Appendix 2: Structural Engineer Report and Drawings / Price & Myers

University of London
Lansdowne Terrace & Guilford Street Townhouses

Structural Engineering
RIBA Stage 3 Report

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Reviewed by: **Michael Brown MEng CEng MIStructE**

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Date	Revision	Notes/Amendments/Issue Purpose
Mar 24	1	Stage 3a issue for information
June 24	2	Stage 3a issue for planning

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Contents

Appendices:

1 Introduction

Price & Myers are part of a design team working for the University of London alongside Burd Haward Architects, Max Fordham M&E Engineers, and CPC Project Management and QS. The project involves the refurbishment of eight grade II listed terraced houses - formerly student accommodation, but now disused.

This report summarises the structural engineering investigations and design work that has been undertaken in for RIBA Stage 3 in preparation for Planning and Listed Building Consent applications. Several site visits have been undertaken, and record information has been reviewed, along with the open areas of past investigations that are apparent on site. However specific targeted physical investigation - aligned with these proposals - is currently being procured. The proposals will be developed in more detail when intrusive investigations have taken place.

2 The Site & Ground Conditions

The buildings form the corner of Lansdowne Terrace and Guilford Street in Bloomsbury, Central London.

The site is largely flat, and the buildings are separated from the pavement by an open area and railings at ground floor level. At the rear, the lower ground floor is accessed directly from a landscaped courtyard that is part of the International House student accommodation block.

There are some small street trees on the building side of the street, and larger trees in the park opposite Lansdowne Terrace.

A simple desk study has been undertaken and is included in Appendix A. This indicates that the buildings date from the 1790's, that the natural ground is likely to be gravels over London Clay, although the location at the edge of the gravel outcrop and the presence of basements means that there may be little gravel present. The Lost Rivers of London map indicates that some minor tributaries of the River Fleet rose in the area. The London Underground route maps suggest that there will be no tube tunnels nearby, and the WWII Bomb Damage maps indicate significant damage in the area - including damage to varying degrees to all eight buildings that form this project.

The buildings were partially refurbished in 2000, with architectural and engineering services carried out by ACP Architects Limited and GIBB Limited respectively. As part of this work a geotechnical investigation interpretive report was produced. Investigations undertaken included two bore holes and six hand dug trial pits. These investigations found a typical soil profile comprising of Made Ground overlying London Clay over Lambeth Beds. Soil contamination testing was also undertaken which found elevated levels of mercury and lead, possibly from the nearby hospital and university sites. A perched ground water table was found within the made ground.

Records of two trial pits in the Lansdowne Terrace lightwell has been provided as part of a package of more recent record information. It is unclear but these appear to have been recorded by AKS Ward Engineers - probably in September 2019. In both pits the foundations bear into a stiff clay with some evidence of tree roots.

Figure 1 - Aerial view of buildings

3 The Existing Buildings

Building Description and Historic information

All eight buildings - 1-4 Lansdowne Terrace and 89-92 Guilford Street - are listed Grade II and the Historic England listing description gives them as built in 1794 to the designs of James Burton - the property developer responsible for most of Georgian Bloomsbury, and father of the famous architect Decimus Burton. James Burton is recorded as having lived in 92 Guilford Street.

The buildings are generally all typical Georgian terraced properties with the traditional solid loadbearing masonry external walls and lower ground internal walls, and then timber floors and internal walls above.

89-91 Guilford Street and 2-4 Lansdowne Terrace follow a largely typical terraced house layout over Lower Ground, Ground, first second and third floors. 92 Guilford Street and 1 Lansdowne Terrace make up the corner and have bespoke layouts.

Site surveys and study of the record drawings and desk study information has revealed a large number of structural defects in the buildings - and these are reflected in the reports by Gibbs, Cambell Reith and AKS Ward Engineers dating from 2000, 2018 and 2019 respectively. While these reports describe defects and propose repairs, they do not attempt to explain or understand wholistically the evolution of the structure of the buildings from their original form, into the current situation.

Observed defects have been scheduled in the document and drawings contained in the Appendix. In addition, these drawings describe the structural elements and layout where they are visible through some previous investigations.

The first major known changes to the building appear to have been because of the extensive WWII bomb damage. Visual inspection and record images indicate that significant rebuilding resulted - and some damaged and/or compromised structure may remain. Repair from this period my include lather and plaster finishes but using the modern lathes and cementitious plaster that is visible in the building in several areas. WWII rebuilding often happened in rather uncontrolled ways due to skills and material shortages, and its possible that some defective or inadequate framing was incorporated as early as this.

Following these repairs, record drawings indicate that the buildings have undergone a series of significant alterations to move them further away from their original layouts. It seems likely that several of these alterations have been made without a full understanding of the existing structure - and therefore of the impact of the changes. This has resulted in cracking, distortion, deformation, and excessive flexibility - primarily affecting the internal floors walls and stairs.

For all buildings the last major refurbishment appears to have happened in the early 2000's and included a rebuilding of the rear extensions (in a non-original location and in cavity masonry), complete rebuilding of the roofs of 89-91 Guilford in modern steel beams and trussed rafters, repairs to the masonry façade, installation of new wall to wall restraints at each level and underpinning to the foundations at No. 92 Guilford Street and the flank wall at No.4 Lansdowne Terrace.

Calculations carried out on the apparent joist sizes loads and supports suggest deflections of 60 to 100mm in some areas - which reflects the approximate distortions present on site.

It is apparent from viewing the facades on Lansdowne terrace and Guilford street that the buildings have undergone further recent structural movements which has caused damage to the brickwork. Preliminary calculations have found that the stresses below the foundations are in exceedance of what is typically allowable in London Clay. The damage to the façade and foundations were thoroughly investigated and reported during the 2000 refurbishment works, see below for more information, and yet appear to be ongoing.

Comprehensive investigations are currently being undertaken to confirm the sources for the various defects, and a holistic - rather than piecemeal - approach taken to addressing them, which responds to and enhances the remaining historic aspects of the building.

Summary of 2000s Refurbishment Reports and Investigations

As part of the 2000 refurbishment works undertaken by ACP Architects Limited and Gibb Limited, soil investigations and structural survey work was undertaken. The below points summarise the findings. Note that following two sections below, 'Foundations' and 'Structural Condition Survey', contain conclusions made by the authors of the 2000s reports and do not necessarily align with our assessment.

Foundations

- Soil conditions comprise of Made Ground over 35m thickness of London Clay and Lambeth Beds. The depth of the Made Ground layer varies between 0.35m and 0.55m below the adjacent hardstanding at Lower Ground level.
- A perched ground water table was encountered within the Made Ground
- Foundations comprise of non-corbelled strip masonry foundations bearing on Made Ground or weathered clay. The depth of foundations varies across the site, becoming shallower to the south-east.
- The damage observed to the superstructure is likely to be due to building movements caused by undersized foundations that are also shallow and hence within the seasonal moisture variation zone of and subject to repeated settlement and heave. Variation of foundation depth and founding strata across the site is also likely to have contributed to differential settlement.
- A modern reinforced concrete retaining wall adjacent No.92 Guilford street is likely to have contributed to the overloading of the foundation soil to the terraces at this location
- Contaminated ground was recorded which is possible from nearby hospital and university sites
- Window sampling was undertaken to determine if desiccation may be a factor in the failure of the foundations however the results were inconclusive

Structural Condition Survey

- The external walls have suffered permanent structural movement. The most extensive and severe façade cracking was observed at No.1 Lansdowne Terrace and No.92 Guilford Street.
- All of the masonry is in poor condition and found to be soft and deteriorating.
- Large areas of façade have been repointed with cement based mortar
- Large areas of the front external walls to No.2 & 3 Lansdowne Terrace and 89 to 91 Guilford Street have been treated with a coating of unknown origin.
- Additional outer skin to No.1 Lansdowne terrace is butt jointed to adjacent inner skins. Full height cracking present.

- Extensive cracking between party walls and external walls.

Main Stair Survey

A condition survey of the existing main staircases to the Georgian Townhouses has been undertaken by Price and Myers, refer Appendix D. The existing stairs vary considerably in type and condition and consist of a mixture of original cantilever stone stairs, original timber stairs and modern timber stairs. In many cases the balustrades are in poor condition and likely non-compliant due to their capacity to resist horizontal barrier loadings, flexibility and low height. Ad hoc attempts to stiffen and strengthen the balustrades have been made but in most cases are ineffective. The P&M report groups the stairs into four basic types as listed below and assigns a condition score based on a red, amber or green system.

1. Suspected historic timber stairs and treads with thin timber balustrade handrails and spindles in a Georgian style.
2. Suspected historic timber stairs with full height timber walls provided at either side.
3. Suspected historic stone cantilever stairs with thin timber handrails and iron spindles in a Georgian style
4. Suspected modern timber stairs with thick timber handrails and spindles, newel posts generally provided at landings

Front Façade Crack Study

Price and Myers have undertaken a condition survey of the Lansdowne Terrace and Guilford Street facades, refer appendix E. A structural condition survey was also completed by Gibb Limited as part of the 2000 redevelopment works and has been included within the appendix. It is worth noting that additional cracks have been identified as part of the Price and Myers survey that were not recorded during the 2000 Gibb survey, indicating that further movement has occurred since the previous refurbishment works.

Deformation and cracking are visible along both facades, particularly at No.2 and No.3 Lansdowne terrace. There are also extensive historic repairs visible, which in places have begun to fail. These repairs generally include repointed cracks and patches of new masonry. A large outward bow to No.92 Guilford Street is visible. A render applied to the façade at lower levels of No.2 and No.3 Lansdowne is delaminating from the façade.

From reviewing the crack map patterns it appears that the failure mode is caused by both settlement of the foundations and outward movement of the façade. It appears that settlement has occurred at the flank wall to No.89 Guilford and the party wall at No.90/91 Guilford as well as the Guilford street façade to No.92. On Lansdowne terrace, it appears than settlement has occurred at buildings No.2 and No.3.

It also seems that some of the post war repairs to the lower level brickwork on Lansdowne Terrace in particular may not have been carried out in a durable or effective manner.

Figure 2 - 1940's photograph of Lansdowne Terrace showing rebuilding in progress.

4 Proposed Structure

The design proposals have been developed to result in a co-ordinated refurbishment proposal that can address the structural issues in a sensitive, appropriate and consistent way, and provide the spaces that the Client seeks, and the environmental performance that they are committed to.

Originally presented as three options, at the Clients instigation, the design now reflects the most environmentally ambitious proposal where the buildings are refurbished to the EnerPHit standard - Passivhaus for an existing building.

In addition, the project includes the construction of an additional floor level in the form of a mansard extension at the current roof level.

Description

The requirement is to carry out the necessary structural work to get the buildings back into use as accommodation. This includes addressing the ongoing structural deficiencies which evidently exist – refer to Defects Register and previous report sections for details. In addition, the works involve a mansard extension level, structural repairs and strengthening work, as well as alterations to suit the new room layouts.

The new layouts, materials and designs attempt to be sensitive to the original construction form and original room and stair layouts. With additional operational energy sustainability criteria applied, additional structural work and alterations are required to achieve airtightness and insulation levels.

Outline of Structural Works

The proposal will involve the internal structure being stripped back to the 'bones', and new loadbearing timber supporting frames installed in the centre of the terraced house plans. Frames are erected under existing joists prior to removing the existing walls where possible, to minimise temporary works, additional foundations are needed at basement level to support the frames. Existing floors typically repaired and doubled up with new joists in the worst areas. Removal of the roof structure and construction of a new floor at level four and a new mansard roof structure. The existing party walls are to be extended in height. At No.2-4 Lansdowne Street, the existing level two-three stair will be demolished, and access to level three and four will be provided by a new stair which extends over the existing stair well to the lower floors.

The new internal frames as described above are to be lined with plywood and will provide lateral support to the structure in the longitudinal direction and act as spine walls. The frames are to be designed to resist the greater of the wind loads or 2.5% of the structural mass within the tributary area of the bracing wall. The spine wall frames are to be constructed from LVL to enable the columns to be constructed from multiple smaller sized sections supplied in short lengths, which requires the additional strength and stiffness of LVL, as well as to limit the amount of shrinkage induced deflections, while keeping the connection designs simple.

Defects highlighted in the Defects Register will all require investigation and resolution as part of the works. This may include extensive brick repair to Lansdowne Terrace elevation, underpinning of Lansdowne Terrace party wall areas and any other foundations identified as needing to be improved..

Repairs to the cracked main façade as described in section 3, require further investigation and may involve partial rebuilding, careful repointing in appropriate mortar, and pinning or reinforcement or larger scale rebuilding at the most severe locations. The input of specialist masonry repair contractors will be sought in the next stages.

Existing rear extension 'outriggers' - actually built in cavity masonry in the 2000s - are altered to provide roof terraces. Some complexity will result in providing appropriate balustrading to these terraces.

A small extension is added to the rear of No92 Guilford Street - in an area that was previously part of the building.

Entrances to the vaults at lower ground level are to be enlarged to enable use as bike stores. The existing vault walls are significantly distorted in several areas and will require repair and strengthening, works are also likely to be required to the pavement railings - to ensure that they provide an acceptable level of load resistance.

Underpinning to party walls and exterior walls may be required and the extent will be determined in the next stages with input from the Geotechnical Engineer. As discussed in section 3, the building has likely experienced foundation settlement and rotation which has caused significant damage to the facades. Historic repair work undertaken in the 2000s does not appear to have arrested the building movements. The increase in load from the proposed new level will need to be carefully considered against the capacity of the existing foundations. Preliminary calculations have shown the existing bearing pressures below the party walls and external walls to be approximately 275kPa, which is significantly higher than typical London Clay allowable bearing pressure.

EnerPHit Standard Specific Structural Interventions

New insulation and linings are required throughout the buildings to achieve EnerPhit Standard requirements, which will likely involve structural interventions as described below.

Embedded timbers within the street facing façade, including joists and wall plates, will need to be cut back and removed from the masonry. This is because the proposed new internal linings and insulation at this location will potentially create a damp and non-breathable zone which will lead to decay of the timbers. It is proposed that the joists will be re-supported on a new internal timber structure, refer sketch SK10 within the Appendix C. Note that this is dependent on the outcome of the hygrothermal analysis. Note the courtyard façade will be insulated externally and therefore not subject to the same risks.

New insulation is required below the lower ground level floor. This will require the uplifting of the existing slab and installation of new slab under new insulation under a new screed. This may require underpinning of the existing foundations depending on final build ups, levels and excavations required for M&E services.

The weight of the new linings, insulation and other new materials will need to be carefully monitored and compared against the weight of existing materials removed to ensure excessive load is not being added to the structure and foundations.

Mechanical and Electrical Services Integration

Significant alterations are needed to provide routes for the new ASHP and MVHR heating and ventilation systems, including plant platforms at roof level and frequent large penetrations through the main loadbearing walls.

New risers will be integrated within the new timber double wall spine wall at No.89 to No.91 Guildford Street and No. 2 to No.4 Lansdowne Terrace. No.1 Lansdowne Terrace and No.92 Guildford will have new risers constructed within the floor adjacent the existing stairs.

It is likely that significant areas of the lower ground floor slab will need to be replaced to permit construction of new foundations, drainage and M&E services routes. Depending on the depths of the existing foundations relative to the existing floors, and the thickness of new insulation required, further underpinning may be needed.

Automatic opening vents are to be provided within the communal stair wells, which stop at second floor. The vents will be placed within existing window openings and therefore structural interventions are not required.

The building is to be fitted with a sprinkler system which require large sprinkler tanks to be housed on site. Three options have been proposed for the location of these including the International Hall basement, the rear courtyard area or the lower ground level of No.92 Guilford Street. In all cases it is likely a new reinforced concrete ground bearing slab will be required to support the tanks.

Risk

The detail of the EnerPHit certification may have significant structural implications that are not yet fully understood although they are suggested on the drawings – e.g. cutting joist ends out of walls and re-supporting on new internal timber frame, builderswork holes that necessitate the rebuilding sections of wall, , floor insulation resulting in need to underpin etc.

These impacts will become clearer as the design develops and the investigation of the existing structure is undertaken.

In all cases, work to the existing stairs cases will be required as a minimum to fix the non-compliant arrest elements and arrest the progressive movement. The extent of this various from house to house and level to level – refer to Price & Myers Defects Schedule. A balance will need to be arrived at between sensitivity to listed fabric and the requirements of Building Control.

5 Design Criteria

Codes and Standards

Final design and calculation will be carried out in accordance with the relevant British Standards, Eurocodes and Codes of Practice, along with the appropriate conservation guidelines appropriate to a listed building.

Design Life

Typical design life for structural components is given to be 50 to 60 years, however, as this building ably demonstrates, even without the best maintenance regimes, the real lifespan of the structure is indeterminate and likely to be much longer.

Loadings

Imposed loadings to BS EN 1991-1-1:2002

- Apartments (Living/kitchen/bathroom) - 1.5kN/m^2 - Category A1 Table NA.2 BS EN 1991-1-1:2002
- Non communal stairs - 2.5kN/m^2 - Category A5 Table NA.2 BS EN 1991-1-1:2002
- Balconies/terraces - 2.5kN/m^2 - Category A5 Table NA.2 BS EN 1991-1-1:2002
- Communal areas (Stairs/landings) - 3.0kN/m^2 - Category A6 Table NA.2 BS EN 1991-1-1:2002
- Roofs - 0.6kN/m^2 - Table NA.7 BS EN 1991-1-1:2002

The loadings above are those outlined within UK National Annex to Eurocode 1, however, we will argue for as low a loading as possible - to be sympathetic to the original structure - we would hope that normal residential live loads of **1.5kN/sqm** throughout will apply with **0.6kN/sqm** on the roofs.

Imposed partitions and parapet loadings to BS EN 1991-1-1:2002

- Non communal areas - 0.36kN/m - Category A(i) Table NA.8 BS EN 1991-1-1:2002
- Communal areas - 0.74kN/m - Category A(ii) Table NA.8 BS EN 1991-1-1:2002

Design Fire Periods

Fire periods and the approach to structural fire resistance needs to be determined by the Fire Engineer or Architect. At present we assume all fire resistance will be inherent in the construction (e.g. for the brick) or achieved by boarding (e.g. in the case of timber walls or floors or steel beams).

The developing structural solution is predicated on the retention of as much existing timber structure as possible and the installation of an internal timber frame to re-suppport the floors through the centre of the plan. This structure is assumed to be **fully encapsulated** to provide the R, E, and I fire resistance to the required level. The structure proposed has no inherent fire resistance and required full protection for the duration of the fire period.

It is understood that a full sprinkler system will be installed, but that dry risers are not required.

Disproportionate Collapse & Building Safety Act

The existing structure is a 5-storey residential building with multiple occupants and would be classed as Class 2B under Part A3 of the Building Regulations. With the addition of the mansard structure and level four floor, the building will become a 6-storey structure but will remain classed as 2B. However, as a historic masonry building it will not comply with these requirements.

Our assessment is that the proposed uses will render the building 'no more unsatisfactory' in the proposed use. The increase in height and occupancy due to the new mansard structure will be mitigated against by the planned repairs and improvements to the structure that will improve the overall robustness, including the installation of new horizontal ties, construction of new lateral load resisting ply lined spine walls, underpinning to the foundations, repairs to damaged masonry and the absence of risk associated with domestic gas appliances. Hence the risk would be assessed as having reduced.

To further mitigate against any additional risk from the mansard level, the new level four structure will be designed as a strong floor to contain debris from collapses above in line with the mitigation principles of the Camden Rule Approach. Additionally, the new mansard structure is to be constructed of lightweight materials to limit the additional load to lower floors.

With just over 13m from street level to the forth-floor level, the building will not be classified as a Higher Risk Building under the Building Safety Act 2023.

Embodied Carbon and Sustainability

As a retrofit and refurbishment project, the embodied carbon in the scheme should be able to remain at a low level. A full audit will be carried out in the next design stages.

The high aspirations for operational carbon performance within the EnerPHit standard may require certain structural changes which come at an embodied carbon (and financial) cost. This includes works to existing walls to improve airtightness and insulation, but which will add load. It also may include a need to remove the timber joist ends from the external wall (to prevent rot when the new insulation changes the dewpoint in the wall). This has significant structural implications and some practical difficulties which need to be investigated fully and detailed fully when we have a fuller knowledge of the existing details.

Opportunities to Reduce Embodied Carbon
- Continue to pursue structural solutions that frame the buildings internally in timber (as they would originally have been) without resorting to steel.
- Control or limit the requirement to break out the existing lower ground floor slabs - resulting in waste, potentially large embodied carbon costs for underpinning and new slabs. The need for new foundations and new drainage and services runs in these slabs may make this difficult.

Temporary Works and Sequence of Construction Issues

Site access is constrained to the street frontages which are also in close proximity to the hospital and therefore sometimes reserved for ambulance use. Care will need to be taken to co-ordinate expectations for use of the pavement and street frontages with any limitations imposed by the hospital.

Given the significant structural issues with the building, a careful approach will need to be taken during construction to prevent escalation of the works and loss of original fabric. Monitoring of the walls during the works with preset trigger levels will allow this to be controlled.

Certain aspects of the work - for example removal of the roof, and repair/reconstruction of significant masonry elements - will require temporary propping. This will be designed by the Contractors Temporary Works Engineer in due course.

Civil Engineering, Below Ground Drainage and Flood Risk

Refer to separate Price & Myers report.

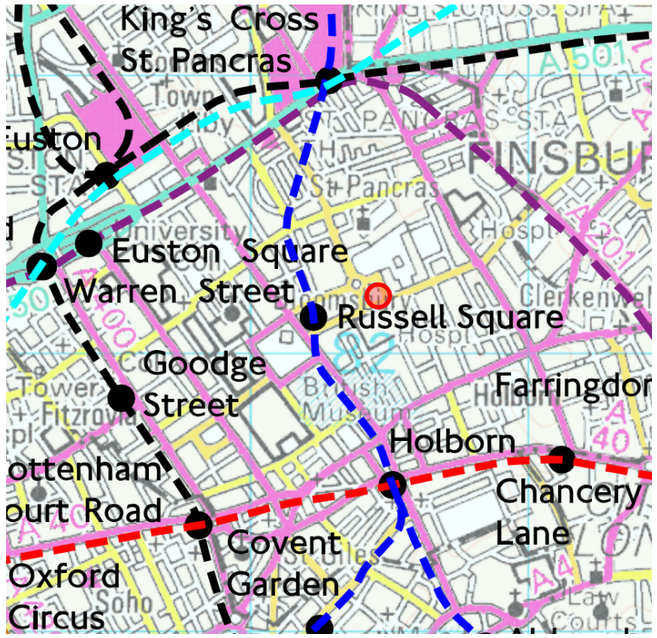
Appendix A
Desk Study

PRICE & MYERS

Job No.	31153	Page	SK DS1	Rev	1
Date	Dec 23	Eng	AT	Chd	-
Job	Lansdowne & Guilford Townhouses				

LOST RIVERS

LUL TUBE TUNNELS



WWII BOMB DAMAGE

PRELIMINARY DESK STUDY

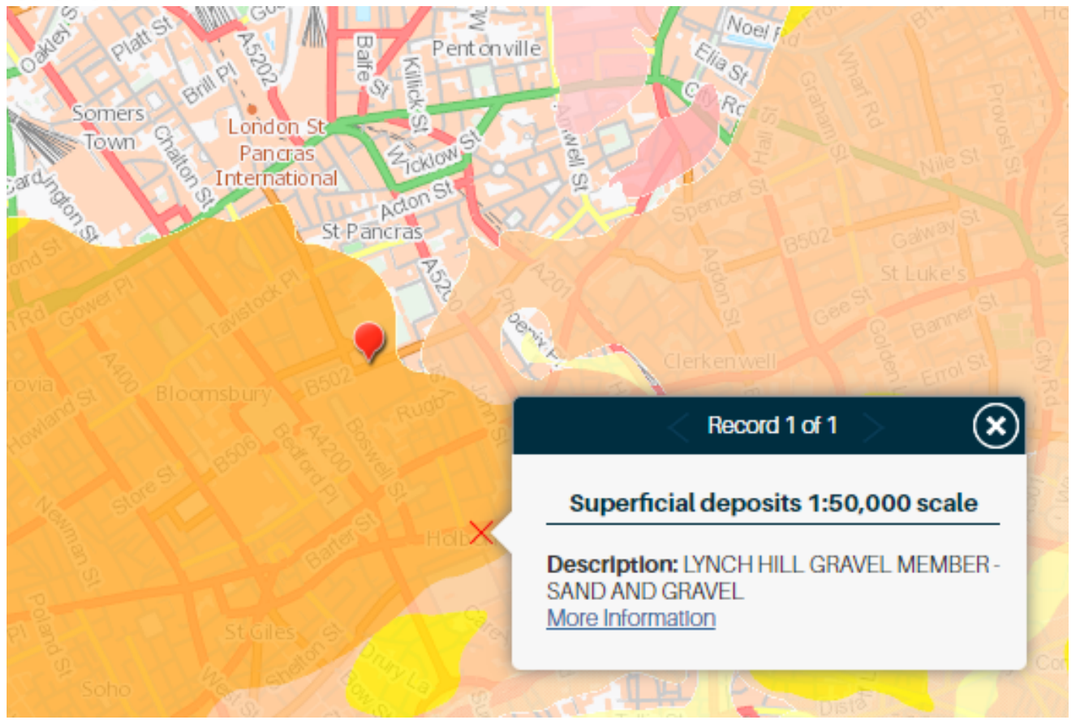
LOST RIVERS - tributaries of the Fleet passing nearby

LUL UNDERGROUND TUNNELS - no tunnels nearby

WWII BOMB DAMAGE - extensive damage to all buildings

GEOLOGY - edge of Lynch Hill gravel over London Clay - note given the existing basements on the site, it may be that the gravel will no longer be present.

GEOLOGY



Appendix B
Existing Structure and Defects Register

KEY

existing loadbearing masonry

existing studwork (possibly loadbearing)

manhole

span of existing timber joists (sometimes based on floorboard direction)

structure below

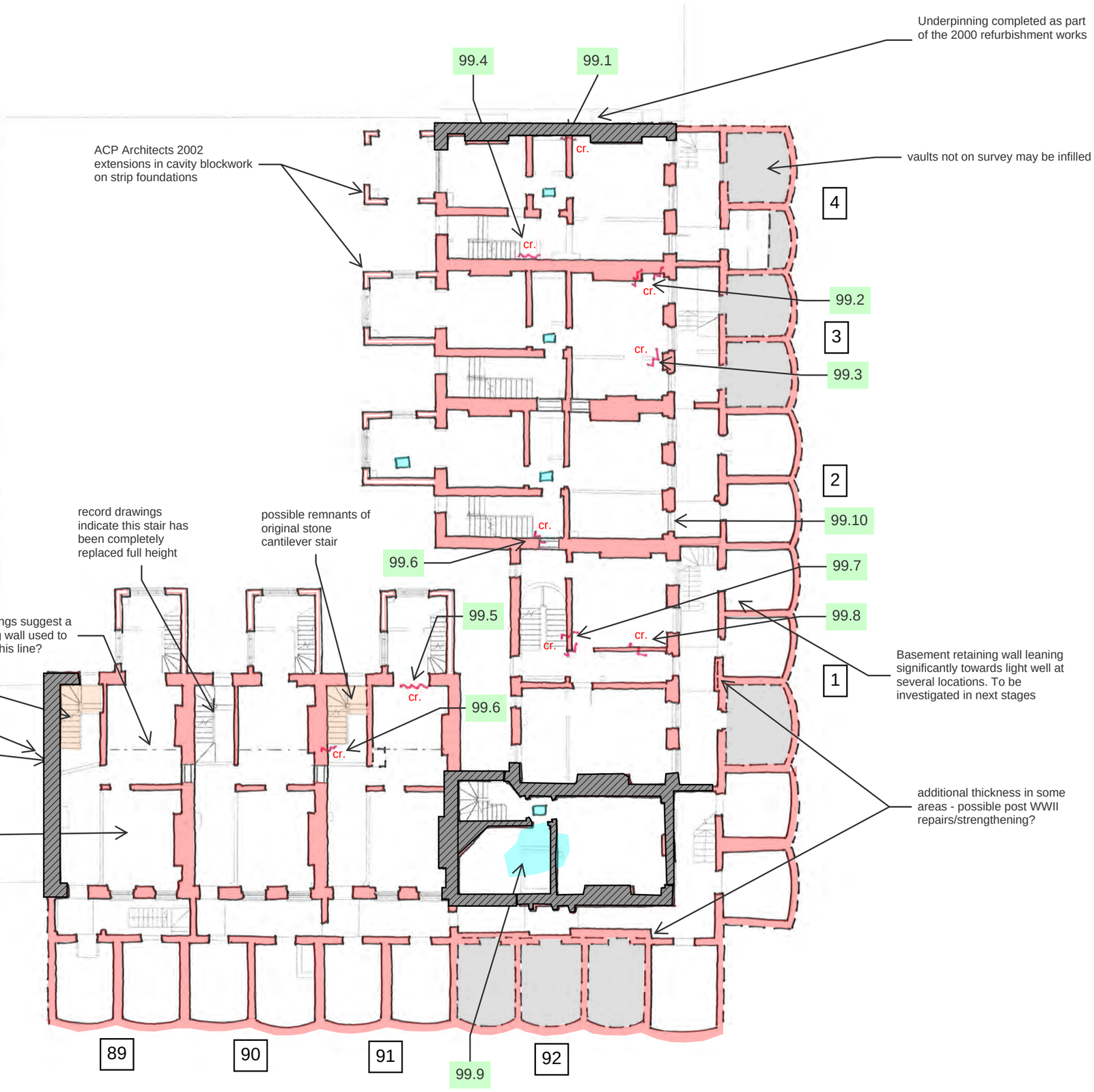
beam under

steel beam or tie bar

structural cracking to wall or soffit — cr.

area of significant distortion

defect number - refer to Defects Register for further information — 99.1



NOTES:-

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2. Do not scale from this drawing in either paper or digital form. Use written dimensions only. All dimensions are in millimetres and levels in metres.
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3. Health & Safety :
   All specific drawing notes are to be read in conjunction with the project "Information Pack" and "Site Rules".
4. For general notes refer to Drawing No. 31153-0001

Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

EXISTING PLAN AT LOWER GROUND FLOOR

Status
FOR INFORMATION
NOT FOR CONSTRUCTION

Drawn KM	Eng AT
Scales 1 : 100 at A1	
Drawing No 31153/0099	Rev P01

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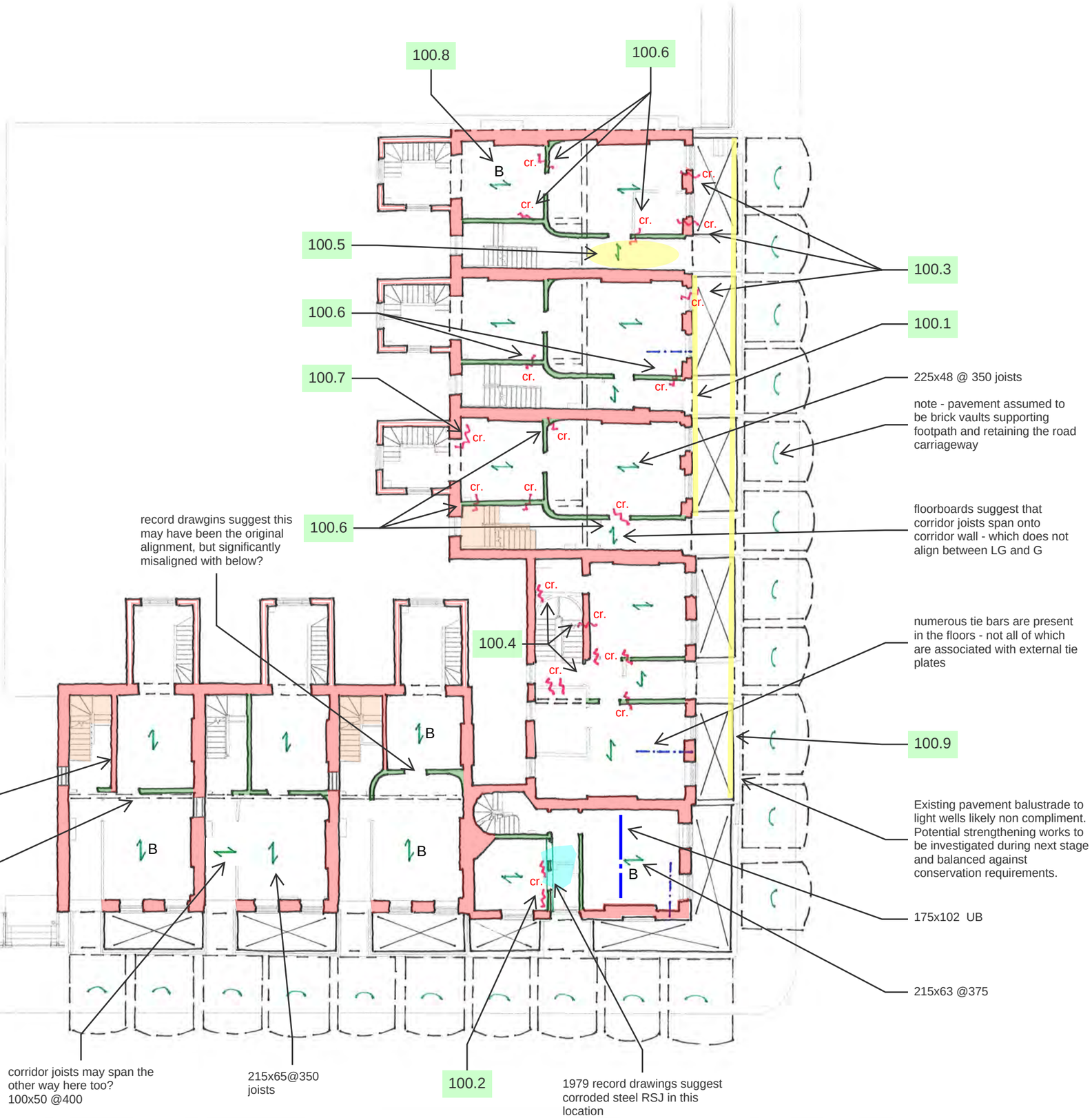

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Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

EXISTING PLAN AT GROUND FLOOR

Status
FOR INFORMATION
NOT FOR CONSTRUCTION

Drawn	KM	Eng	AT
Scales	1 : 100 at A1		
Drawing No		Rev	
31153/0100		P01	

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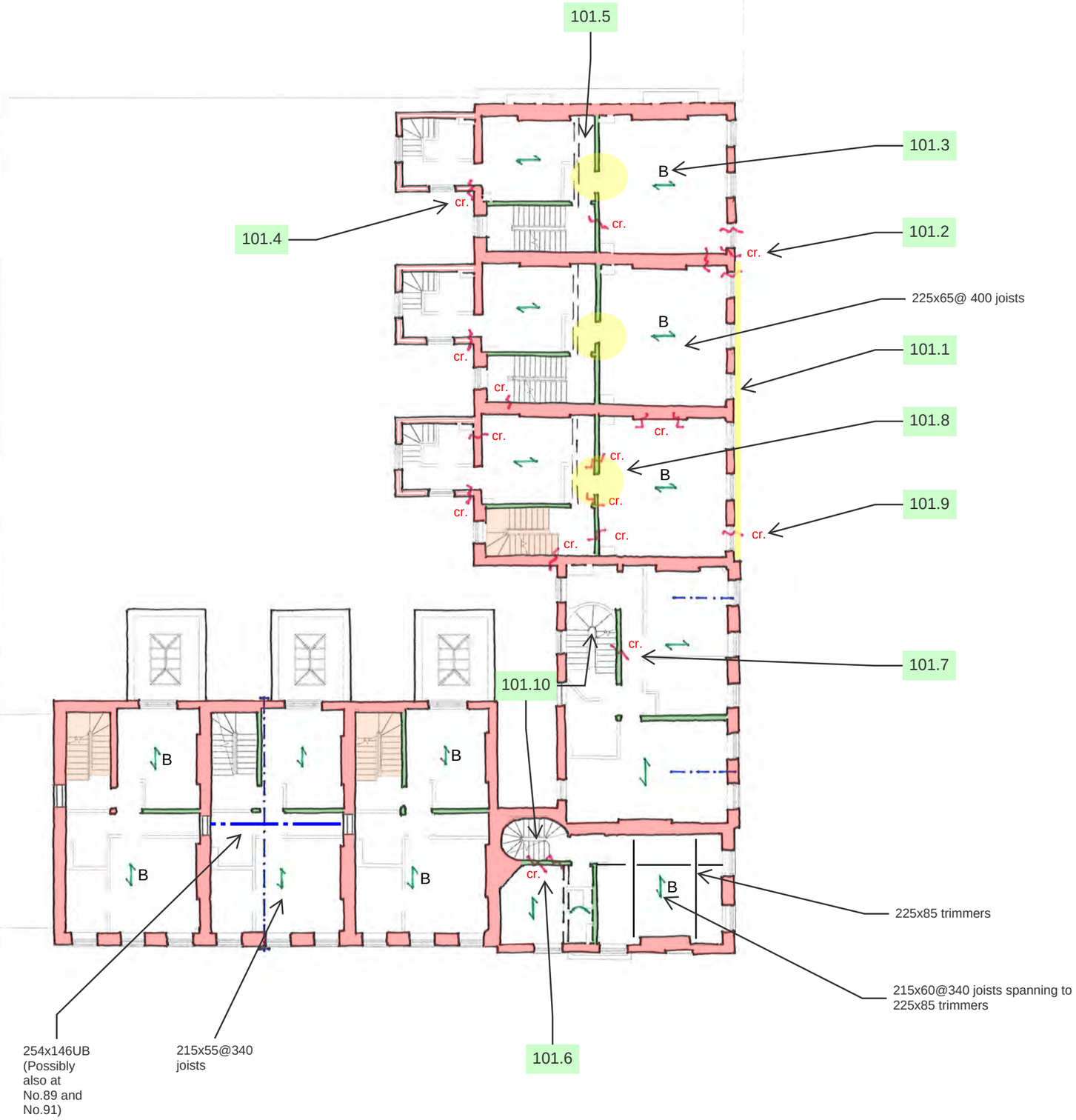

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Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

EXISTING PLAN AT FIRST FLOOR

Status
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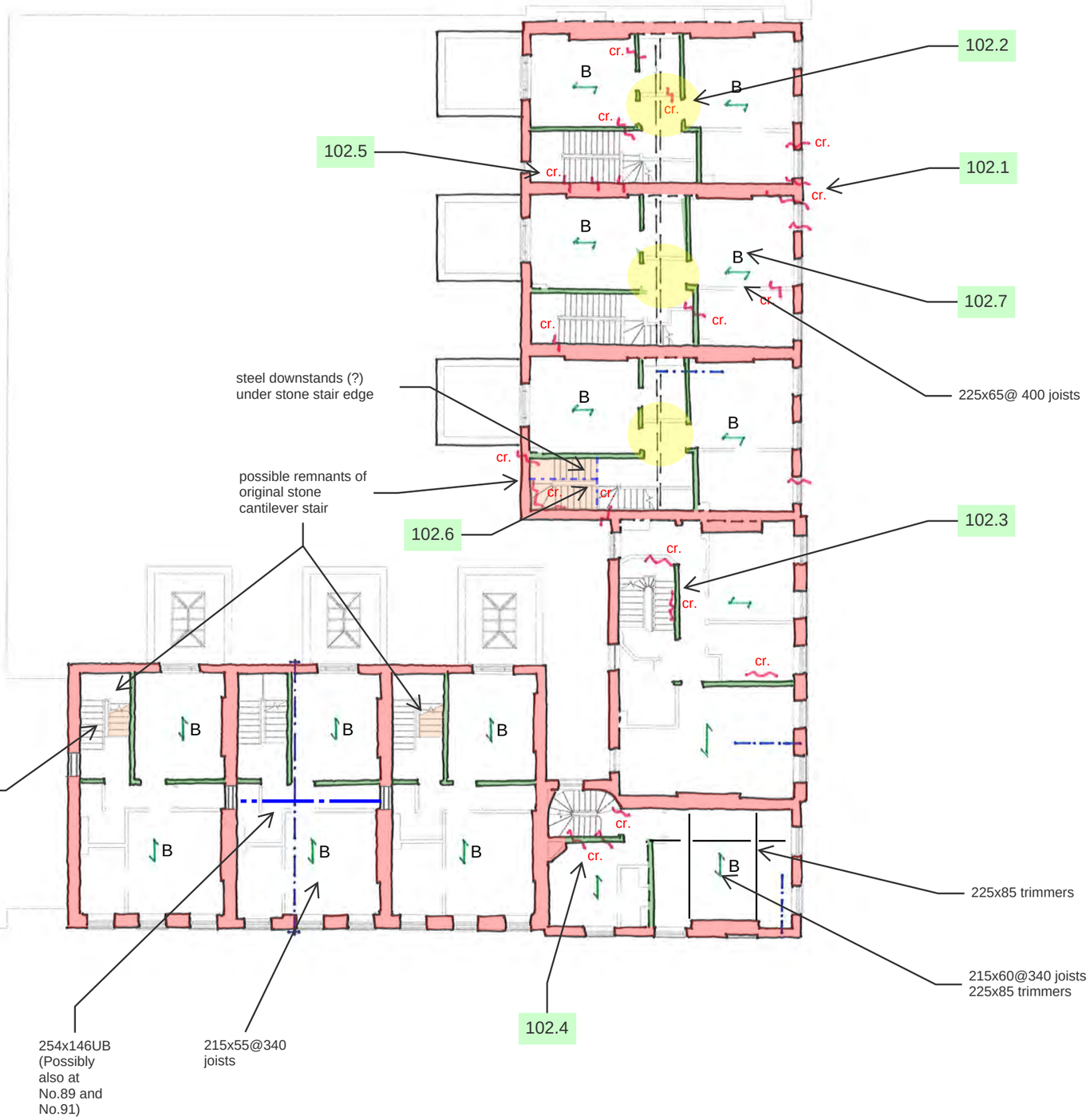
area of significant distortion

defect number - refer to Defects Register for further information — 99.1



NOTES:-

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3. Health & Safety :
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4. For general notes refer to Drawing No. 31153-0001

Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

EXISTING PLAN AT SECOND FLOOR

Status
FOR INFORMATION
NOT FOR CONSTRUCTION

Drawn	KM	Eng	AT
Scales	1 : 100 at A1		
Drawing No		Rev	
31153/0102		P01	

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KEY

existing loadbearing masonry

existing studwork (possibly loadbearing)

manhole

span of existing timber joists (sometimes based on floorboard direction)

structure below

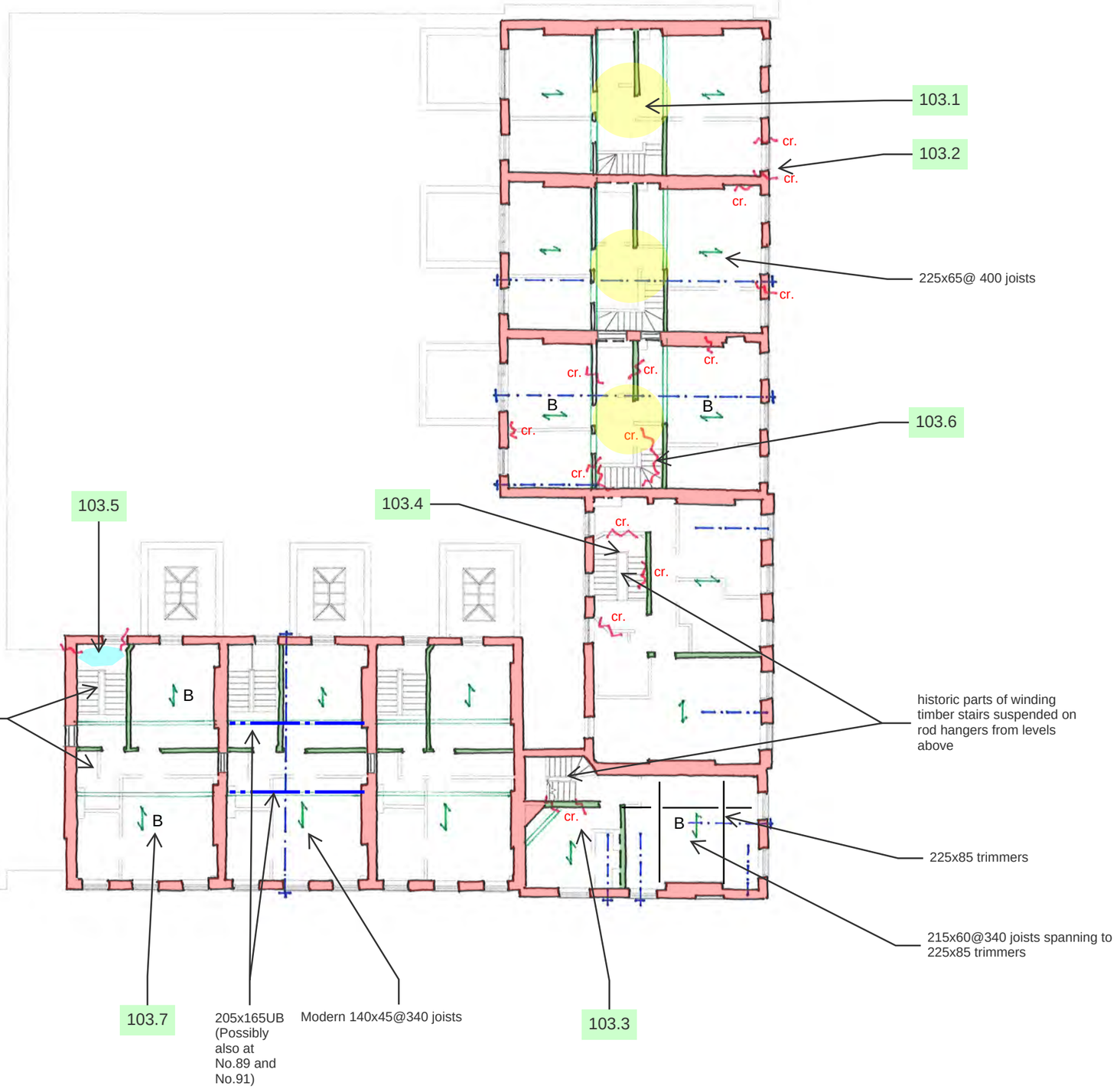
beam under

steel beam or tie bar

structural cracking to wall or soffit — cr.

area of significant distortion

defect number - refer to Defects Register for further information — 99.1



NOTES:-

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4. For general notes refer to Drawing No. 31153-0001

Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

EXISTING PLAN AT THIRD FLOOR

Status
FOR INFORMATION
NOT FOR CONSTRUCTION

Drawn KM	Eng AT
Scales 1 : 100 at A1	
Drawing No 31153/0103	Rev P01

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KEY

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existing studwork (possibly loadbearing)

manhole

span of existing timber joists (sometimes based on floorboard direction)

structure below

beam under

steel beam or tie bar

structural cracking to wall or soffit — cr.

area of significant distortion

defect number - refer to Defects Register for further information — 99.1

NOTES:-

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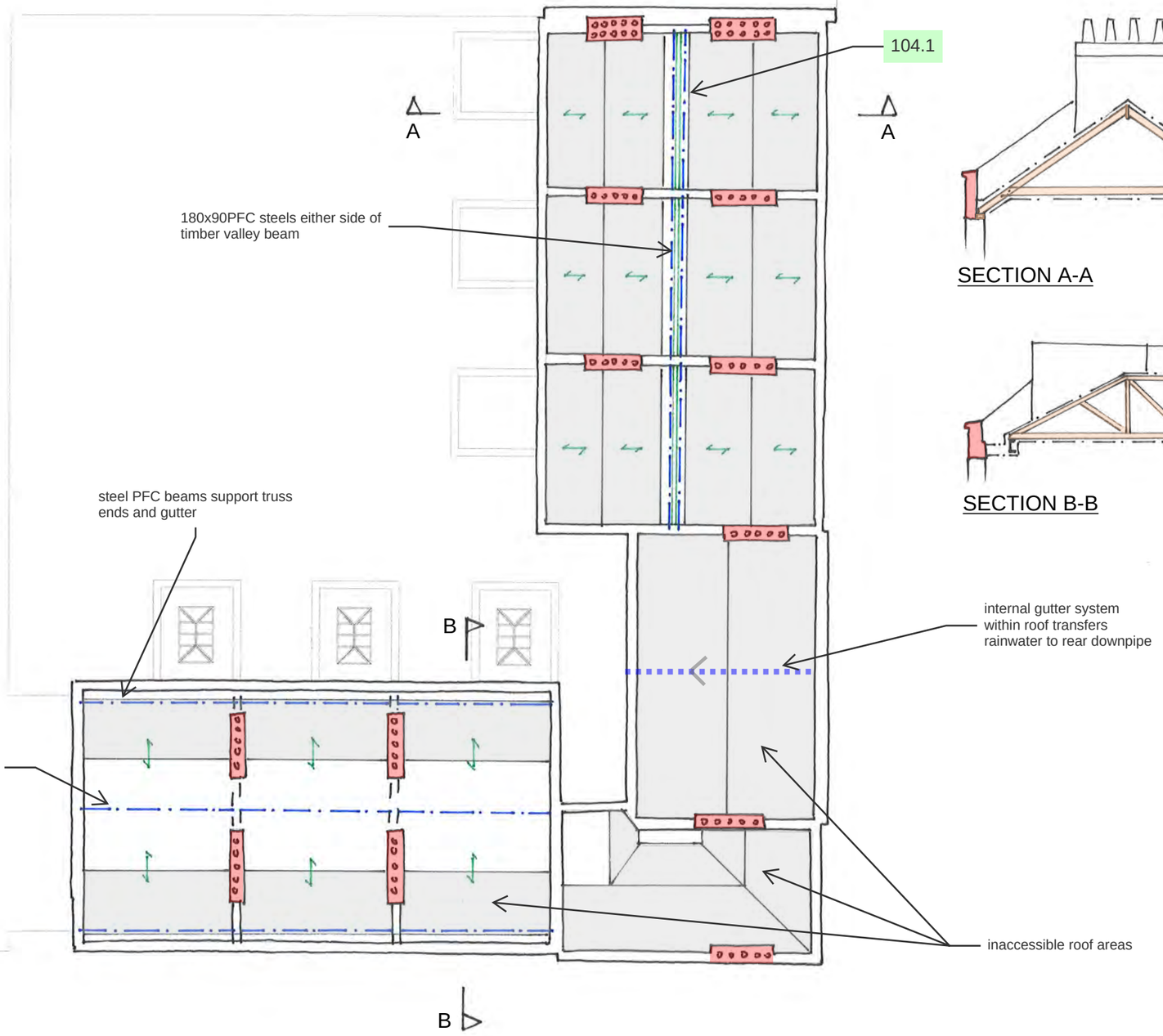
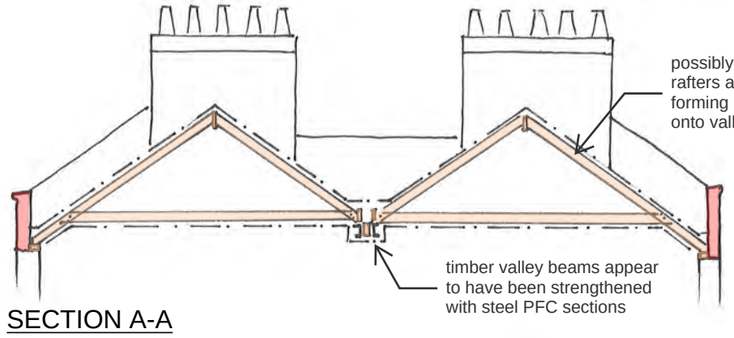
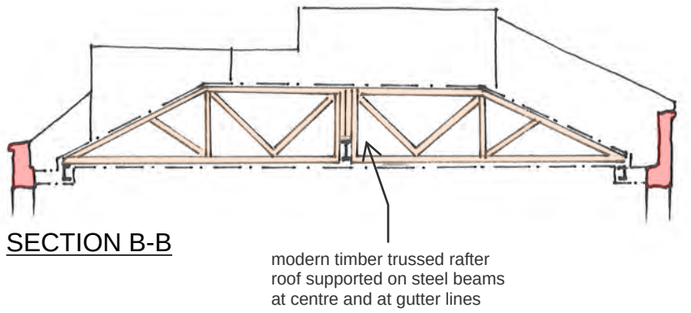




SECTION A-A



SECTION B-B

Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

EXISTING PLAN AT ROOF LEVEL

Status
FOR INFORMATION
NOT FOR CONSTRUCTION

Drawn KM	Eng AT
Scales 1 : 100 at A1	
Drawing No 31153/0104	Rev P01

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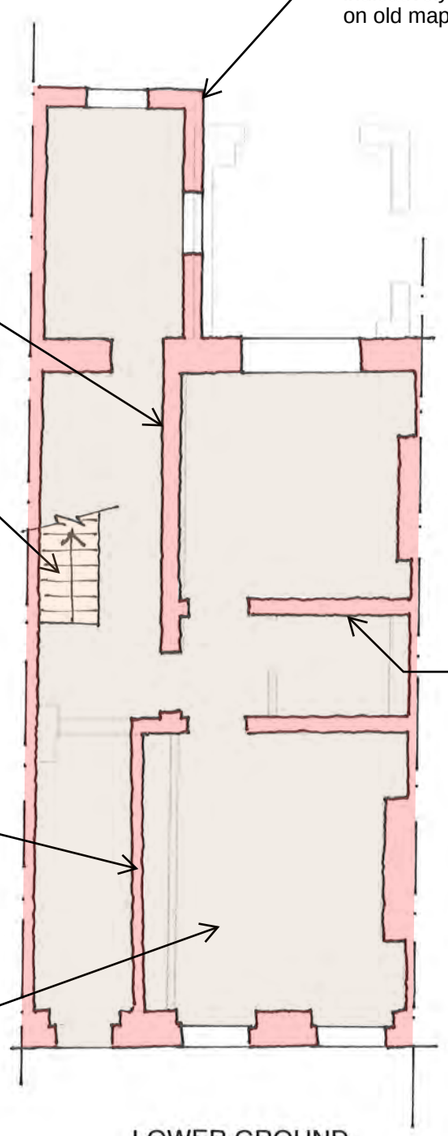
Job No.	31153	Page	SK 04	Rev	1
Date	Sept 23	Eng	AT	Chd	MB
Job	UoL - Guilford & Lansdowne Townhouses				

No3 LANSDOWNE TERRACE
Assumed Original Structural Layout

Sheet 1 of 2 c.1:100@A3



original rear extension shown indicatively based on old maps

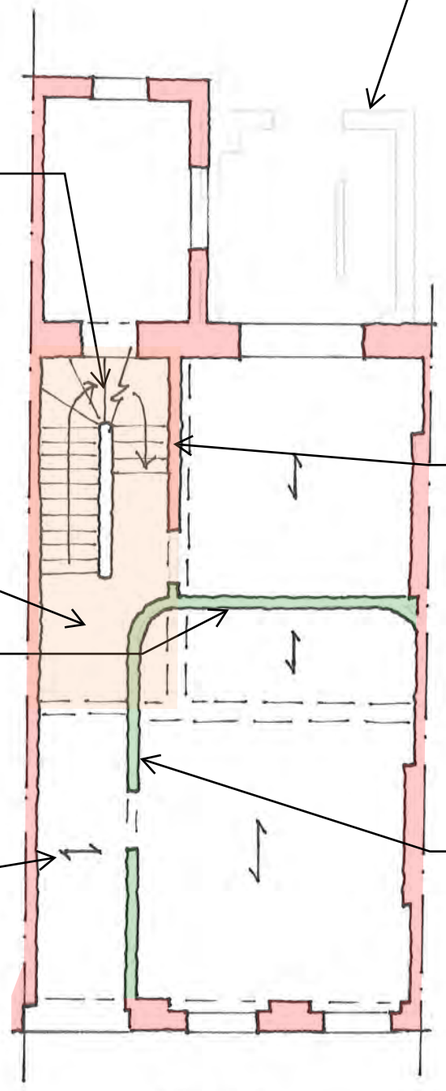
internal brick walls at lower ground some 9" thickess

stone cantilever stair to basement - likely to be cruder - with rectangular blocks and rough hewn soffit

possible loadbearing wall supporting ground floor corridor?

original floor - likely to have been laid brick or stone slab

LOWER GROUND



outline of current modern rear extensions

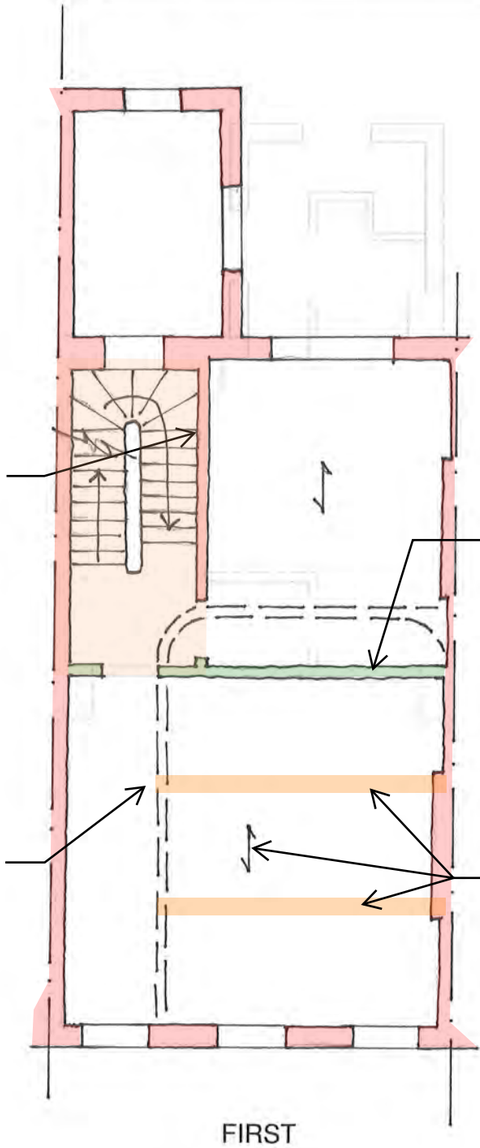
profiled soffit stone cantilever stair with cast iron balusters up to second floor level

extent of stone stair landings etc unclear

do these walls align?

corridor joists appear to span side to side?

GROUND



stair wall likely to continue up in masonry to provide support for stone cantilever stair

if there are beams, they may be supported on the corridor wall below?

this wall appears to be loadbearing but does not align with below - was it originally a trussed partition?

these joists are too small to span to the curved wall below - and carry a loadbearing wall from above - possible beams?

FIRST

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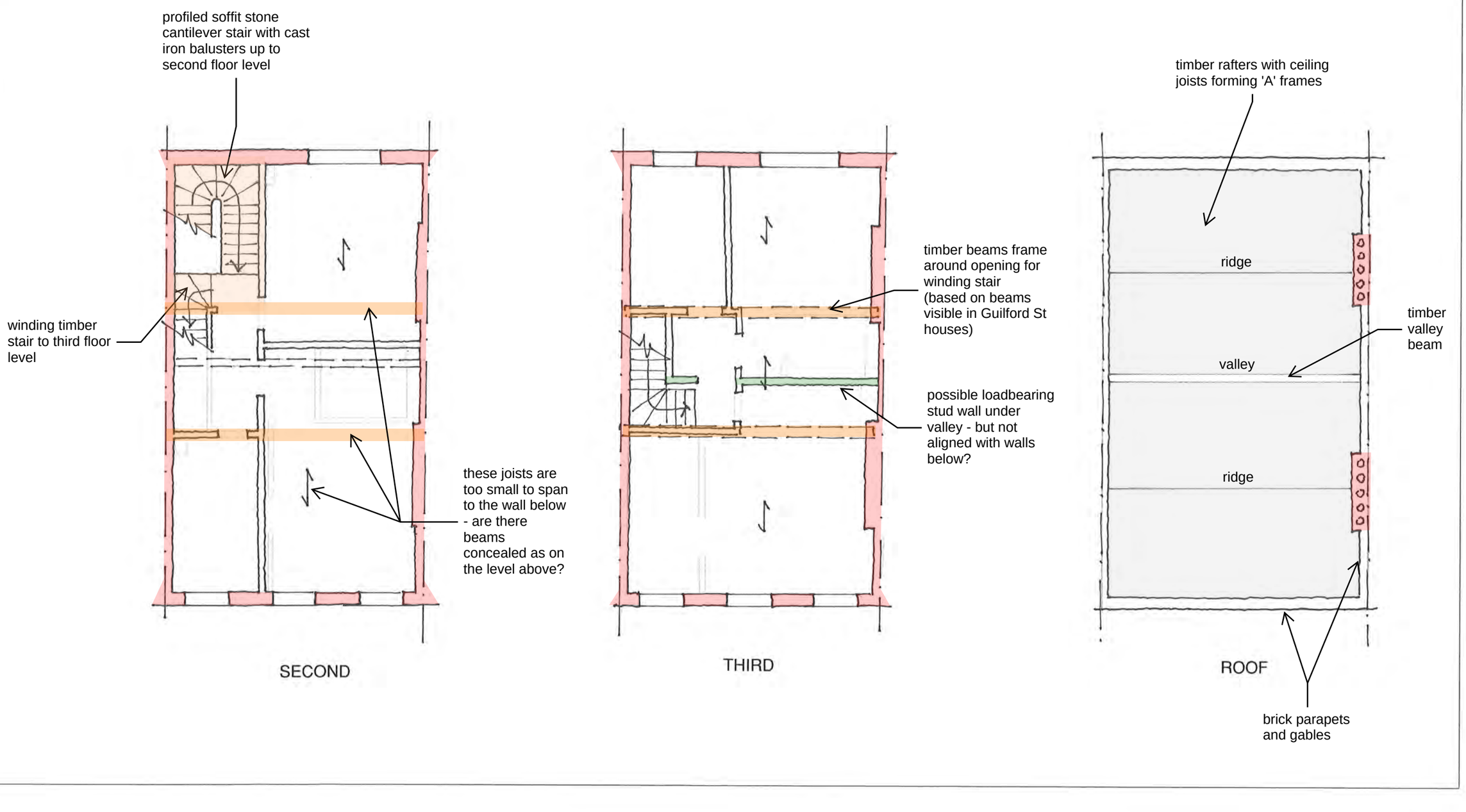
Job No.	31153	Page	SK 05	Rev	1
Date	Sept '23	Eng	AT	Chd	MB
Job	UoL - Lansdowne & Guilford Townhouses				

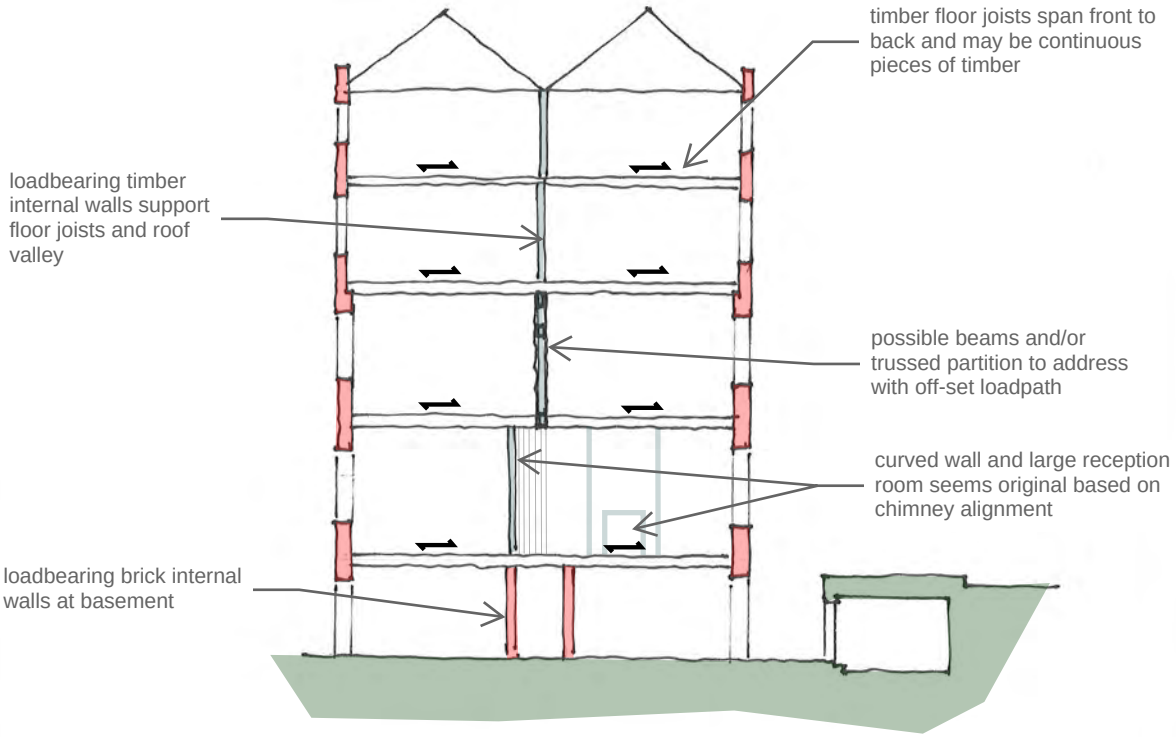
No3 LANSDOWNE TERRACE
Assumed Original Structural Layout

Sheet 2 of 2 c.1:100@A3

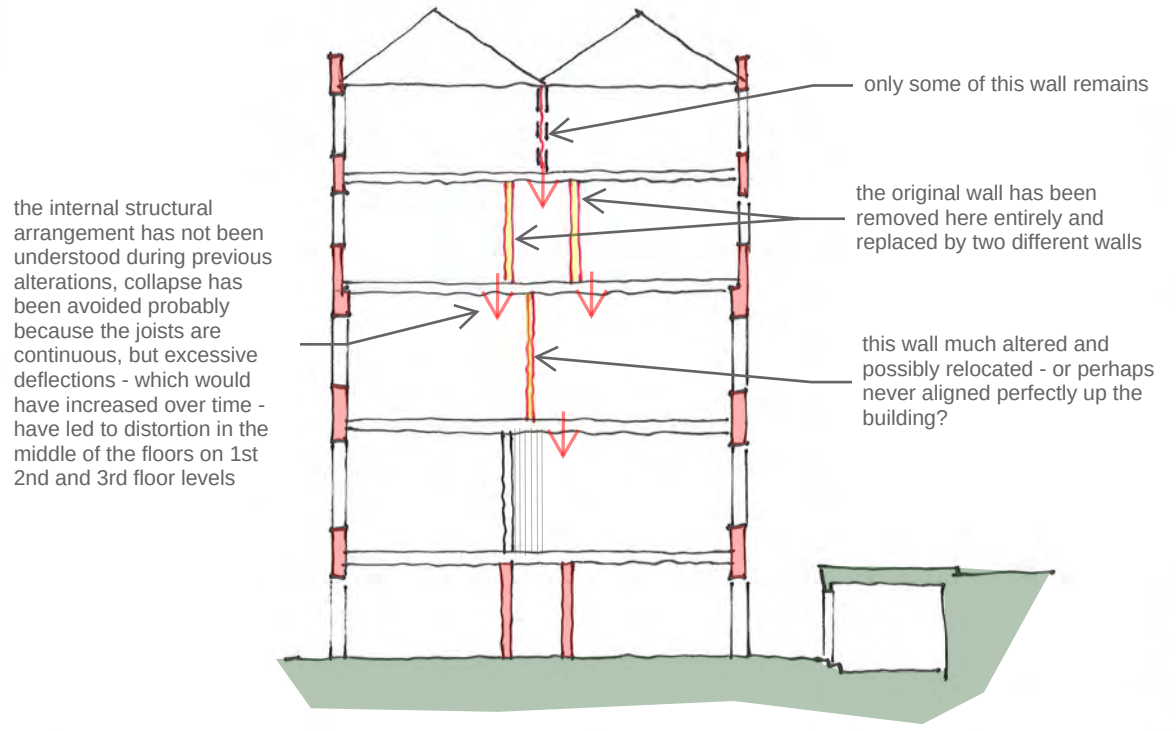


2-4 Lansdowne Terrace - Source of Internal Floor Distortion

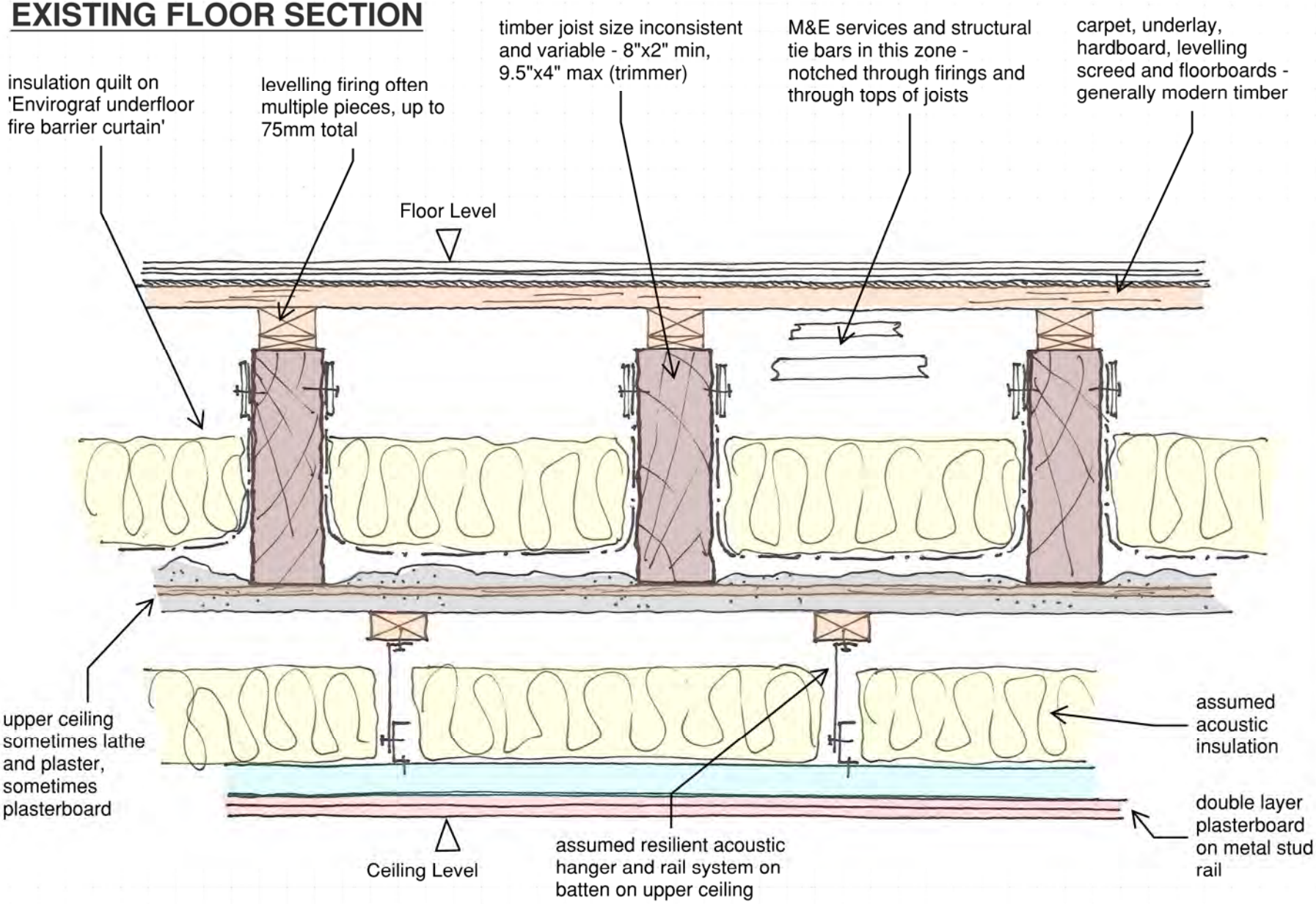
Possible Original Section



Possible Existing Section



EXISTING FLOOR SECTION



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Date Sept 23 Eng AT Chd
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Job No.	31153	Page	SK 01	Rev	1
Date	Sept 23	Eng	AT	Chd	-
Job	Lansdowne & Guilford Townhouses				

INITIAL THOUGHTS ON STRUCTURAL ISSUES FROM PRELIMINARY SITE VISIT

(areas accessed on preliminary visit shaded in green)

Key issues for existing structure:

- Built c.1790 as good quality townhouses
- Extensive WWII bomb damage and rebuilding
- Multiple subsequent conversions and alterations
- Extensions and previous undocumented structural repairs

Primary defects identified or suspected:

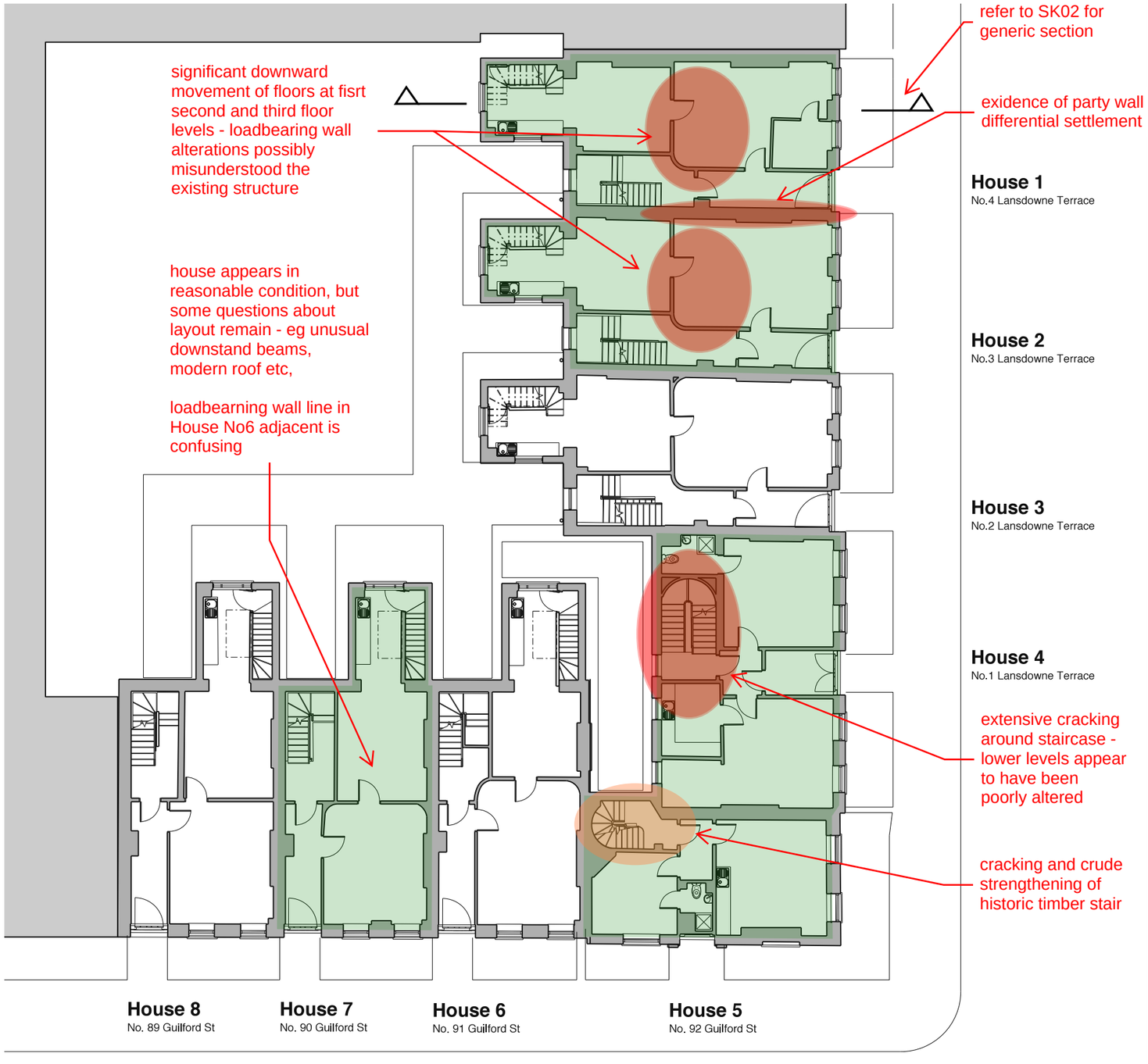
- Significant distortion of floors at upper levels (houses 1 & 2, suspect 3 also) probably due to misconceived alterations to central loadbearing wall line - see SK01.
- Suspected foundation movement at party wall between house 1 and 2 - cause unclear
- Suspected compromised structural supports to stair in house 4 - possibly as a result of past alterations extending the stair to basement level
- Delicate historic timber stair in house 5, has moved and been resupported crudely

Normal defects identified or suspected:

- Floor load capacity performance likely to be below current requirements
- Floor acoustic, fire, vibration, insulation etc performance likely to be below current requirements
- Cracking at junction between original walls and extensions
- Suspected excessive notching of floor joists for services
- Suspected creep distortion of long spanning timber joists
- Suspected moisture damage, at low levels and in bathrooms/kitchens
- Possible local water ingress at roof levels
- Possible historic stairs & balustrades likley to be non-compliant

Next Actions:

- Agree assumed original plan layouts at all levels with Architect and Heritage Consultant, and develop new layouts that work with the original form
- Further visits and investigations
- Confirm accuracy of measured survey or resurvey (key to understanding alignments)
- Develop M&E strategy that respects the form and structure
- Agree acceptable derogations from 'new building' performance standards on conservation grounds
- Currently a non-compliant Class 2B building under Part A3 Disproportionate Collapse - but given that it is unoccupied will this status be accepted in future? (additional storeys may to be difficult to justify)



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Lansdowne & Guildford Townhouses
University of London

Observed Defects Register

Introduction

Price & Myers the consulting structural engineers as part of a design team, including Burd Haward Architects, and Max Fordham M&E Engineers, appointed to the University of London to carry out design work in relation to a planned refurbishment of their properties at 89-92 Guildford Street and 1-4 Lansdowne Terrace in Bloomsbury, London WC1N.

The existing buildings are co-joined traditional five-storey brick and timber terraced houses dating from the 1790's, and listed Grade II. The buildings are known to have undergone multiple phases of alteration, refurbishment, and extension during their lifetime, including significant rebuilding following extensive WWII bomb damage.

This document seeks to record the observed structural defects - generally grouped by type or cause, and by building level - with some discussion of causes and further work. This is not an exhaustive list, and the schedule will be expanded as new information becomes available.

The defect numbering is referenced on the sketch drawings below with approximate locations.

31153	0099	Existing Plan at Lower Ground Floor
31153	0100	Existing Plan at Upper Ground Floor
31153	0101	Existing Plan at First Floor
31153	0102	Existing Plan at Second Floor
31153	0103	Existing Plan at Third Floor
31153	0104	Existing Plan at Roof Level

Prepared by: **Andy Toohey BEng CEng MIStructE**
Reviewed by: **Michael Brown Meng CEng MIStructE**

Job Number: **3153**
Document Reference: **Def Reg**

Date	Revision	Notes/Amendments/Issue Purpose
Oct '23	1	Draft Feasibility Stage Issue
Mar '24	2	Stage 3a Issue

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Lower Ground Floor Defects - Drawing 31153/0099

Defect 99.1
Crack at junction between historic masonry cross-wall and party wall.
Cause - unclear.

Defect 99.2
Cracking in chimney and party wall masonry - associated with wider cracking in this location all the way up the building.
Cause - may relate to foundation movement of this section of party wall.

Defect 99.3
Cracking to apparently non-loadbearing partition wall.
Cause - unclear, but possibility that beams in the floors did load partitions on this line in LG and G floor levels in the past, or that front elevation masonry has moved.

Defect 99.4
Cracking to party wall finishes.
Cause - may be associated with party wall foundation movement - see defect 99.2.

Defect 99.5
Soffit crack near junction with 2002 rear extension.
Cause - suspected settlement of extensions relative to older parts of the building.

Defect 99.6
Cracking to wall finishes
Cause - suspect differential movement at infilled openings.

Defect 99.7
Cracking around walls supporting stair.
Cause - unclear, but the stair arrangement was changed in 2002, and there is extensive cracking throughout its height - possible movement at defective stair support walls or foundations.

Defect 99.8
Cracks to apparently historic corridor wall.
Cause - possible foundation movement in secondary loadbearing wall.

Defect 99.9
Extensive damp and evidence of timber decay.
Cause - leaking plumbing from levels above.

Defect 99.10
Significant distortion of door opening.
Cause - possibly bomb damage or foundation movement - does not seem to be ongoing.

Upper Ground Floor Defects - Drawing 31153/0100

Defect 100.1
Brickwork in poor condition along this length - cracking and poor-quality past repairs failing.
Cause - this may be remaining original brickwork, which was bomb damaged, but patch repaired, and now degrading further.

Defect 100.2
Water damage and wall/ceiling cracking.
Cause - possible on-going water damage and/or distortion of beam below (noted as rusted in old surveys)

Defect 100.3
Cracking to front elevation brickwork
Cause - possibly related to party wall foundation movement - see also 99.2, 99.4, 100.5.

Defect 100.4
Extensive wall cracking around staircase.
Cause - currently unclear, but see 99.7, movement is likely to be related.

Defect 100.5
Clear floor distortion - floor slopes down towards party wall.
Cause - possible foundation movement of party wall- see also 99.2, 99.4, 100.3. Note that the floor levels in the adjacent room have been raised by firings.

Defect 100.6
Cracking in timber stud walls
Cause - unclear - may relate to floor structure distortions above. Load bearing lines in the centre of the plan are unclear.

Defect 100.7
Cracking at junction with new extensions.
Cause - likely to be differential settlement between new and old spread footings.

Defect 100.8
Notable 'bounce' in existing timber floors - **applies to all spans annotated 'B'**.
Cause - original joists may be undersized to modern standards, and subsequent notching and the additional of extra ceilings and acoustic layers may have overloaded them further. Potentially compromised vertical supports may be adding to the flexibility.

Defect 100.9
Significant distortion and cracking to pavement side wall of vaults.
Cause - both inward lateral movement due to retaining loads, and possible foundation movement due to past tree activity.

First Floor Defects - Drawing 31153/0101

Defect 101.1
Brickwork in poor condition along this length - cracking and poor-quality past repairs failing.
Cause - this may be remaining original brickwork, which was bomb damaged, but patch repaired, and now degrading further. See also 100.1.

Defect 101.2
Cracking to front elevation brickwork, and party wall.
Cause - possibly related to party wall foundation movement - see also 99.2, 99.4, 100.3, 100.5.

Defect 101.3
Notable 'bounce' in existing timber floors - **applies to all spans annotated 'B'**.
Cause - original joists may be undersized to modern standards, and subsequent notching and the additional of extra ceilings and acoustic layers may have overloaded them further. Potentially compromised vertical supports may be adding to the flexibility.

Defect 101.4
Cracking at junction with new extensions.
Cause - likely to be differential settlement between new and old spread footings

Defect 101.5
Significant misalignment of potential loadbearing wall lines.
Cause - either original and resolved by beams or trussed partitions (which may survive in a damaged format), or a result of ill-conceived later alteration.

Defect 101.6
Diagonal cracking in stairwell stud wall.
Cause - pattern suggests downward movement of wall edge away from fireplace. Possible foundation movement or cumulative shrinkage of stud wall timbers, relative to stable brick at chimney.

Defect 101.7
Extensive wall cracking around staircase.
Cause - currently unclear, but see 99.7 and 100.4, movement is likely to be related.

Defect 101.8
Diagonal cracking to partition and noticeable floor downward distortion - **applies in several areas**.
Cause - likely to relate to insufficient vertical support in the centre of the plan - original layout may have been ambitious, and misunderstood int eh course of subsequent alterations - e.g. beam sections or supports compromised, trussed partitions inadvertently damaged etc.

Defect 101.9
Masonry wall cracking externally and internally in No2 Lansdowne.
Cause - unclear, external cracking may relate to poor brickwork on front façade, internal cracking may relate to internal distortions causing strains in the surrounding brickwork.

Defect 101.10

Historic stairs have suffered movement - new steel hanger rod systems insensitively installed. **Applies on several levels,**

Cause - swept soffit historic timber winder stairs typically don't survive well in institutional usage and require skilled carpentry repair work. Suspect that some flexibility and distortion has resulted from misuse and movements of surrounding structure.

Second Floor Defects - Drawing 31153/0102

Defect 102.1
Cracking to front elevation brickwork, and party wall.
Cause - possibly related to party wall foundation movement - see also 99.2, 99.4, 100.3, 100.5. 101.2

Defect 102.2
Diagonal cracking to partition and noticeable floor downward distortion - **applies in several areas**.
Cause - likely to relate to insufficient vertical support in the centre of the plan - original layout may have been ambitious, and misunderstood int eh course of subsequent alterations - e.g. beam sections or supports compromised, trussed partitions inadvertently damaged etc. See also 101.8.

Defect 102.3
Extensive wall cracking around staircase.
Cause - currently unclear, but see 99.7, 100.4 and 101.7, movement is likely to be related.

Defect 102.4
Diagonal cracking in stairwell stud wall.
Cause - pattern suggests downward movement of wall edge away from fireplace. Possible foundation movement or cumulative shrinkage of stud wall timbers, relative to stable brick at chimney. See also 101.6.

Defect 102.5
Cracking to party wall masonry
Cause - unclear but may relate to movements near the front elevation - item 102.1, or general strains due to floor distortions.

Defect 102.6
Cracking and distortion around beams and post support on soffit.
Cause - unclear - possible that original beams to trim third floor have been inadvertently compromised.

Defect 102.7
Notable 'bounce' in existing timber floors - **applies to all spans annotated 'B'**.
Cause - original joists may be undersized to modern standards, and subsequent notching and the additional of extra ceilings and acoustic layers may have overloaded them further. Potentially compromised vertical supports may be adding to the flexibility.

Third Floor Defects - Drawing 31153/0103

Defect 103.1
Diagonal cracking to partition and noticeable floor downward distortion - **applies in several areas**.
Cause - likely to relate to insufficient vertical support in the centre of the plan - original layout may have been ambitious, and misunderstood int eh course of subsequent alterations - e.g. beam sections or supports compromised, trussed partitions inadvertently damaged etc. See also 101.8, 102.2.

Defect 103.2
Cracking to front elevation brickwork, and party wall.
Cause - possibly related to party wall foundation movement - see also 99.2, 99.4, 100.3, 100.5. 101.2, 102.1.

Defect 103.3
Diagonal cracking in stairwell stud wall.
Cause - pattern suggests downward movement of wall edge away from fireplace. Possible foundation movement or cumulative shrinkage of stud wall timbers, relative to stable brick at chimney. See also 101.6 and 102.4.

Defect 103.4
Extensive wall cracking around staircase.
Cause - currently unclear, but see 99.7, 100.4, 101.7 and 102.3 - movement is likely to be related.

Defect 103.5
Area of damp on soffit
Cause - likely to be leakage or blockage to inaccessible box gutter above.

Defect 103.6
Severe cracking around wall and stair up to third level
Cause - likely to be a further symptom of the compromised supports of the floors in the centre of the pan in many areas.

Defect 103.7
Notable 'bounce' in existing timber floors - **applies to all spans annotated 'B'**.
Cause - original joists may be undersized to modern standards, and subsequent notching and the additional of extra ceilings and acoustic layers may have overloaded them further. Potentially compromised vertical supports may be adding to the flexibility.

Roof Level Defects - Drawing 31153/0104

Defect 104.1
Valley beams significantly distorted.
Cause - likely that past alterations have undermined the support of the valleys, which may now have been rectified by the addition of steelwork, but the distorted shape remains.

NOTE - the defects recorded in this register are only those noted by the inspections that are possible at the time of the current revision of the register. It cannot be taken as an exhaustive or complete list. Our knowledge of the building will remain imperfect even at the end of the project as not all of the structure will ever be exposed for measurement, inspection and testing.

Appendix C
Proposed Structure

KEY

existing loadbearing walls - brick & timber

new loadbearing timber posts and walls - refer to sketch for detail

structural brickwork demolition with edges made good in toothed and bonded new brick

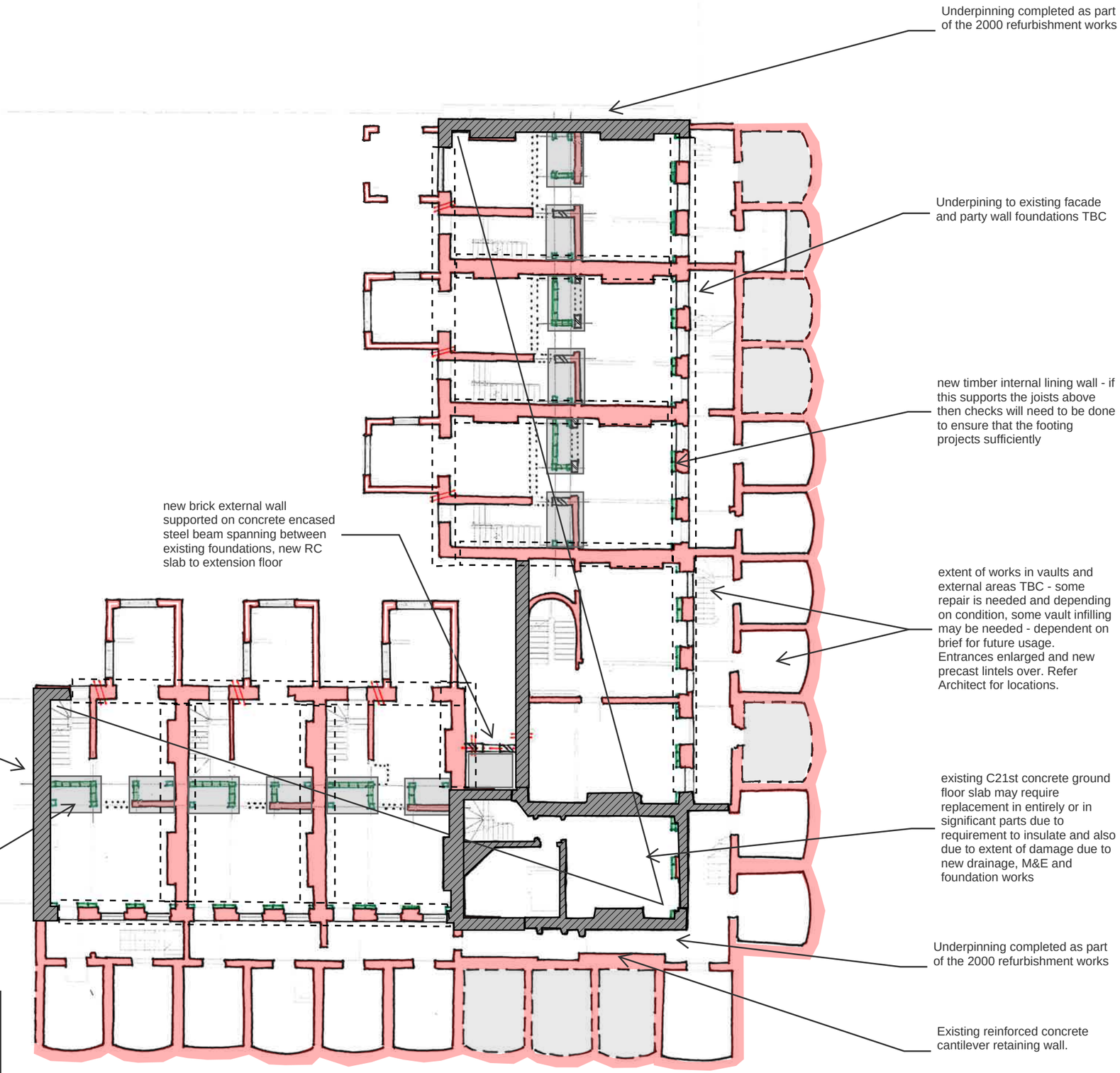
span of existing timber joists (all existing joists will require inspection and notch repairs)

area of existing joist requiring doubling up

area of new timber joisted floor

steel main BWIC opening for MVHR intake/extract - refer to sketch for detail

Historic underpinning



NOTE
For all information relating to the known details of the existing structure and its known defects refer to drawings 0099-0104 and the Defects Register

NOTES -

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Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

PROPOSED PLAN AT LOWER GROUND FLOOR

Status
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Drawn	KM	Eng	AT
Scales	1 : 100 at A1		
Drawing No		Rev	
31153/0199		P01	

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KEY

existing loadbearing walls - brick & timber

new loadbearing timber posts and walls - refer to sketch for detail

structural brickwork demolition with edges made good in toothed and bonded new brick

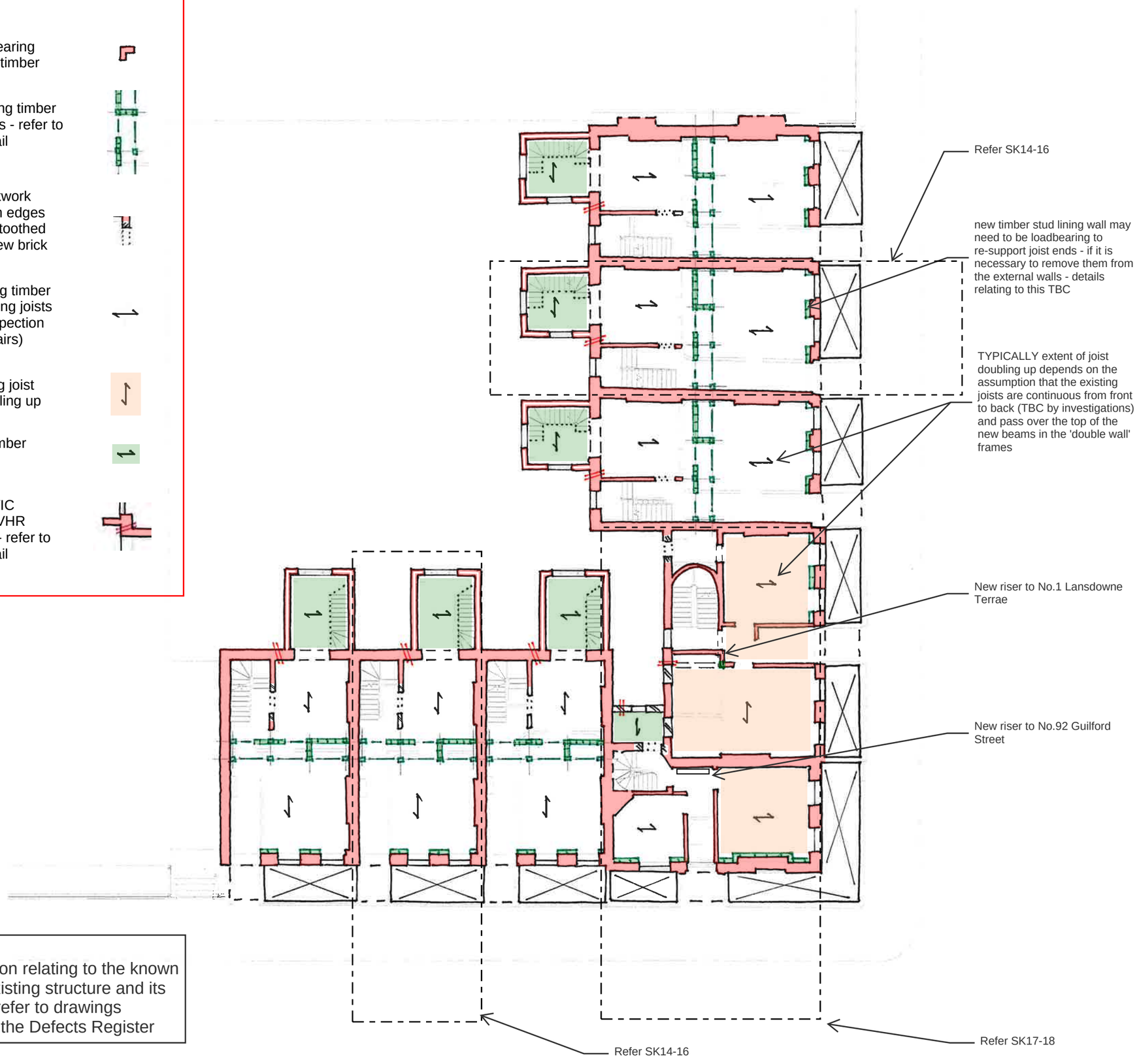
span of existing timber joists (all existing joists will require inspection and notch repairs)

area of existing joist requiring doubling up

area of new timber joisted floor

steel main BWIC opening for MVHR intake/extract - refer to sketch for detail

NOTE
For all information relating to the known details of the existing structure and its known defects refer to drawings 0099-0104 and the Defects Register



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Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

PROPOSED PLAN AT GROUND FLOOR

Status
FOR INFORMATION
NOT FOR CONSTRUCTION

Drawn	KM	Eng	AT
Scales	1 : 100 at A1		
Drawing No	31153/0200	Rev	P01

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KEY

existing loadbearing walls - brick & timber

new loadbearing timber posts and walls - refer to sketch for detail

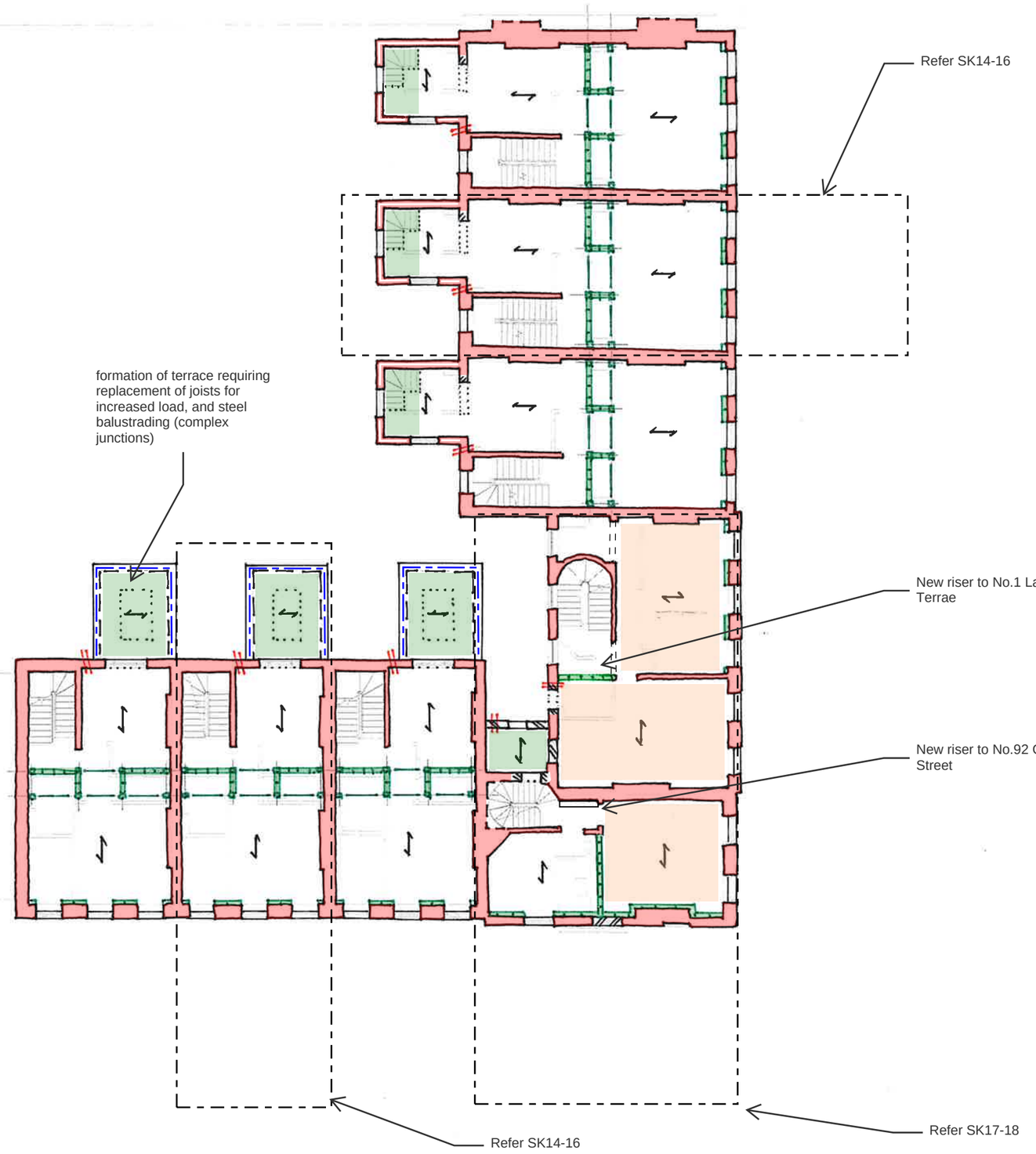
structural brickwork demolition with edges made good in toothed and bonded new brick

span of existing timber joists (all existing joists will require inspection and notch repairs)

area of existing joist requiring doubling up

area of new timber joisted floor

steel main BWIC opening for MVHR intake/extract - refer to sketch for detail



NOTE
For all information relating to the known details of the existing structure and its known defects refer to drawings 0099-0104 and the Defects Register

NOTES:-

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3. Health & Safety :
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4. For general notes refer to Drawing No. 31153-0001

Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

PROPOSED PLAN AT FIRST FLOOR

Status
FOR INFORMATION
NOT FOR CONSTRUCTION

Drawn	KM	Eng	AT
Scales	1 : 100 at A1		
Drawing No		Rev	
31153/0201		P01	

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KEY

existing loadbearing walls - brick & timber

new loadbearing timber posts and walls - refer to sketch for detail

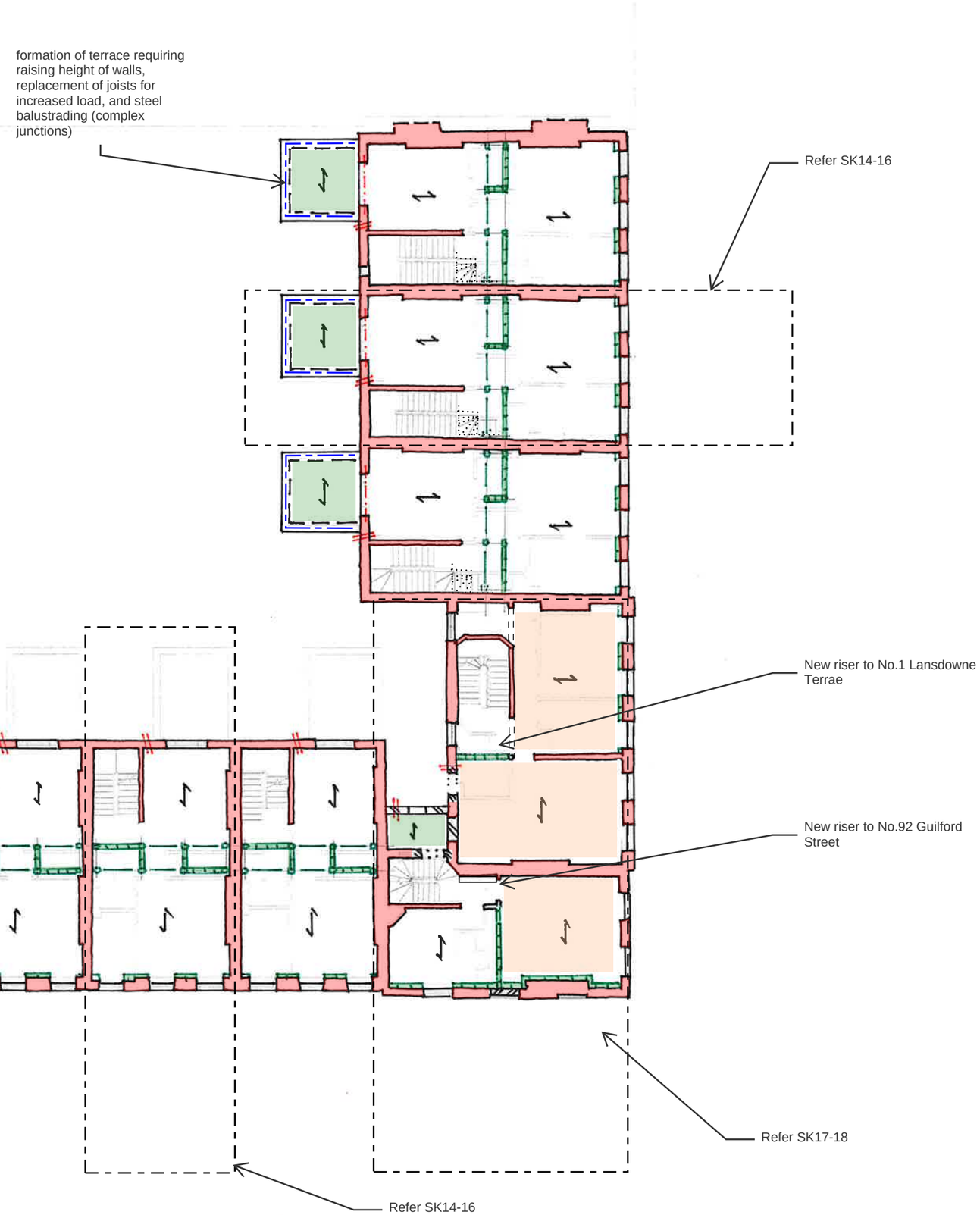
structural brickwork demolition with edges made good in toothed and bonded new brick

span of existing timber joists (all existing joists will require inspection and notch repairs)

area of existing joist requiring doubling up

area of new timber joisted floor

steel main BWIC opening for MVHR intake/extract - refer to sketch for detail



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Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

PROPOSED PLAN AT SECOND FLOOR

Status
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Drawn	KM	Eng	AT
Scales	1 : 100 at A1		
Drawing No	31153/0202	Rev	P01

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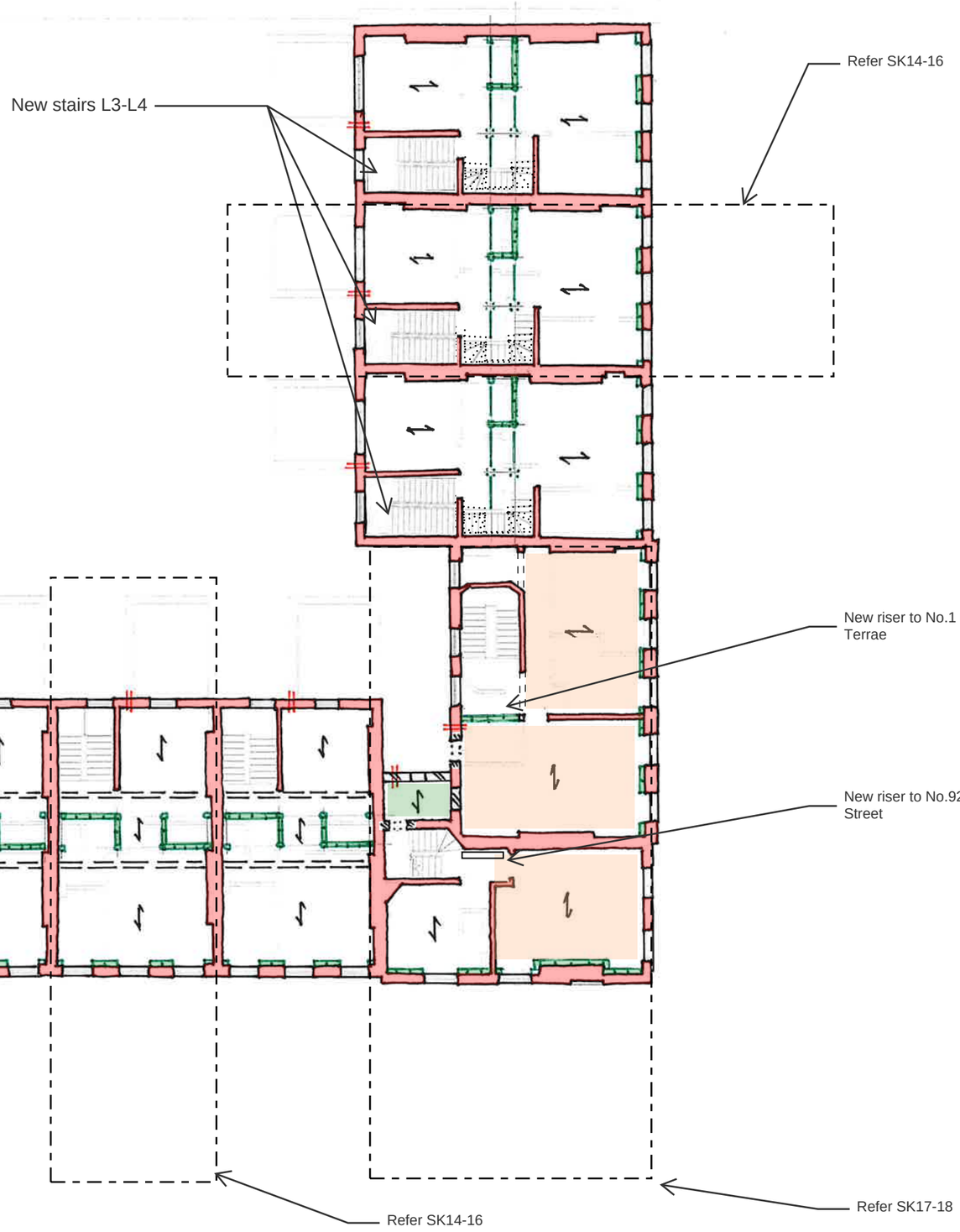

NOTE
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Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

PROPOSED PLAN AT THIRD FLOOR

Status
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Scales	1 : 100 at A1		
Drawing No		Rev	
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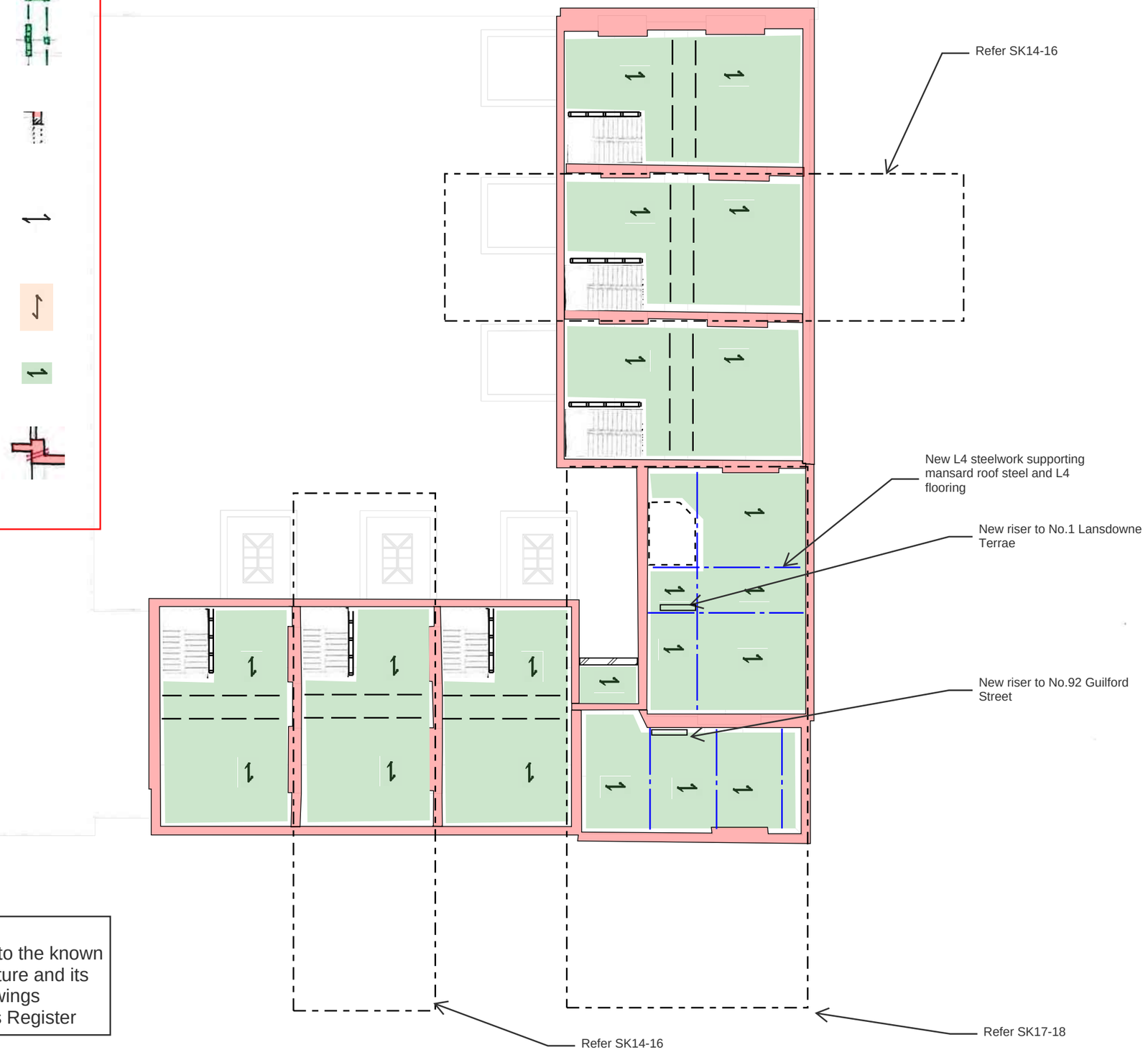

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Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

PROPOSED PLAN AT FORTH FLOOR

Status
FOR INFORMATION
NOT FOR CONSTRUCTION

Drawn	KM	Eng	AT
Scales	1 : 100 at A1		
Drawing No		Rev	
~~31153/0203~~		P01	

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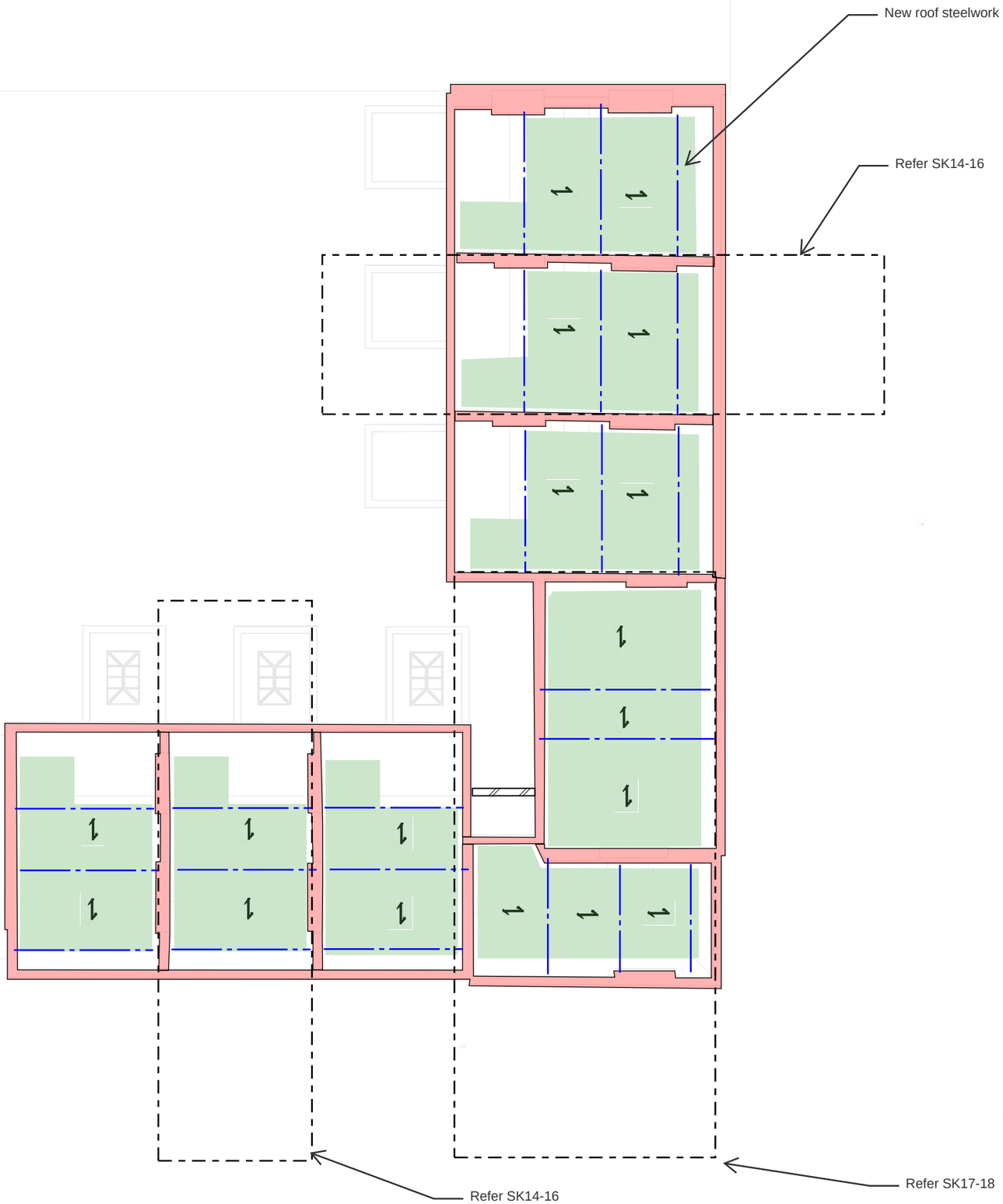

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Rev	Date	Drawn	Eng	Amendment

LANSDOWNE TERRACE AND GUILFORD STREET TOWNHOUSES, WC1N

PROPOSED PLAN AT ROOF LEVEL

Status
FOR INFORMATION
NOT FOR CONSTRUCTION

Drawn	KM	Eng	AT
Scales	1 : 100 at A1		
Drawing No		Rev	
31153/0204		P01	

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Job No.	31153	Page	SK 14	Rev	1
Date	06/2024	Eng	AJT	Chd	
Job	Lansdowne Terrace and Guilford Street				

PROPOSED STRUCTURE AT NO.89 - NO.91 GUILFORD STREET AND NO.2-NO.4 LANSDOWNE TERRACE

(~ 1:100 @ A3)

Existing C21st concrete ground floor slab may require replacement entirely or in significant parts due to requirement to insulate and also due to extent of damage due to new drainage, M&E and foundation works

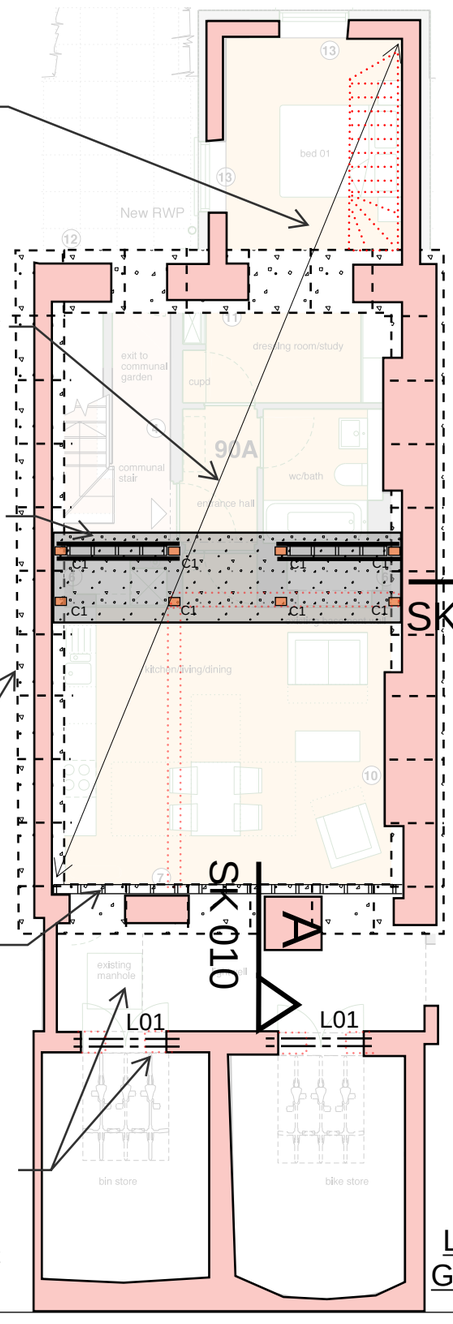
New RC foundation. Underpin sequence may be required

Double sided ply sheeting to wall at LG to G. Note position of ply shown are for the No.89-91 Guildford Street town houses only. Refer Architect for Lansdowne terrace arrangement

Extent of underpinning to existing masonry walls to be confirmed in next stages

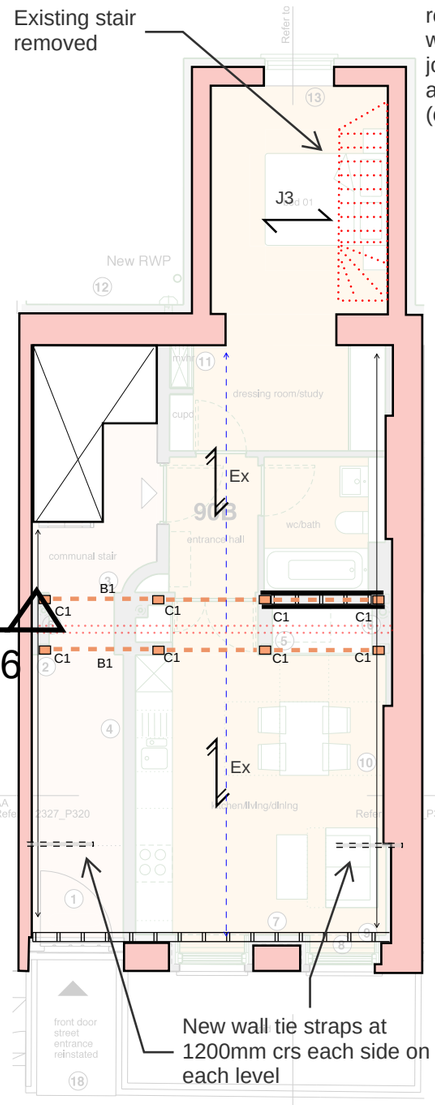
New timber internal lining wall - if this supports the joists above then checks will need to be done to ensure that the footing projects sufficiently. Refer SK10

Extent of works in vaults and external areas TBC - some repair is needetd and depending on condition, some vault infilling may be needed - dependent on brief for future usage. Entrances enlarged and new precast lintels over L01



LOWER GROUND

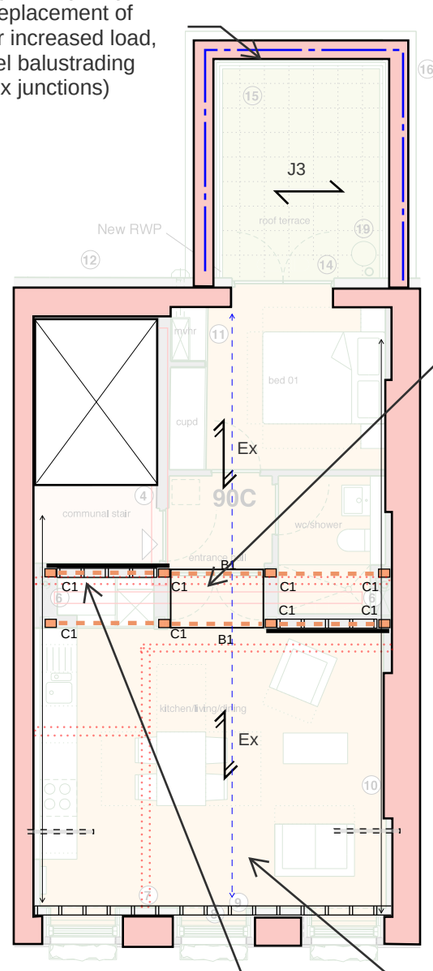
Existing stair removed



New wall tie straps at 1200mm crs each side on each level

GROUND FLOOR

formation of terrace requiring raising height of walls, replacement of joists for increased load, and steel balustrading (complex junctions)

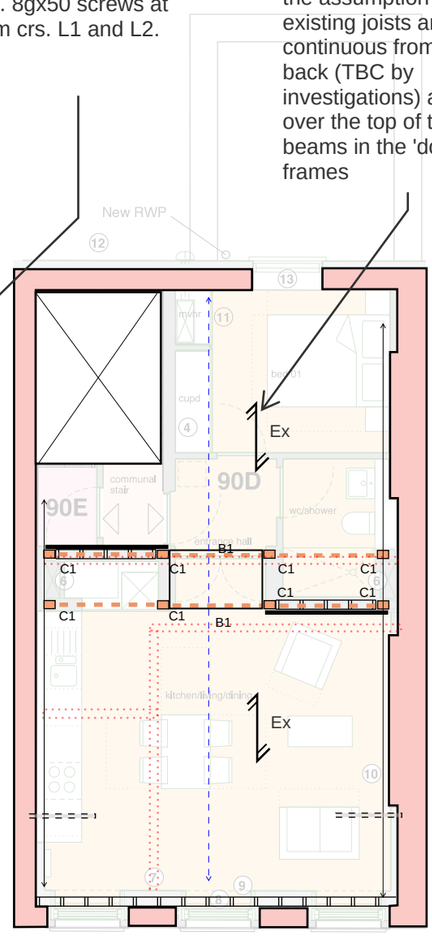


Single sided ply sheeting to wall at L1-L3

FIRST FLOOR

12mm ply transfer diaphragm let into existing joists. 8gx50 screws at 60mm crs. L1 and L2.

TYPICALLY extent of joist doubling up depends on the assumption that the existing joists are continuous from front to back (TBC by investigations) and pass over the top of the new beams in the 'double wall' frames



Existing wall to wall restraints

SECOND FLOOR

MEMBER SCHEDULE

B1 - 3x/51/200 LVL	C1 - 3/51x151 LVL	J1 - 245x44 C24 @300	PS1 - 100mmX215mmX440mm
B2 - 203x133x30 UB	C2 - 203X133X30UB	J2 - 245x44 C16 @400	
B3 - 254x146x37 UB		J3- 195x44 C16 @400	
B4 - 254x254x73 UC			

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Job No.	31153	Page	SK 15	Rev	1
Date	06/2024	Eng	AJT	Chd	
Job	Lansdowne Terrace and Guilford Street				

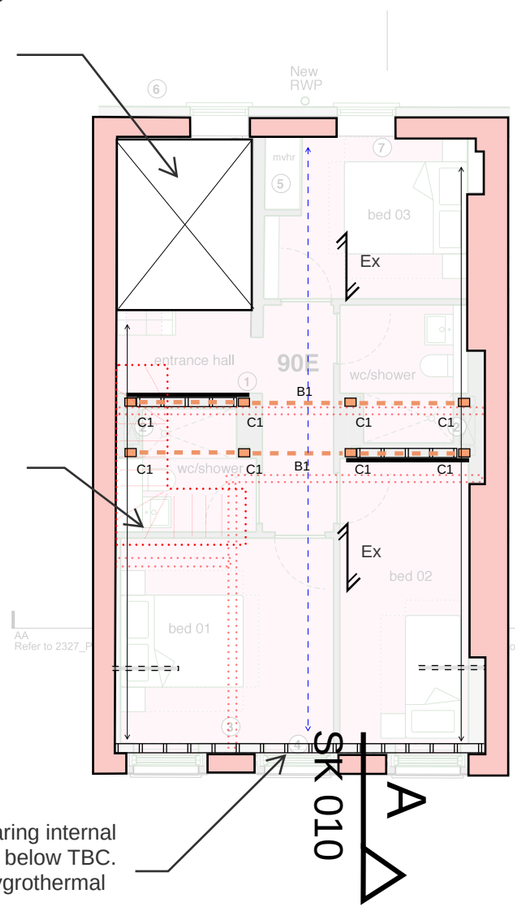
PROPOSED STRUCTURE AT NO.89 - NO.91 GUILFORD STREET AND NO.2-NO.4 LANSDOWNE TERRACE

(~ 1:100 @ A3)

New stair opening at No. 2-4 Lansdowne Terrace. Joists are assumed to be continuous over internal timber spine walls. TBC on site. Additional void trimming structure required if found to be otherwise.

Stair from level 2-3 demolished at No. 2-4 Lansdowne Terrace

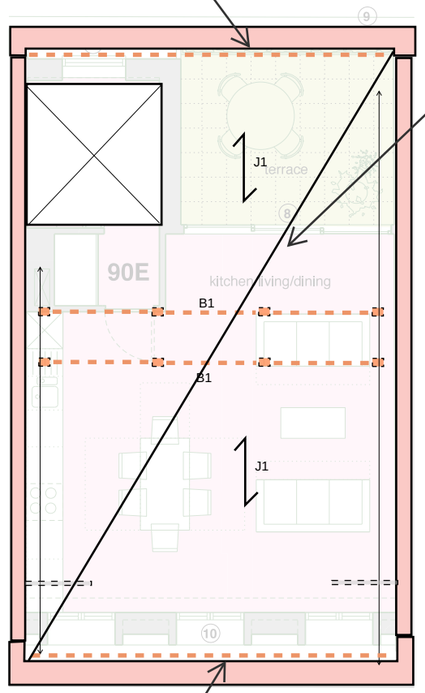
New load bearing internal stud wall wall below TBC. Subject to hygrothermal analysis



THIRD FLOOR

New wall plate supporting joists

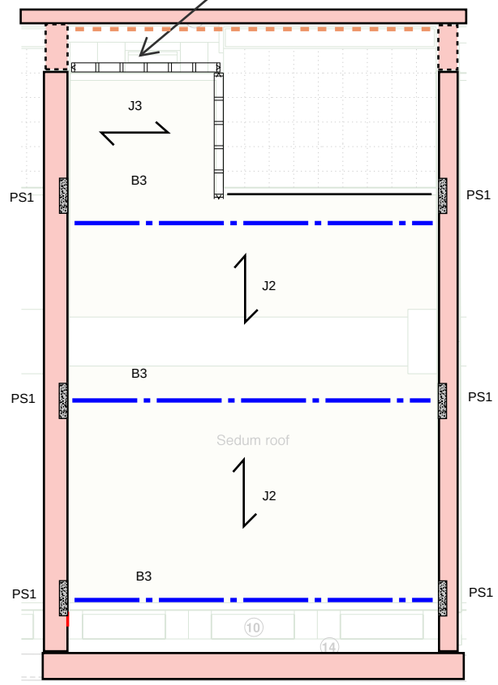
New load bearing internal stud wall wall below TBC. Subject to hygrothermal analysis



FORTH FLOOR

New 18mm ply floor over joists

Load bearing timber stud below forming at new stair



ROOF

MEMBER SCHEDULE

B1 - 3x/51/200 LVL	C1 - 3/51x151 LVL	J1 - 245x44 C24 @300	PS1 - 100mmX215mmX440mm
B2 - 203x133x30 UB	C2 - 203X133X30UB	J2 - 245x44 C16 @400	
B3 - 254x146x37 UB		J3- 195x44 C16 @400	
B4 - 254x254x73 UC			

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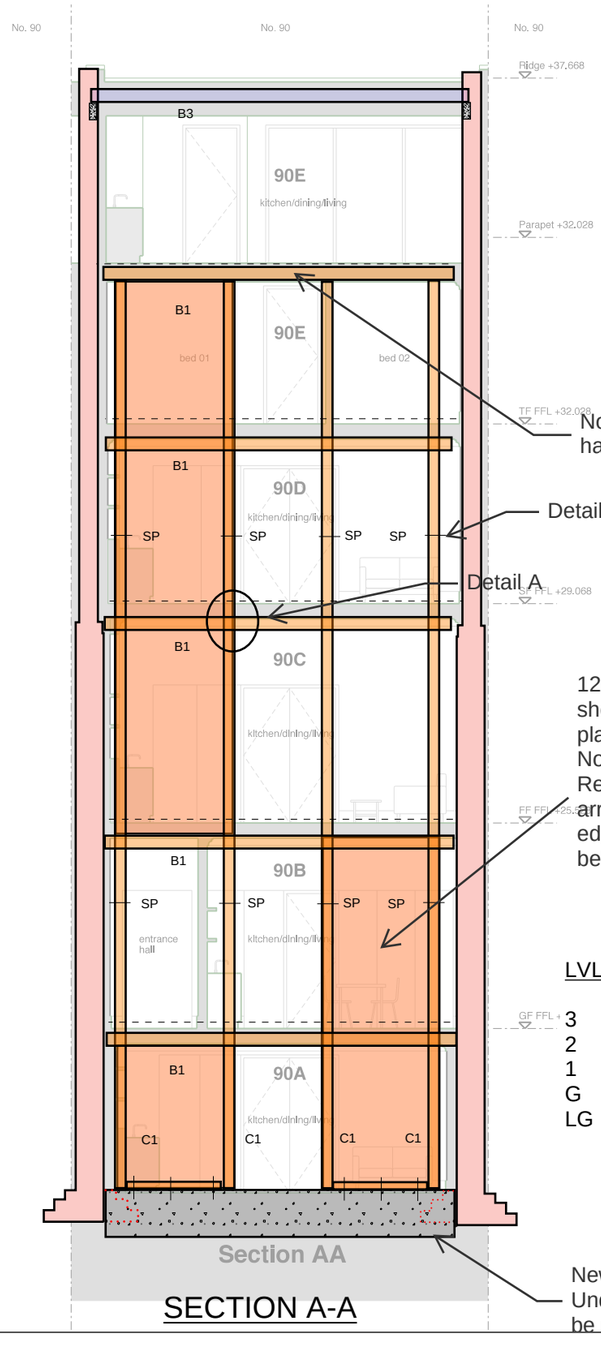
Job No.	31153	Page	SK 16	Rev	1
Date	06/2024	Eng	AJT	Chd	
Job	Lansdowne Terrace and Guilford Street				

NEW SPINE WALL STRUCTURE

(~ 1:100 @ A3)



SECTION A-A

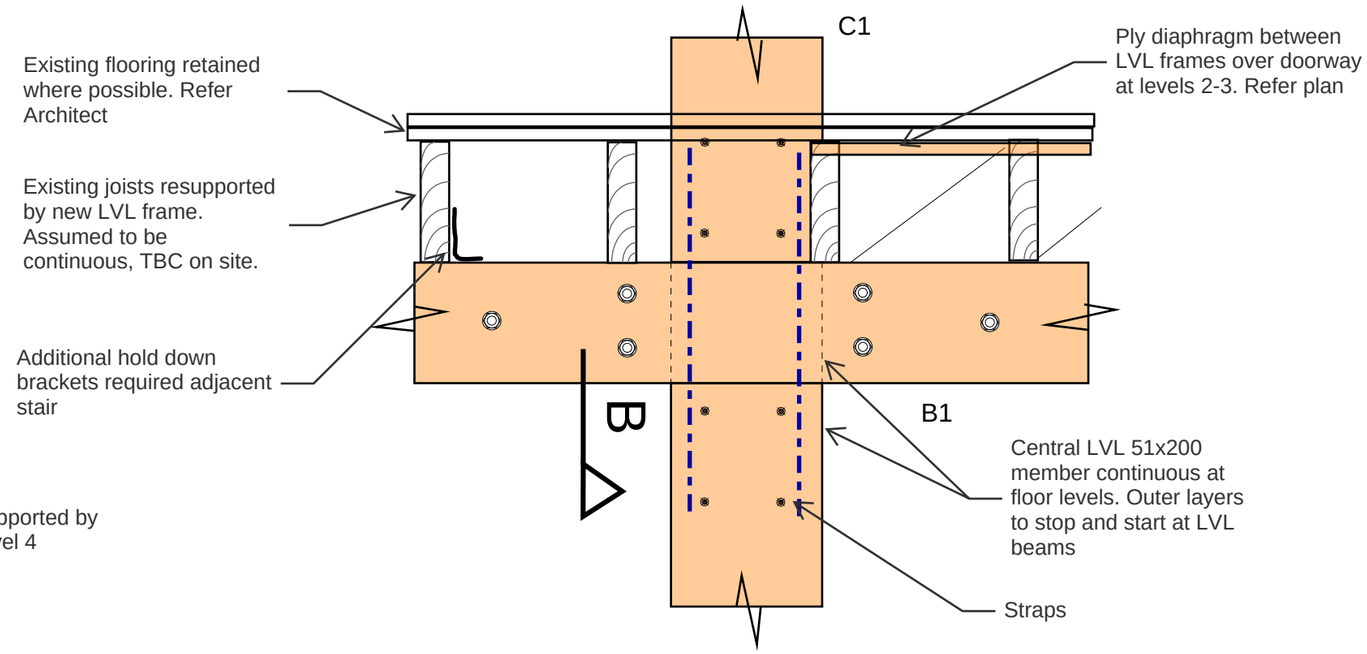
Note joists supported by hangers at level 4

Detail C

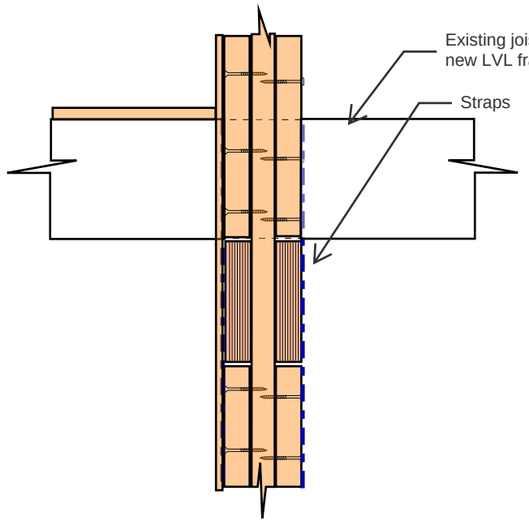
12mm Ply bracing walls. Blocking to all sheet edges. Arrangement as shown on plan. Note position of ply shown is for the No.89-91 Guilford Street town houses only. Refer Architect for Lansdowne terrace arrangement. 8g x 50mm screws with sheet edge fixings spaced at 's_1' as per table below. Mid sheet fixings at 300mm crs

LVL	PLY LINING	FIXINGS 's_1'
3	Single sided	150mm
2	Single sided	150mm
1	Single sided	100mm
G	Double sided	100mm
LG	Double sided	100mm

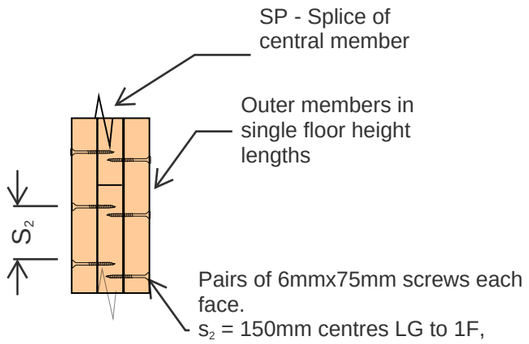
New RC foundation. Underpin sequence may be required



DETAIL A



DETAIL B



DETAIL C

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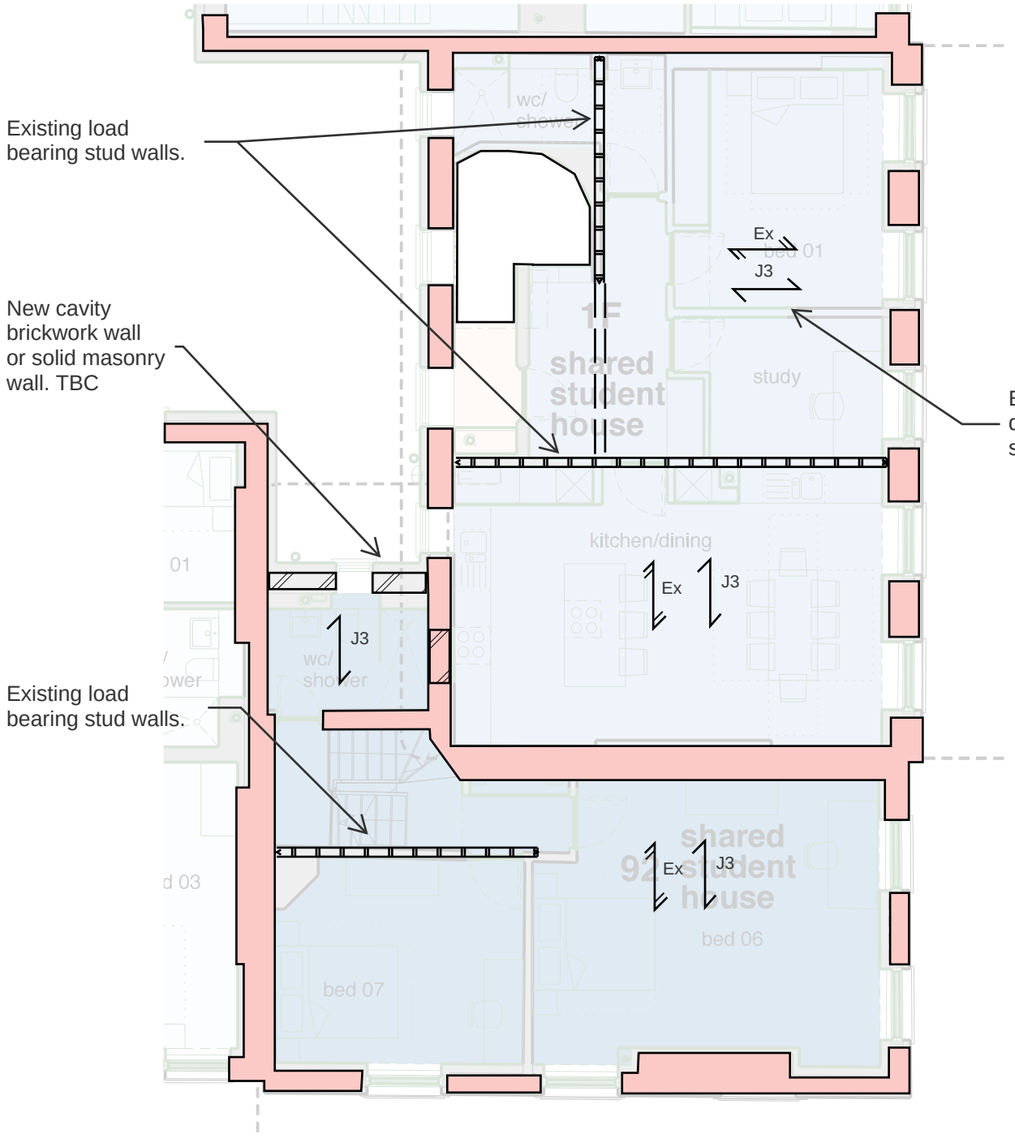
Job No.	31153	Page	SK 17	Rev	1
Date	06/2024	Eng	AJT	Chd	
Job	Lansdowne Terrace and Guilford Street				

PROPOSED STRUCUTRE NO.92 GUILFORD STREET & NO.1 LANSDOWNE TERRACE

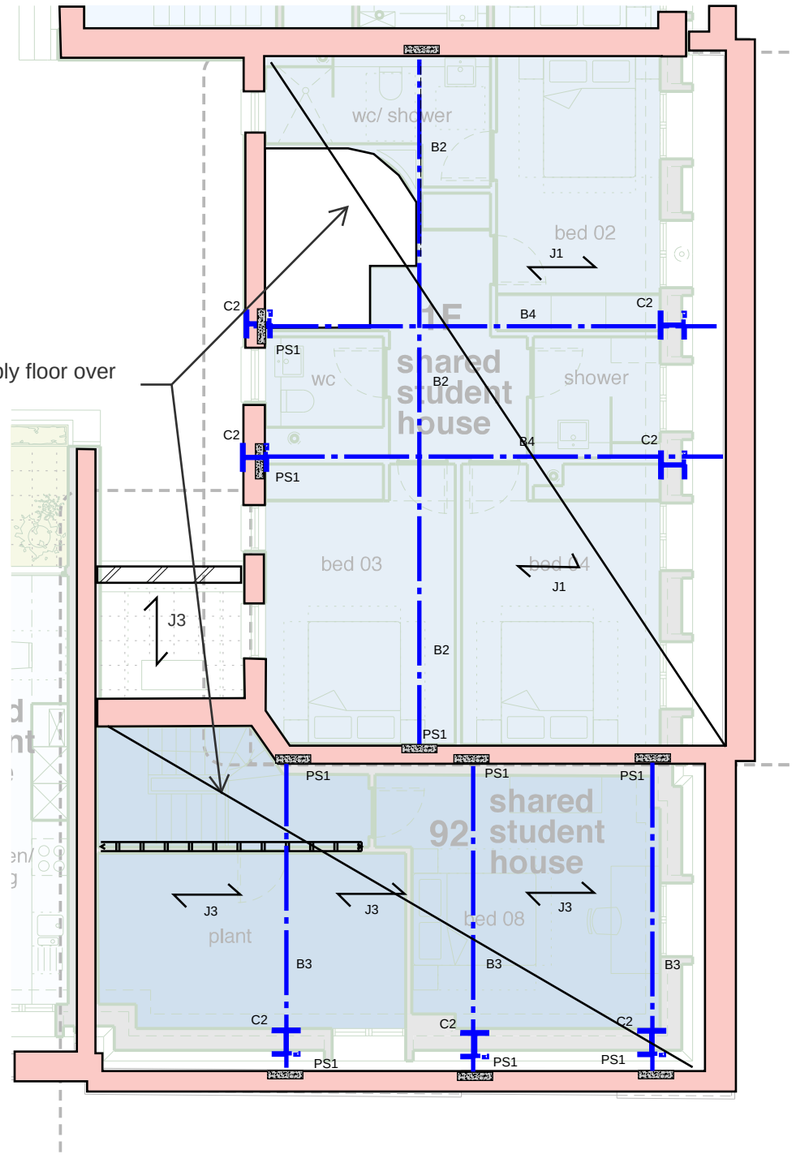
(~ 1:100 @ A3)

MEMBER SCHEDULE

B1 - 3x/51/200 LVL	C1 - 3/51x151 LVL	J1 - 245x44 C24 @300	PS1 - 100mmX215mmX440mm
B2 - 203x133x30 UB	C2 - 203X133X30UB	J2 - 245x44 C16 @400	
B3 - 254x146x37 UB		J3- 195x44 C16 @400	
B4 - 254x254x73 UC			



FIRST - THIRD FLOORS



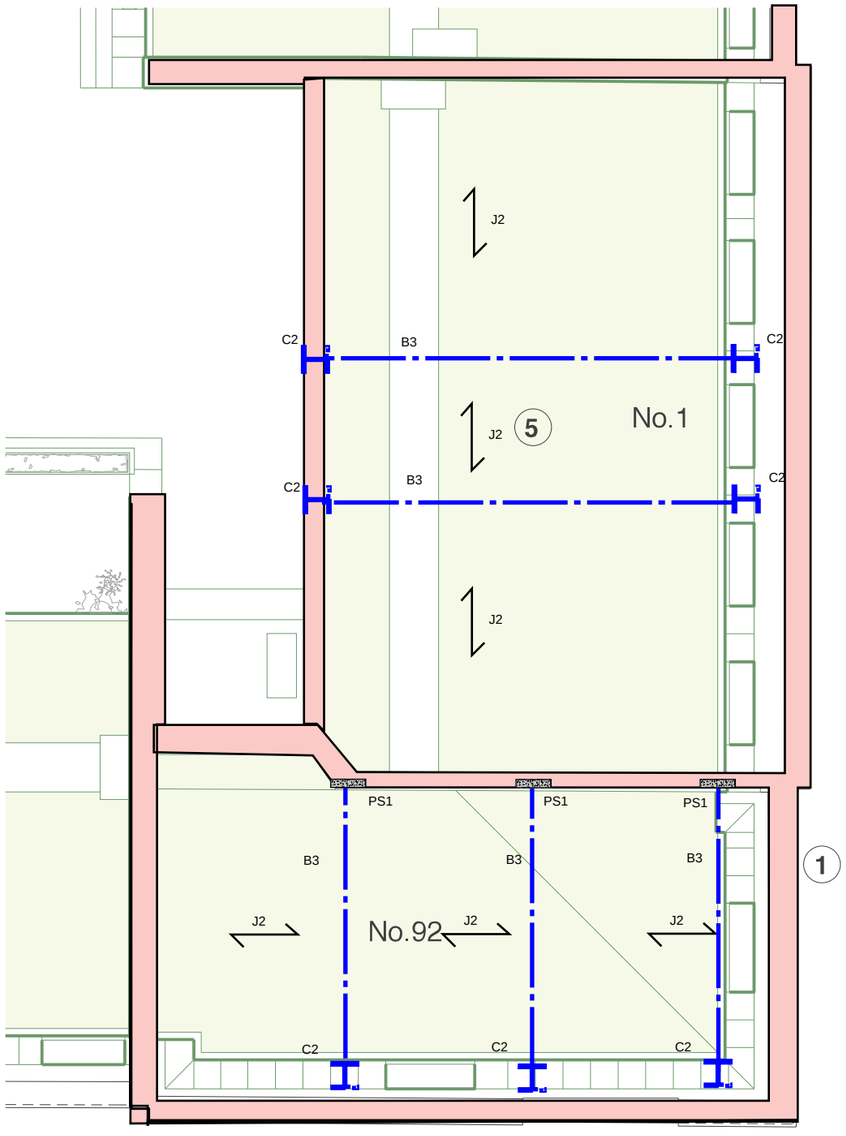
FORTH FLOOR

PRICE & MYERS

Job No.	31153	Page	SK 18	Rev	1
Date	06/2024	Eng	AJT	Chd	
Job	Lansdowne Terrace and Guilford Street				

PROPOSED STRUCUTRE AT NO.92 GUILFORD STREET & NO.1 LANSDOWNE TERRACE

~ 1:100 @ A3)



ROOF

MEMBER SCHEDULE

B1 - 3x/51/200 LVL	C1 - 3/51x151 LVL	J1 - 245x44 C24 @300	PS1 - 100mmX215mmX440mm
B2 - 203x133x30 UB	C2 - 203X133X30UB	J2 - 245x44 C16 @400	
B3 - 254x146x37 UB		J3- 195x44 C16 @400	
B4 - 254x254x73 UC			

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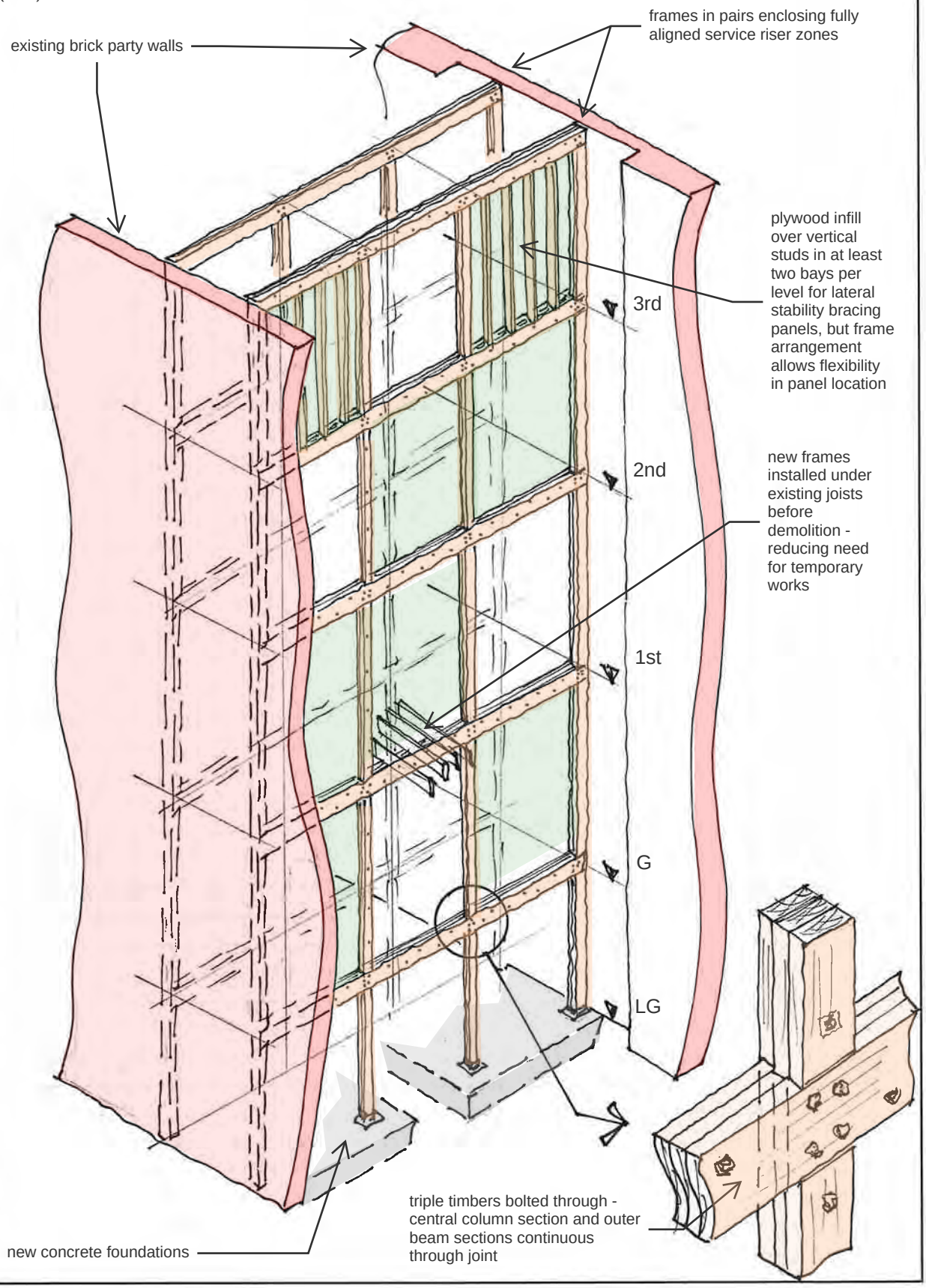
Job No	31153	Page	SK08	Ver	
Date	Feb '24	Eng	AT	Chd	
Job	89-92 Guilford St & 1-4 Lansdowne Terr				

DOUBLE TIMBER REPLACEMENT SPINE WALL CONCEPT SKETCH ISOMETRIC

(NTS)



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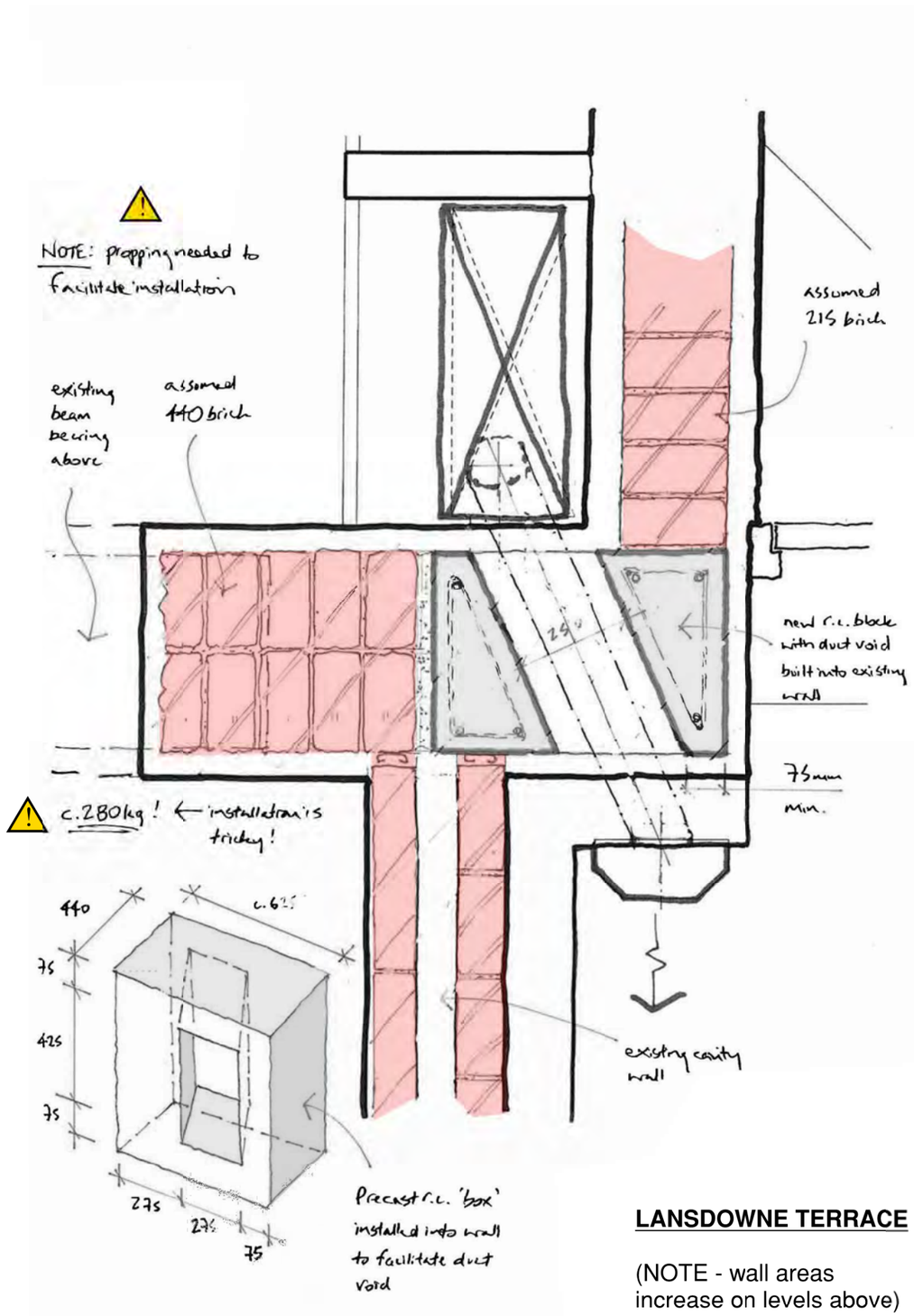
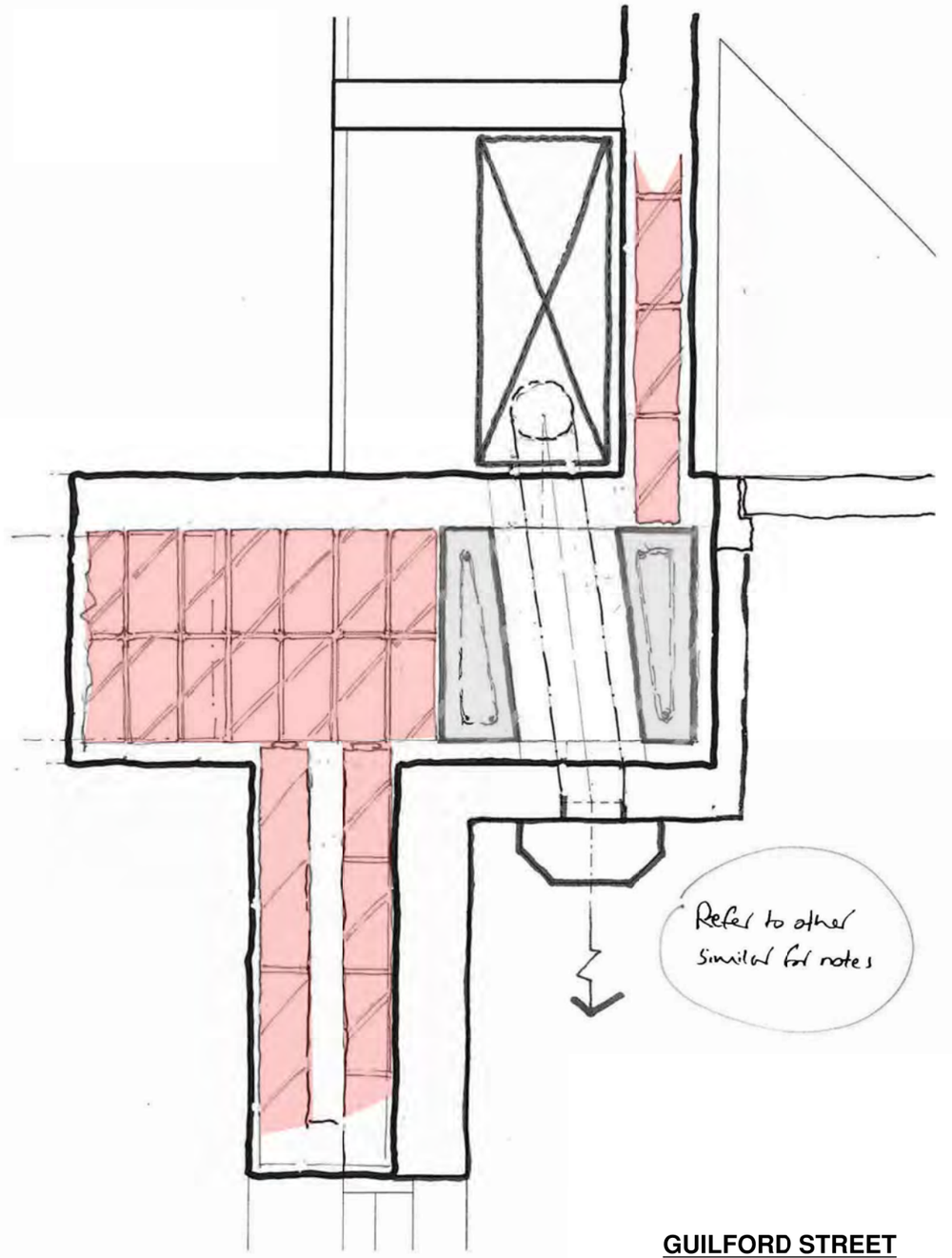
Job No.	31153	Page	SK 09	Rev	1
Date	March '24	Eng	AT	Chd	-
Job	UoL - Lansdowne & Guilford Townhouses				

CONCEPT FOR FORMING MVHR HOLES THROUGH REAR ELEVATION



LANSDOWNE TERRACE

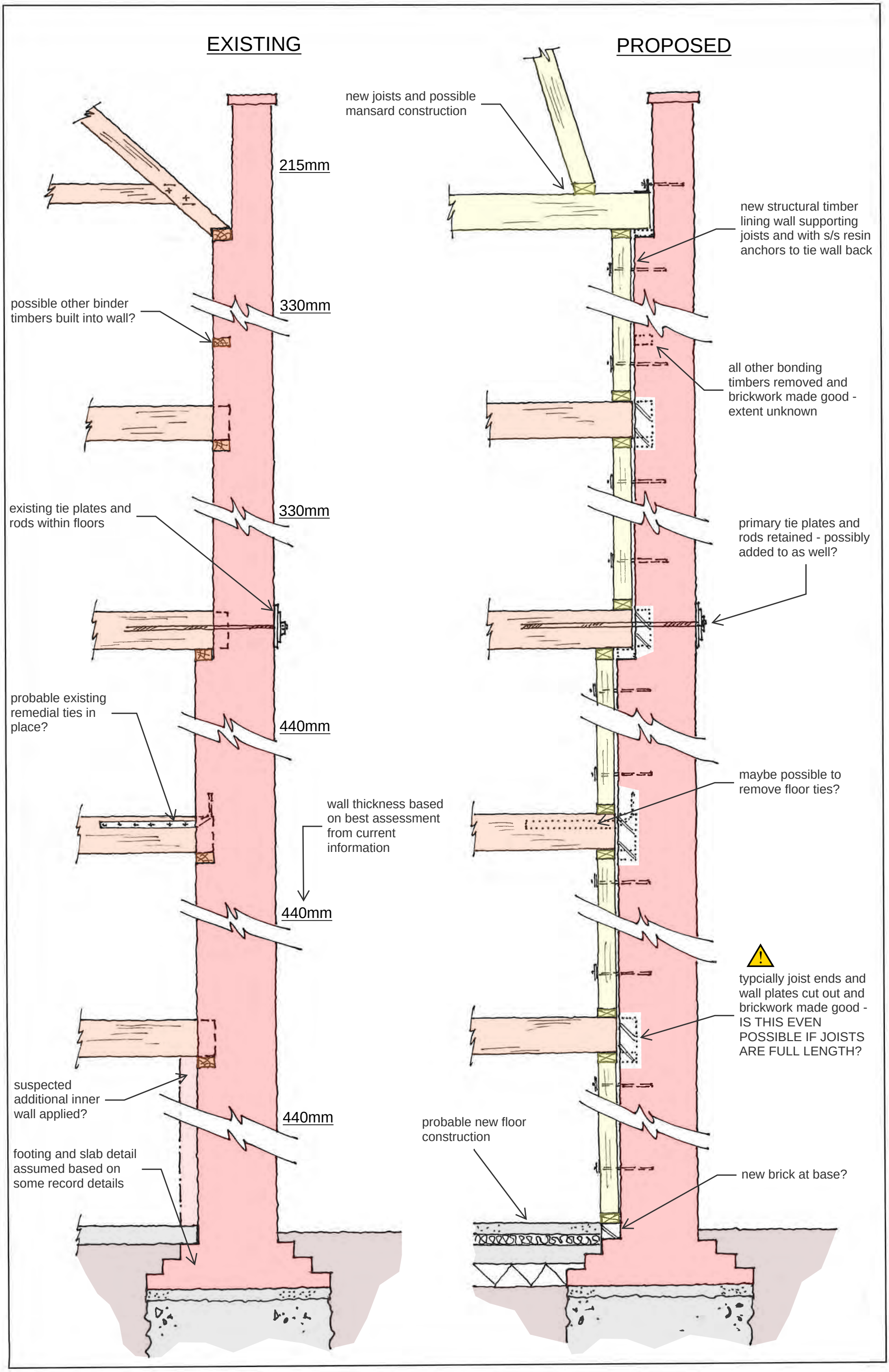
(NOTE - wall areas increase on levels above)



GUILFORD STREET

(NOTE - wall areas increase on levels above)

FRONT ELEVATION STUDY OF EXISTING AND PROPOSED DETAILS



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Job Lansdowne & Guilford Townhouses
Date April '24 Eng AT Chd
Job No 31153 Page SK10 Ver

Appendix D
Preliminary Structural Stair Survey Summary

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1-4 Lansdowne Terrace & 89-92 Guilford Street, London WC1 - Summary of Preliminary Structural Condition Survey of Existing Main Staircases

Ref: 31153
Date: May '24
Revision: v1
Prepared by: Andrew Thornton

Introduction

This document summarises our survey of the condition of the existing main staircases to the Georgian terraced properties at 1-4 Lansdowne Terrace and 89-92 Guilford Street London WC1. The existing stairs vary considerably in type and condition and consist of a mixture of original cantilever stone stairs, original timber stairs and modern timber stairs. In many cases the balustrades are in poor condition and likely non-compliant due to their capacity to resist horizontal barrier loadings, flexibility and low height. Ad hoc attempts to stiffen and strengthen the balustrades have been made but in most cases are ineffective. Significant cracking has also been observed within the stairwells, refer P&M Stage 3 investigation report. This report groups the stairs into four basic types, refer text below and photos on pages 4-7.

1. Suspected historic timber stairs and treads with thin timber balustrade handrails and spindles in a Georgian style.
2. Suspected historic timber stairs with full height timber walls provided at either side.
3. Suspected historic stone cantilever stairs with thin timber handrails and iron spindles in a Georgian style
4. Suspected modern timber stairs with thick timber handrails and spindles, newel posts generally provided at landings

Each stair flight for each building has been assigned a condition rating based on a red/amber/green system. Also note that in all cases the balustrade height may be non-compliant and needs to be checked.

R	Balustrade or stair in very poor condition, significant intervention required to remediate
A	Balustrade or stair in ok condition, some intervention required to remediate
G	Balustrade or stair in good condition, no or minimal intervention required.

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Tabe 1 - Number 1-4 Lansdowne Terrace Preliminary Structural Condition Survey of Existing Main Staircases

House Number	Stair Flight	Tread Type	Stair Type	Condition	Photo Reference Page #	Notes and Main issues identified
4LT	2-3	Timber	Type 2	G		
	1-2	Timber	Type 1	R	4	Very loose and ineffective balustrades, likely non-compliant
	G-1	Timber	Type 1	R	4	Very loose and ineffective balustrades, likely non-compliant
	LG-1	Timber	Type 4	A	8	Handrails span to full height posts at lower ground and at half landing which provide some rigidity
3LT	2-3	Timber	Type 2	G		
	1-2	Timber	Type 1	R	11	Very loose and ineffective balustrades, likely non-compliant. Horizontal bars installed across stairs to tie balustrade at various points
	G-1	Timber	Type 1	R	10	Very loose and ineffective balustrades, likely non-compliant. 75x75 posts added to G-1 Landing provides some additional rigidity
	LG-1	Timber	Type 4	A	9	Handrails span to full height post at half landing providing some rigidity. Ineffective light gauge aluminium retrofit baluster added at bottom
2LT	2-3	Timber	Type 2	A	5	No handrails present to stair and balustrade at edge of landing possibly non-compliant
	1-2	Stone	Type 3	R	15,16	Retrofit boxed in beam supporting edge of cantilever stone stair from half landing to level 2. Iron balustrade on significant lean
	G-1	Stone	Type 3	R	13, 14	Retrofit timber beams and posts supporting stone stair at half landing
	LG-1	Timber	Type 4	A	12	Handrails span to full hight post one side only providing some rigidity
1LT	2-3	Timber	Type 1	R		75x75 timber posts provided at half landing on way to third floor provides some stiffness but remains loose and ineffective
	1-2	Timber	Type 1	R	18,19	As per LG-G notes. 3 x 12mm hanger rods from 1st to third floor. Balustrade missing spindles at one location
	G-1	Timber	Type 1	R	17	Ineffective retrofit steel straps added to restrain loose balustrade. Significant cracking visible in walls
	LG-1	Timber	Type 4	R		Ineffective retrofit steel straps added to restrain loose balustrade. Significant cracking visible in walls

1. Survey based on visual inspection on 21/03/2024 and limited record information
2. For details of stair types and specific details refer to photographs on pages 4-7

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Table 2 - Number 89-92 Guilford Street Preliminary Structural Condition Survey of Existing Main Staircases

House Number	Stair Flight	Tread Type	Stair Type	Condition	Photo Reference Page #	Notes and Main issues identified
92GS	2-3	Timber	Type 1	R	25	Very loose and ineffective balustrade. Cracks visible in walls. Stair hung from possibly undersized timber beams at roof level
	1-2	Timber	Type 1	R	21	As per G-1 notes. Timber full height post provides some rigidity to balustrade at second floor
	G-1	Timber	Type 1	R	20	Very loose and ineffective balustrades. Hangers provided to upper levels
	LG-1	Timber	Type 2	G		
91GS	2-3	Timber	Type 4	G		
	1-2	Stone	Type 3	G		
	G-1	Stone	Type 3	G		Full height walls to side of first flight. Balustrade to second flight feels reasonably rigid although height needs checking
	LG-1	Timber/Stone	Type 4	A	22	Lower half possibly stone. 100x100 timber newel post at bottom provides some stiffness. Full height walls to side of 2nd flight
90GS	2-3	Timber	Type 2	A		Loose and ineffective balustrade. Very loose and ineffective newel posts
	1-2	Timber	Type 4	G		
	G-1	Timber	Type 4	G		
	LG-1	Timber	Type 4	A	23	Reasonably rigid balustrade however ineffective post provided at bottom of first fight
89GS	2-3	Timber	Type 4	G		Stair and balustrade in good condition. Double newel posts provide rigidity to railings
	1-2	Stone	Type 3	R	24	Some attempt to restrain balustrade but remains loose and ineffective . Retrofit rod is no longer bonded into stonework
	G-1	Stone	Type 3	G		Good condition stone stairs with rigid balustrade
	LG-1	Timber	Type 4	G		Stair and balustrade in good condition. Double newel posts provide rigidity to railings

1. Survey based on visual inspection on 21/03/2024 and limited record information
2. For details of stair types and specific details refer to photographs on pages 4-7

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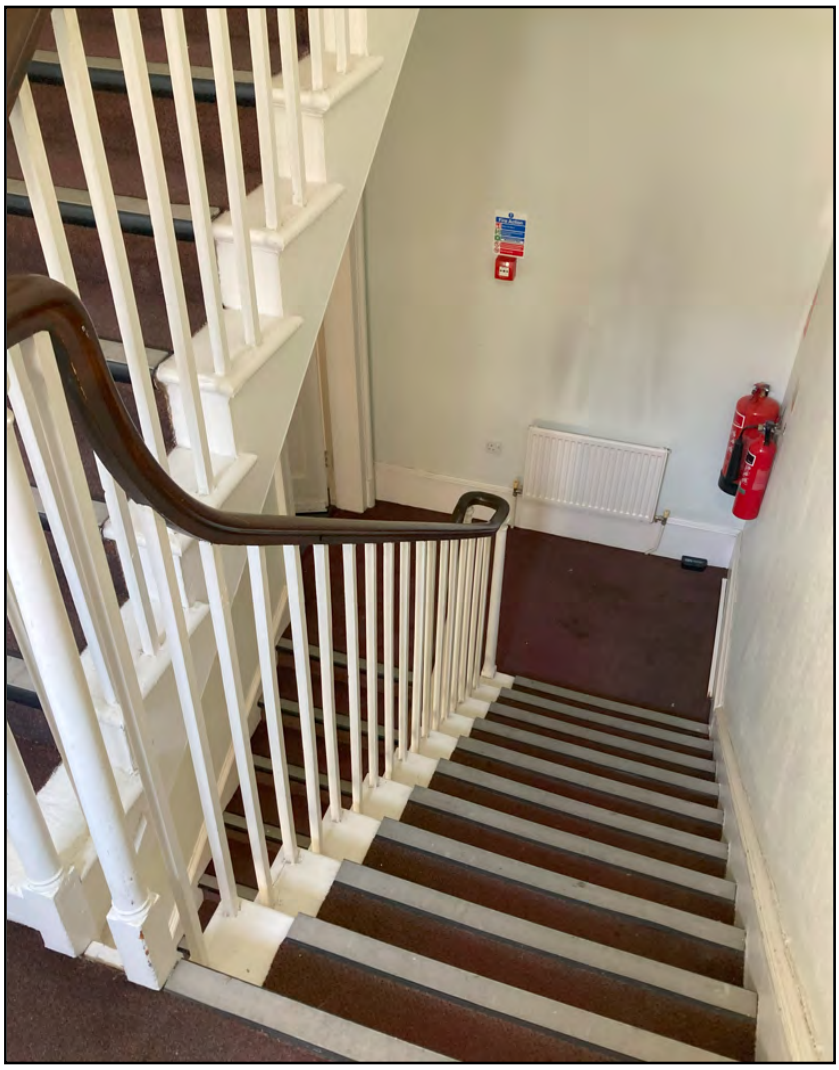
Typical Type 1 Stair (Suspected historic timber)



Type 1 stair

- Timber treads, risers and stringers
- Profiled 50mmx50mm timber handrail
- 20mmx20mm timber spindles at 120mm crs
- Pairs of 40mm round newel posts at some landings
- Generally loose and infective balustrade
- Handrail height to be confirmed

Typical Type 2 Stair (Suspected historic timber)

Type 2 stair

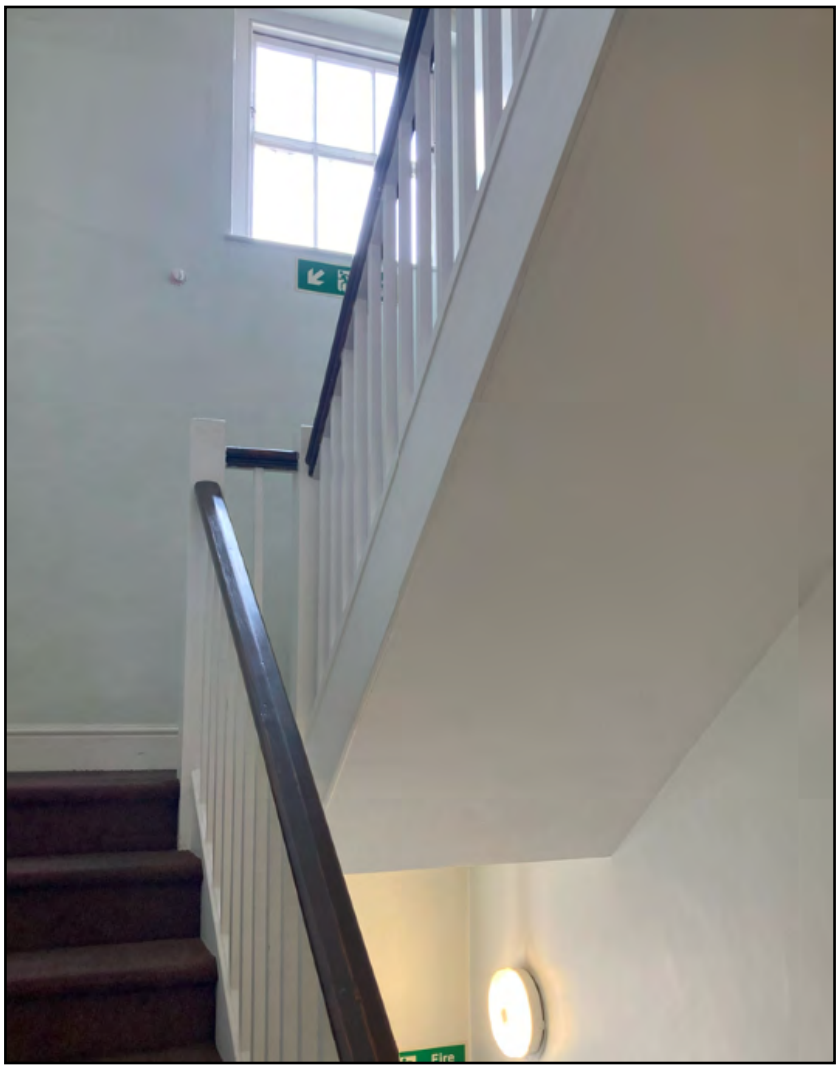
- Timber treads, risers and stringers
- Walls either side
- Handrail provided at some locations only

Typical Type 3 Stair (Suspected historic stone cantilever)

Type 3 stair

- Cantilever stone treads
- Profiled 50mmx50mm timber handrail
- 12mmx12mm iron spindles at 120mm crs
- Generally loose and infective balustrade
- Handrail height to be confirmed

Typical Type 4 Stair (Suspected modern timber)



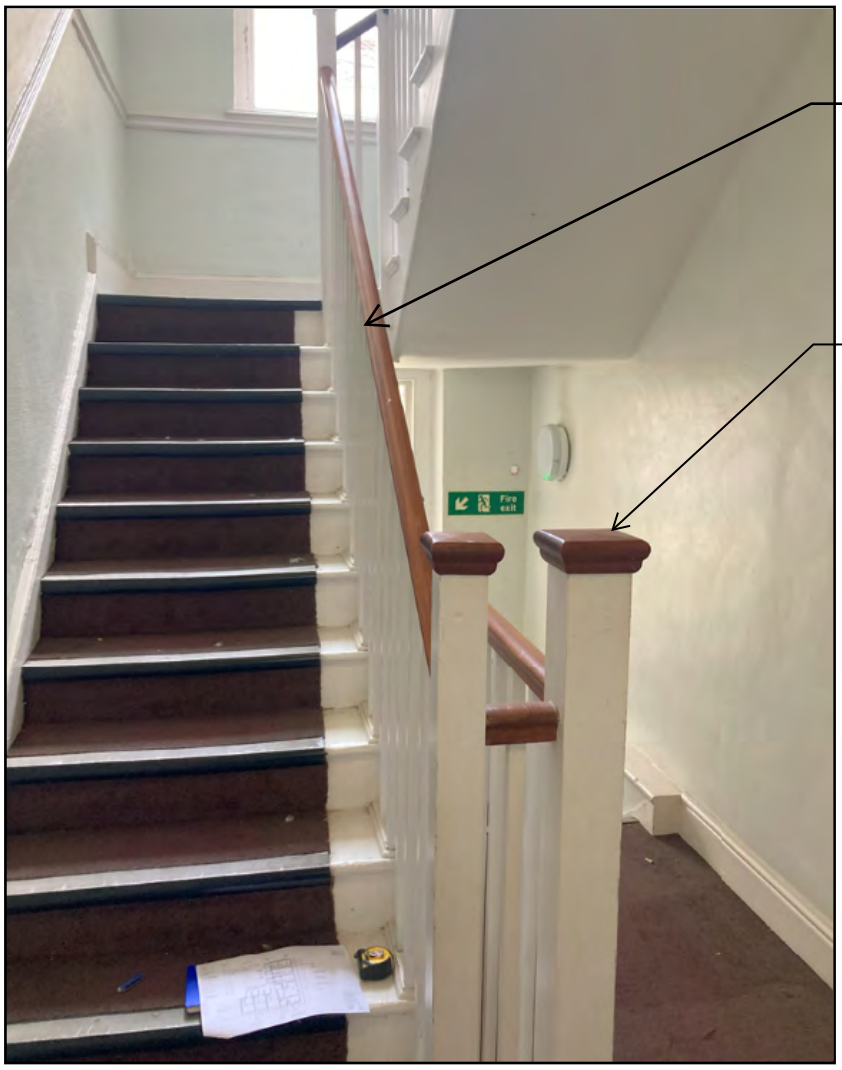
Type 4 stair

- Timber treads, risers and stringers
- Profiled 50mmx50mm timber handrail
- 25mmx25mm timber spindles at 120mm crs
- Pairs of 100mmx100mm newel posts at most landings
- Generally feels solid and in good condition
- Handrail height to be confirmed

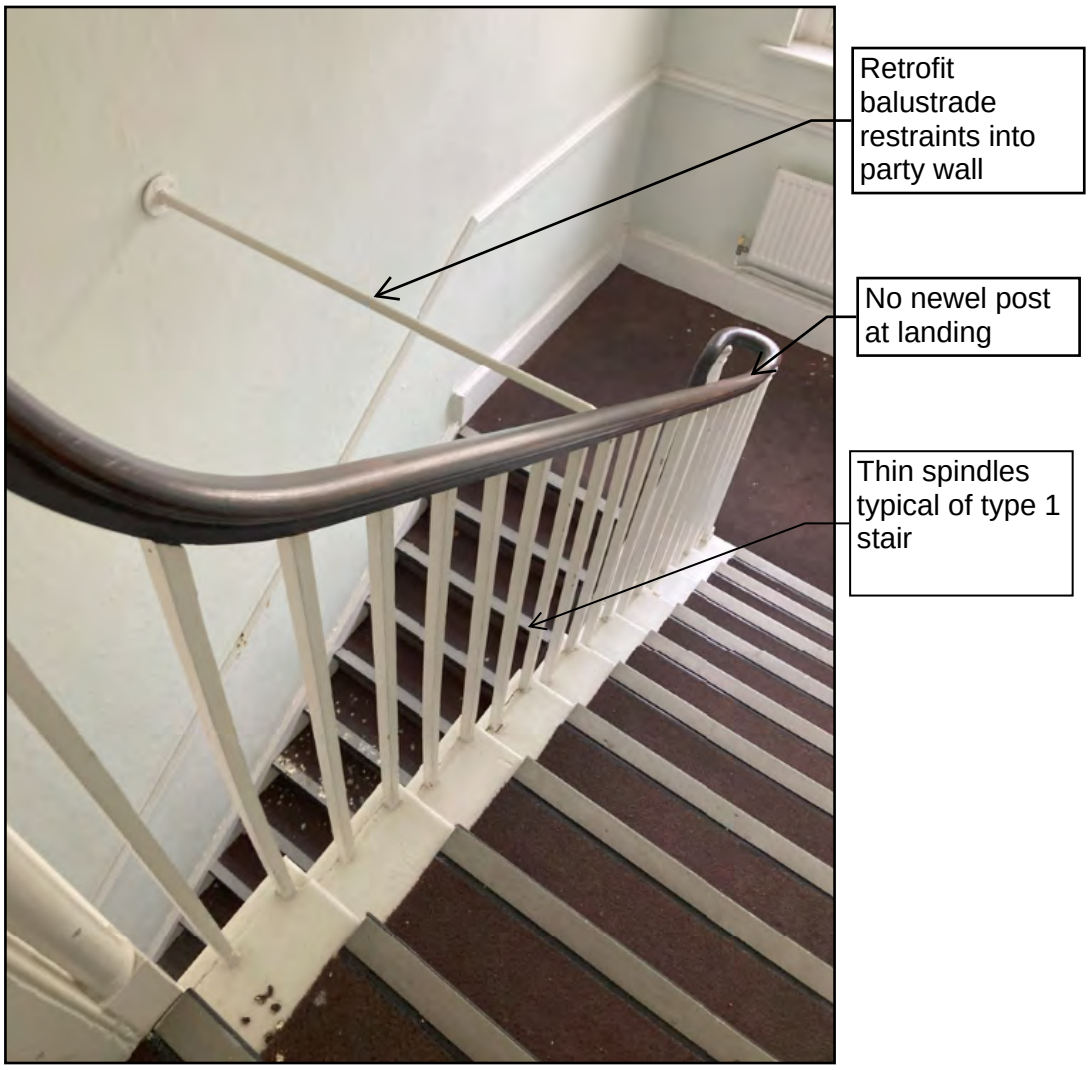
Stair 4LT at Lower Ground - Ground

Stair 3LT at Lower Ground - Ground

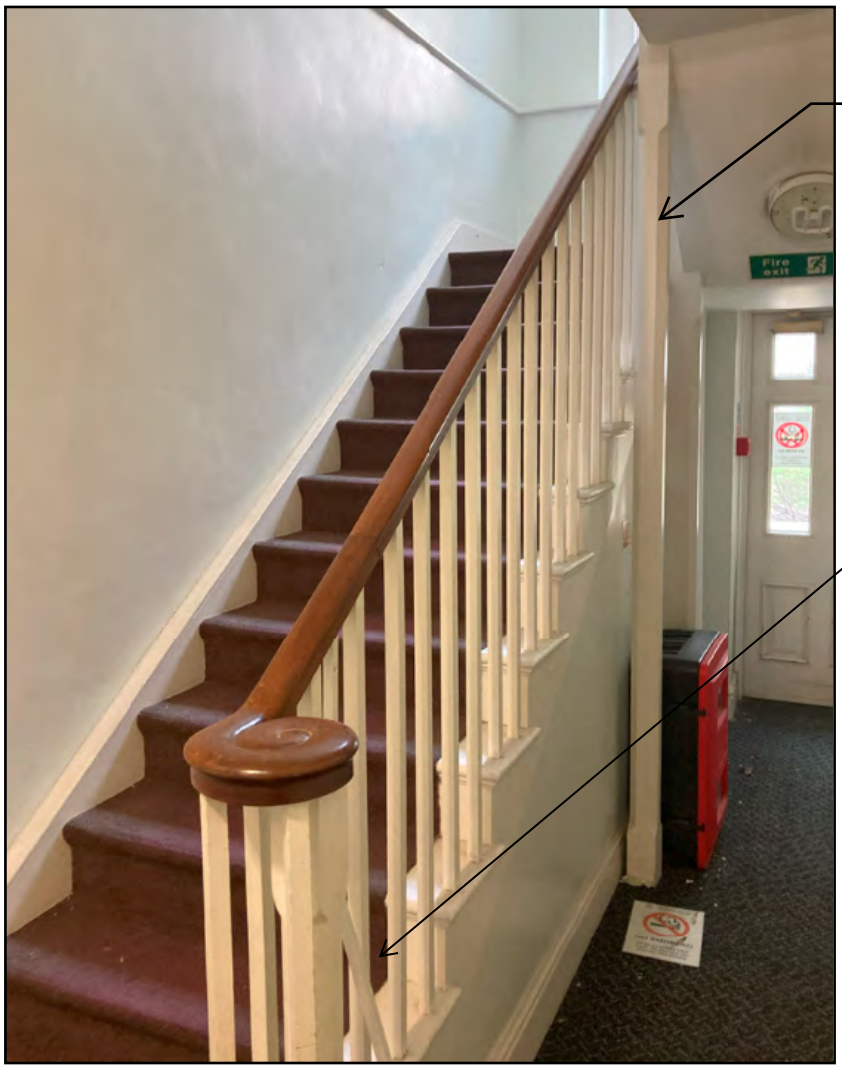
Stair 3LT at Ground - First Floor



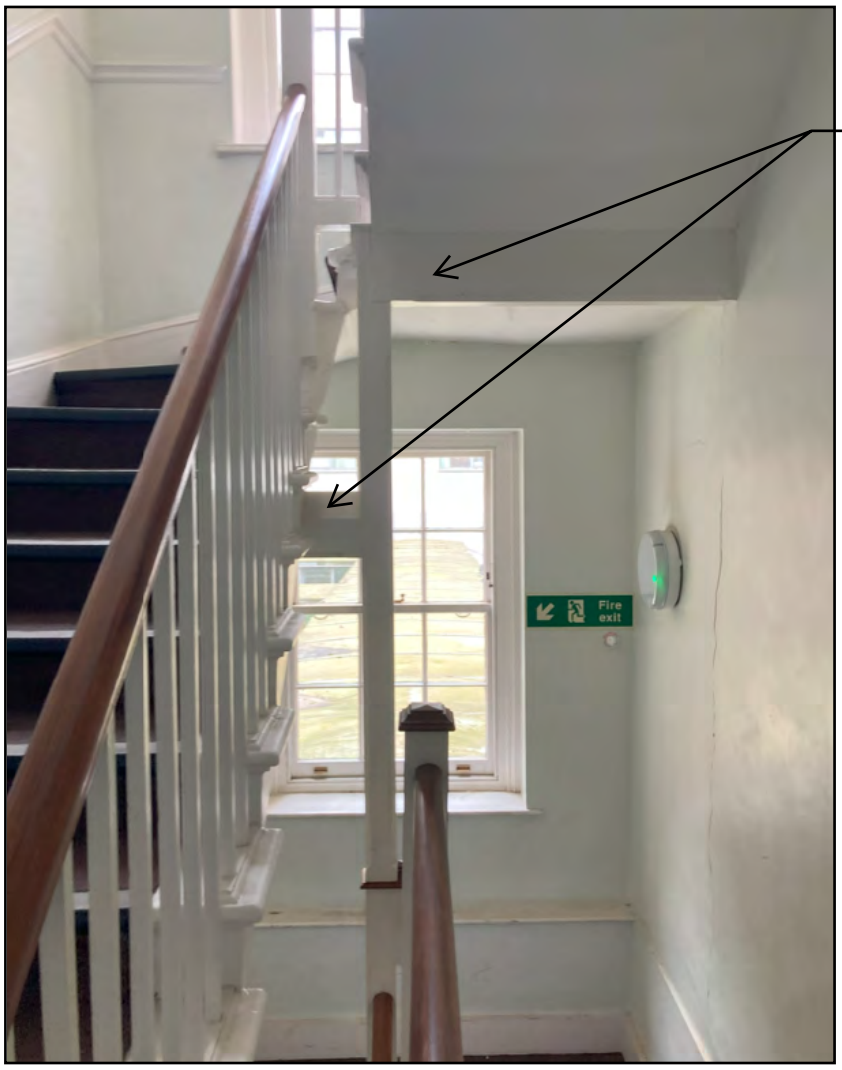
Stair 3LT at First Floor - Second Floor



Stair 2LT at Lower Ground - Ground

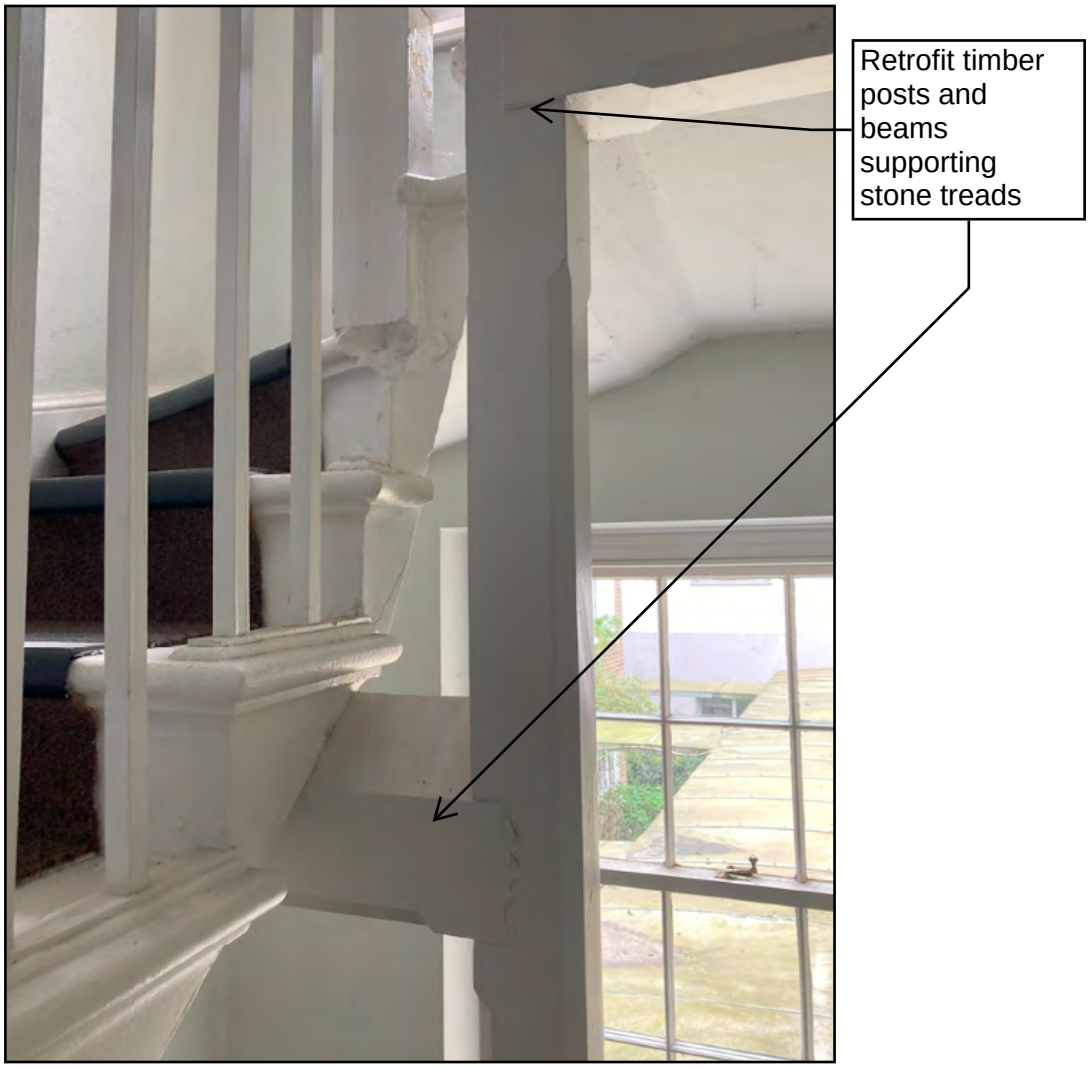


Stair 2LT at Ground - First Floor

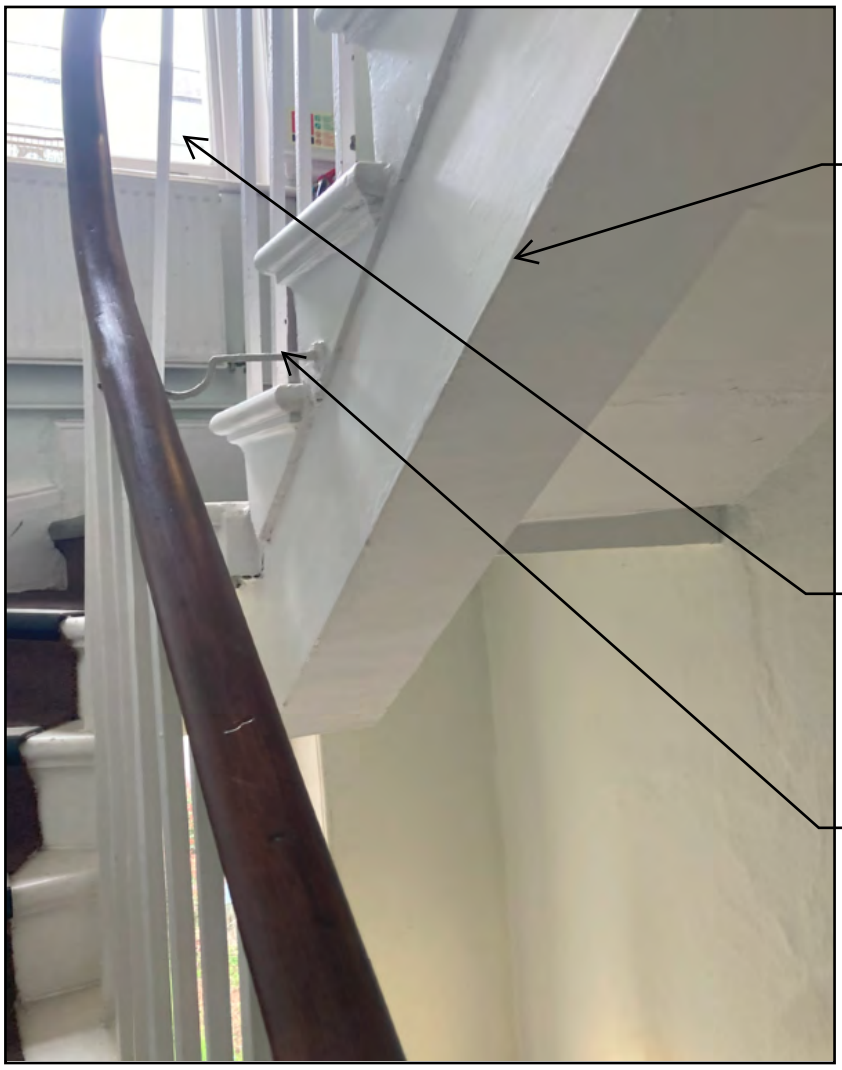


Retrofit timber posts and beams supporting stone treads

Stair 2LT at Ground - First Floor

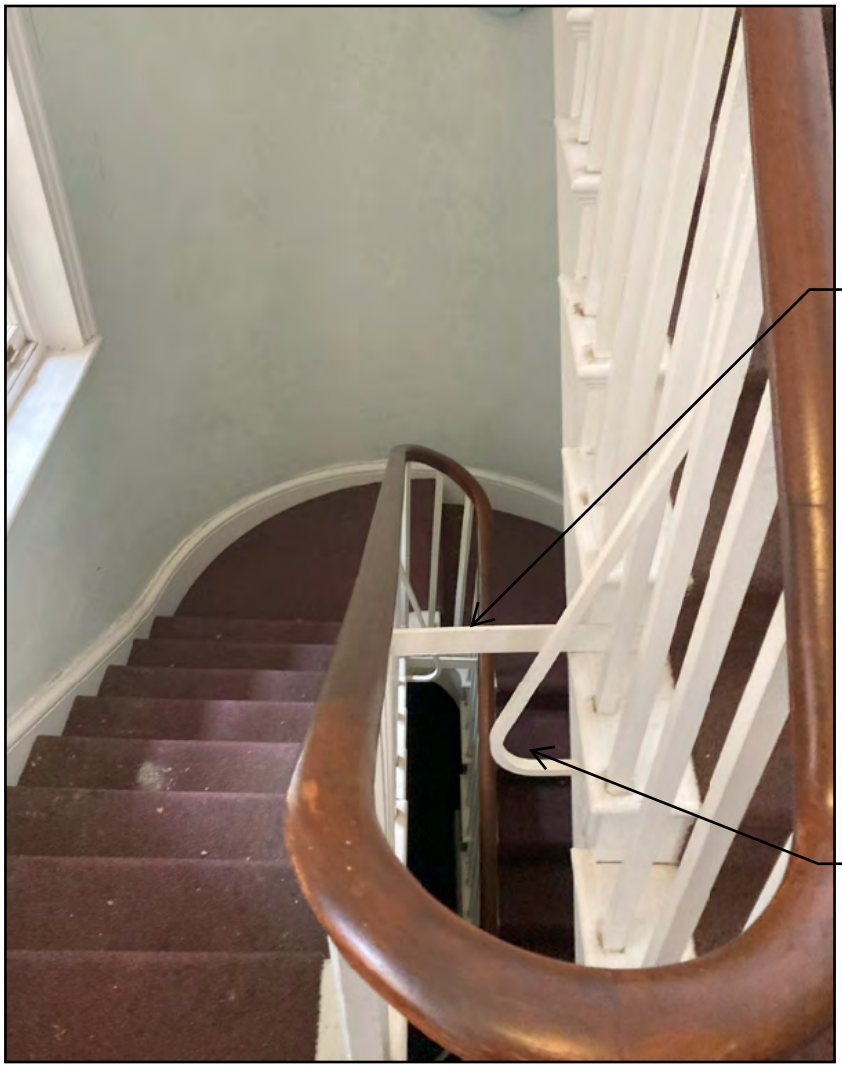


Stair 2LT at First floor - Second Floor



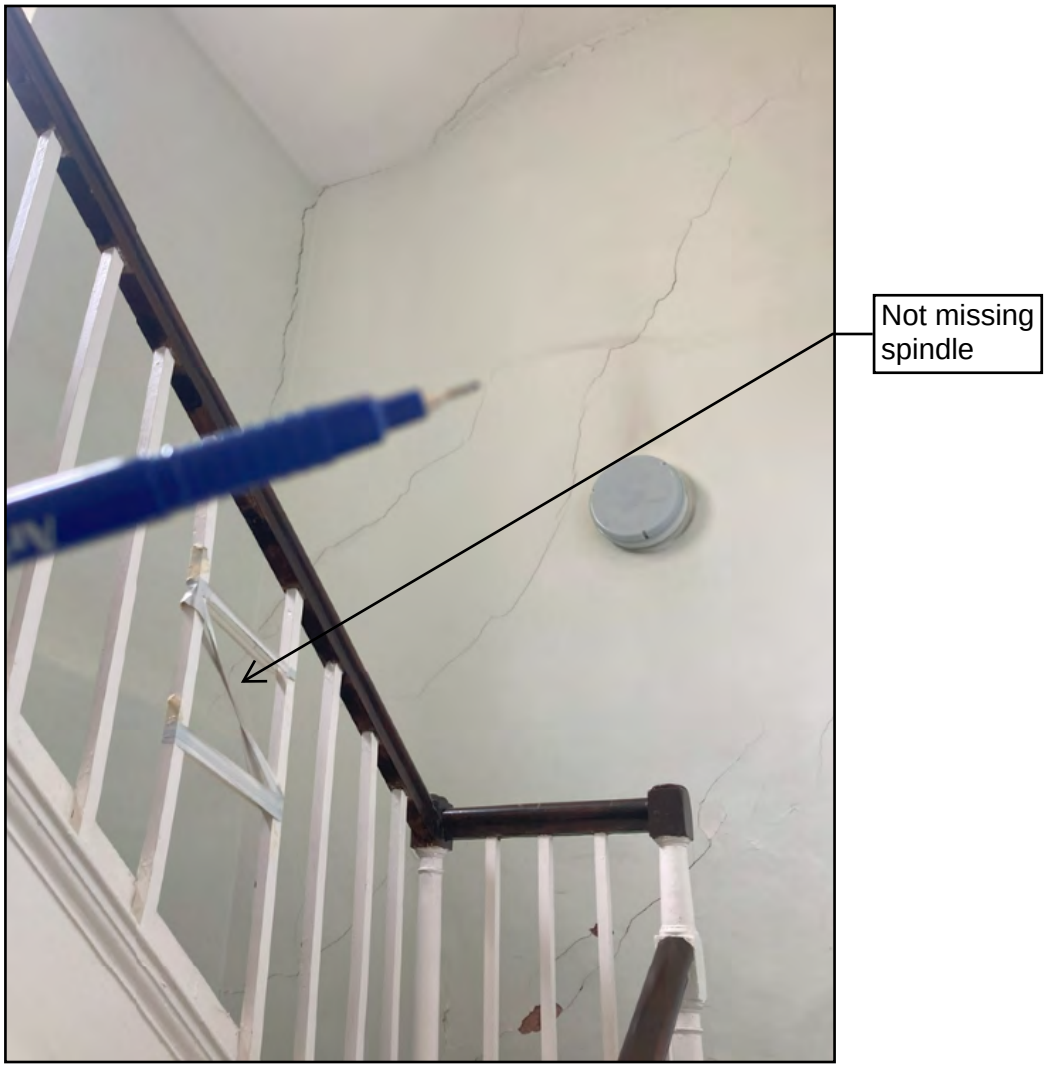
Stair 2LT at First Floor - Second FLoor

Stair 1LT at - Ground - First Floor



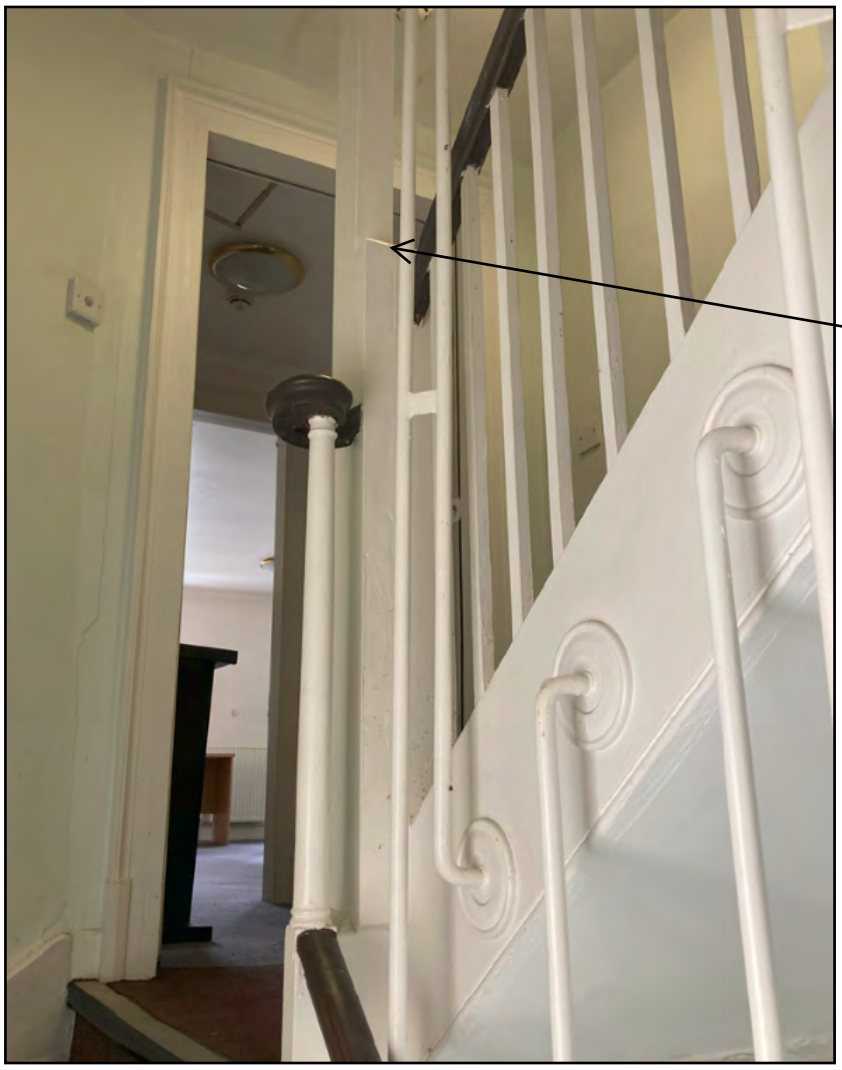
Stair 1LT at First Floor - Second Floor

Stair 1LT at First Floor - Second Floor



Stair 92GS at First Floor - Second Floor

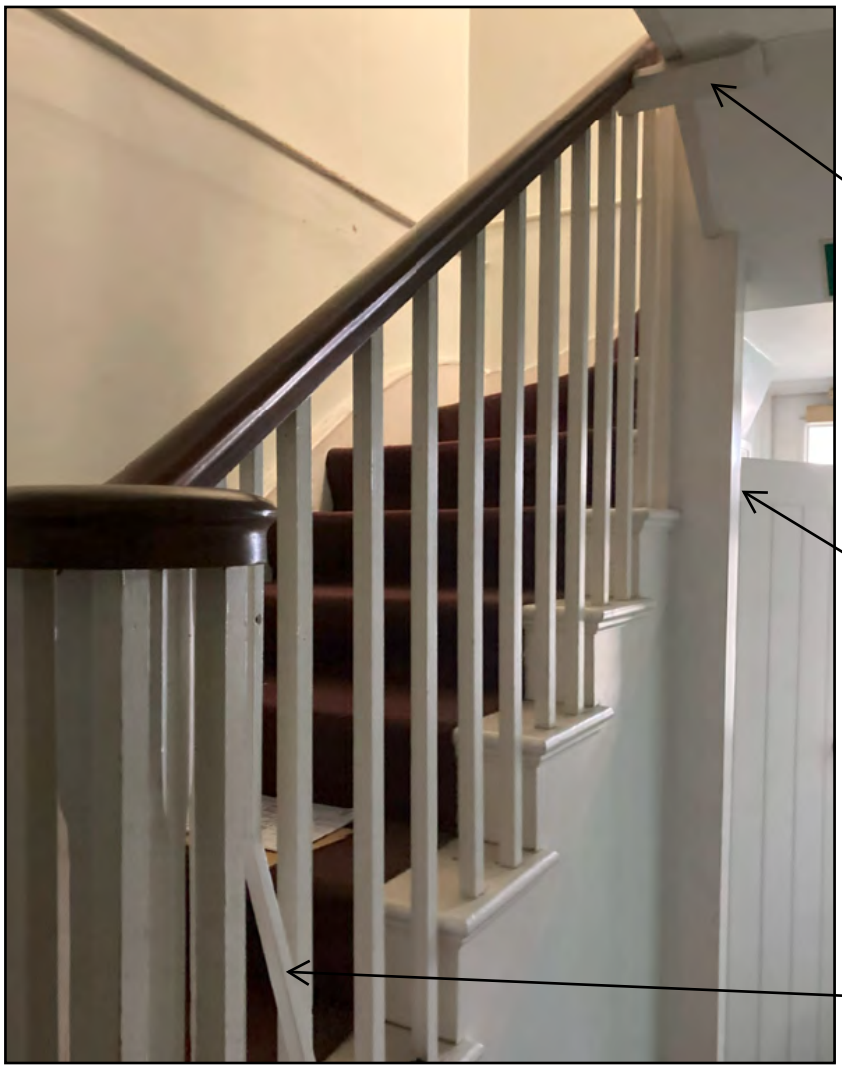
Stair 92GS at Second Floor



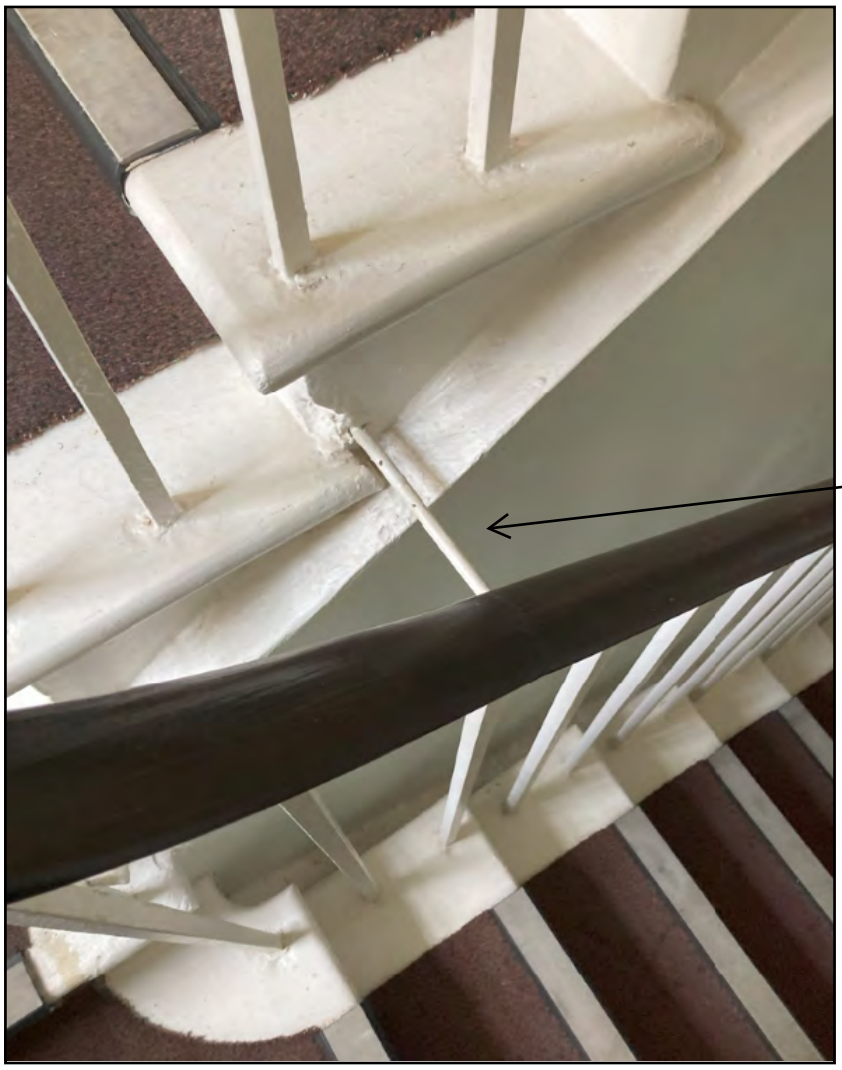
Stair 91GS - Lower Ground

Note Stone visible at lower half of first flight. Upper half possibly timber

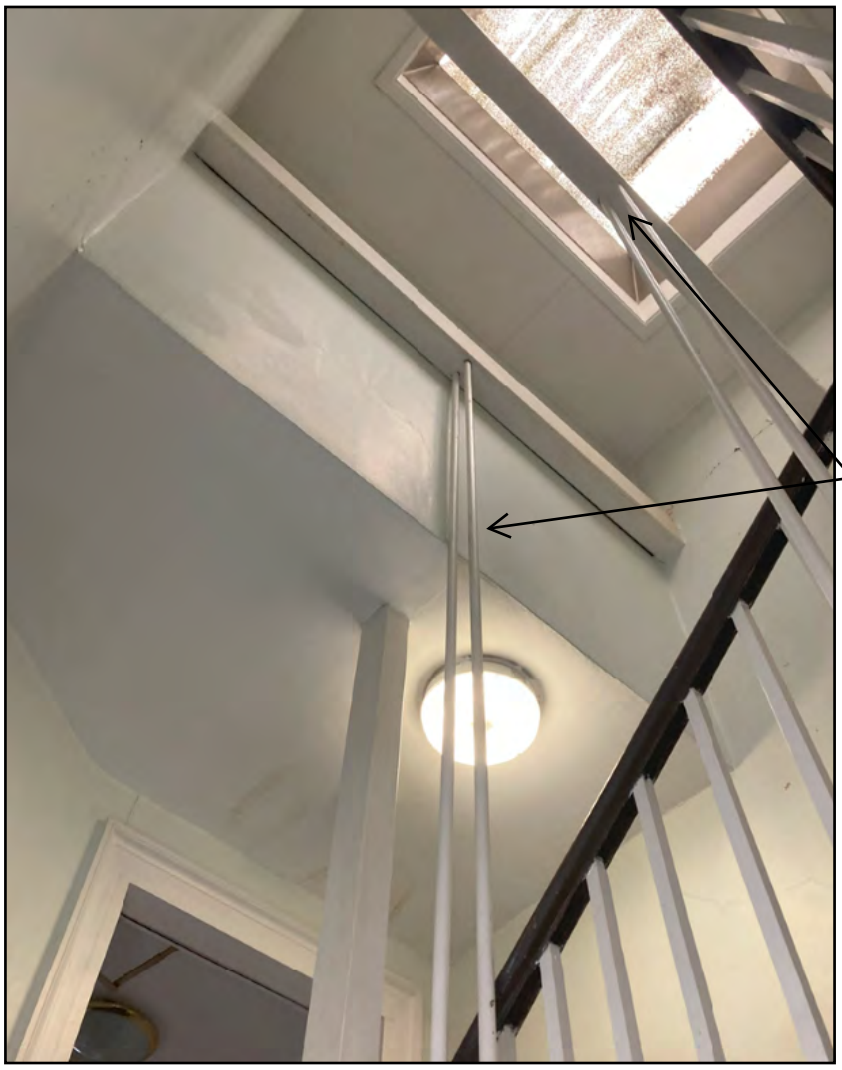
Stair 90GS - Lower Ground



Stair 89GS at First floor - Second Floor



Stair 92GS at Second Floor -Third Floor



Appendix E
Façade Condition Survey

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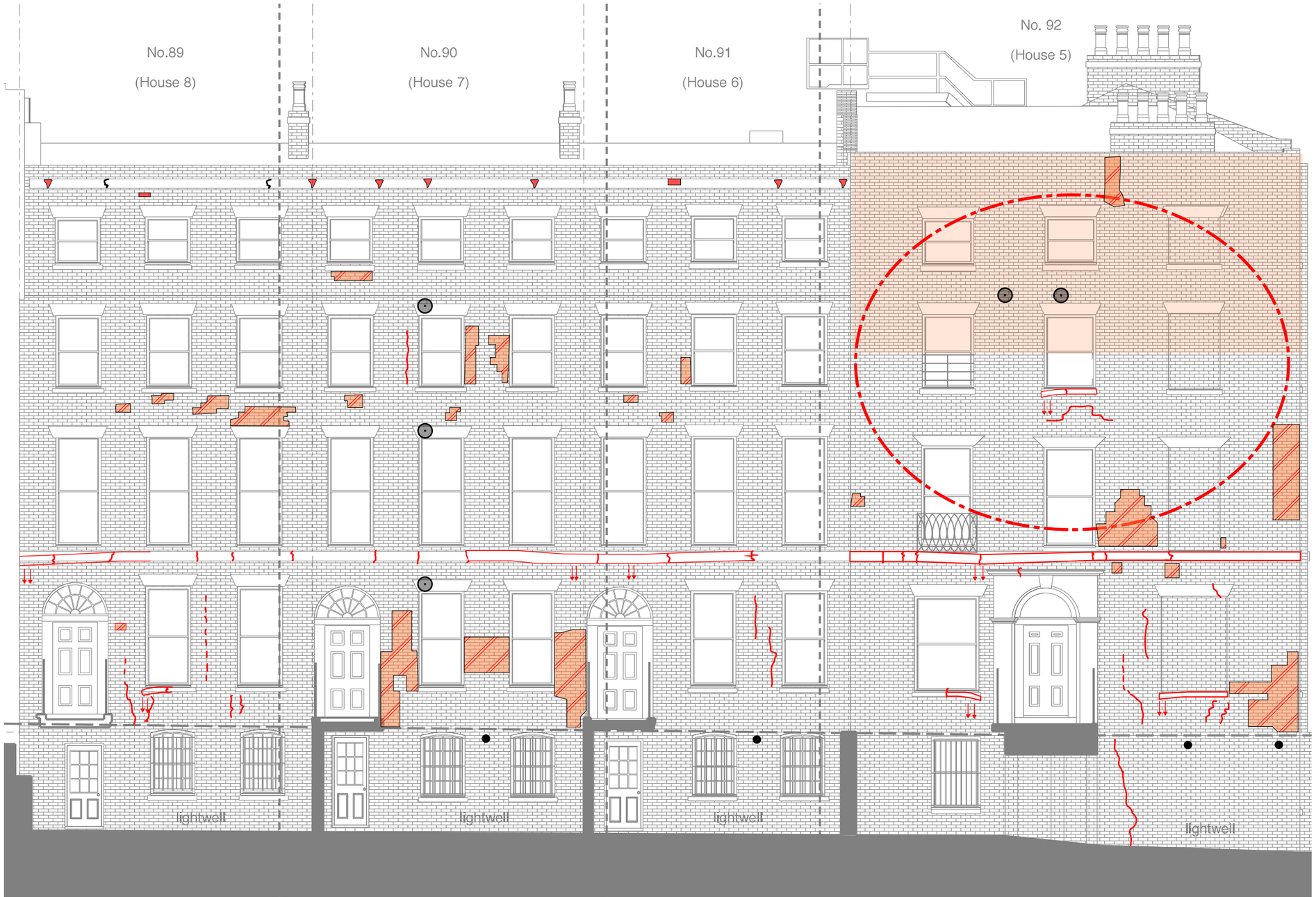
Job No.	31153	Page	SK11	Rev	1
Date	05/2024	Eng	AJT	Chd	AT
Job	Lansdowne Terrace And Guildford Street Townhouses				

GUILFORD STREET GEORGIAN TERRACES FACADE CONDITION MAP

(~ 1:100 @ A3)



KEY

- Assumed Georgian brickwork
- Assumed 20th Century brickwork
- Possible 20th Century repair
- Spalling
- Visible crack
- Repointed crack
- Visible displacement (exaggerated)
- Visible outwards movement
- Historic strengthening tie plate
- Drain penetration
- Lightwell balustrade support

Notes:

1) Lower Ground level facade has had a render applied which is possibly concealing further cracking to the facade.

2) Sections of the Ground level facade on Lansdowne terrace have had a render applied which is detailed to appear like brickwork and is delaminating. Refer SK12

Elevation 01 - Guilford St

PRICE & MYERS

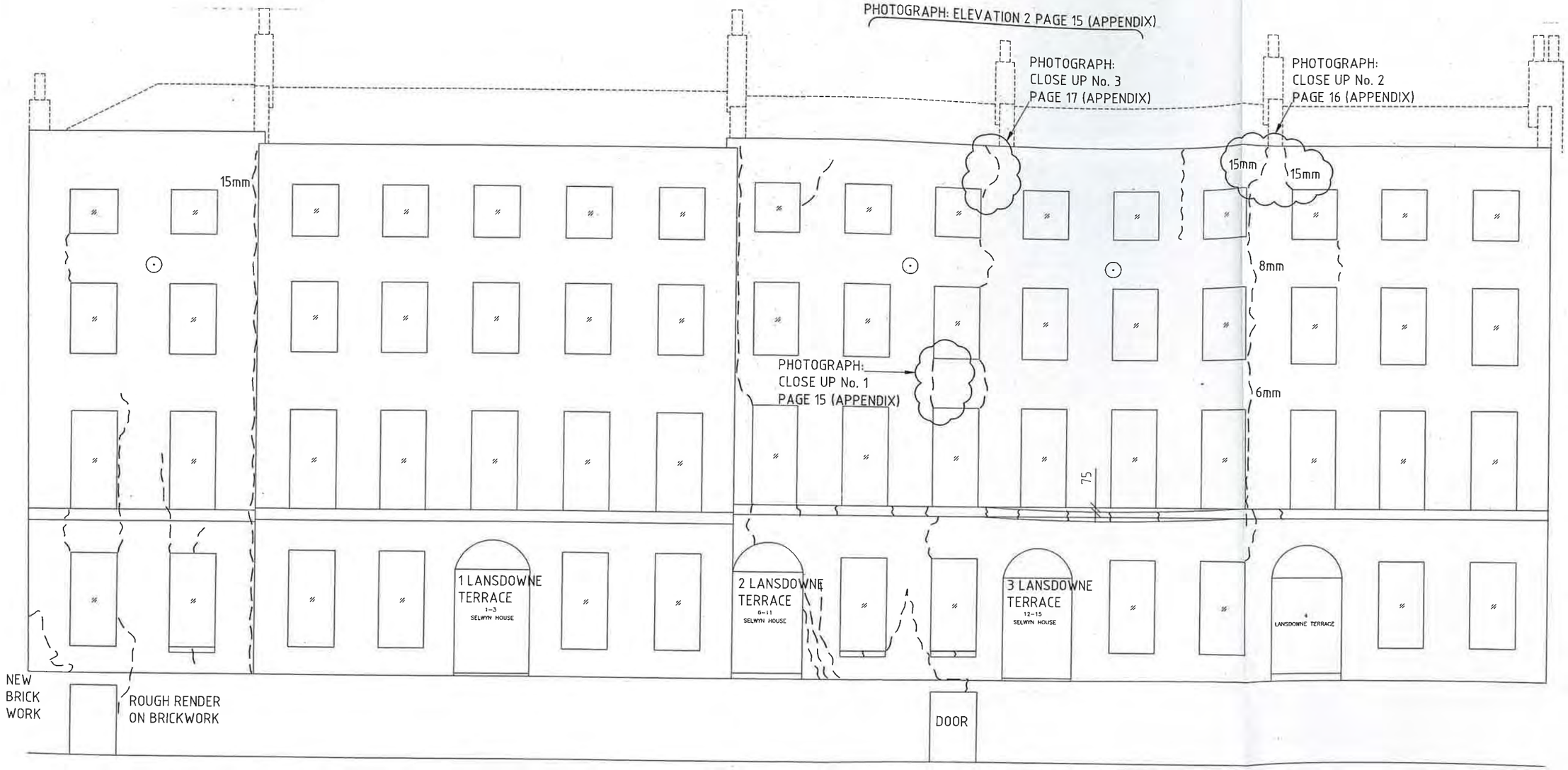
Job No.	31153	Page	SK12	Rev	1
Date	05/2024	Eng	AJT	Chd	AT
Job	Lansdowne Terrace And Guildford Street Townhouses				

LANSDOWNE TERRACE GEORGIAN TERRACES FACADE CONDITION MAP

(~ 1:100 @ A3)

KEY

(REFER SK11)



FRONT EXTERNAL ELEVATION LANSDOWNE TERRACE
CRACK SURVEY

LEGEND

CRACK LINE

⊙ - BULLSEYE ANCHOR

NOTES

REV.	DATE	DRAWN	CHKD.	APPD.	DESCRIPTION
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DATE: 02/06

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INTERNAL FRONT ELEVATION LANSDOWNE TERRACE CRACK SURVEY

LEGEND

CRACK LINE

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EXTERNAL FRONT ELEVATION GUILDFORD STREET
CRACK SURVEY

LEGEND

CRACK LINE

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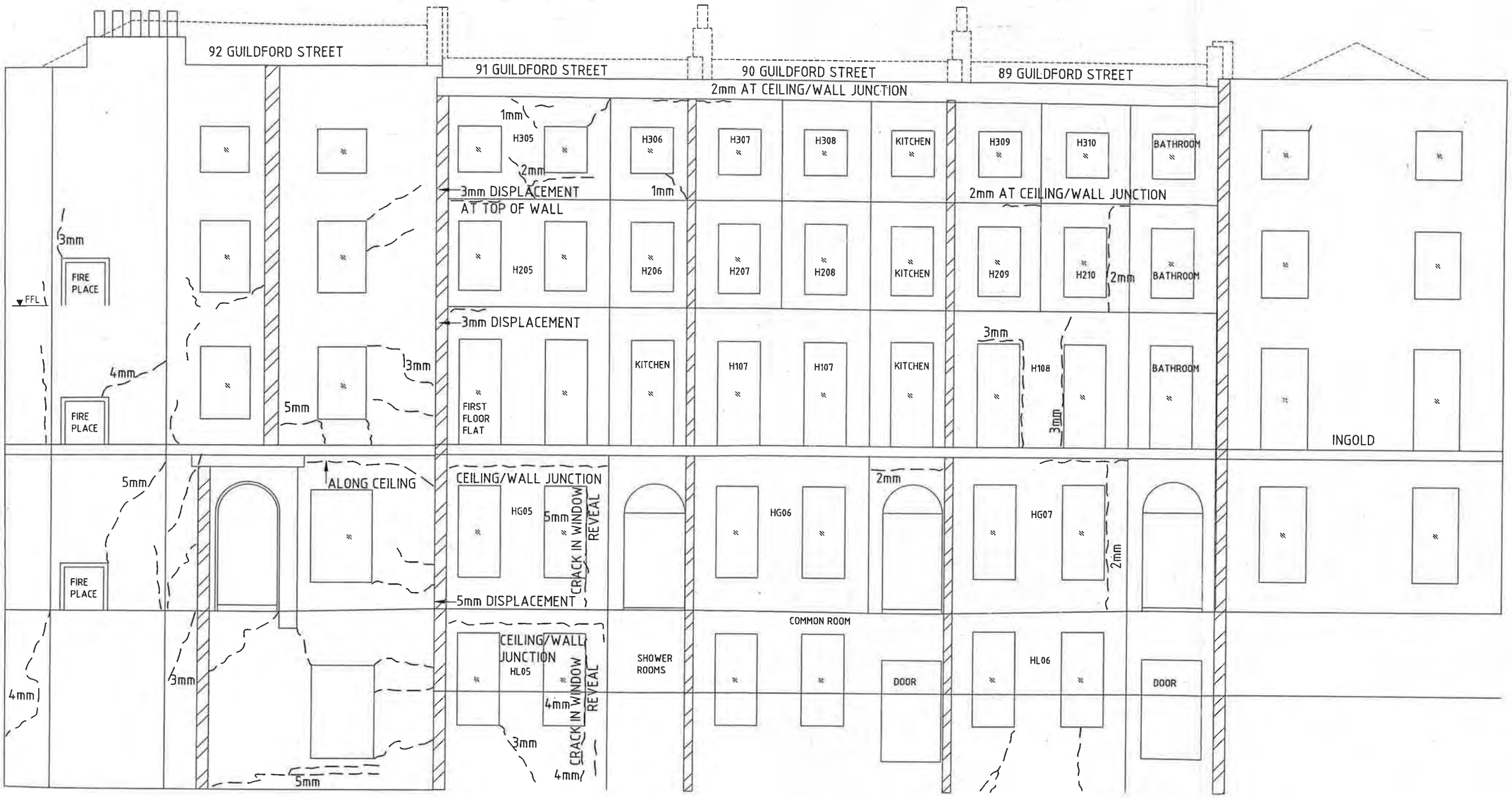

INTERNAL FRONT ELEVATION GUILDFORD STREET
CRACK SURVEY

LEGEND

CRACK LINE

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DATE	02/00