1&1a Montague Street

Structural Report

Curtins Ref: 063007

Revision: V02

Issue Date: 26 July 2018

Client Name: The British Museum

Client Address: Great Russell Street, WC1B 3DG

Site Address: 1&1a Montague Street, London W1B

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Rev	Description	Issued by	Checked	Date
00	First issue	NCD	NCD	23/07/2018
01	Includes amendments suggested by BDP Architects and the British Museum	NCD	NCD	25/07/2018
02	Includes drawings in Appendix 2	NCD	NCD	26/07/2018

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Author	Signature	Date
Neill C Duke BSc(Hons) CEng MICE Associate	NCD	26/07/2018

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1.0 Introduction

Two letters dated 15 May 2018 were issued by Regeneration and Planning Development Management, London Borough of Camden for the properties at 1 and 1A Montauge Street, London WC1B 5BP:

- DECISION – Town and Country Planning Act (as amended), Full Planning Permission Granted; and
- DECISION - Planning (Listed Building and Conservation Areas() Act 1990, Listed Building Consent Granted, including -
  permission for the creation of new openings at first, second and third floors; and
  Condition No. 6, which requires a structural engineer's report and method statements for No.1 in order to safeguard the architectural and historic interest of the building.

The proposals to upgrade the two Grade II listed town houses for 21st Century office use are supported by Camden, allowing the buildings to be fully repaired and reused to avoid their addition to the Heritage at Risk Register. New work and work of making good (repair) are to be carried out to match the existing adjsacent work as closely as possible in material and detailed execution.

Within this report, we propose to address the following aspects:

- repair works to the rear elevation and balcony, including a prospective method statement;
- structural repair of internal and external cracking (where appropriate); and
- forming new internal structrual openings.

Extracts or "snips" from drawings and mark-ups have been included up to demonstrate proposals and supplement the report text. Similarly, information has been extracted from the HeliFix website.

2.0 Rear Elevation and Balcony

The proposals for the rear balcony had previously comprised the removal of the balcony structure for refurbishement (possibly off site) and whilst those works were ongoing, the rear elevation was going to be repaired, followed by reinstatement of the balcony.

Figure 1 - Existing balcony

More recently, localised exposure works revealed that the balcony is of a much lesser construction than anticipated. Of the six supports, three are just cantilevering out of the thickness of the rear elevation wall, whilst the other three are supported by diagonal braces.

Figure 2 - Example of an existing braced support to the balcony

We are of the opinion that as a structure, its supports cannot be justified analytically and certainly not to accommodate loadings from present day standards. If the structure is removed for refurbishment and then reinstated, there is a significant possibility lots of additional strengthening works may be required, potentially impacting upon the elevation brickwork. Certainly the existing cantilever bearing detail would not be acceptable. Consequently, it is proposed the balcony be refurbished in situ, without removal, but with some strengthening works basically just to support the balcony structure.

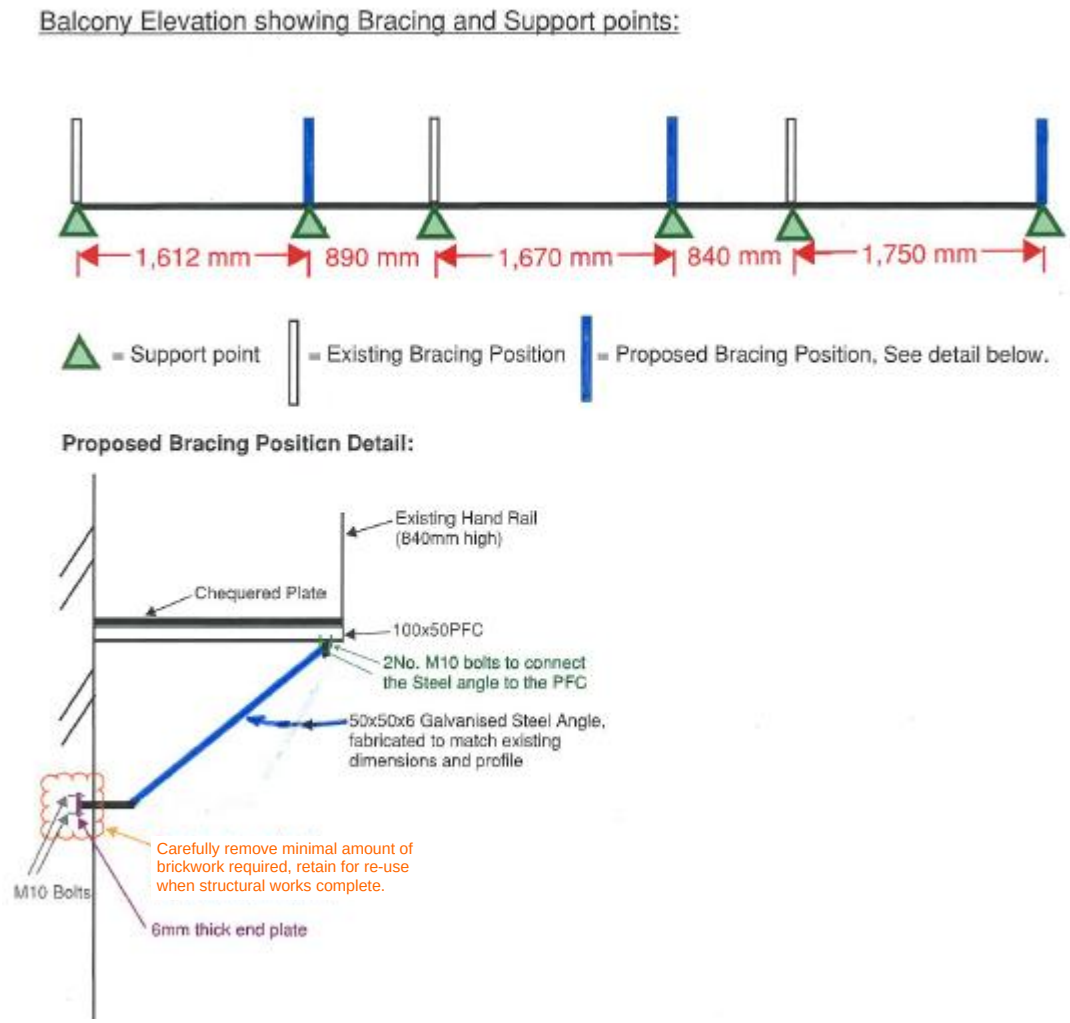


Figure 3 - Balcony - Proposed Bracing Position and Detail (**Note the brickwork should be removed with care, in order to facilitate the re-use of the bricks when the structural works are complete)

It is proposed that the existing three braced supports be supplemented with three new braced supports at the locations of the existing cantilever supports, i.e. replicating the existing braced supports. A sketch detail is shown above. Please also refer to BDP drawing (15) AE002, Rev D issued with this report.

The loadings for balconies are much higher than can be accommodated by the present form of construction and indeed higher than would be acceptable for the strengthened form of construction, hence it is NOT to be used as a balcony.

In addition, it is considered wise to secure the returning ends of the handrail to the rear elevation. That would comprise simple cleats bolted to the rear elevation and the handrail. If necessary, a pocket could be formed in the face of the wall, so that the cleat can be secured at a nominal 100mm behind the external face of the elevation, and the pocket be reinstated.

Further, the hand rail is at less than the recognised minimum safe height of 1100mm. Hence, reinforcing the scenario that the balcony be retained as a “feature”, not a structure, and be identified by signage within the building and in the Building Fabric Manual that the balcony is not to be accessed nor used as such.

In addition to the balcony, remedial works are required for the rear elevation. In properties of this age and type, frequently the outer skin / external face of the main external walls used to be built by an experienced bricklayer, whilst the inner thickness was built by an apprentice. Thus the thickness of the walls was not fully bonded. Indeed, through the thickness of such walls, bed joints may be at differnet levels due to inconsistent coursing. This form of construction is described as “snapped header” construction. It is proposed to install remedial ties to ensure that the wall is bonded through its thickenss.

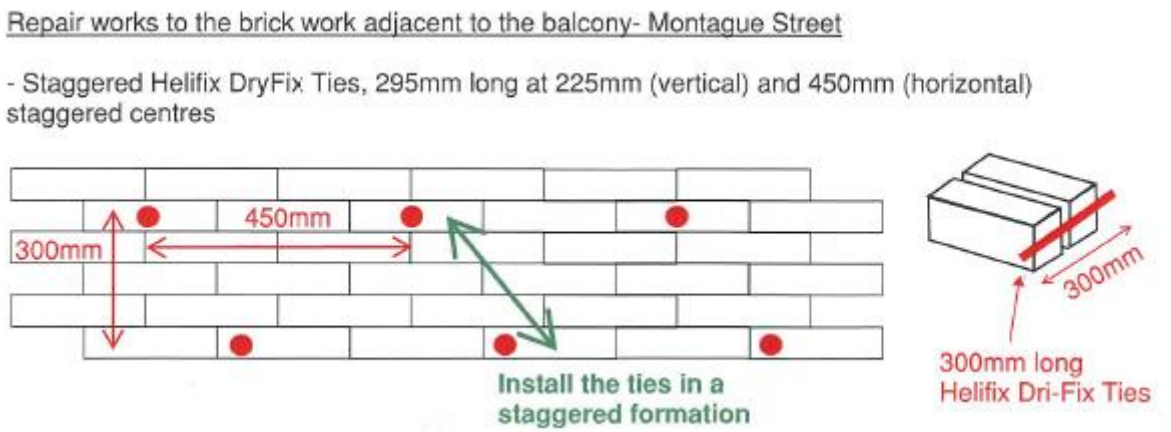


Figure 4 - Repair Works to Rear Elevation

The form of remedial works is shown above. DryFix ties, as their name suggests, do not require resin or grout. They comprise a mechanical pinning, but do not involve mechanical expansion. The ties are easy to install and effective, and finished behind the face of the masonry.

Applications

- Versatile replacement wall tie
- For securing multiple layers of masonry
- For pinning delicate masonry features

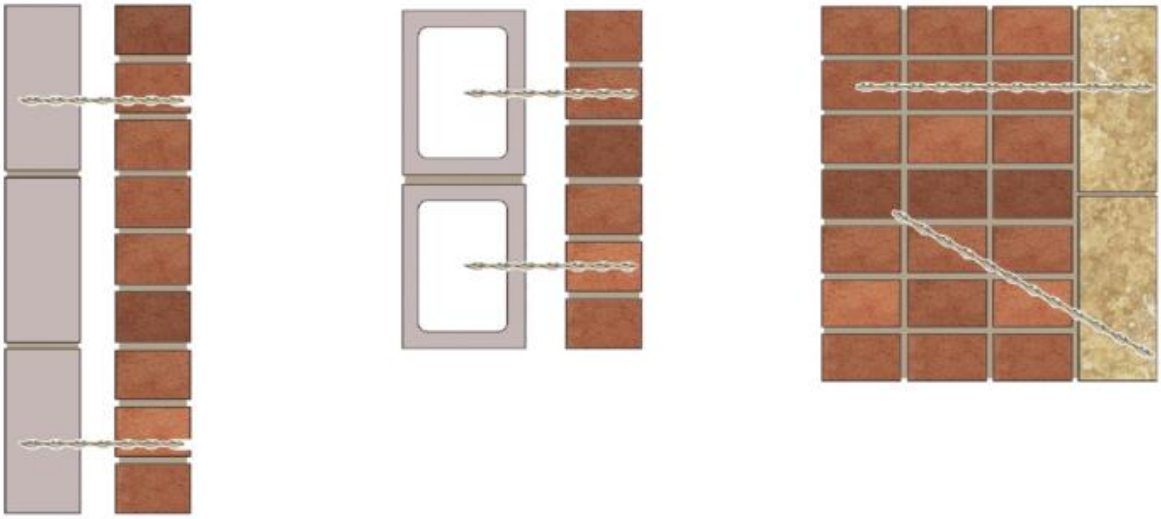


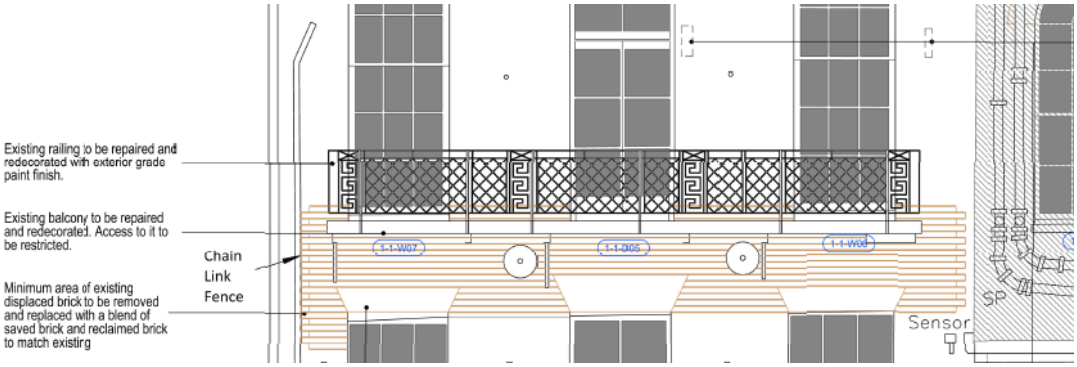
Figure 5 - Examples of how and where DryFix Ties may be utilised

For Montague Street, this form of repair is suggested for the spandrel panel and pier to No.1 at the end of the balcony near the party wall.

3.0 Prospective Method Statement for the Repair of the Rear Elevation to No.1

Note: this a “prospective” method statement in which we believe the items of works are described in a reasonably logical order. However, the appointed contractor may seek to vary the actual sequencing of some aspects of works, depending upon availability of resources and materials.

1. Retain existing balcony temporary supports in position and erect scaffold to facilitate access to the balcony and rear elevation.
2. As noted above in the report, and witnessed by limited exposure on site, the external half brick thickness of facing brick does not appear to be fully bonded to the main inner thickness of the wall construction. Below each of the three simple cantilever bearings for the balcony, carefully form a nominal 100mm deep pocket in the face of the elevation by localised removal of bricks (at a level that corresponds with the braced supports for the balcony), of approximately 200mm height and width. Note that the removal of the brickwork should be carried out with care in order to facilitate the re-use of the bricks.
3. Take dimensions of existing bracing sections and the formed pocket in order to fabricate new braced supports for the balcony. Fabricate new sections to reflect the shape of the existing ones, including an end plate detail that will bear into the pocket and be anchored to the brickwork with a minimum of 2No. M10 resin anchors and connecting with 2No. M12 bolts to the existing balcony cantilevering supports. The newly fabricated sections are to be galvanised prior to delivery to site.
4. Install the three new braces in position below the balcony.
5. At the returning ends of the existing handrail, carefully form a nominal 100mm deep pocket in the face of the elevation by localised removal of bricks, of approximately 150mm height x 100-200mm width. Note that the removal of the brickwork should be carried out with care in order to facilitate the re-use of the bricks.
6. Fabricate small cleats, 50mm long cut from 200 x 100 angle sections and galvanize.
7. Install the cleats into position, fixing into the brickwork with 2No. M10 resin anchors and to the handrail with 2No. M8 bolts.
8. Make good the five pockets formed in the elevation (three below the balcony for the new braces and two at the ends of the cleats to the handrail) with brickwork and pointing to match existing adjoining areas.
9. The balcony is going to be retained as a feature rather than be functional, hence the temporary works need to remain in place whilst the balcony structure is refurbished and the remedial works are undertaken to the elevation brickwork.
10. Undertake structural repair of the cracking as described elsewhere in this report.
11. Install the mechanical pinning and remedial ties – HeliFix DryFix ties – see sketch below for the area to be addressed.



12. Outline specification for the refurbishment of the balcony:
    - abrasive / sand blast clean and wire brush the balcony to remove the existing coating(s);
    - examine the exposed structure and allow to be repaired as necessary;
    - apply primer, two pack high build epoxy zinc phosphate to 80microns DFT; and
    - apply finishing coating of two pack high build epoxy micaceous irn oxide to 170microns DFT.
13. Remove the temporary works and scaffolding with care. In the event that anything untoward is noticed, then Curtins should be contacted for a site visit to be made.
14. Undertake refurbishment of localised areas of the balcony that need addressing following removal of the temporary works and / or scaffolding.

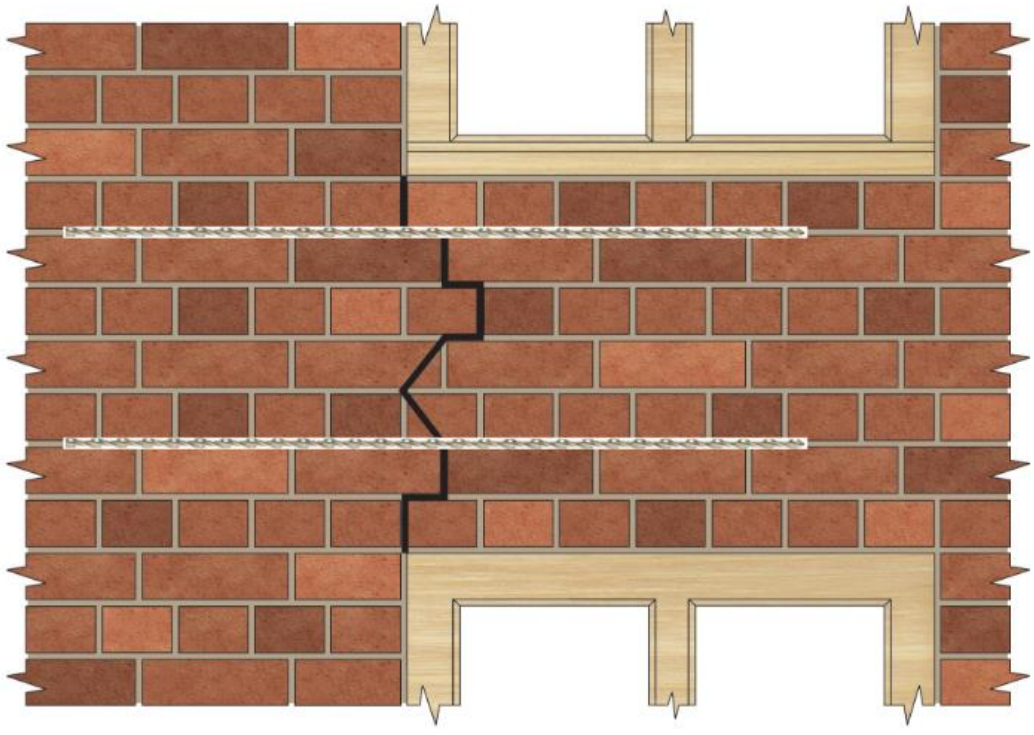
4.0 Internal and External Cracking

Where internal cracking occurs, such as around the spine wall of No.1, crack monitoring and investigations have proven the movement to be historic, not recent, i.e. longstanding and not significantly progressive. Consequently, it is anticipated that repair of the cracks in the superstructure, without the need for underpinning works, will be sufficient to reinstate the structural integrity.

Cracking in the elevation brickwork is to be repaired by installation of 1000mm long Helifix HeliBars, bedded in position at 225mm vertical centres with HeliBond grout – all materials to be used strictly in accordance with the manufcaturer's guidleines and recommendations – pointed to match the adjoining areas of face brickwork.

The full length of the cracking, including that between HeliBars, is to be repaired with a proprietary repair mortar, such as an epoxy based weatherproof filler like Crackbond TE – again, all materials to be used strictly in accordance with the manufcaturer's guidleines and recommendations.

A "snip", below, from the HeliFix website shows the crack stitching repair.



Lengths of HeliBar extending 500mm either side of the crack are bonded into cut slots, normally the mortar beds, with HeliBond grout or resin for a reliable and permanent solution. Where cracks are less than 500mm from an external corner or an opening, at least 100mm should be bent round the corner and bonded into the return wall or bent and fixed into the reveal, avoiding any DPC membrane.

Figure 6 - HeliFix crack stitching repair

Cracks being repaired in this manner have been identified on site, both internally and externally. Those works will be supplemented by (non-structural) repointing works.

5.0 Internal - Structural Openings

The Decision notices include consent for the creation of new openings at first, second and third floor levels, as shown on the Architect's planning submission drawings.

Localised exposure works in advance of creating the openings have revealed there to be elements of more than simple vertical loadbearing timber studs to these internal walls. There are diagonal timber sections within the walls and differing sizes of timber studs.

In order to reduce the level of structural intervention of the existing building fabric and minimise or obviate the need for structural works, we now propose to retain the larger timber studs and generally only remove the smaller timbers. This has the effect of reducing the widths of the proposed structural openings, but still achieving the opening up of the various spaces.

The proposals are shown on the two drawings, second and third floor levels, in the Appendix.

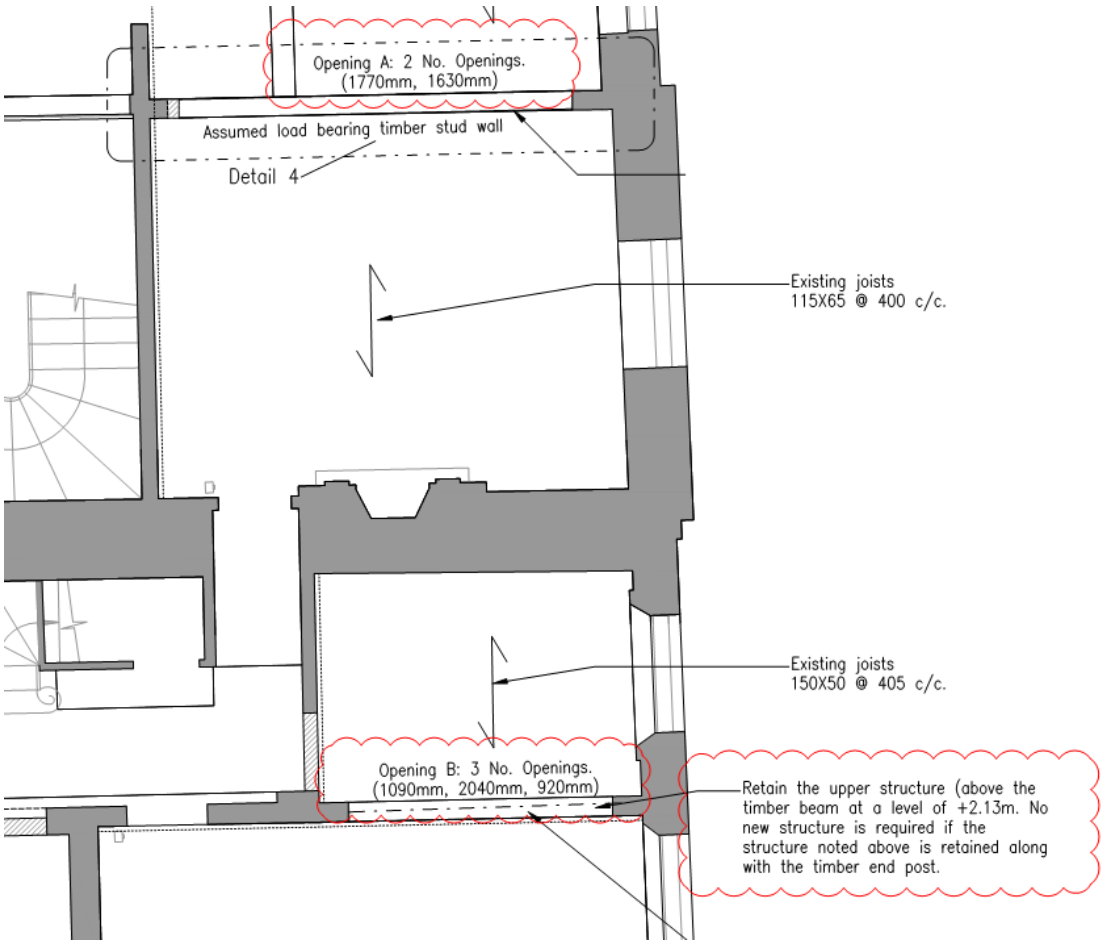


Figure 7 - Extract from second floor drawing showing reduction of opening widths minimising structural interventions (refer to Appendix 2, BDP Drawing (20)AP004_WorkInProgress)

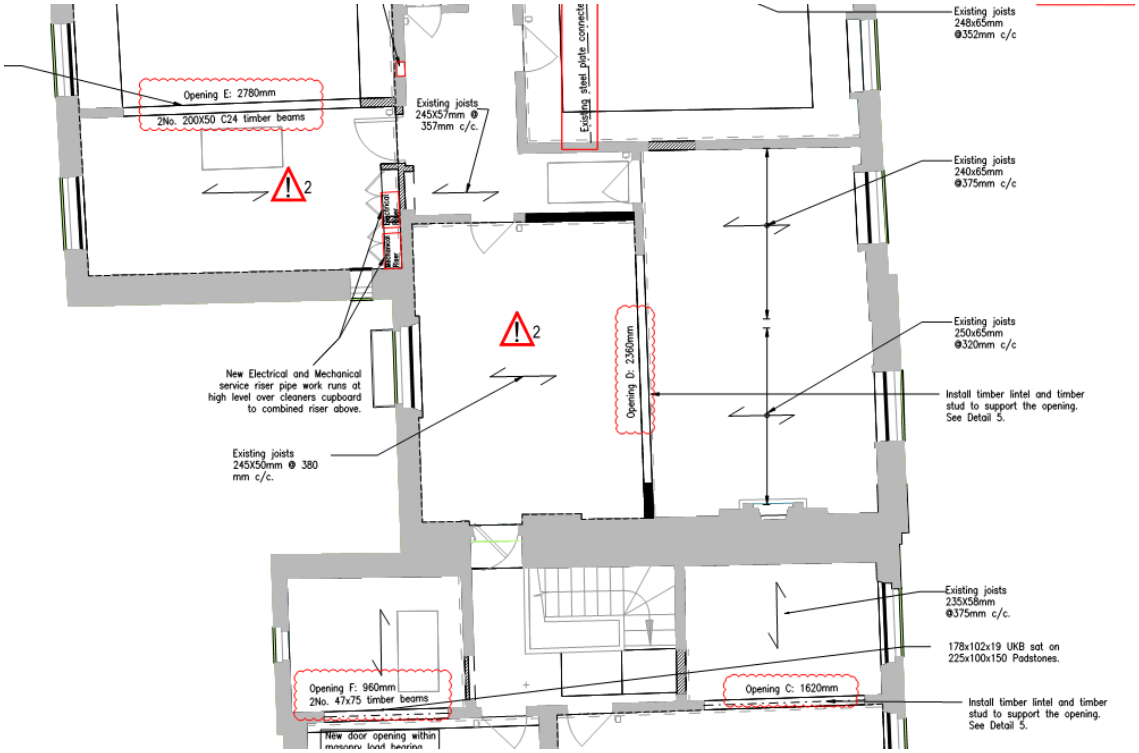


Figure 8 - Extract from third floor drawing showing reduction of opening widths minimising structural interventions (refer to Appendix 2, BDP Drawing (20))AP005_WorkInProgress)

6.0 Appendix 1

Below, is a copy of a report titled, “Statement Related to Historic Movement”, which has been submitted to Camden previously.

063007 1 & 1A Montague Street

Statement Relating to Historic Movement

curtins

Curtins Ref: 063007
Project Name: 1 & 1A Montague Street
Issue Date: 25 April 2017
Revision: first issue

Introduction
This statement relates to the historic settlement that is evident in the north west corner of 1 and 1A Montague Street.

Description of the Existing Structure
These are Georgian terraced properties considered to be typical of their age and type, that comprise external loadbearing masonry walls; internal loadbearing masonry walls at the lower levels and loadbearing timber stud walls at the upper levels; and suspended floors of timber construction. The buildings have been modified heavily since originally built. Further information is included within Hockley & Dawson’s letter reports issued to The British Museum, dated 27 September 2012 and 23 November 2012.

Visual Observations
Curtins have been provided with photographs dating back to 2012, a study of which reveals that there does not appear to have been any significant deterioration, since then, of the cracking or distortions evident in the rear corner of the property adjacent to the party wall.
Curtins were also appointed to visit the site throughout 2016 and during that period no further movement was observed.

Discussion
Whilst the cause of the cracking observed is not obvious, it is historic, not new. We have been informed that the adjoining owner has also not reported any new cracking or deterioration. Consequently, the cracking and distortions are now considered to be longstanding and non-progressive, or at least not significantly progressive, and as such have reached a stable equilibrium.

Summary
There are distortions that can be addressed. We are of the opinion that substructure works, such as underpinning, is not warranted and believe that such works would be likely to cause further movement as a result of the construction. The proposed works to replace the rear façade at first floor level will improve the structural integrity by tying the locally rebuilt façade through to the floor structure.

Signatory
This report has been prepared on the basis of visual observations and with the benefit of limited site investigations, but no actual crack or level monitoring. Our report is provided for the sole use of the named client and is confidential to the client and his professional advisors. All parts of the property that were covered, unexposed or inaccessible were not inspected and therefore we are unable to report that such parts are free from defects.

Neill C Duke
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Curtins Consulting Ltd

7.0 Appendix 2

BDP drawings for 1-1A Montague Street:

- Proposed rear Elevation - (15) AE002, Rev D
- Second Floor Plan - (20)AP004_WorkInProgress
- Third Floor Plan - (20))AP005_WorkInProgress

NOTES

X-X-DXX	EXISTING DOOR
*X-X-DXX	NEW DOOR
^X-X-DXX	NEW DOOR TO REPLACE EXISTIN ASBESTOS CONTAINING DOOR
X-X-WXX	EXISTING WINDOW NUMBERS

REVISION / DESCRIPTION | DRAWN | CHECKED | DATE

D - For Listed Building Consent Discharge Condition 6	LBE	AC	25/07/18
C - For Planning and Listed Building Consent Application	LBE	MB	23/06/17
B - For Planning and Listed Building Consent Application	LBE	MB	01/06/17
A - For comments	LBE	MB	12/05/17
FIRST ISSUE	LB	MB	28/04/17

KEY PLAN

CLIENT LOGO

THE BRITISH MUSEUM

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British Museum
Perimeter Properties Refurbishment

P2007246

DRAWING TITLE
1-1A Montague Street
Proposed Rear Elevation

Planning and LBC Application

SCALE
1:50@A1

DATE
April '17

DRAWING No.
(15)AE002

REVISION
D

WIP

NOTES

- EXISTING STRUCTURE
- NEW CONSTRUCTION
- OFFICE SPACE
- KITCHEN / STORE / CLEANER'S CUPBOARDS
- TOILETS
- X-X-DXX — EXISTING DOOR
- * X-X-DXX — NEW DOOR
- *^ X-X-DXX — NEW DOOR TO REPLACE EXISTING ASBESTOS CONTAINING DOOR
- X-X-WXX — EXISTING WINDOW NUMBERS
- * X-X-WXX — NEW WINDOW NUMBERS
- DOOR HOLD OPEN DEVICE

REVISION / DESCRIPTION	DRAWN	CHECKED	DATE

J- Structural openings	MF	AC	TBI
I - Structural openings setting out	MF	AC	18/05/18
H - Stage 4	MF	AC	04/05/18
G - For information	LB	MB	26/06/17
F- For information	LB	MB	08/06/17
E - For information	LB	MB	28/04/17
D - For information	LB	MB	06/04/17
C - For information	LB	MB	17/03/17
B - For information	LB	MB	03/03/17
A - For information	LB	-	21/02/17
FIRST ISSUE	LB	-	13/02/16

KEY PLAN

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British Museum
Perimeter Properties Refurbishment

P2007246

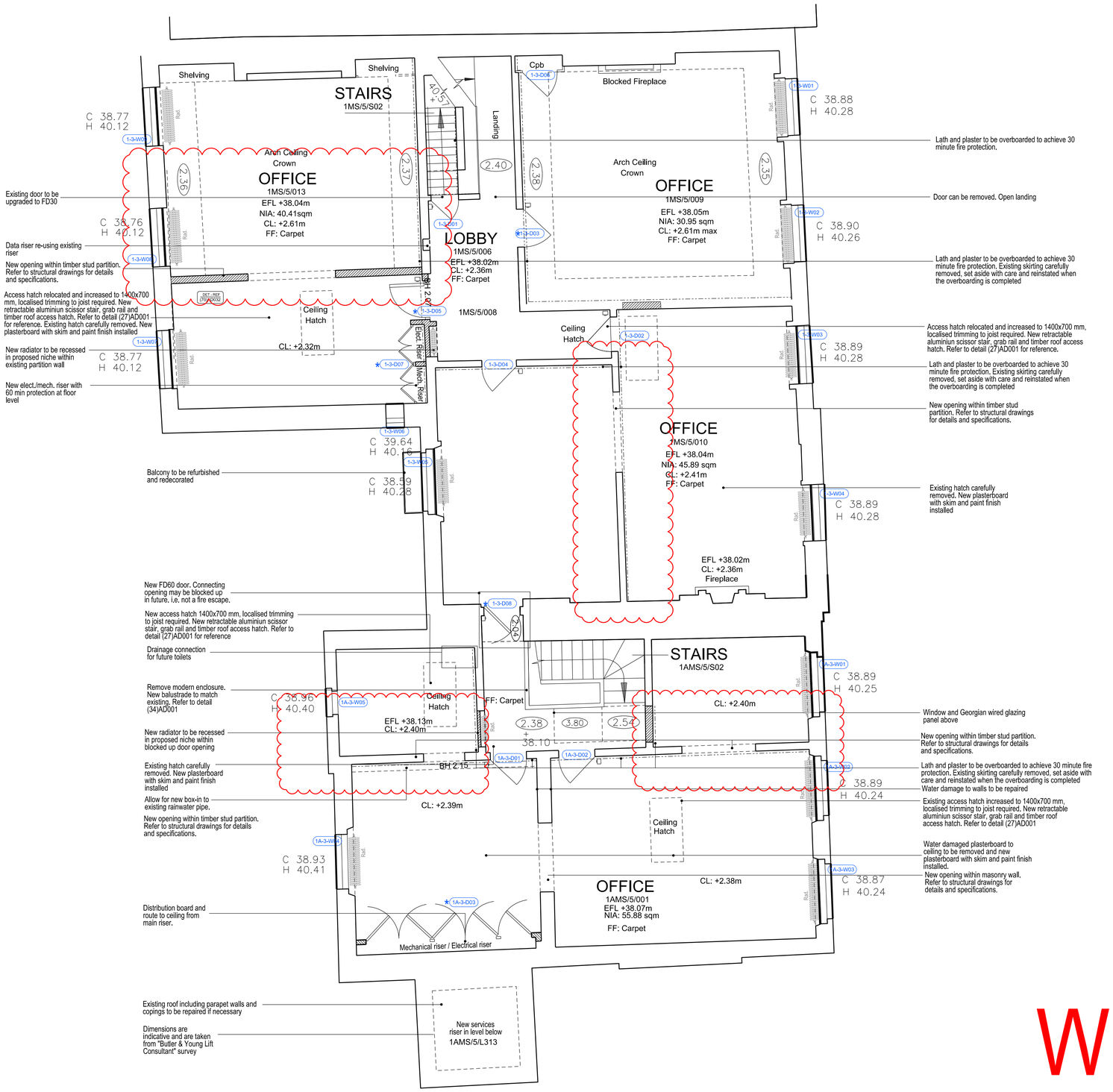
DRAWING TITLE
1-1A Montague Street
Second Floor Plan

SCALE
1:50@A1

DATE
February '17

DRAWING NO.
(20)AP004

REVISION
I



WIP

NOTES

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- NEW CONSTRUCTION
- OFFICE SPACE
- KITCHEN / STORE / CLEANER'S CUPBOARDS
- TOILETS
- X-X-DXX — EXISTING DOOR
- ✶ X-X-DXX — NEW DOOR
- ✶∧ X-X-DXX — NEW DOOR TO REPLACE EXISTING ASBESTOS CONTAINING DOOR
- X-X-WXX — EXISTING WINDOW NUMBERS
- ✶ X-X-WXX — NEW WINDOW NUMBERS
- DET - REF (22)ADXXX — INTERNAL OPENING DETAIL
- DOOR HOLD OPEN DEVICE

REVISION / DESCRIPTION	DRAWN	CHECKED	DATE
J- Structural openings	MF	AC	TBI
I - Structural openings setting out	MF	AC	18/05/18
H - Stage 4	MF	AC	04/05/18
G- For information	LB	MB	26/06/17
F- For information	LB	MB	08/06/17
E - For information	LB	MB	28/04/17
D - For information	LB	MB	07/04/17
C - For information	LB	MB	17/03/17
B - For information	LB	-	03/03/17
A - For information	LB	-	21/02/17
FIRST ISSUE	LB	-	13/02/17

KEY PLAN

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P2007246

DRAWING TITLE
1-1A Montague Street
Third Floor Plan

SCALE
1:50@A1

DATE
February '17

DRAWING No.
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