.

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 Mansion House (A6) relative to the excavation elements listed in Tables 5 is sufficiently large that this building should not be affected by their construction. A new cross passage is also proposed between the platform tunnels of the central line, see Figure 3.

The Xdisp model filenames used to undertake this assessment are:

- A6 - Stage 4
- A6 - Stage 3
- A6 - Stage 2
- A6 - 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 analysed section 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 (%)
A6 (line 1)	44	0.039
A6 (line 2)	<1	0.001
A6 (line 3)	11	0.017
A6 (line 4)	42	0.023

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

Section	Maximum Settlement (mm)	Maximum Tensile Strains (%)
A6 (line 1)	45	0.039
A6 (line 2)	<1	0.001
A6 (line 3)	14	0.023
A6 (line 4)	46	0.030

Table 7: Building response at end of Construction Stage 4

The results of the assessment show that the end of construction Stage 4 is the critical stage for this building although this is similar to Stage 3. Section A6 line 1 experiences the most onerous combined tensile strain. The orientation is shown in Figure 3. The vertical and horizontal ground movements along line 1 are shown in Figure 4. The relative positions of the building and tunnels along section A6 line 1 is shown in Figure 5. The calculated strains are summarised in Table 8.

Strains in section (Curvature)	Position from start (m)	Length (m)	Average* Horizontal Strain (%)	Maximum Tensile Strains (%)	Damage Category
Sagging	0.0	18.4	-0.042	0.021	Negligible
Hogging	18.4	42.9	0.012	0.039	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 46mm.

Whilst the Stage 2 assessment includes all major works in the vicinity of Mansion House, it does not specifically include the construction of a 0.75m external diameter cable tunnel which will be constructed from the Moving Walkway tunnel in the vicinity of the North East corner of Mansion House approximately 21m in a Northerly direction to a shaft leading to the Central Line Ticket Hall area. This has been assessed and is confirmed to have no significant impact on tensile strain and settlement. The cable tunnel will be included in the Stage 3 assessment.

5.2 Heritage and Structural 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
The Mansion House is an unframed rectangular masonry box. It is approximately 61m long. East and west elevations have major windows near each end, in the Ballroom and the Egyptian Room. The windows are discontinuities where movement will tend to concentrate. Hogging movement will produce tensile strains towards the top of the windows where there are vulnerable structural elements: the window arches, the stained glass, the internal balconies, and the bottle balustraded parapets. Window arches may spread and the voussoirs joggle vertically. Stained glass may stretch and tear its lead cames. The internal balconies which bridge the windows may be stretched and pulled away from their supports. The bottle balustrade parapets may be stretched and lose their stability. Elsewhere, other sensitive structural elements are timber staircases with hanging newels, and timber ceilings supporting heavy plaster enrichments.
Score: 2 – The predicted movements will tend to be concentrated in areas of weakness, particularly large openings to the west and east elevations.
Sensitivity of the heritage
The building contains rich decorative surfaces. To the northern portion, particularly sensitive heritage features include the plaster ceilings/walls to the first floor administrative spaces and former court. Also at this end of the building, the ballroom has delicate plaster finishes and a bracketed balcony which shows signs of sagging. This area is closest to the higher predicted settlements, and differential movements across this section of the building may concentrate damage within this area. Further south, there are areas of heavy plasterwork in deep relief throughout the central public and private apartments. To the west, the Egyptian Room contains statuary, plaster decoration, and a balcony, all of which may be sensitive to cracking. The stained glass windows are very sensitive and show signs of bulging and distortion. Externally, the facades of the building are of high heritage value, with sensitivities including the northern portico and tall windows to the long east and west elevations. Damage may occur to the window surrounds and voussoirs.
Score: 2 – The building contains a wealth of original finishes and surfaces, damage to which has the potential to significantly affect the heritage value of the building. The external Portland stone finishes are also highly sensitive and finely jointed.
Sensitivity of the condition
A continuous programme of renovation is undertaken throughout the building, and the surface condition of the building and its features is generally good, with some localised areas of crazing and cracking to plaster surfaces. However, there is evidence of previous movement which may have caused hidden weaknesses, and will be the focus of future movement. The building has been much altered since its construction in 1739, and strengthened on various occasions in response to decay of its piled foundations and subsidence due to successive tunnelling. Visible evidence of previous movement includes uneven floors, joggled arch voussoirs, sagging stairs and balconies, and a distorted portico on the west side. Hidden movement may include the opening of timber joints, reduced bearing length of beams, and loosening of timber carcassing which supports plasterwork. Successive bouts of movement are accumulative and fabric can only be stretched so far before local failures occur. Repairs and strengthening over the years will have dealt with much of the stretching, but some planes of weakness are likely to remain.
Score: 1 – though the internal condition of the building is generally good and undergoes repair and renovation on a regular basis, there is evidence of previous movement and specific areas of disrepair which may exacerbate the structural and heritage sensitivities of the building.

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 2

The condition sensitivity score is 1

The total score for this building is 5

6 Conclusion

The Stage 2 engineering assessment has predicted that the maximum tensile strain falls within damage category 0 for the Mansion House. 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, particularly due to previous incidents of settlement which may have impacted the structural behaviour of the building. This assessment has determined that the building has a total score of 5.

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

In particular, the Stage 3 assessment should examine the implications of previous mitigation, and further assess the behaviour of the rich and fragile finishes and structural elements.

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.

[4] Mair R J, Taylor R N and Burland J B (1996). Prediction of ground movements and assessment of risk of building damage due to bored tunnelling. (In: International Conference of Geotechnical Aspects of Underground Construction in Soft Ground, London, pp. 713–718.

[5] LU Guidance Document G0058 Civil Engineering Technical Advice Notes, Issue No. A17, Feb. 2013.

[6] Burland J B (1995). Assessment of risk of damage to buildings due to tunnelling and excavation. Proceedings: 1st International Conference of Earthquake Geotechnical Engineering, IS Tokyo, 1995.

[7] RIBA D – Phase 3 Potential Damage Assessment of the Mansion House. Mott MacDonald. N133-BCR-MMD-00-DC-Z-0067-S0-1.0. (2012).

[8] Powderham, A.J. Recent advances in the design and construction of foundation engineering structures. Foundation Engineering. (pp 15) (date unknown)

LUL Bank Project Office
10 King William Street
London EC4 N7TW

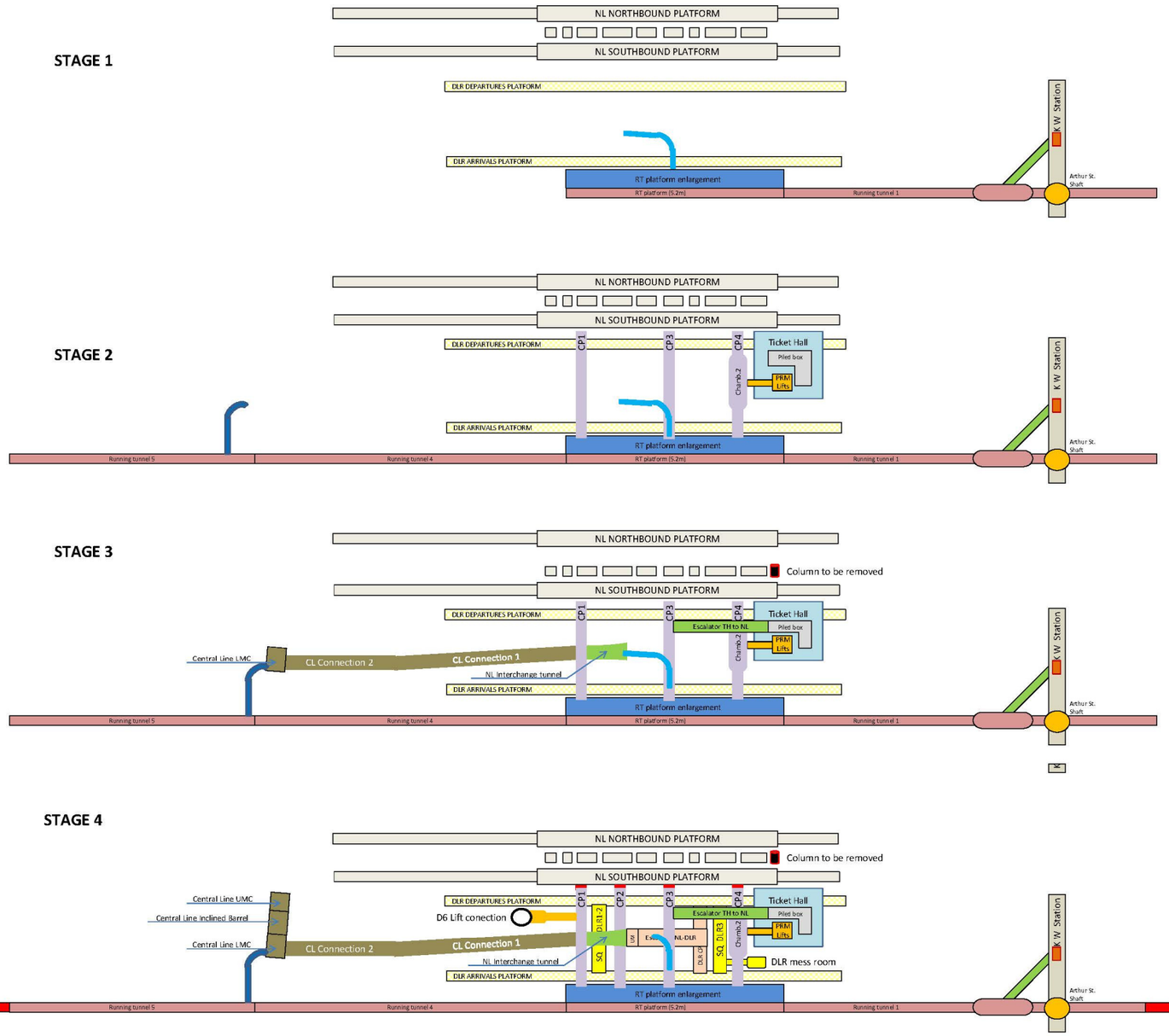


Figure 1: Construction Stage model

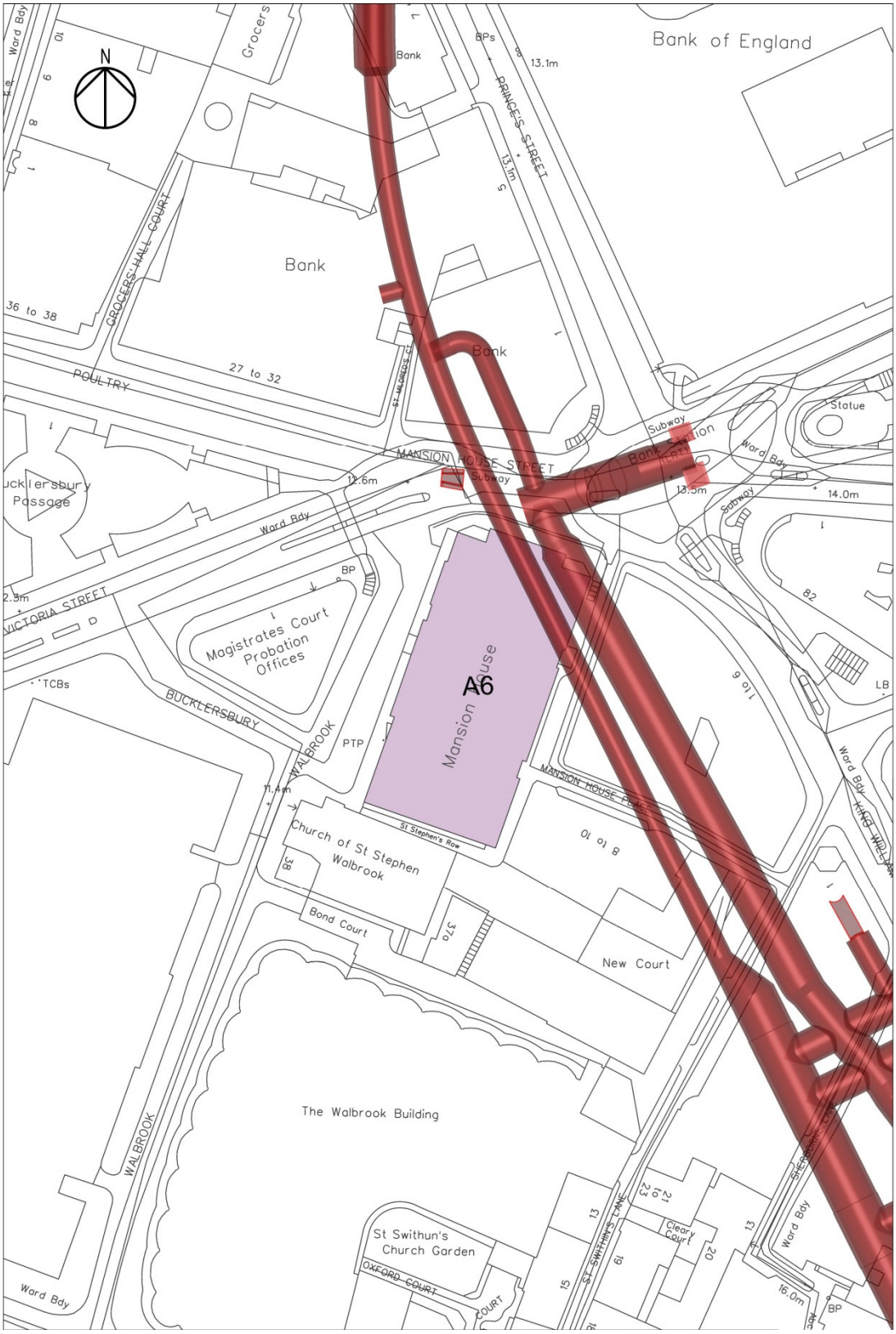


Figure 2: Location plan showing building location in relation to BSCU works

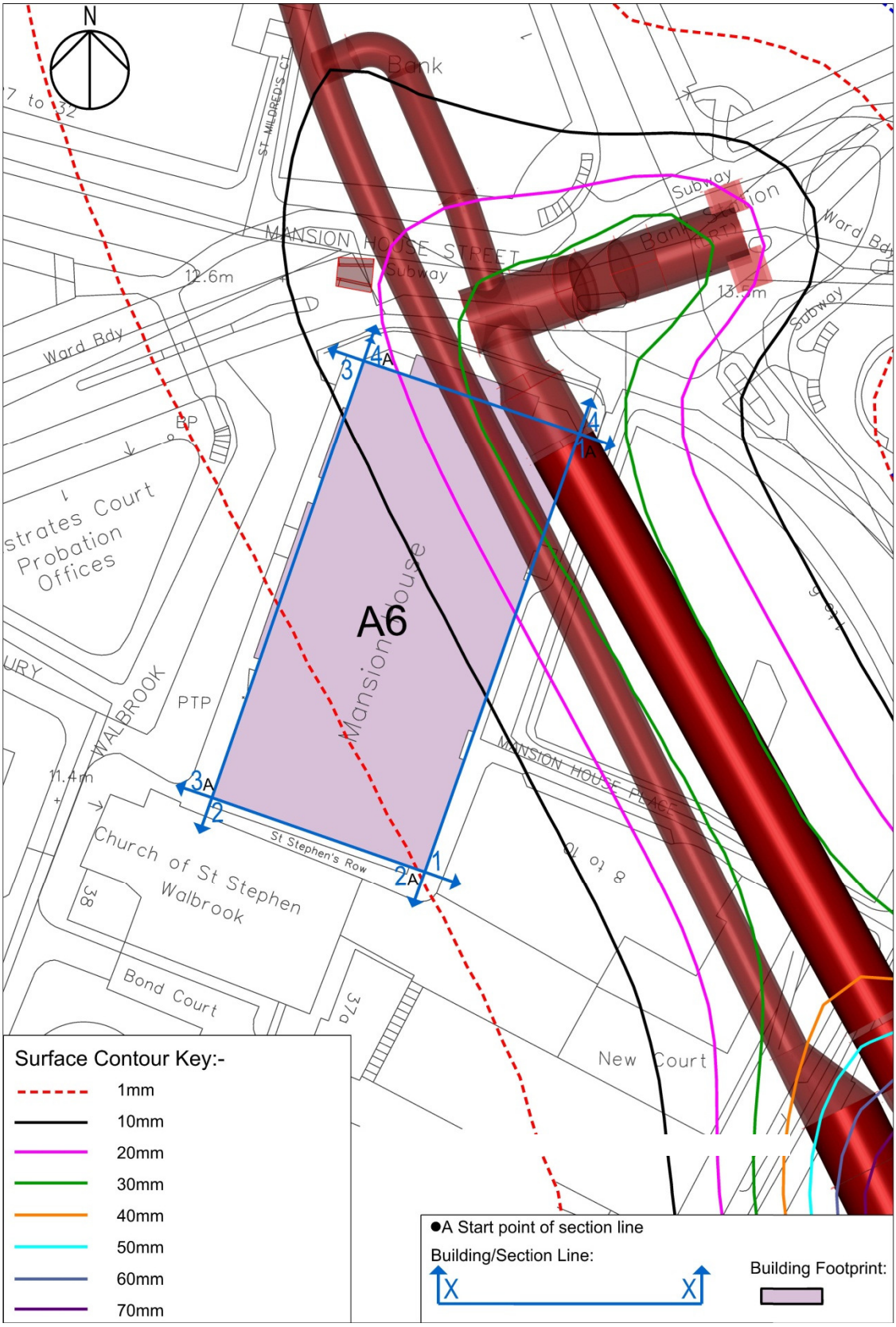


Figure 3: Building location, sections analysed and Settlement Contours at stage of worst case for tensile strains

LUL Bank Project Office
10 King William Street
London EC4 N7TW

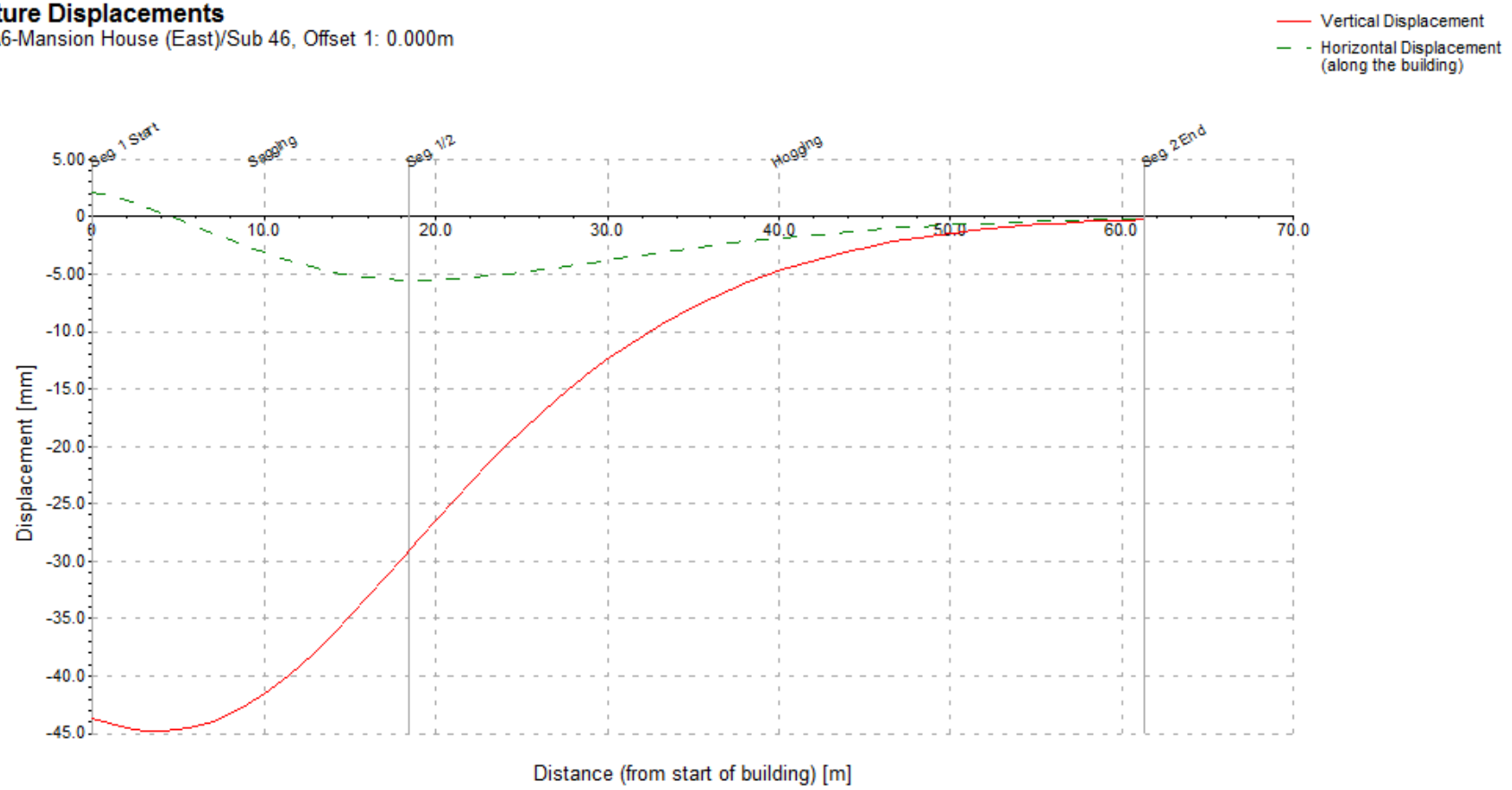


Figure 4: Building displacement at founding level at stage 4 (line 1) of worst case for tensile strains

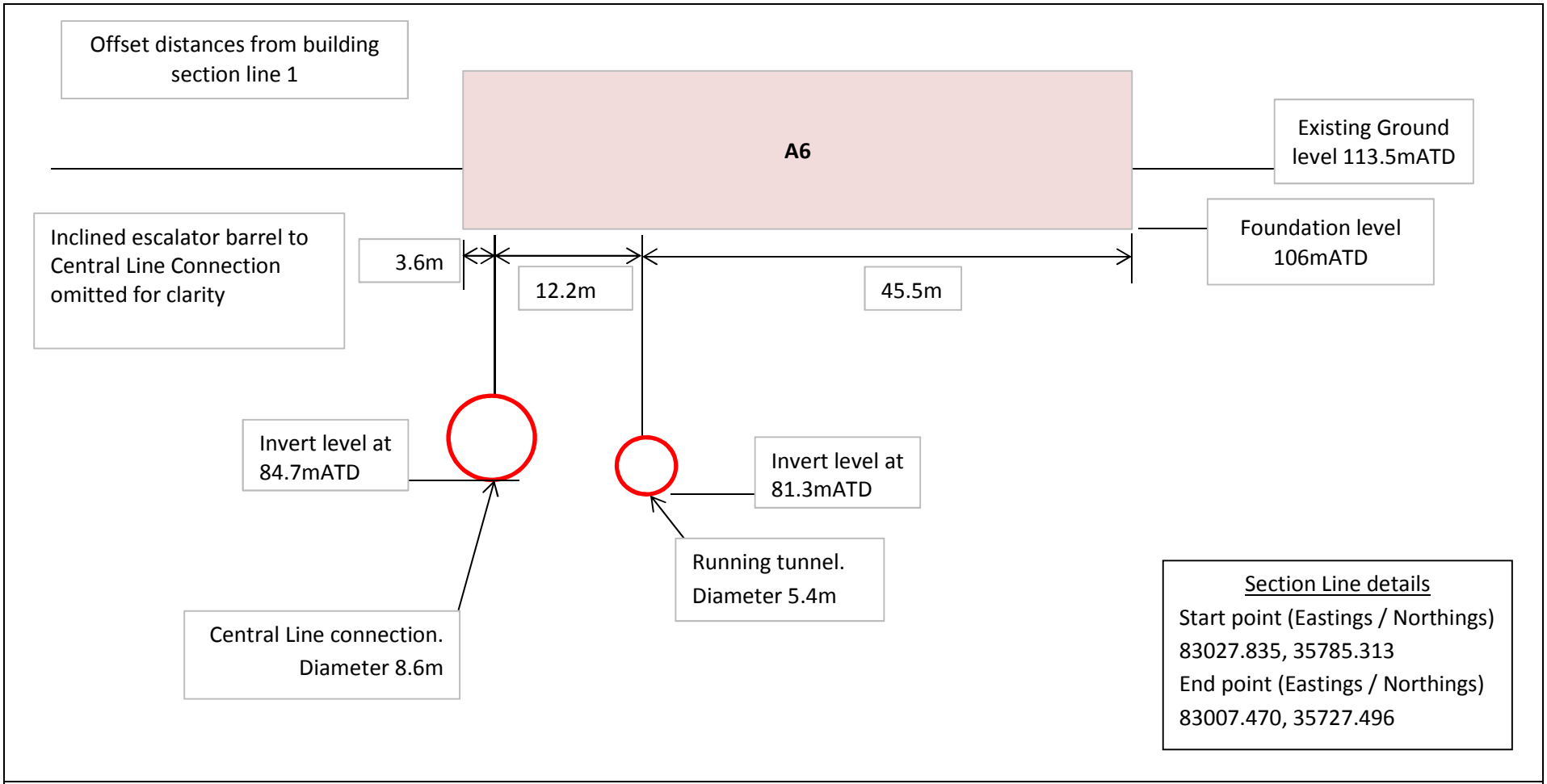
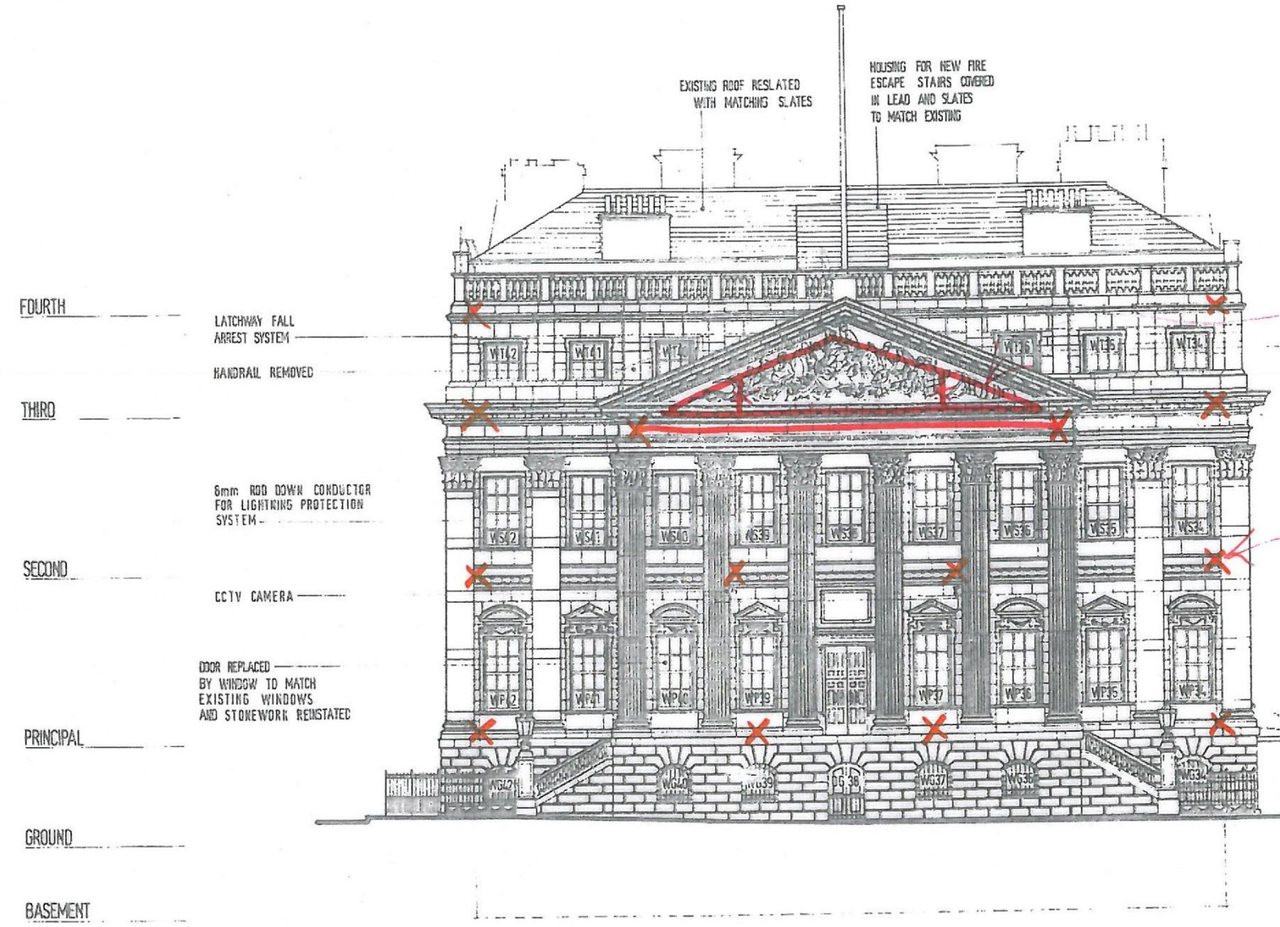


Figure 5: Diagrammatic cross-section of section (line 1) relative to tunnel locations

Appendix 6: Plans of structural ties

ASA MARK-UP
26/6/14
ELEVATIONS SHOWING EXISTING TIES



ALAN BAXTER & ASSOCIATES
27 MAR 1991

0 1 2 3 4 5 6 7 8 9 10metres

TENDER DRAWING

C General revisions Feb '91
B Revised generally for B'Reg submission Nov '90

City of London
Department of Building and Services
Director of Building and Services
Corporation of London
PO Box 270 Guildhall
London EC2P 2EJ

APRIL '90
1:100

MANSION HOUSE REFURBISHMENT

NORTH ELEVATION
AS PROPOSED

MHD MN 10
B C

ABA MARK-UP
26/6/14

C	Revised generally for B'Reg submission	Nov '90
B	General revisions	Feb '91

EXISTING HANDRAILS AND STEPS REMOVED AND PEDIMENT ROOF RE-CLAD IN LEAD

SIDES OF NEW FIRE ESCAPE STAIRS CLAD IN LEAD.

EXISTING ROOF RESLATED WITH MATCHING SLATES

HANDRAILS REMOVED.

LIFT TOWER RENDERED AND COURSED TO MATCH EXISTING STONEWORK

EXISTING ASPHALT REPLACED WITH SLATES

DORMER WINDOW FRAMES REPLACED. PIVOTED CASEMENTS REPLACED WITH SASHES

EXISTING DORMER WINDOW OPENING REDUCED IN WIDTH

BALUSTRADE TAKEN DOWN AND RE BUILT INCORPORATING NEW STONE AS NECESSARY

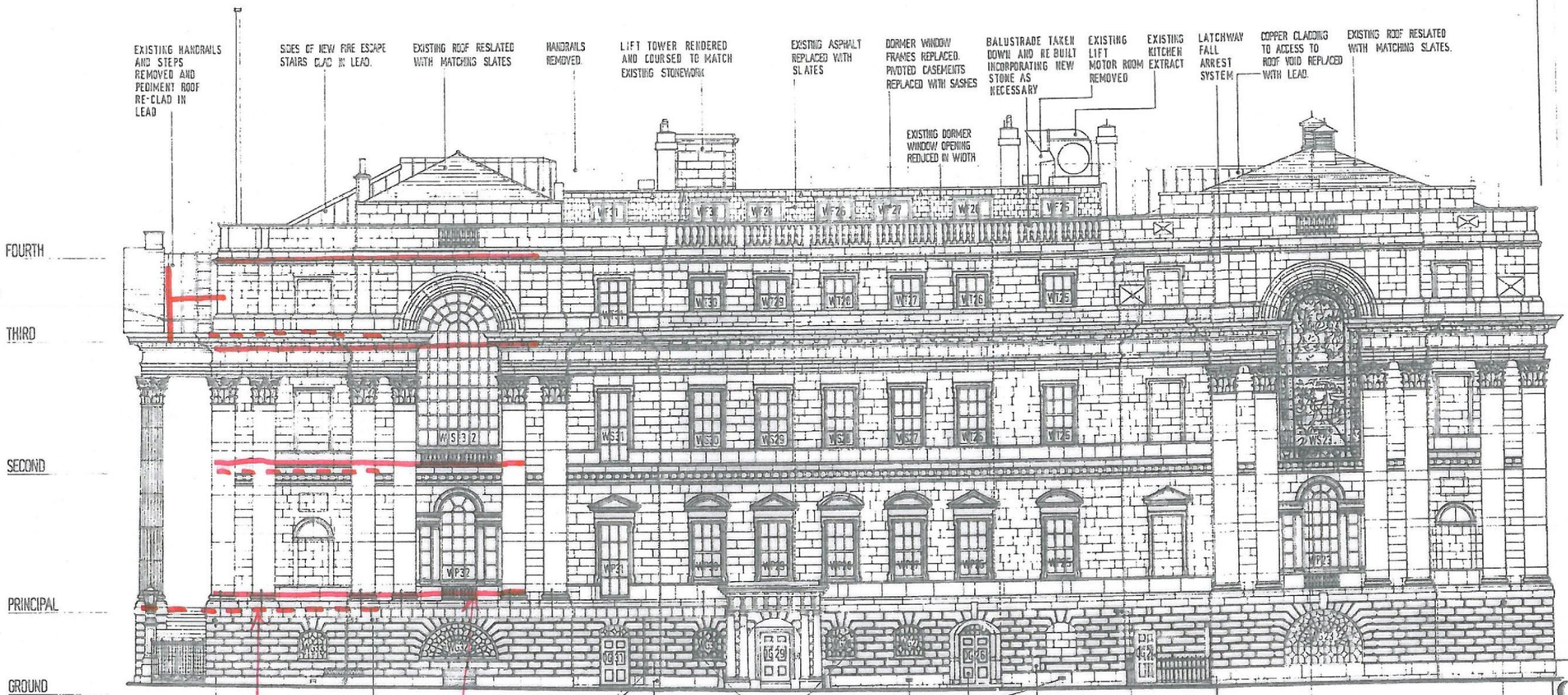
EXISTING LIFT MOTOR ROOM REMOVED

EXISTING KITCHEN EXTRACT

LATCHWAY FALL ARREST SYSTEM

COPPER CLADDING TO ACCESS TO ROOF VOID REPLACED WITH LEAD.

EXISTING ROOF RESLATED WITH MATCHING SLATES.



CCTV CAMERA

CANOPY REFURBISHED

NEW DRY RISER INLET BOX

EXISTING LIGHTNING PROTECTION TAPE REMOVED

EXISTING BOARDED WINDOWS TO BE REFURBISHED

NEW FRESH AIR LOUVRES

NEW DOOR INTO ORIGINAL OPENING

DRY RISER INLET BOX IN ADJUSTED POSITION

CCTV CAMERA

6mm ROD DOWN CONDUCTOR FOR LIGHTNING PROTECTION SYSTEM

STAINED GLASS WINDOW CONSERVED LIGHTING GANTRY REMOVED

CCTV CAMERA

ALAN BAXTER & ASSOCIATES
27 MAR 1991

0 1 2 3 4 5 6 7 8 9 10metres

TENDER DRAWING

City of London
Department of Building and Services

Director of Building and Services
Corporation of London
PO Box 270 Guildhall
London EC2P 2EJ
01 606

APRIL '90

1:100

MANSION HOUSE REFURBISHMENT

WEST ELEVATION
AS PROPOSED

MHD MN 11

C D

ABA MARK-UP
26/6/14

C	Revised generally for B'Reg submission	Nov'90
B	General revisions	Feb'91

NEW ACCESS LADDER AND WALKWAY

LATCHWAY FALL ARREST SYSTEM

EXISTING ROOF RESLATED WITH MATCHING SLATES

EXISTING CHIMNEY STACK, HANDRAIL AND LADDER REMOVED

COPPER CLADDING TO ACCESS TO ROOF VOID REPLACED WITH LEAD

NEW AIR HANDLING CHILLER WITH SLATE GREY METAL CLADDING PANELS

NEW PLANTROOM FINISHED WITH SLATES

BALUSTERS REPAIRED AND REPLACED AS REQUIRED

SERVICE TOWER RENDERED AND COURSED TO MATCH EXISTING STONEWORK

EXISTING STACK INCREASED IN HEIGHT

NEW AIR HANDLING CHILLER WITH SLATE GREY METAL CLADDING PANELS

EXISTING ROOF RESLATED WITH MATCHING SLATES

NEW ACCESS LADDER AND WALKWAY

WALKWAY AND RSJ'S REMOVED. PEDIMENT ROOF CLAD IN LEAD.

FOURTH

THIRD

SECOND

PRINCIPAL

GROUND

8mm ROD DOWN CONDUCTOR FOR LIGHTNING PROTECTION SYSTEM

EXISTING LIGHTNING PROTECTION TAPE REMOVED

CCTV CAMERA

VENT PIPES REMOVED STONEWORK MADE GOOD AT LATER PHASE

EXISTING RAILINGS TO REDUNDANT UNDERGROUND ACCESS EXTENDED TO INCLUDE NEW FIRE ESCAPE DOOR WITH NEW GRILLE ABOVE IN ORIGINAL OPENING

NEW SASHES

NEW DRY RISER INLET BOX

NEW AIR EXTRACT LOUVRES BELOW

EXISTING DOORWAY REPLACED BY NEW WINDOW AND DECORATIVE GRILLE TO MATCH CORRESPONDING WINDOW ON WEST ELEVATION

CCTV CAMERA

ALAN BAXTER & ASSOCIATES
27 MAR 1991

0 1 2 3 4 5 6 7 8 9 10

TENDER DRAWING

City of London

Department of Building and Services

Director of Building and Services
Corporation of London
PO Box 270 Guildhall
London EC2P 2EJ

APRIL '90

1:100

MANSION HOUSE REFURBISHMENT

EAST ELEVATION AS PROPOSED

MHD MN 13

C

ABA MARK-UP
HIGHLIGHTING EXISTING TIES
26/6/14

ALTERATIONS TO EXISTING COURTROOM BALCONY
FOR DETAILS SEE DRG Nº C669/01/644,645

LOCAL INFILL TO STAIRWELLS.
FOR DETAILS SEE DRG Nº C669/01/524

REPAIRS TO EAST MAIN STAIRS
FOR DETAILS OF THE EXISTING STRUCTURE & REPAIR WORKS SEE DRG Nº C669/01/631

NEW SERVICE RISER
FOR DETAILS REFER TO DRG.Nº C669/01/610 & 611

NEW SERVICE HOIST (L3)
FOR DETAILS SEE DRG. Nº C669/01/628

NEW M.O.E STAIRS FROM KITCHEN.
FOR DETAILS SEE DRG. Nº C669/01/624

NEW FURNITURE HOIST (L4)
FOR DETAILS SEE DRG. Nº C669/01/626

INFILL OF EXISTING OPENING TO ARCHITECTS DETAIL.

PLAN OF COURTROOM BALCONY

A

B

A

B

CANOPY REPAIRS.
TO ARCHITECTS DETAILS.

REPAIRS TO WEST MAIN STAIRS.
FOR DETAILS OF THE EXISTING STRUCTURE & REPAIR WORKS SEE DRG Nº C669/01/631 & 633 INCLUSIVE

NEW CORTILE STRUCTURE.
FOR DETAILS SEE DRG. Nº C669/01/525.603 & 604

NEW SERVICE LIFT & STAIRS
INCLUDING SURROUNDING TIMBER FLOOR - FOR DETAILS SEE DRG. Nº C669/01/525, 612-615

ALTERATION TO MOE STAIRS
FOR DETAILS SEE DRG Nº C669/01/525 & 636

THIS DRAWING IS NOT A WORKING DRAWING IT ONLY SHOWS AN OUTLINE SUMMARY OF THE PROPOSED STRUCTURAL WORKS AT THIS LEVEL. FOR DETAILS SEE- DRG. Nº C669/01/524 & 525

PLAN OF MEZZANINE LEVEL.

Notes:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS AND THE SPECIFICATION.
2. DENOTES AREA OF STRUCTURAL ALTERATIONS.
3. DENOTES AREA OF REPAIRS/IMPROVEMENTS TO EXISTING STRUCTURE, E.G. FLOORS.
4. DENOTES AREA OF EXISTING CONCRETE SLAB IN FLOOR OF FIRST FLOOR OVER GOLD VAULTS.
5. DENOTES TIES ADDED 1990 AS PART OF PROTECTIVE WORKS FOR DLR TUNNELING. (SEE A.B.A DRG. Nº C669/05/100 FOR KEY PLANS SHOWING LOCATION OF THE TIES)
6. VAULTING BELOW.
7. FOR SECTIONS A-A & B-B SEE DRG Nº 669/01/600 & 601

FOR INFORMATION ONLY
THIS IS NOT
A WORKING DRAWING

Rev:	Date:	Amendment:
	31.8.93	ISSUED TO CLIENT FOR ARCHIVING
	6-8-91	RE-ISSUED TO CONTRACT.
/	23-8-90	ISSUED TO TENDER.

ALAN BAXTER & ASSOCIATES
CONSULTING CIVIL & STRUCTURAL ENGINEERS
14-16 COWCROSS STREET, LONDON EC1M 6DR
TELEPHONE 01-250 1555

Job:
MANSION HOUSE.

Drg. Title:
FIRST FLOOR PLAN
PROPOSED STRUCTURE
SUMMARY DRAWING.

Scale:	Date:	Drawn:
1:100	AUG. 90	Checked: ST

Drg. No. C669/01/512 Rev:

ABA MARK-UP
26/6/14

N

REPAIRS TO EAST MAIN STAIRS
FOR DETAILS SEE DRG. Nº C669/01/633

NEW SERVICE RISER
FOR DETAILS SEE DRG Nº C669/01/610 & 611

NEW MOE STAIR
FOR DETAILS SEE DRG Nº C669/01/636

B

A

A

B

NORTH ESCAPE STAIRS.
FOR DETAILS OF NEW SUPPORT STRUCTURE SEE DRAWING Nº C669/01/616, 617, 602, 526

REPAIRS TO WEST MAIN STAIRS
FOR DETAILS OF THE EXISTING STRUCTURE AND REPAIR WORKS SEE DRAWING Nº C669/01/633

NEW CORTILE STRUCTURE
FOR DETAILS SEE DRG Nº C669/01/527, 603 & 604

NEW SERVICE LIFT & STAIRS
INCLUDING SURROUNDING TIMBER FLOOR FOR DETAILS SEE DRAWING Nº C669/01/527, 612 & 615

THIS DRAWING IS NOT A WORKING DRAWING IT ONLY SHOWS AN OUTLINE SUMMARY OF THE PROPOSED STRUCTURAL WORKS AT THIS LEVEL. FOR DETAILS SEE~ DRG.Nº C669/01/526 & 527

Notes:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS AND THE SPECIFICATION.
2. DENOTES AREA OF PROPOSED STRUCTURAL ALTERATIONS.
3. DENOTES AREA OF REPAIRS TO EXISTING STRUCTURE.
4. DENOTES TIES ADDED 1990 AS PART OF PROTECTIVE WORKS FOR DLR TUNNELING. (SEE A.B.A DRG.Nº C669/05/100 FOR KEY PLANS SHOWING LOCATION OF THE TIES.)
5. FOR SECTION A-A AND B-B SEE DRG. No 669/01/600 & 601.

FOR INFORMATION ONLY.
THIS IS NOT
A WORKING DRAWING

Rev:	Date:	Amendment:
	31.8.93	ISSUED TO CLIENT FOR ARCHIVING.
	4.8.91	ISSUED TO CONTRACT.
/	25.5.91	ISSUED TO TENDER.

ALAN BAXTER & ASSOCIATES
CONSULTING CIVIL & STRUCTURAL ENGINEERS
14-16 COWCROSS STREET, LONDON EC1M 6DR
TELEPHONE 01-250 1555

Job:
MANSION HOUSE.

Drg. Title:
SECOND FLOOR PLAN PROPOSED STRUCTURE SUMMARY DRAWING.

Scale:	Date:	Drawn: SEAN STRADLING
1:100	AUG.90	Checked: ST

Drg. No. C669/01/513 Rev. /

AOA MARK-UP
26/6/14

N

PORTICO REPAIRS
FOR DETAILS SEE
DRG.Nº C669/01/646

NEW OPENINGS
FOR DETAILS SEE
DRG.Nº C669/01/655

REPAIRS TO BALCONY
FOR DETAILS SEE
C669/01/642

ARCH OVER REBUILT
FOR DETAILS SEE DRG.
Nº C669/01/655

B

NEW OPENING
FOR DETAILS
SEE DRG.Nº
C669/01/655

NEW RC ELBOW TIES
FOR DETAILS SEE
DRG Nº C669/01/650

REPAIRS TO TIES
FOR DETAILS SEE DRG.
Nº C669/01/654

A

MAKE GOOD
CRACKS AS
DRG.Nº C669/01/655

ST STEPHENS CHURCH

MAKE GOOD
BRICKWORK TO
ARCHITECT'S
DETAILS.

A

A

MAKE GOOD
BRICKWORK TO
ARCHITECT'S
DETAILS.

MAKE GOOD
CRACKS AS DRG.
Nº C669/01/650.

A

NEW OPENINGS
FOR DETAILS
REFER TO DRG.
Nº C669/01/655

NEW NORTH STAIRS.
FOR DETAILS SEE
DRG.Nº C669/01/616 & 617

REPAIRS TO EAST AND WEST
MAIN STAIRS
FOR DETAILS SEE DRG.Nº
C669/01/633

B

NEW CORTILE STRUCTURE.
FOR DETAILS SEE DRG.Nº
C669/01/529,603 & 604

NEW SERVICE LIFT. & STAIRS
INCLUDING SURROUNDING
TIMBER FLOOR - FOR DETAILS
SEE DRG.Nº C669/01/529,612
- 615

THIS DRAWING IS NOT A WORKING DRAWING
IT ONLY SHOWS AN OUTLINE SUMMARY OF
THE PROPOSED STRUCTURAL WORKS AT
THIS LEVEL. FOR DETAILS SEE ~
DRG.Nº C669/01/528 & 529

Notes

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS AND THE SPECIFICATION.
2. DENOTES AREA OF PROPOSED STRUCTURAL ALTERATIONS.
3. DENOTES AREA OF REPAIR WORKS TO EXISTING STRUCTURE.
4. DENOTES TIES ADDED, 1990 AS PART OF PROTECTIVE WORKS FOR DLR TUNNELING. (SEE A.B.A DRG.Nº C669/05/100 FOR KEY PLAN SHOWING LOCATION OF THE TIES.)
5. FOR SECTIONS A-A & B-B SEE DRG Nº669/01/600 & 601

FOR INFORMATION ONLY
THIS IS NOT
A WORKING DRAWING

Rev:	Date:	Amendment:
	31.5.93	ISSUED TO CLIENT FOR ARCHIVING.
A.		REVISED TO INCORPORATE INFORMATION CONTAINED IN SITE MEMO'S ISSUED TO CONTRACTOR 18.6.92.
	6.8.91	ISSUED TO CONTRACT.
/	15.3.91	ISSUED TO TENDER.

ALAN BAXTER & ASSOCIATES
CONSULTING CIVIL & STRUCTURAL ENGINEERS
14-16 COWCROSS STREET, LONDON EC1M 6DR
TELEPHONE 01-250 1555

Job:

MANSION HOUSE.

Drg. Title:

THIRD FLOOR PLAN.
PROPOSED STRUCTURE.
SUMMARY DRAWING

Scale:	Date:	Drawn: / Checked:
1:100	AUG .90	SAM BARROW / ST

Drg. No. C669/01/514 Rev: A

NEW M.O.E STAIRS OVER BALLROOM ROOF.
FOR DETAILS SEE DRG.Nº C669/01/530,602,647

NEW CHILLER SUPPORT.
FOR DETAILS SEE DRG. Nº C669/01/531,618-620
NOTE:-
EXISTING STRUCTURE NOT SHOWN FOR CLARITY. NEW STRUCTURE CONSTRUCTED OVER EXISTING.

NEW SERVICE RISER.
FOR DETAILS SEE DRG. Nº C669/01/610,611

NEW PLANT STORE.
FOR DETAILS INCLUDING MAIN AND SECONDARY SUPPORT BEAMS AND CONCRETE PLANT BASES SEE DRG. Nº C669/01/531,533,
NOTE:- 618-620
EXISTING STRUCTURE NOT SHOWN FOR CLARITY. NEW STRUCTURE CONSTRUCTED OVER EXISTING.

NEW CHILLER SUPPORT.
FOR DETAILS SEE DRG. Nº C669/01/531, 618-620
NOTE:-
EXISTING STRUCTURE NOT SHOWN FOR CLARITY. NEW STRUCTURE CONSTRUCTED OVER EXISTING.

NEW MEANS OF ESCAPE
FOR DETAILS SEE DRG Nº C669/01/640

INFILL TO EXISTING STAIRWELL.

INFILL TO EXISTING ROOFLIGHT.

NEW NORTH STAIRS.
FOR DETAILS SEE DRG.Nº C669/01/530,602, 616-617

ALTERATIONS TO 4th FLOOR ACCOMODATION.
FOR DETAILS SEE DRG Nº C669/01/530,638

REPAIRS TO WEST STAIRS.
FOR DETAILS SEE DRG. Nº C669/01/633

NEW LIFT MOTOR ROOM.
FOR DETAILS SEE DRG. Nº C669/01/622-623

ALTERATIONS TO EXISTING LOADBEARING PARTITION
FOR DETAILS SEE DRG Nº C669/01/639

NEW SERVICE LIFT & STAIRS INCLUDING SURROUNDING TIMBER FLOOR
FOR DETAILS SEE DRG Nº C669/01/531,612-615

ALTERATIONS TO 4th FLOOR ACCOMODATION
FOR DETAILS SEE DRG Nº C669/01/638

THIS DRAWING IS NOT A WORKING DRAWING IT ONLY SHOWS AN OUTLINE SUMMARY OF THE PROPOSED STRUCTURAL WORKS AT THIS LEVEL FOR DETAILS SEE - DRG.Nº C669/01/530 & 531

Notes:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND ENGINEERS DRAWINGS AND THE SPECIFICATION.
2. DENOTES AREA OF PROPOSED STRUCTURAL ALTERATIONS.
3. DENOTES AREA OF REPAIR WORKS TO EXISTING STRUCTURE.
4. DENOTES TIES ADDED 1990 AS PART OF PROTECTIVE WORKS FOR DLR TUNNELING. (SEE A.B.A DRG. Nº C669/05/100 FOR KEY PLAN SHOWING LOCATION OF TIES.)
5. FOR SECTIONS A-A & B-B SEE DRG Nº 669/01/600 & 601

ABA MARK-UP 26/6/14

FOR INFORMATION ONLY. THIS IS NOT A WORKING DRAWING

Rev:	Date:	Amendment:
	31.8.13	ISSUED TO CLIENT FOR ARCHIVING.
A	6.8.91	ISSUED TO CONTRACT.
-	15.3.91	ISSUED TO TENDER

ALAN BAXTER & ASSOCIATES
CONSULTING CIVIL & STRUCTURAL ENGINEERS
14-16 COWCROSS STREET, LONDON EC1M 6DR
TELEPHONE 01-250 1555

Job: MANSION HOUSE.

Drg. Title: FOURTH FLOOR PLAN, PROPOSED STRUCTURE SUMMARY DRAWING.

Scale: 1:100 | Date: AUG 90 | Drawn: ALAN TOMSON | Checked: ST

Drg. No. C669/01/515 | Rev. A

Appendix 7: Stained glass window survey, July 2014

Chapel Studio
Stained Glass Limited
Design & Craftsmanship in Stained Glass

E S T I M A T E

Our ref: RJH/VCT/E2546
16 July 2014

Mr David Rathbone
Alan Baxter & Associates LLP
75 Cowcross Street
London
EC1M 6EL
Tel: 020 7250 1555
drathbone@alanbaxter.co.uk

MANSION HOUSE - LONDON

BSCU - Stage 2 Mitigation Works:

Recommendation and cost for works to the stained glass windows which were surveyed on 14/07/2014.

The Egyptian Hall:
Windows designed by Alexander Gibbs and installed in 1868 - East and West Elevations. The last major restoration to these windows was in 1992-3.

West End:
Depicting the signing of the Magna Carta, Queen Elizabeth's procession from the city to Westminster and the Royal Arms is also depicted.

East End:
Procession of King Edward VI to his Coronation, The death of Wat Tyler. Royal Arms and the City arms are also depicted.

Following the restoration and refitting of both windows in March and Early April 1993, the IRA Bishops gate Bomb blast on the 24th April 1993 causing damage to the East end window. A section was removed and restored and insitu holding remedial repair works were carried out.
Both windows are set into wooden frames with screwed on beading and tied with copper wire to the internal bronze bars at every solder joint along the line of the bars. Due to the exceptional overall size of these windows a tee section was introduced to help elevate the weight of a panel upon a panel.

Condition:

West Window; The lead matrix and its weatherproofing cement was found to be in good condition. All panels are still firmly tied to the support Bars. Due to its size there is some random bowing in areas which is to be expected and a review in 3-5 years time is recommended.

East Window; The lead matrix and weatherproofing cement was also found to be in good condition, the bowing to this window is bordering on severe in places. The copper ties are stretched to their limit and any further movement mainly to the central section depicting the death of Wat Tyler at Smithfield would snap the ties completely and the bowing would progress rapidly causing cracking to the glass and damage to the solder joints. If the predicted movement to this window is of 1 - 2mm , mitigation works are recommended.

Works: From safe access internally and externally to be provided by others:
Cut the copper ties and release the beading. Carefully rack out the putty and remove the panels one at a time at every sub division. Temporarily fill the openings with a 10mm twin wall obscured plastic. Transport to our studio where we will undertake a photographic record of before and after works to be handed over on completion. We will then lay the panels flat on the benches and cut solder joints and remove the cement seal to the bowed areas. We will warm these areas with air flow and over a period of time the panel will flatten. Once flattened the joints can be re-soldered and the panel will be re-cemented. We will renew any perimeter leads where necessary. The glass will be carefully cleaned with de-ionised water and soft cotton swabs. We will apply new 1/16 gauge copper ties to every solder joint to align with the support bars. Its recommended that the opportunity is taken to introduce extra shaped bars to run in line with the vertical lead matrix. This would help reduce further instances of bowing. Finally we will return to site and refit all panels back into position leaving the area all sound and in clean condition.

[redacted]

Yours sincerely

Robert Holloway A.C.R
Director

Robert J Holloway Esq. AMGP, ACR - Director
Elise Learner BA (Hons) A.C.R. - Consultant
Registered Office:- 14 Bridge Road, Hunton Bridge, Kings Langley, Hertfordshire WD4 8RE
Tel: 01923 266386 Fax: 01923 269707
E-mail:customer@chapelstudio.co.uk Website:www.chapelstudio.co.uk
VAT Registration Number 198 1215 49 Company Registration No:- 517256

Chapel Studio
Stained Glass Limited
Design & Craftsmanship in Stained Glass

PHILOSOPHY OF REPAIRS

This is a blanket statement for all Reports: not all procedures will apply in each case.

Robert Holloway is Accredited Conservator Restorer of the Institute of Conservation. Their Code of Practice follows the guidelines issued by the Institute, the Corpus Vitrearum Medii Aevi and English Heritage.

Technical Procedures

1. We aim to retain the appearance of the commission in every respect, keeping original materials wherever possible.
2. Every effort will be made to keep original glass.
3. Only where glass is missing will it be suggested that a new piece be cut to shape, of 'antique' mouth blown glass of a matching colour, painted in style, initialed and dated in small but legible letters and fired for permanence, to form a replacement. Adopting such a suggestion is up to the Client in conjunction with the Architect and Heritage Bodies.
4. All glass will be carefully examined under the microscope for assessment regarding (i) its condition; (ii) the stability of its painted surface if it has painted or enameled detail.
5. As far as is appropriate, each piece of glass will be cleaned front and back with de-ionised water, using suitable tools such as glass fibre brushes.
6. Careful consideration will be given to original painted areas to decide whether a permitted consolidation gent should be used to prevent further paint loss.
7. Where painted detail has been lost or the legibility compromised by a degree of paint deterioration, it will be suggested to a client that these details or a supporting mat could be painted on a backing plate and sealed to the original. This is particularly important with regard to missing detail or indistinctness on the face of key characters in a design. Adopting such a suggestion is up to the Client in conjunction with the Architect and Heritage bodies.
8. All cracks will be edge-bonded with approved resins and supported with a backing plate: a matted piece of1.5mm glass, kiln formed to match the contours of the original.
9. All backing plates will be silicon edge-bonded to the original glass to create a seal.
10. If thought appropriate, cracks will be mended with copper-foil (which makes a thinner line than leading).
11. Unsightly mending leads will be carefully removed where appropriate and feasible and the pieces put together again using whatever method is appropriate: (i) an approved resin bond, supported by a backing plate (ii) copper-foil (iii) string lead (very narrow and unobtrusive) or a narrower lead than previously used.
12. It will be suggested that missing areas of enamel can be replaced by painting new colour/s onto a backing plate and sealed to the original. Adopting such a suggestion is up the Client in conjunction with the Architect and Heritage Bodies.
13. All necessary new leads will be of the same size and profile. This does not apply to repair leads.
14. The leaded light cement will be applied by hand.
15. All original ironwork will be kept unless unfeasible.
16. All ironwork will be assessed, cleaned and repainted as required, using approved substances.
17. All work in the Studio is documented 'before' and 'after' with photography.
18. Rubbings are made before disassembly.
19. Detailed notes are made during all procedures.
20. All procedures are reversible.

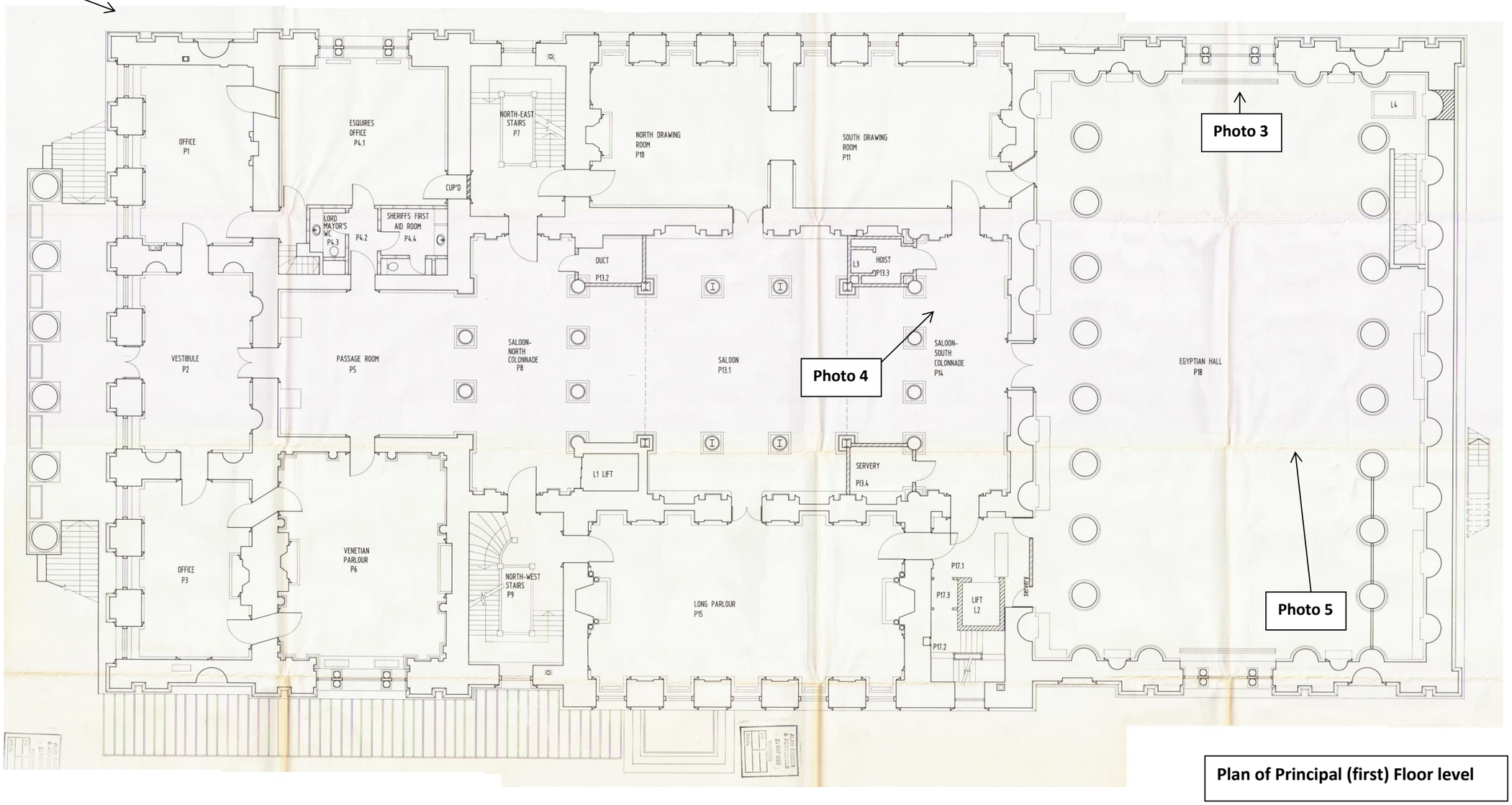
Robert J Holloway Esq. AMGP, ACR - Director
Elise Learner Bettembourg BA (Hons) - Consultant

Registered Office:- 14 Bridge Road, Hunton Bridge, Kings Langley, Hertfordshire WD4 8RE
Tel: 01923 266386 Fax: 01923 269707
E-mail:customer@chapelstudio.co.uk Website:www.chapelstudio.co.uk
VAT Registration Number 198 1215 49 Company Registration No:- 5172596

Appendix 8: Photo Locator

Mansion House Place

Photos 1 and 2

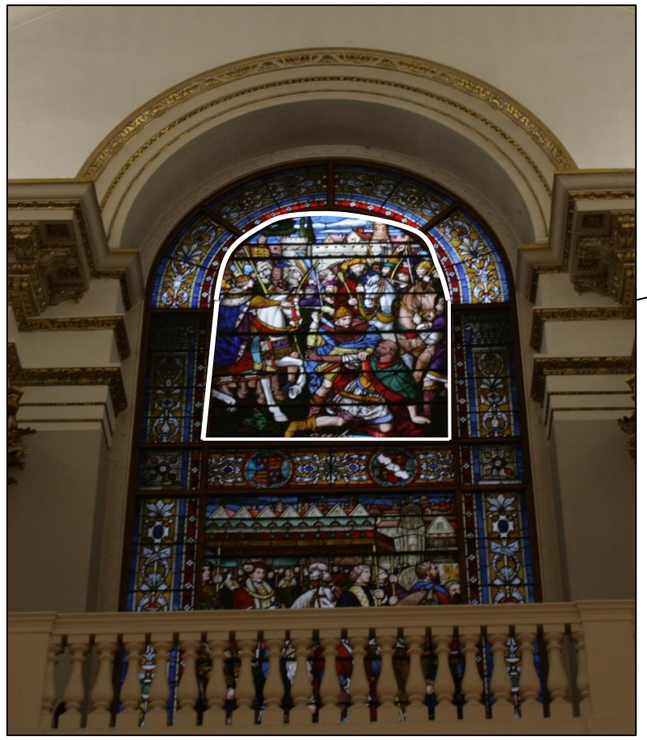


Plan of Principal (first) Floor level

Walbrook

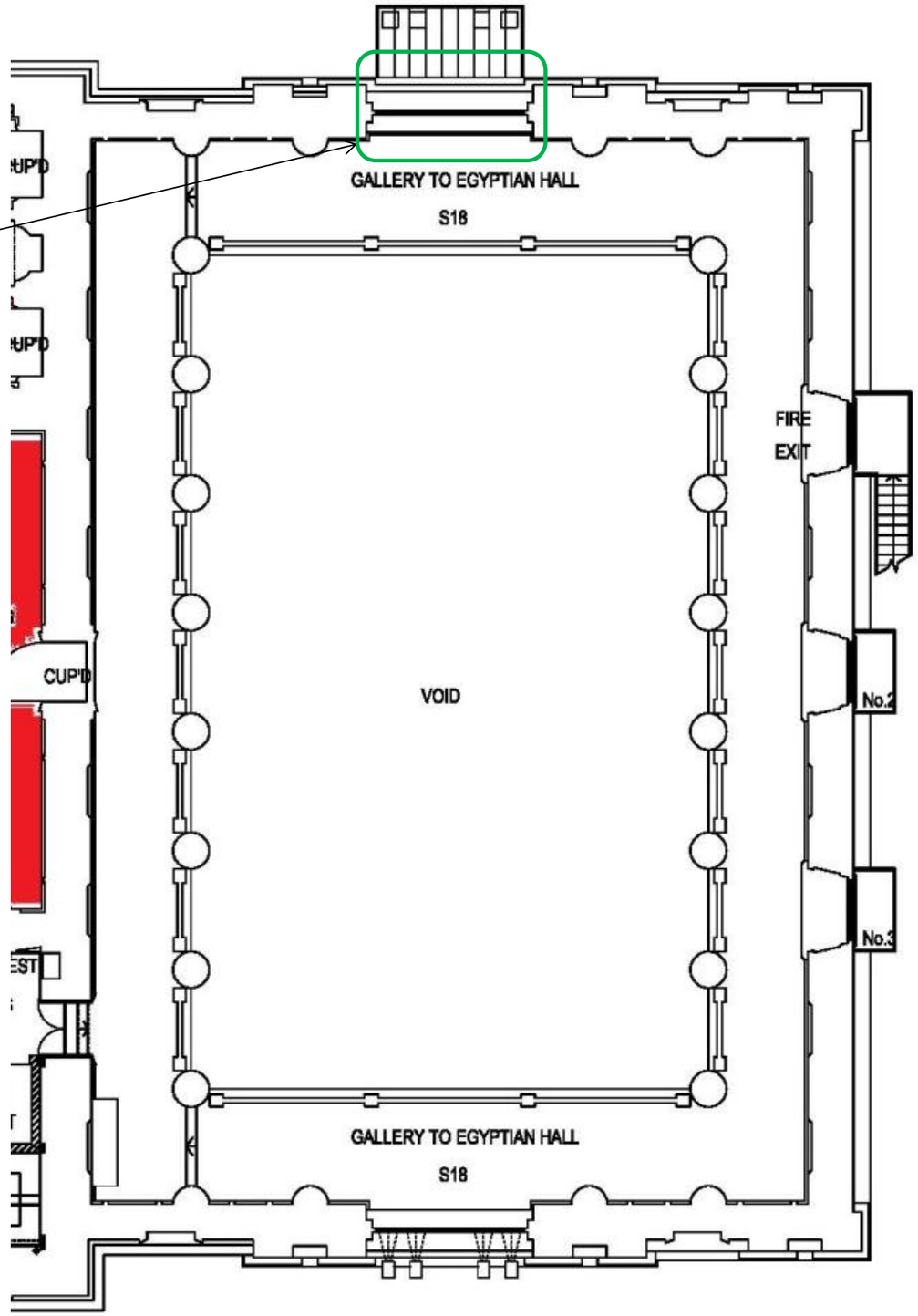
N

Appendix 9: Areas of interest potentially affected by ground movement

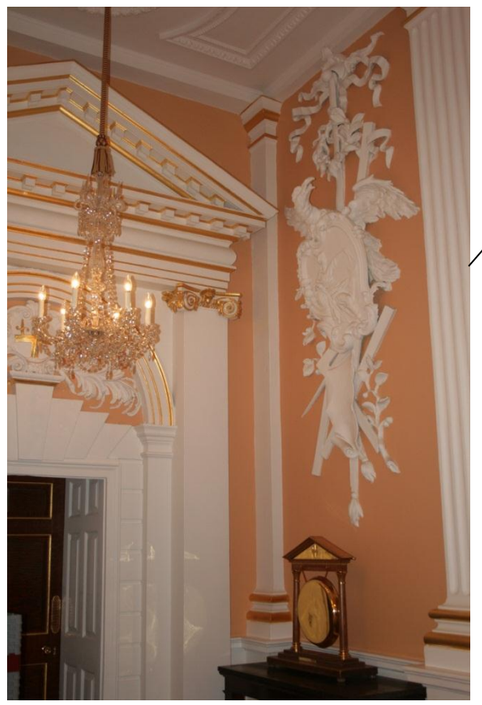


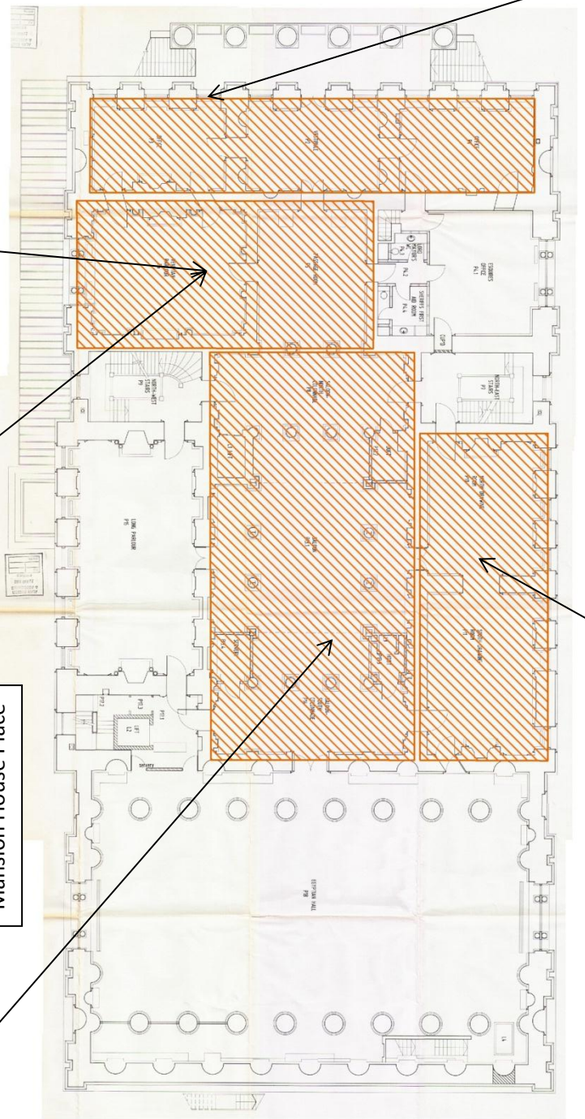
Stained glass window with panel to be removed shown in white outline

Egyptian Hall plan at gallery level



Exterior view of stained glass, with panel to be removed shown in white outline





Mansion House Place

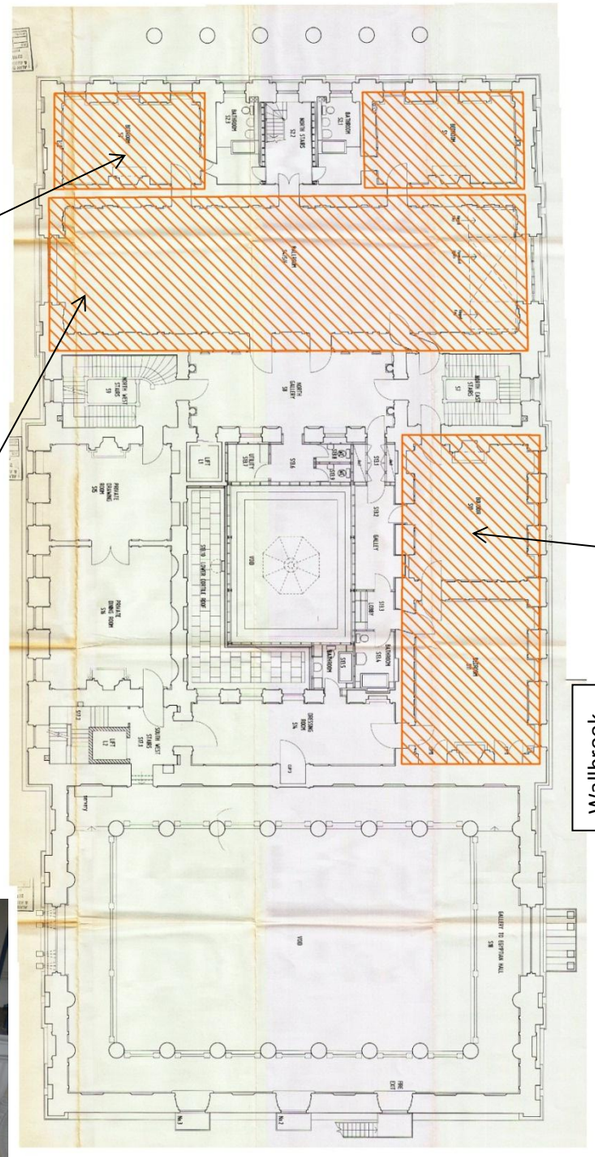
Wallbrook

Principal (first) Floor

Areas of decorative plaster

N

Mansion House Place



Wallbrook

Second Floor

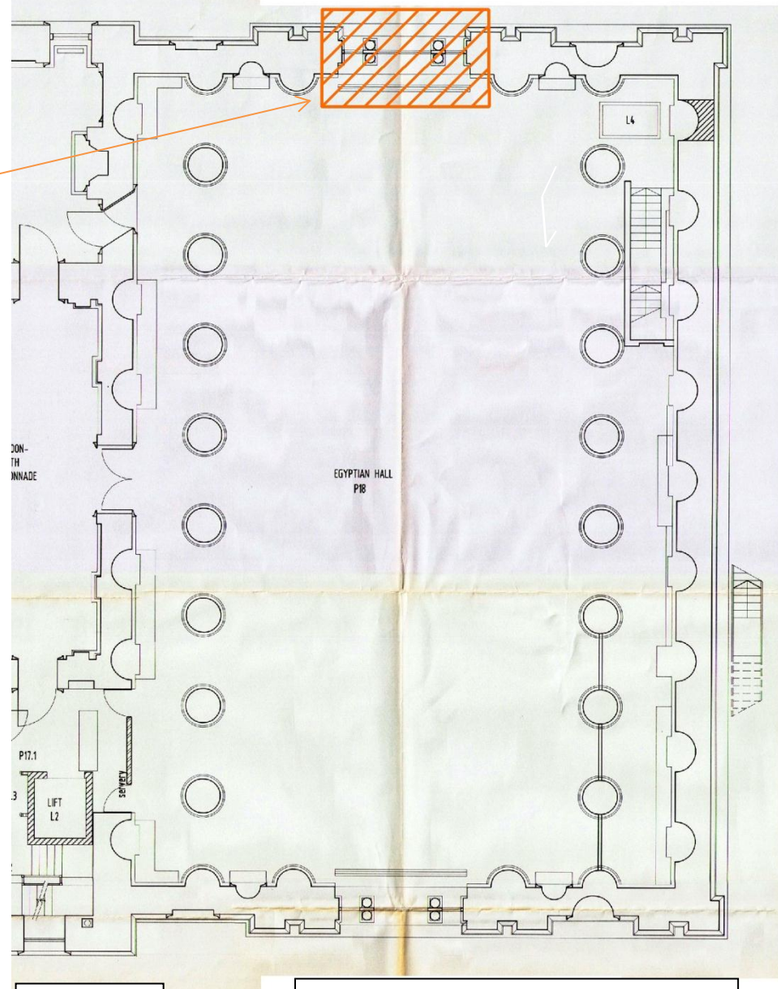
Areas of decorative plaster

N

Appendix 10: Areas to be affected by the protective works

Egyptian Hall eastern window, panel to be temporarily removed

Mansion House Place



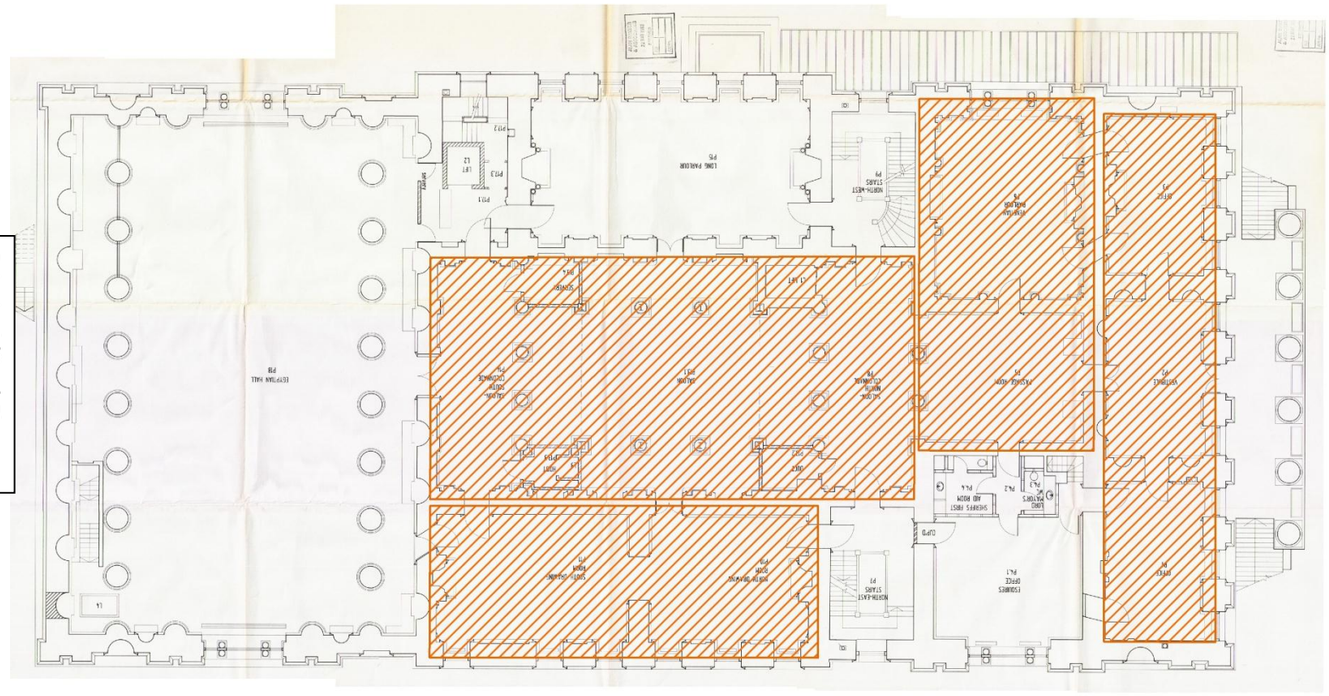
Wallbrook

Egyptian Hall plan at principal floor level, showing the location of the eastern window

N

Mansion House Place

Principal (first) Floor



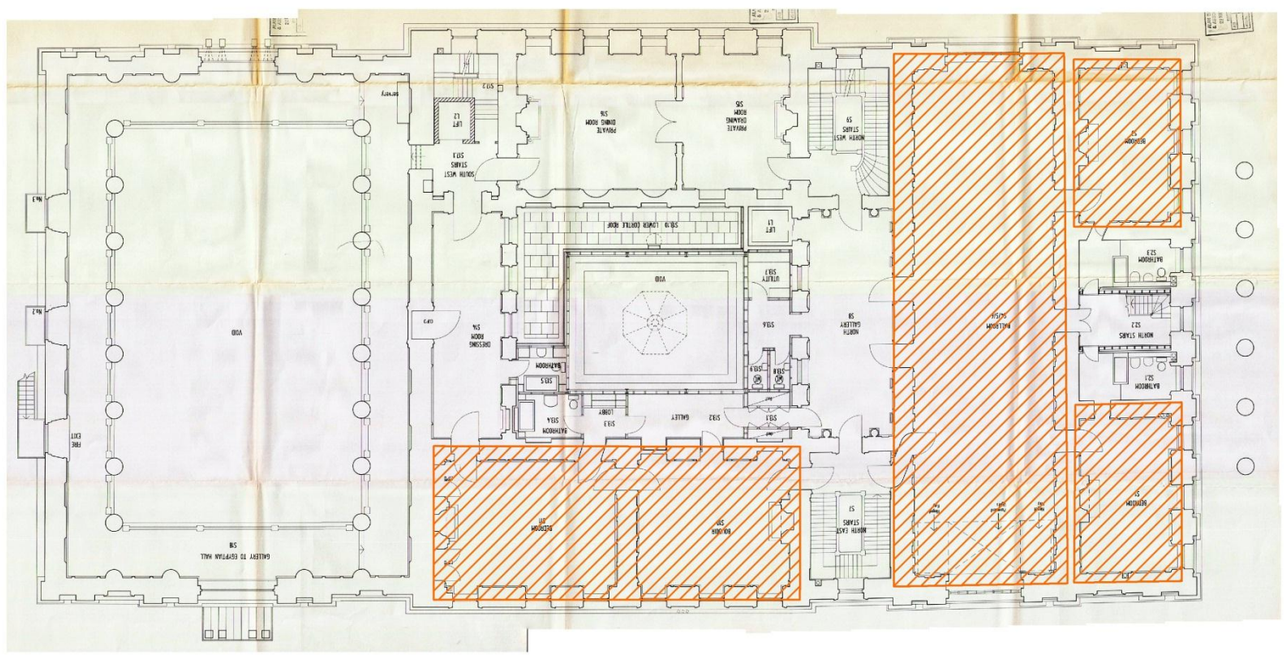
Wallbrook

Areas of decorative plaster that require survey and potential consolidation

N

Mansion House Place

Second Floor



Wallbrook