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STRUCTURAL ENGINEERS

Fraser House Outline Structural Engineering Proposals

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Date: 13/12/2022

Client: ARE Assets

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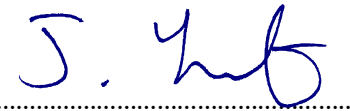
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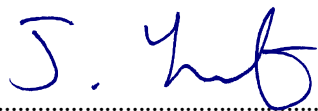
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Date: 13/12/2022



Rev	Issue	Date	Originator	Checker	Approver
P01	First Issue	25/11/2022	MWS	JDY	JDY
P02	Revised below ground drainage	13/12/2022	MWS	JDY	JDY

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1 Introduction

1.1 Brief

DYSE have been appointed by the ARE Assets to act as consulting structural engineers for the proposed development at Fraser House. The development proposes to convert an existing building into a mixed use development with a restaurant space at the upper ground and lower ground floor levels and residential accommodation to the first, second, third and fourth floor levels.

This report outlines the concept structural design for the proposed development and has been undertaken to RIBA work stage 2, concept design.

The purpose of this report is to provide outline structural design and specifications for informing architectural and services design and to inform a cost plan. The structural scheme considered is subject to detailed design and further consideration with both architectural and services design.

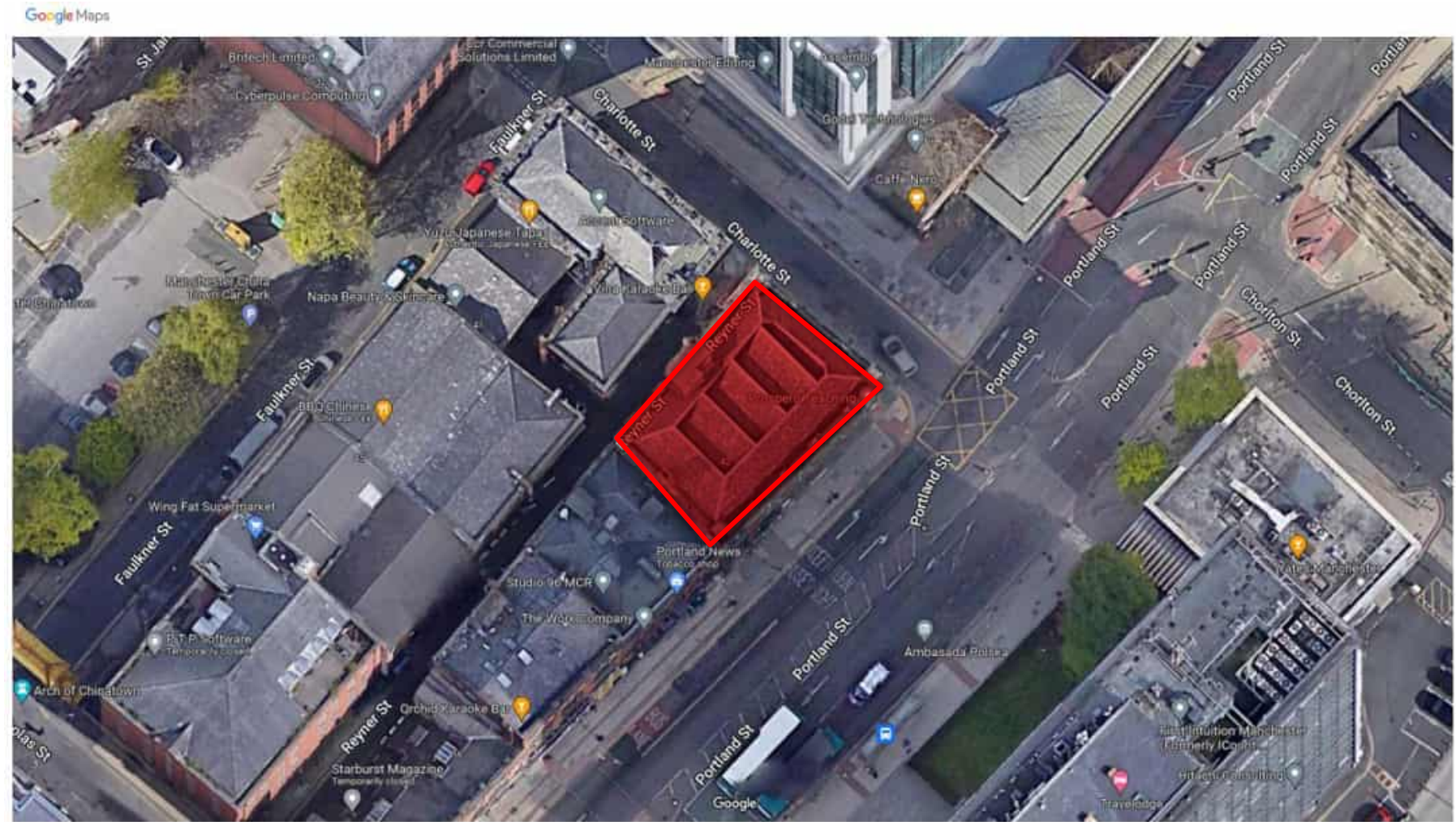


Figure 1 Aerial view of Fraser House.

2 Site

2.1 Location

The site is located within Manchester City Centre at 36 Charlotte Street, Manchester, M1 4FD.

The site is bounded by roads to three sides and is accessed via both Portland Street and Charlotte Street. The site is bounded to the north east by Charlotte Street and to the south west by adjoining buildings. Portland street bounds the site to the south east with Reyner Street bounding the site to the north west. Reyner Street is noted as being very narrow, with limited access.

2.2 Topography

The site is currently developed with the existing building occupying the entire footprint of the site. The site is generally level in two orthogonal directions.

2.3 Existing building

The existing building is a seven storey building; two basement stories and five above ground stories (including ground). The floors of the building are formed with wide plank timber floor boards spanning between primary timber beams supported on metal columns and external load bearing masonry walls. The roof is formed as a north light roof, with timber rafters spanning between timber purlins. Timber purlins span between metal beams supported on metal columns. Glazed elevations of the north light roof are supported on timber beams spanning between metal columns.

2.4 History

As per the findings of the preliminary heritage assessment undertaken by Paul Butler Associates, the building is thought to have originally been constructed in 1855 by Edward

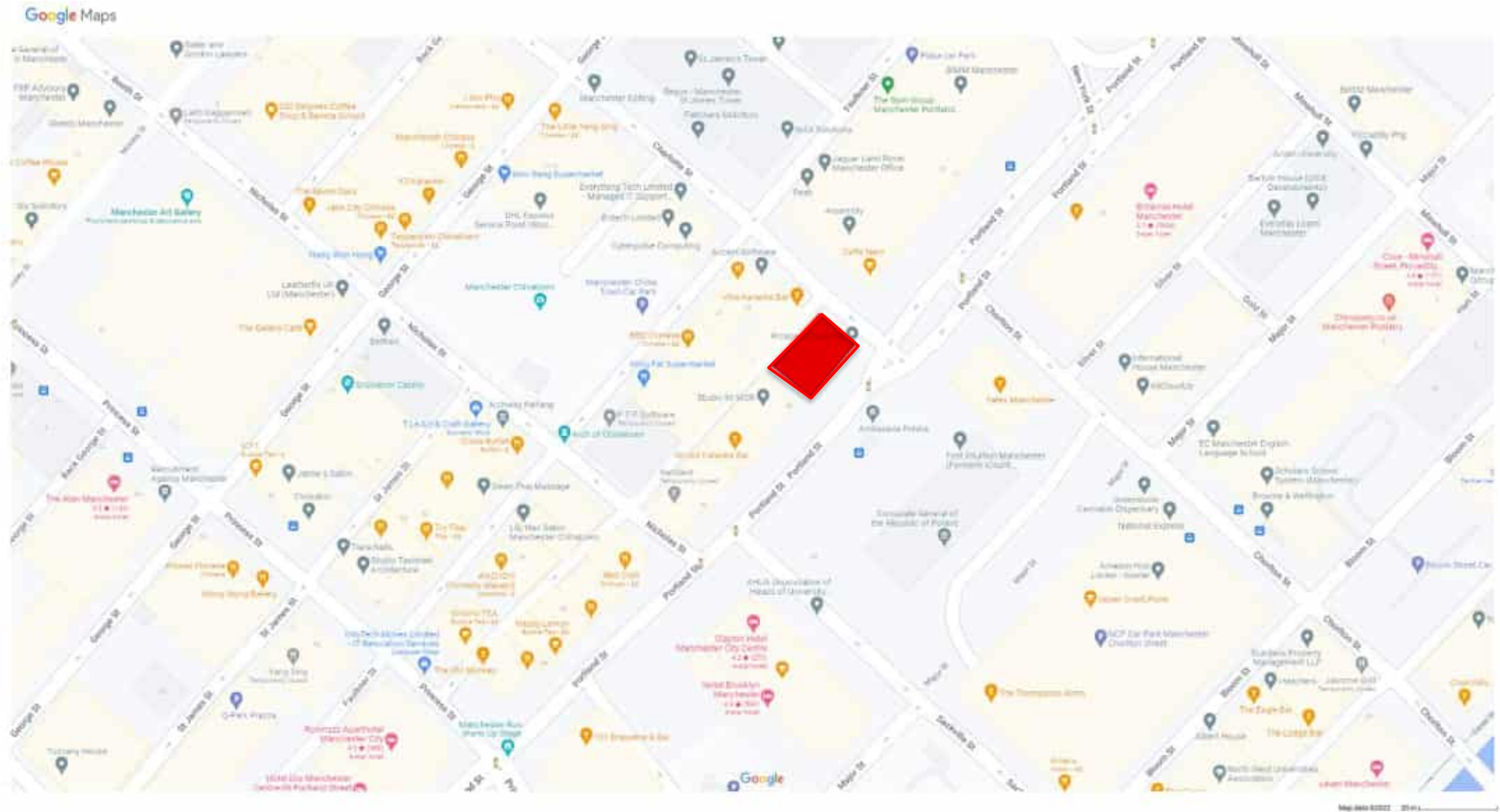


Figure 2 Site location.

Walters as a textile warehouse building in the Italianate style. Since, the building has been used for a variety of purposes including restaurant use across the lower ground, upper ground and first floors. The building has also been used for banking, art and exhibition space and offices across the upper floors.

The building is currently vacant and we understand that the building has been vacant for a number of years.

2.5 Geology

2.5.1 British Geological Survey (BGS) records

Review of publicly available BGS records indicates the following stratigraphy:

- Superficial deposits: Till, Devensian. (Clay)
- Bedrock: Chester formation, Sandstone.

Review of publicly available BGS borehole records from within a few hundred metres of the site indicates the stratigraphy to be CLAY to a depth circa 8.4m BGL, overlying SANDSTONE.

2.5.2 Phase 1 and 2 geo-environmental investigations

No physical geo-environmental investigations have taken place in relation to this project to date.

2.5.3 Radon

A review of BRE 211 and Radon Map UK indicates that the site is located in an area not requiring Radon protection.

2.5.4 Gas

Given the location of the site, ground gas has been considered and is unlikely to be an issue.

2.5.5 Contamination

Given the location of the site, contamination has been considered and is unlikely to be an issue.

3 Legislative requirements

All new structures and structural alterations within the UK are required to comply with the current Building Regulations.

The civil and structural aspects of the proposed development are covered under the following Approved Documents (AD) of the building regulations.

1. AD-A Structure
2. AD-B1 Fire
3. AD-H Drainage and waste disposal

The civil and structural design is to be in accordance with the ADs and their references.



Figure 3 General view of building from Portland Street.

4 Development constraints

4.1 Site location and logistics

The building currently occupies the entire footprint of the site, therefore requiring the majority of the delivery and offloading to be on either Portland Street or Charlotte Street.

Portland street is a major public highway within Manchester city centre, therefore to minimise the disruption caused by deliveries, long span heavy elements should be avoided as part of the structural design. Simple construction with shorter and lighter components is favoured to achieve maximum programme efficiencies.

As the footprint of the building occupies the entire site there are no laydown areas available on the site for material delivery. The contractor should consider just in time delivery strategies for all construction materials and waste removal.

The contractor should consider utilising a site waste management plan to ensure any recyclable material is taken to an appropriate waste management facility.

Alternatively, the contractor maybe able to utilise the existing loading bay within the

building at the lower ground floor level for deliveries and waste removal.

Due to the tight nature of the site, no site cabins are thought to be able to be located on site. The location of site welfare facilities is to be considered by the contractor when tendering for the project.

4.2 Site context

Charlotte Street bounds the site to the north, with Portland Street bounding the site to the east. Adjacent buildings bound the site to the south, with Reyner Street bounding the site to the west.

4.3 Highways

The footprint of the existing building occupies the entire site boundary.

Consideration should be given to the availability of using Portland Street or Charlotte Street for deliveries as both options would require a lane closure.

5 Architectural proposals

It is proposed to refurbish the existing building and change the use of the building into restaurant space at the lower ground and upper ground levels with residential accommodation to the first, second, third and fourth floor levels.

The architectural proposals are appended to this document within Appendix F -.

5.1 Existing structure

The proposed architectural design for the building proposes to retain much of the existing structure.

5.2 Roof

The existing roof structure is formed as a Northlight roof with vertical glazing to the northern roof pitches. Based on our knowledge of buildings of a similar age in a similar locality we have assumed that the roofs are formed as traditional cut timber roofs with slates, overlying a membrane, overlying timber rafters underdrawn by a lath and plaster ceiling.

5.2.1 First, Second, Third and Fourth Floors

The existing floors comprise of wide plank timber floor boards, spanning between primary timber beams spanning between metal columns and load bearing masonry walls.

5.2.2 Upper ground floor structure

The majority of the existing floor plate comprises of wide plank timber floor boards, spanning between primary timber beams spanning between metal columns and load bearing masonry walls.

The section of floor at the rear of the building to the left of the internal load bearing masonry spine wall is formed as a jack arch floor, with masonry jack arches spanning between metal

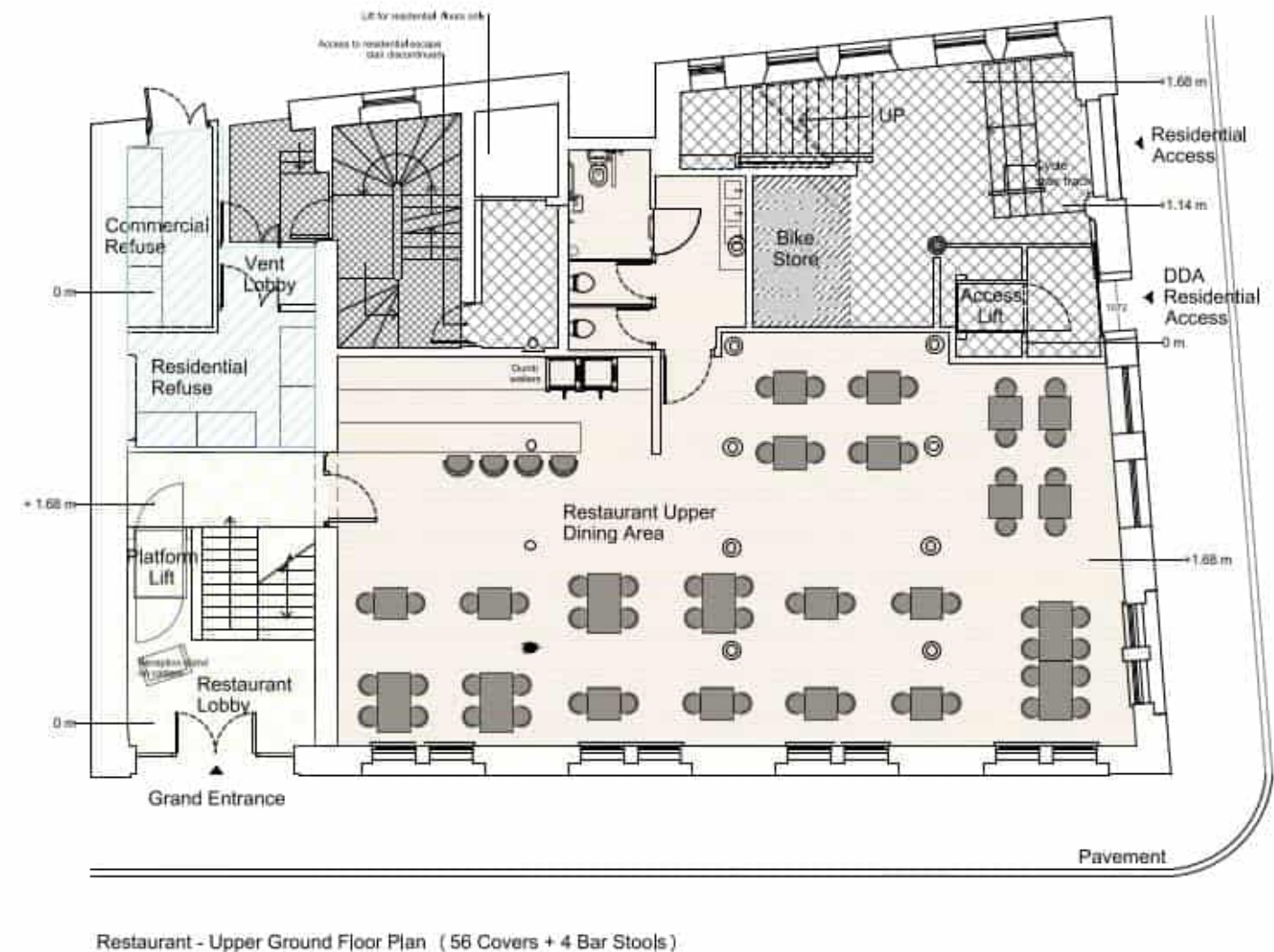


Figure 4 Extract from Space Studios drawing 2022-1008M-013 Rev E Proposed upper ground floor level.

beams which span between load bearing masonry walls. A concrete slab appears to span over the jack arch floors, however no opening up works have been undertaken to confirm the build up of the jack arch floor as part of the initial survey works.

5.2.3 Lower ground floor structure

The existing floors comprise of wide plank timber floor boards, spanning between primary timber beams spanning between metal columns and load bearing masonry walls.

5.2.4 Basement

The existing basement floor slab is anticipated to be formed as a ground bearing slab, cast directly onto the natural strata on site. No intrusive opening up works have been undertaken to confirm the build up of the existing slab.

6 Load appraisal

A load appraisal has been undertaken to assess the vertical load capacity of the existing structure to confirm the viability for the reuse of the existing structure as part of the proposed refurbishment works. Refer to Appendix E -for the findings of the initial load appraisal.

7 Considerations for change of use

7.1 Superstructure

The existing structure is to be retained and reused where possible within the proposed refurbishment works.

A sketch scheme, conveying the structural strategy is appended to this document within Appendix C -

The proposed refurbishment works aim to retain as much of the existing structure as is feasible with new alterations being light touch and reversible. This is considered further in chapter 9.

7.1.1 Roof

- Installation of new smoke vent
- Installation of new access hatch
- Installation of new ceiling
- Installation of new secondary glazing to northlight windows

The main structural interventions for the roof are discussed further within section 9.

7.1.2 First, Second, Third and Fourth Floors

- New smoke vent and services risers voids
- New insulation, services, acoustical treatment and fire protection
- New non structural partitions built up off the existing timber floor.

The main structural interventions for the upper floors are discussed further within section 9.

7.1.3 Upper ground floor structure

- New smoke vent and services risers voids

- New insulation, services, acoustical treatment and fire protection
- New non structural partitions built up off the existing timber floor.

The main structural interventions for the upper floors are discussed further within section 9.

7.1.4 Lower ground floor structure

- New smoke vent and services risers voids
- New insulation, services, acoustical treatment and fire protection
- New non structural partitions built up off the existing timber floor.

The main structural interventions for the lower ground floor are discussed further within section 9.

7.1.5 Basement

- New waterproofing strategy
- New slab insulation
- New fire compartmentation walls
- New opening to existing load bearing masonry spine wall

The main structural interventions for the basement are discussed further within section 9.

7.2 Substructure

No intrusive ground investigations have been undertaken to confirm the nature and depth of the existing foundations. It has been assumed that the foundations are formed from corbeled brick footings founded directly on the natural strata below the site. The existing foundations appear serviceable with no obvious signs of foundation movement having occurred, based on the findings of the visual walkover survey.

A load appraisal has been undertaken, with an overall net reduction in loading as a result of the proposed alteration works. Due to this net

overall reduction, it is believed the existing foundations will remain serviceable thus no underpinning works are deemed necessary as part of the proposed refurbishment works.

7.2.1 Stability

Stability against lateral forces is achieved by external wall panels spanning vertically between floor and roof plates. Roofs and floors will contribute to the lateral stability of the building, by acting as diaphragms distributing lateral forces between buttressing load bearing masonry walls which in turn act as shear walls to transfer lateral loads down to the foundations.

The existing stability system is to be retained and utilised within the refurbishment works.

7.3 Retaining structures

The perimeter walls to the lower ground floor and basement walls are thought to be formed as solid load bearing masonry. No intrusive opening up works have been undertaken to confirm the nature of the existing basement retaining walls.

7.4 Disproportionate collapse

Part A3 of Approved Document A (AD-A) of the building regulations considers disproportionate collapse.

The existing building is seven stories, two basement stories and five above ground stories. The upper floors have historically been used as a warehouse, office and restaurants.

The lower ground floor has been used as a restaurant, with the basement understood to have historically been used for storage and plant.

AD-A classifies 'warehouses and industrial buildings over 4 stories' within Consequence Class 3.

AD-A classifies 'offices greater than 4 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A classifies 'retailing premises greater than 3 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A classifies 'Hotels, flats and apartments and other residential buildings greater than 4 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A states that for buildings intended for more than one type of use the Consequence Class should be the most onerous type. Therefore, the existing building is classed within Consequence Class 3.

The change of use converts the building with restaurant use at the lower ground, upper ground and first floor level and residential use from second floor up to the fourth floor.

AD-A classifies 'retailing premises greater than 3 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A classifies 'Hotels, flats and apartments and other residential buildings greater than 4 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A states that for buildings intended for more than one type of use the Consequence Class should be the most onerous type. Therefore, the proposed building is classed within Consequence Class 2b.

Chapter 2.6 of BCS Technical Guidance Note 21 considers conversions, alterations and extensions to existing buildings including change of use. Regulation 5 considers that given "(b) the building contains a flat where previously it did not" a material change of use applies.

Regulation 6 requires that:

Where a material change of use takes place compliance works aren't required due to a change of use involving category (b), but additional works and/or checks on the structure maybe necessary where 'building work' is being undertaken.

No significant building work is considered as taking place, therefore no additional structural requirements are required with regards to disproportionate collapse. This approach should be confirmed acceptable by building control.

The proposed building is class 2b. AD-A states that there are several ways of justifying the existing building for the proposed change in consequence class as outlined below in order of preference:

- Consider notional element removal (70m² or 15% of the floor area at that storey)
- As there is a regular column grid within the building it is conceivable that notional element removal achieved. This is to be further investigated.
- Check the capacity of the existing columns as key elements.
- This would require further intrusive investigations to be undertaken to confirm the thickness and capacity of the existing columns.
- Check the existing connections between the timber beams and metal columns.
- Given the age of the building it is unlikely that the connections will be suitable to provide both vertical and horizontal tying action, and would require significant strengthening.

Disproportionate collapse will be further considered outside of this document.

7.5 Fire

For a residential building of this type, AD-B requires structural elements to have a minimum of 60 minutes fire resistance. Roof beams do not need to be fire rated if it is ensured that cladding cannot fall beyond the site boundary during a potential fire.

Fire protection will typically be provided to steelwork/metal work with intumescent paint as it is assumed that the existing metalwork will be exposed. No architectural information detailing proposed finishes is currently available.

Fire protection to timber floors and beams will be typically provided by encasing floors and beams with fire rated plasterboard.

The exact fire strategy is to be further considered as the design progresses. Specific guidance is to be provided by the fire consultant.

7.6 Movement, deflection and tolerances

7.6.1 Primary movement joints

Structural movement joints are often provided when floor plates are particularly large, or where there are sudden changes in structural form, number of storeys or foundation type. This is to control differential movements, whether from structural, thermal or moisture changes.

Given the historic uniform nature of the building, no primary movement joints are deemed necessary.

7.6.2 Secondary movement joints

Secondary movement joints are used to divide structural elements into smaller elements to deal with the local effects of temperature and moisture content.

As no new extensions are to be added to the building, secondary movement joints are not deemed necessary.

7.6.3 Settlement

A review of the publicly available British Geological Survey Records indicates that the superficial deposits on site are formed as clay. Settlements within clay occur over a number of years as the moisture is squeezed out of the clay due to the compressive loading applied.

Given the age, and previous industrial uses of the building, we are of the opinion that any likely settlement of the foundations would have likely already occurred. In addition as there is an overall net unloading of the building, further settlement is unlikely to occur.

7.7 Waterproofing

Waterproofing should be designed to BS 8102:2009 protection of below ground structures against water from the ground.

As the lower ground floor and basement levels are to be formed as habitable space, two waterproofing systems are required. Given the existing nature of the existing basement structure, structurally integral systems are not deemed viable, thus a combination of a barrier and drained cavity system will be required.

Waterproofing should be designed and detailed by a specialist supplier, with the final solution agreed on by the architect, engineer, client and specialist supplier.

7.8 Stairs

A central stone stair case runs from the lower ground floor up to the fourth floor. Flanking load bearing masonry walls and a central masonry spine wall provide support to the stone stair case which are to be retained as part of the proposed alteration works.

In addition the existing timber stairs adjacent to the Charlotte Street entrance are to be retained.

New timber staircases are to be include within the design of the new restaurant entrance via Portland Street.

New timber stairs maybe necessary to provide access to the basement space as the current staircase is unlikely to meet current regulations.

7.9 Lifts

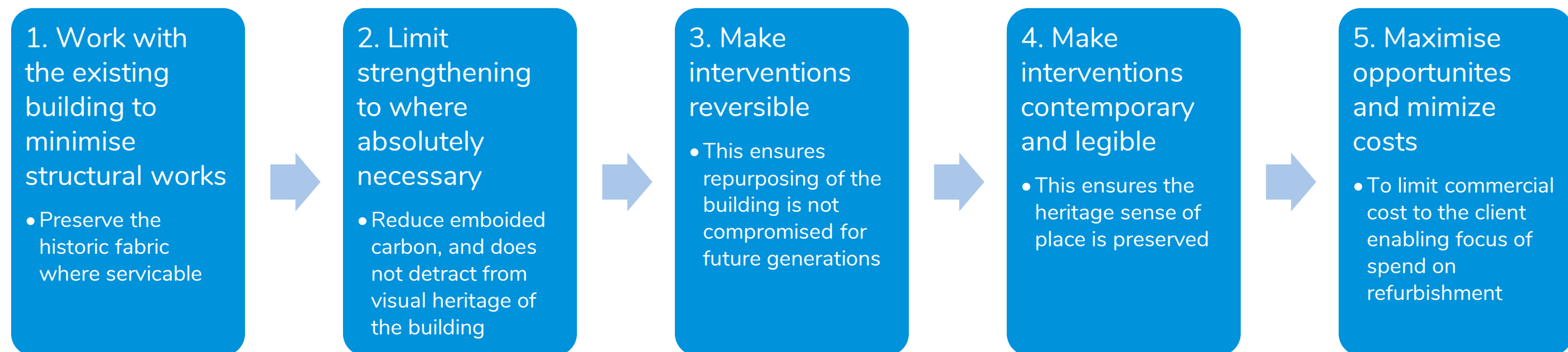
It is anticipated that new platform lift will be included as part of the proposed alteration works, within the original lift shaft. It is anticipated that new structural support will be required to support the new platform lifts. The exact arrangement is to be further considered once an exact lift specification is provided.

Two new platform lifts will be installed to provide DDA compliant access to the restaurant and accommodation spaces. Voids for the new lift openings will be trimmed out with new structural framing. The exact support arrangement for the new platform lifts will be confirmed following the confirmation of the exact platform lift specification.

8 Conservation approach

There are several interventions proposed to the existing building fabric, as summarised below. The aim to the interventions will be to provide low embodied carbon and cost effective structural refurbishment whilst protecting and preserving the historic building fabric.

The key structural design principles considered in this design, in order or priority, are:



9 Structural interventions

Intervention reference	Description	Floor/Level	Demolition / addition / reinstatement	Structural approach	Structural principles	Further work required
1	Formation of new smoke vent void within roof.	Roof	Demolition	Smoke vent to be positioned to avoid cutting through primary roof structure. Opening within roof to be trimmed out with new structural timber.	1.Smoke vent positioned to avoid cutting through primary structure. 2.Minimal timber trimming required for new smoke vent.	
2	New secondary glazing to be added to northlight roofs.	Roof	Addition	Secondary glazing to be added to glazed sections of northlight roof.	1.Historical glazing retained. 3.New secondary glazing to be positioned in front of heritage asset.	
3	New plasterboard ceiling to be installed to underside of vaulted roof space.	Roof	Demolition	Existing lath and plaster ceiling to be carefully removed and replaced with new plasterboard ceiling and insulation.	3. Original lath and plaster ceiling maybe reinstated if desirable.	
4	Formation of new smoke vent void within fourth, third and second floor plates .	Fourth, third and second floors	Demolition	Smoke vent to be positioned to avoid cutting through primary floor structure. Opening within floor to be trimmed out with new structural timber.	1.Smoke vent positioned to avoid cutting through primary structure. 2.Minimal timber trimming required for new smoke vent.	
5	Formation of new service riser void within fourth, third and second floor plates .	Fourth, third and second floors	Demolition	Service riser to be positioned to avoid cutting through primary floor structure. Opening within floor to be trimmed out with new structural timber.	1.Servce riser positioned to avoid cutting through primary structure. 2.Minimal timber trimming required for new service riser.	
6	Intumescent paint to structural metal work including columns and arched frames	Roof, fourth third, second, first, upper ground, lower ground and basement	Addition	Existing metal work to be cleaned with a new intumescent paint applied to the metal work to provide fire protection.	1.Preserve the historic fabric of the building.	
7	New lift to be installed within the original lift shaft.	Roof, fourth third, second, first, upper ground and lower ground.	Addition	Existing lift to be removed with new lift and running gear to be installed within the original lift shaft void.	1. Preserve the historical building fabric (original lift shaft masonry). 3. Make interventions reversible. 4.Make interventions contemporary and legible.	
8	New ceiling, insulation, services, acoustical treatment and fire protection to all floors.	Roof, fourth, third, second, first, upper	Addition	The original wide plank floor boards are to be retained with the surface sanded. New insulation, acoustical treatment, services and	1. Preserve the historical building fabric (wide plank floor boards) 3. Make interventions contemporary and legible	

Intervention reference	Description	Floor/Level	Demolition / addition / reinstatement	Structural approach	Structural principles	Further work required
		ground and lower ground		ceiling to be installed to the underside of the wide plank floor boards.		
9	Trimming for new platform lift.	First floor and upper ground floor	Demolition.	New platform lift opening to be trimmed out with new structural timber as necessary.	1. Platform lift positioned to avoid cutting through primary structure. 2. Minimal timber trimming required for new service riser.	
10	Trimming for new dumb waiter openings within floor plate.	Upper ground floor	Demolition	New dumb waiter openings to be trimmed out with new structural timber as necessary.	1. Dumb waiter positioned to avoid cutting through primary structure. 2. Minimal timber trimming required for new service riser.	
11	New partitions to refuge store.	Lower ground floor & Basement	Addition	New blockwork partitions to be built up off the existing floor for the new refuge stores.	3. Partition intervention is reversible. 4. Partition intervention is contemporary and legible.	
12	New raised floor to new restaurant lobby area.	Upper ground floor	Addition	New raised timber joists floor to provide new access to restaurant area at the upper ground floor level	3. Floor intervention is reversible. 4. Floor intervention is contemporary and legible.	
13	New DDA compliant access from Charlotte Street.	Lower ground floor	Demolition	New DDA compliant access to be created within the external load bearing masonry wall facing Charlotte Street.	1. Location of new opening positioned to preserve as much of the historic fabric as possible. 4. New access opening to be contemporary and legible.	
14	New access stair void to lower ground floor.	Upper ground floor	Demolition	New stair void to be provided within the upper ground floor and trimmed out with new structural timber trimming.	1. Stair void positioned to avoid cutting through primary structure. 2. Minimal timber trimming required for new stair void.	
15	New openings within load bearing masonry spine wall	Lower ground floor & Basement	Demolition	New structural openings to be created within the load bearing masonry spine wall to accommodate circulation.	1. Location of new opening positioned to preserve as much of the historic fabric as possible. 4. New access opening to be contemporary and legible.	
16	New waterproofing to retaining walls and basement slab.	Lower ground & Basement	Addition	A new waterproofing system will be required to the external loadbearing masonry walls at the lower ground floor and basement level along with the basement slab.	1. Existing basement retaining walls to be retained to preserve the historical building fabric.	

Intervention reference	Description	Floor/Level	Demolition / addition / reinstatement	Structural approach	Structural principles	Further work required
					4. New waterproofing system to be applied over the masonry walls to be contemporary and legible. .	
17	New fire compartmentation walls to basement.	Basement	Addition	New non-structural blockwork partitions are to be built up off the existing basement slab to provide fire compartmentation to the plant areas within the basement.	3. Partition intervention is reversible. 4. Partition intervention is contemporary and legible.	

10 Below ground drainage

Reference should be made to DYSE Technical note LM21346-DYSE-XX-ZZ-TN-S-0003 for the proposed below ground drainage commentary appended to this report.

11 Construction considerations

The scheme is relatively straightforward, with the majority of works within common building practices.

It should be noted that heavy materials (such as stacks of plasterboard) should not be placed on the existing floors.

Debris should be removed from the basement space, along with the demolition of the existing dividing wall within the basement space, are to be removed to allow for an uninterrupted survey of the basement areas to be undertaken.

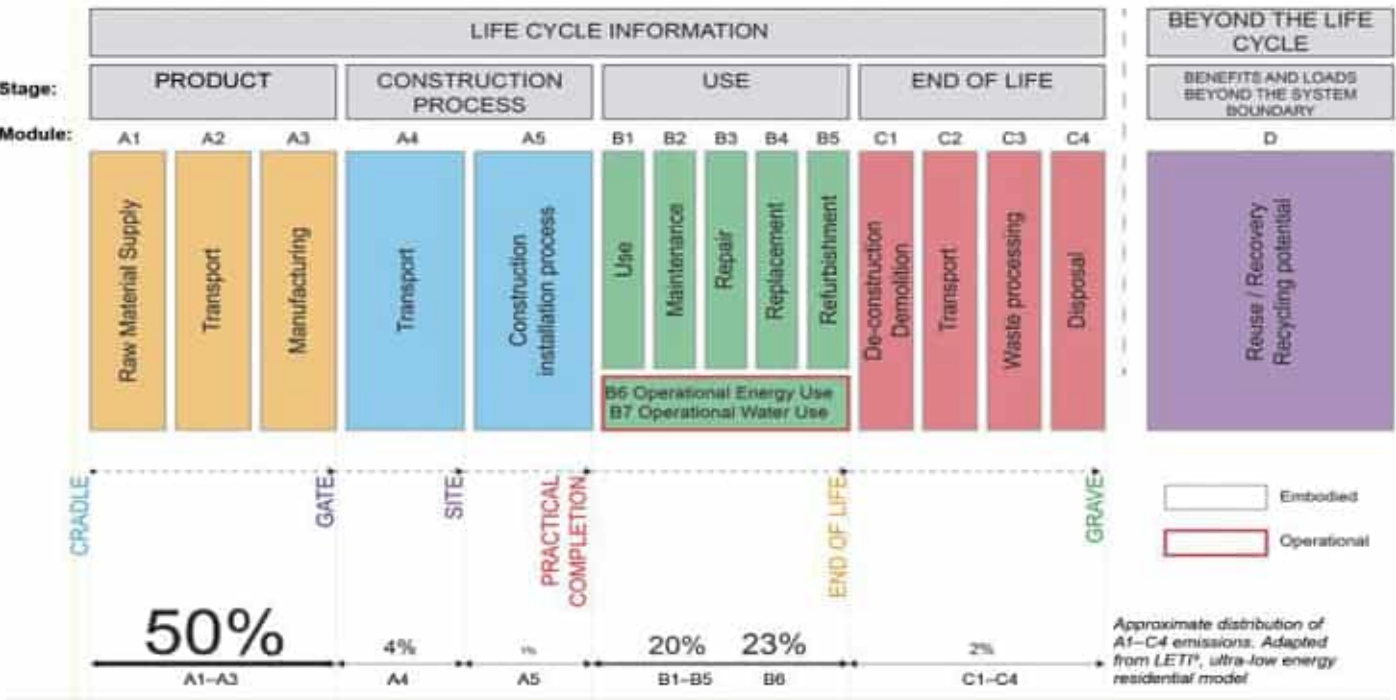


Figure 5 Whole life cycle carbon (from IStructE How to Calculate Embodied Carbon)

12 Health and safety considerations

Significant and unusual hazards within the project include:

- Voids within the upper ground floor and the second floor structure.
- The external stairs have not been accessed and are assumed unsafe.
- Risk of asbestos within the existing fabric of the building.
- Proximity to neighbouring buildings.
- Temporary loading on existing timber floors during construction.
- Working in close proximity to the highway.
- Working within a constrained site.

13 Sustainability

13.1 Overview

The activities of the construction industry have a clear and direct impact on the environment. Buildings and construction activities account for nearly 40% of energy-related carbon dioxide emissions which have contributed to the current climate emergency. Over the next few years we anticipate that embodied carbon in structures will become legislated as we approach a NetZero target. In a building, up to **55%** of the whole life carbon is **A0-A5 capital carbon** in the form of **raw material, transport, manufacture and construction**. In the context of structural design, reduction in the embodied carbon of the structure can have a significant impact on the whole life carbon of a structure.

We are committed to ensuring that our engineering activities and designs have a positive impact on the environment. We believe

collaboration with all members of the design team is critical, with early engagement offering the greatest opportunity to derive well-considered structurally and carbon efficient solutions.

13.2 Project approach

We have not been made aware of any specific project design philosophy for sustainable construction.

With regards to sustainability there are several ways that a well-designed structure can help contribute to a building with responsible environmental credentials.

Clearly a well-refined solution, which as a result uses less raw-material, is important in reducing the environmental impact of a scheme.

Providing as much flexibility of layout as possible, in this instance in the form of non-structural internal partitions, will ensure that the building can be adapted to suit potential future changes with less likelihood of wholesale re-construction necessary in the future.

The use of materials and forms of construction with good thermal properties and efficiencies can improve the whole life performance of a structure.

Locally sourcing materials and labour will significantly reduce transport requirements greatly improving the carbon footprint of the build process.

Primarily, re-use of an existing building is the best approach to reducing carbon within development projects. The architectural proposals aim to retain as much of the historic fabric of the building as possible, thereby reducing the embodied carbon of the building through reuse. As such, this scheme is considered favourably.

14 Contractor's designed portions

There are several contractor's designed portions (CDP) on this project. These should be designed and detailed by the contractor and/or their specialist suppliers. The CDP items on this project include:

- Timber stairs
- Waterproofing
- Steel to steel connections

Appendix A - Surveys, investigations and searches schedule

The below table identifies surveys, investigations and searches which are likely to be required. Note that some of these surveys have already been undertaken or commissioned.

Survey / Investigation / Searches etc.	Scope	Notes
Topographical survey.	Topographical survey to convey levels of existing site.	Received.
Timber rot and damp survey	Assess the condition of all existing structural timber to be retained as part of the proposed refurbishment works.	Received. To be further reviewed.
CCTV below ground drainage survey.	Verify size, levels, positions and condition of existing drainage between site and the sewerage network.	Procured Awaiting results.
Below ground drainage records.	Asset records from United Utilities.	Required
Asbestos survey.	Asbestos survey of the existing building.	Required – by others
Services records.	Statutory services records for connection to the site including water, gas, electricity, telecommunications.	Required – by others
Adjacent building archive records.	Identify and retrieve construction drawings from the local authority building control.	To be further considered

Note: There may be other surveys, investigation and searches required. These will be confirmed as design progresses.

Appendix B - Design criteria

Codes of practice and references

Eurocodes

The following key standards (including relevant National Annex information, codes or practice and references) are to be used in the design:

1. BS EN 1990:2002 Eurocode – Basis of Structural Design.
2. BS EN 1991-1-1:2002 Eurocode 1: Actions on Structures. General actions – Densities, self-weight, imposed loads for buildings.
3. BS EN 1991-1-2:2002 Eurocode 1: Actions on structures. General actions – Actions on structures exposed to fire.
4. BS EN 1991-1-4:2005 Eurocode 1: Actions on Structures. General actions – Wind actions.
5. BS EN 1992-1-1:2004 Eurocode 2: Design of concrete structures. General rules and rules for buildings.
6. BS EN 1992-1-2:2004 Eurocode 2: Design of concrete structures. General rules – Structural fire design.
7. BS EN 1993-1-1:2005 Eurocode 3: Design of steel structures. General rules.
8. BS EN 1996-1-1:2005 Eurocode 6: Design of Masonry structures. General rules.
9. BS EN 1997-1:2004 Eurocode 7: Geotechnical design. General rules.
10. BS 8102:2009 Protection of below ground structures against water from the ground.

Building Regulations

The following building regulations are to be used:

1. AD-A Structure
2. AD-B1 Fire
3. AD-H Drainage and waste disposal

Design loadings

Variable loads: variable floor loading

Given the intended uses, the following minimum imposed floor loads are proposed as per BS EN 1991-1-1:2002 Eurocode 1:

Code	Description	qk, UDL (kN/m ²)	Qk (kN)
A1	Areas for domestic and residential activities	1.5	2.0
C11	Cafes and restaurants	2.0	3.0
C31	Corridors and hallways	3.0	4.5
C32	Stairs and landings in blocks of flats	3.0	4.0
E204	Kitchens	3.0	4.5
E213	Plant rooms	7.5	4.5
F	Roof's accessible for maintenance only.	0.6	0.9

Variable loads: horizontal loads for barriers, parapets and balustrades

Given the intended uses, the following minimum imposed floor loads are proposed as BS EN 1991-1-1:2002 Eurocode 1.

Code	Description	Line load (kN/m)	UDL on infill (kN/m ²)	Point load on infill (kN)
Ai	All areas within or serving exclusively one dwelling excluding external balconies	0.36	0.50	0.25
Aii	Residential areas not covered in i	0.74	4.00	0.50

N.B. Line load applied at 1.1m above datum. Minimum barrier height 900mm internally and 1100mm externally.

Variable loads: snow loading

The variable load capacities of 1.50 kN/m² used for flat roofs will provide sufficient capacity for snow loads of a 50 year return period.

The variable load capacities of 0.60 kN/m² used for pitched roofs will provide sufficient capacity for snow loads of a 50 year return period.

Permanent loads

The structural self-weight will be calculated as per members, components and systems.

Performance criteria

Design life

The design life of a building can be defined as the period of use intended by the designer as agreed with the client. It should be noted that the design life of a new building component might not be the same as the design life for the building. Three categories arise for defining the durability of building elements:

- Replaceable: shorter life than the building life with replacement envisaged
- Maintainable: will last for the life of the building with periodic treatment
- Lifelong: will last for the life of the building

The design life for new structure elements is to be 50 years.

Vertical deflection limits

Element	Total load deflection	Variable load deflection
Structural steel elements generally	Span / 200	
Structural steel elements supporting brittle finishes	Span / 250	Span / 360
Structural steel elements supporting glazing		Span / 500

Appendix C - Scheme sketches

LM21346-DYSE-XX-ZZ-SK-S-0001 P01 Existing Lower Ground Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0002 P01 Existing Upper Ground Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0003 P01 Existing First Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0004 P01 Existing Second Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0005 P01 Existing Third Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0006 P01 Existing Fourth Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0020 P01 Basement level indicating lower ground floor structure over

LM21346-DYSE-XX-ZZ-SK-S-0021 P01 Lower ground floor indicating upper ground floor structure over

LM21346-DYSE-XX-ZZ-SK-S-0022 P01 Upper ground indicating first floor structure over

LM21346-DYSE-XX-ZZ-SK-S-0023 P01 First floor structure indicating second floor structure over

LM21346-DYSE-XX-ZZ-SK-S-0024 P01 Second floor structure indicating third floor structure over

LM21346-DYSE-XX-ZZ-SK-S-0025 P01 Third floor structure indicating fourth floor structure over

LM21346-DYSE-XX-ZZ-SK-S-0026 P01 Fourth floor indicating roof structure over

- General notes
1. Do not scale from these drawings.
 2. Structure shown is based on the findings of the walk over survey undertaken on 29/06/22
 3. No intrusive investigations were undertaken, additional defects maybe present within the structure.
 4. Lower basement not surveyed due to time constraints and lack of lighting.

Structural form

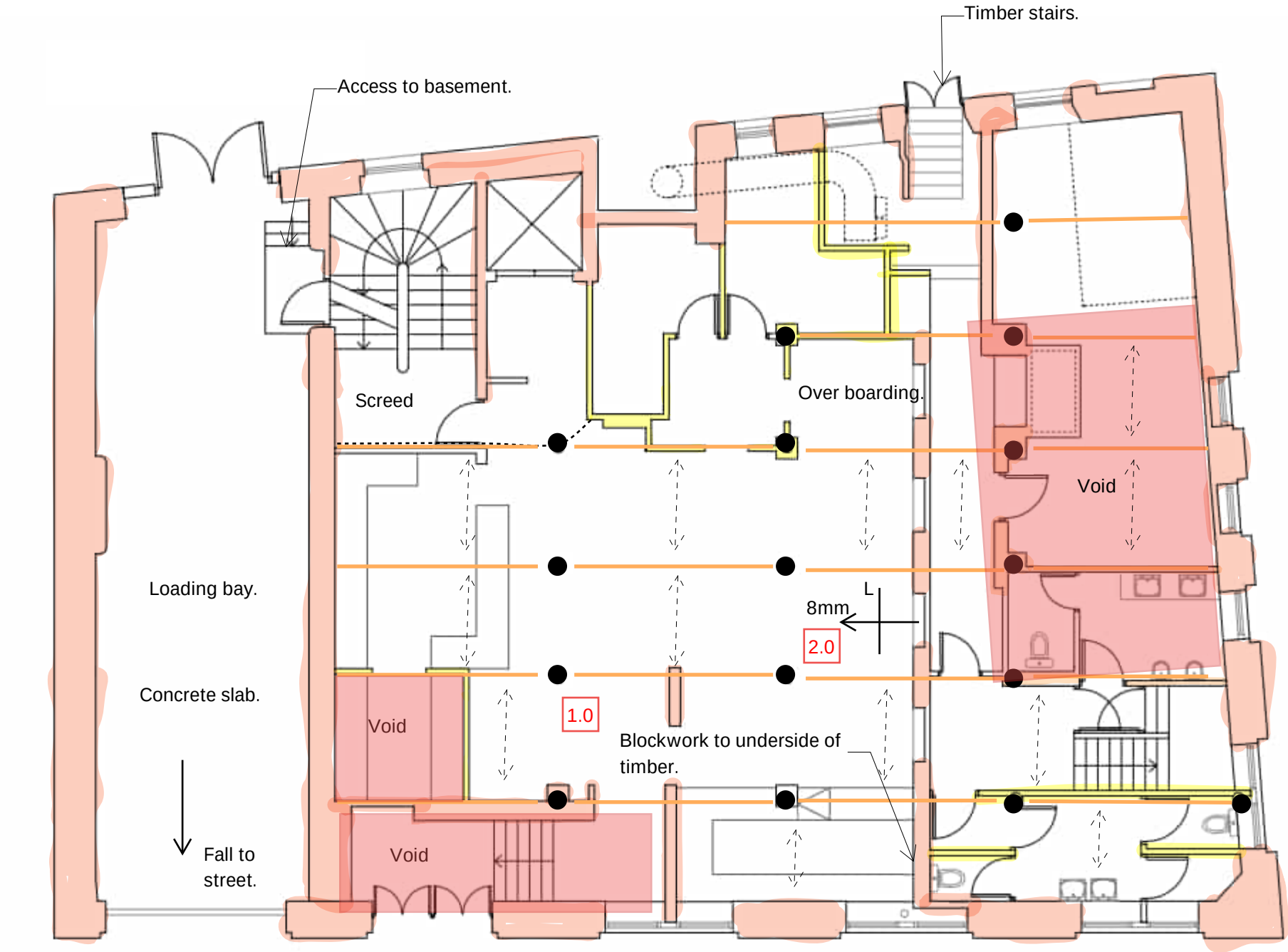
Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls

- General Floor Commentary
1. Floor generally level, with minor undulations noted predominately at board joints.
 2. Columns generally in fair condition given the age of the building.
 3. Existing floor boards circa 70mm thick.
 4. Boxing to timber beams recessed, unclear what size and depth.
 5. Overboard thickness 20mm.
 6. Flooring has local over boarding.
 7. Condition of lintels unknown, no access.
 8. Ceiling infill, assume plaster board.

- Defects Reference
- 1.0 - Debris pile preventing access.
 - 2.0 - Fall to existing floor (mm)

- Structural Legend
- Denotes existing 250mm x 340mm deep timber beams
 - Denotes existing stud work
 - Denotes existing masonry
 - Denotes steel column with circumference 640mm
 - Denotes void area

Project:	Fraser House	Eng:	JB
Title:	Existing Lower Ground Floor Structural Layout	Date:	Aug '22
No:	LM21346-DYSE-XX-ZZ-SK-S- 0001	Rev:	P01



Existing Lower Ground Floor Layout Indicating Ground Floor Structure Over

NTS.



Various Lower Ground Photos.

General notes

1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/06/22
3. No intrusive investigations undertaken, additional defects maybe present within the structure.

Structural form

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls

General Floor Commentary

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 70mm thick.
4. Boxing to timber beams recessed, unclear what size and depth.
5. Overboard thickness 20mm.
6. Flooring has local over boarding.
7. Condition of lintels unknown, no access.
8. Ceiling infill, assume plaster board.

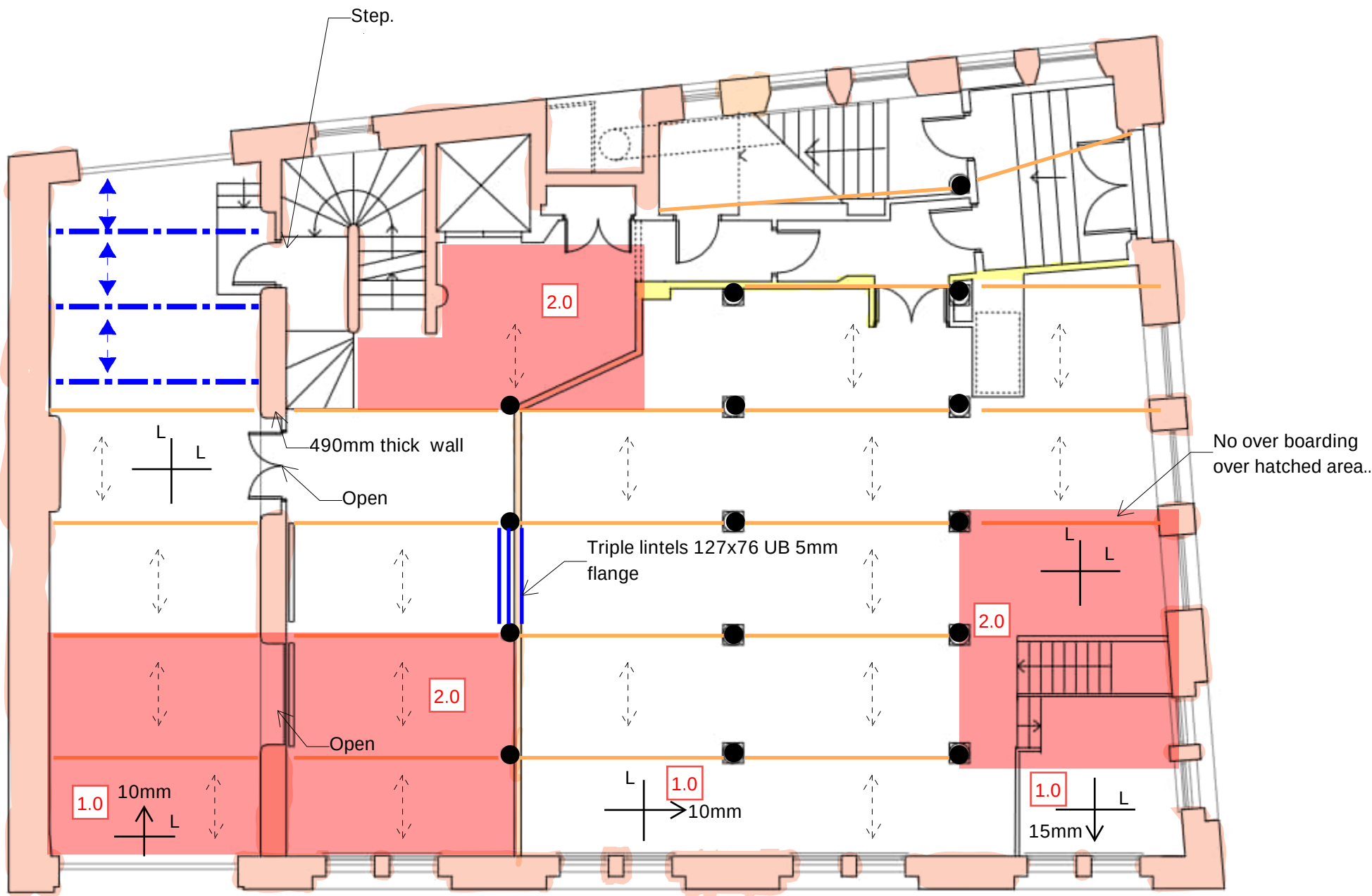
Defects Reference

1.0 - Fall to existing floor (mm).
2.0 - No over boarding (red hatch)

Structural Legend

- - Denotes existing metal columns.
- - Denotes timber beams.
- - Denotes existing masonry.
- - Denotes existing steel beam.
- - Denotes existing stud work.
- - Denotes existing floor span (70mm thick & 222mm wide)
- - Denotes existing Jack arch floor span.

Project:	Fraser House	Eng:	JB
Title:	Existing Upper Ground Floor Structural Layout	Date:	July'22
No:	LM21346-DYSE-XX-ZZ-SK-S-0002	Rev:	P01

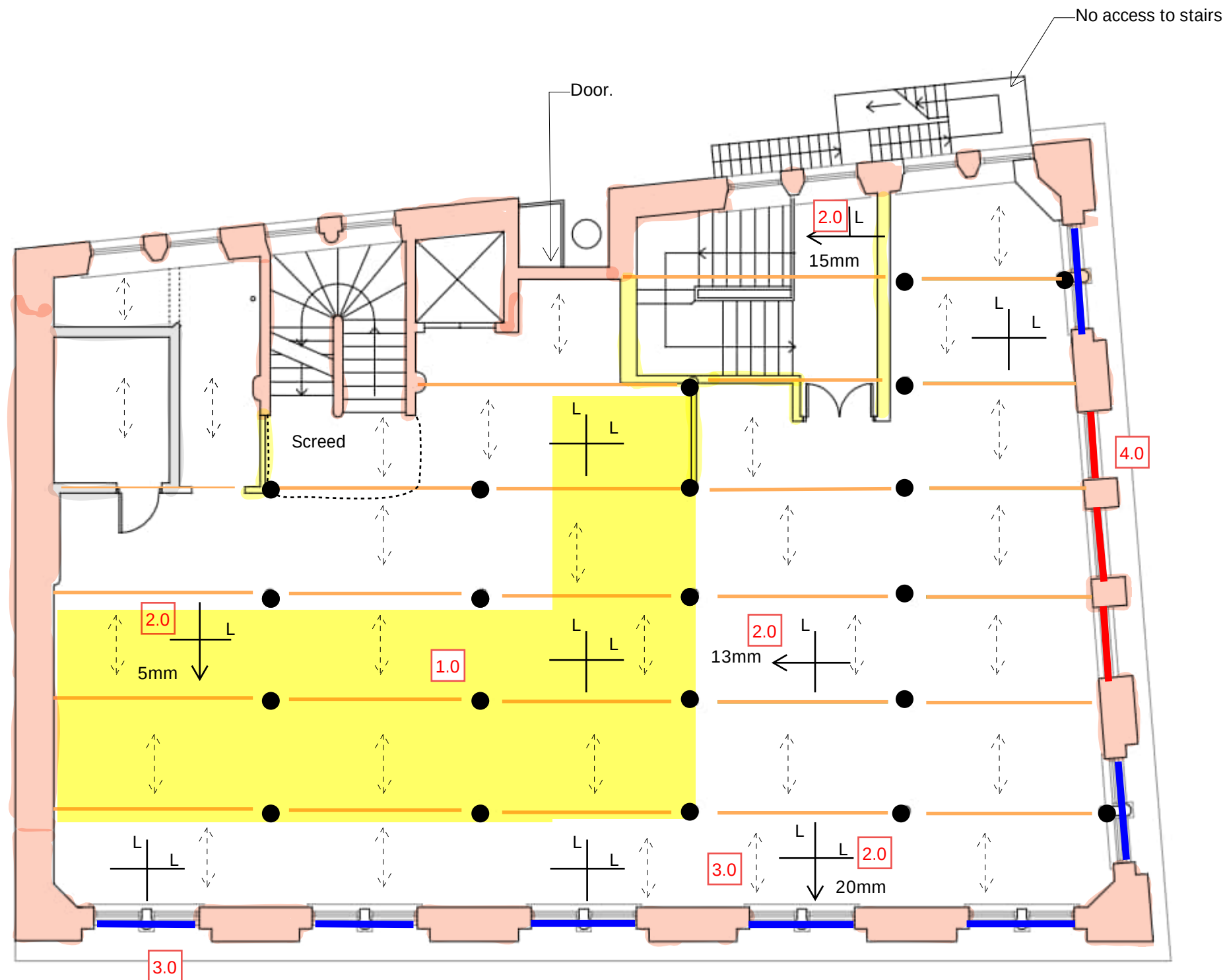


Existing Upper Ground Floor Layout Indicating Structure Over

NTS.



Various Upper Ground Floor Photos



General notes

1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/02/22
3. No intrusive investigations were undertaken, additional defects maybe present within the structure.

Structural form

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls

General Floor Commentary

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 74mm thick.
4. Boxing to timber beams makes it difficult to tell if continuous or not.
5. Overboard thickness 20mm.
6. Flooring has local over boarding.
7. Masonry in fair condition with small diameter holes throughout.

Defects Reference

- 1.0 - Undulation to flooring (yellow hatch).
- 2.0 - Fall to existing floor (mm)
- 3.0 - New timber lintel.
- 4.0 - Steel lintel, fair condition.

Structural Legend

- Denotes existing studwork
- Denotes existing timber beam, approx 350mm deep x 240mm width
- Denotes existing metal column, circumference 510mm
- Denotes existing blockwork
- Denotes existing masonry
- Denotes floor board span (74mm thick & 222mm wide)
- Denotes existing timber lintel
- Denotes existing steel lintel

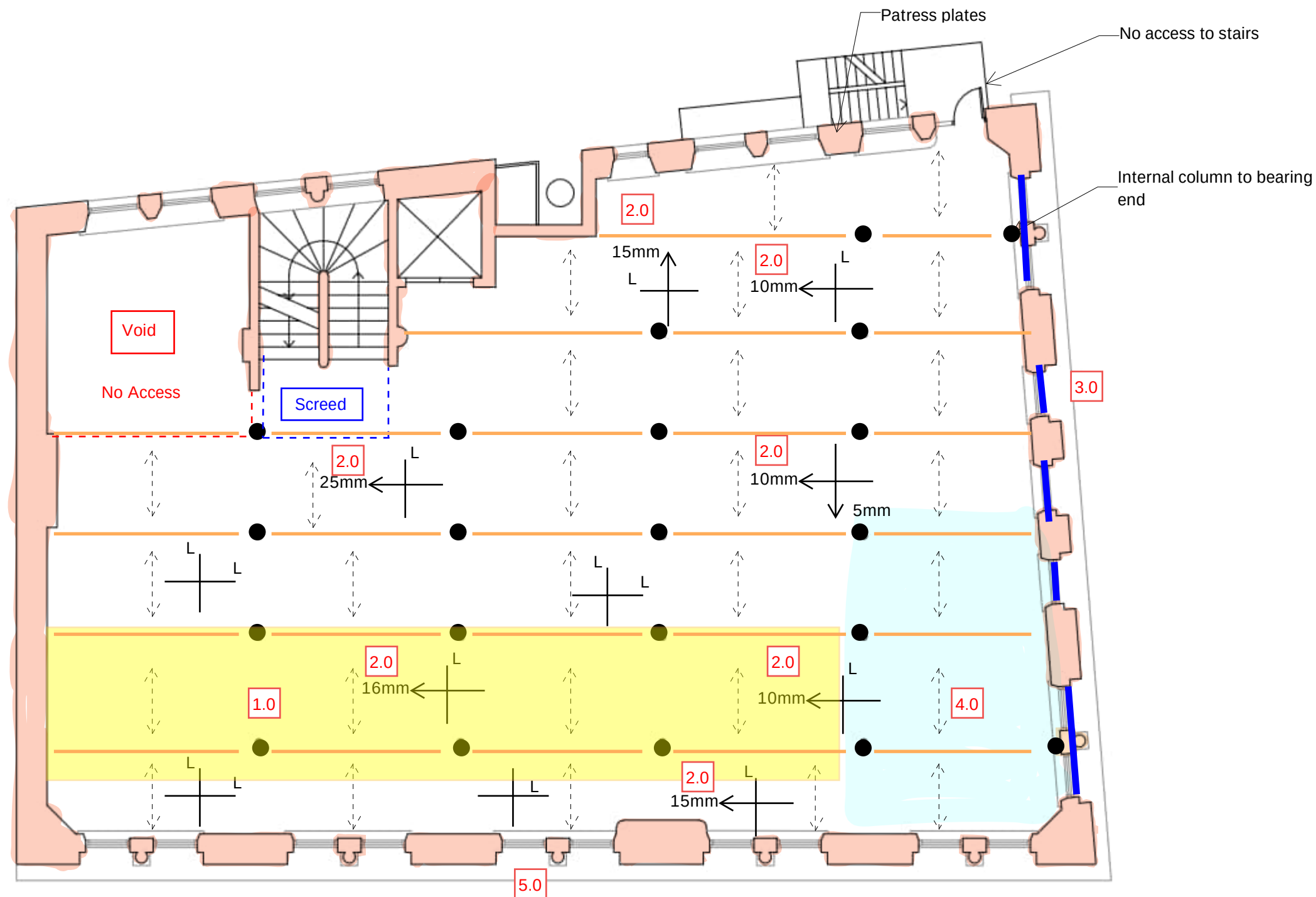
Existing First Floor Layout Indicating Structure Over

NTS.



Various First Floor Photos

Project:	Fraser House	Eng:	JB
Title:	Existing First Floor Structural Layout	Date:	Aug '22
No:	LM21346-DYSE-XX-ZZ-KS-S-0003	Rev:	P01



General notes

1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/02/22
3. No intrusive investigations were undertaken, additional defects maybe present within the structure.

Structural form

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls

General Floor Commentary

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 77mm thick.
4. Boxing to timber beams makes it difficult to tell if continuous or not.

Defects Reference

- 1.0 - Undulation to flooring (yellow hatch)
- 2.0 - Fall to existing floor (mm)
- 3.0 - Loss of section to lintel.
- 4.0 - New timber flooring (blue hatch)
- 5.0 - lintel not visible, no inspection.

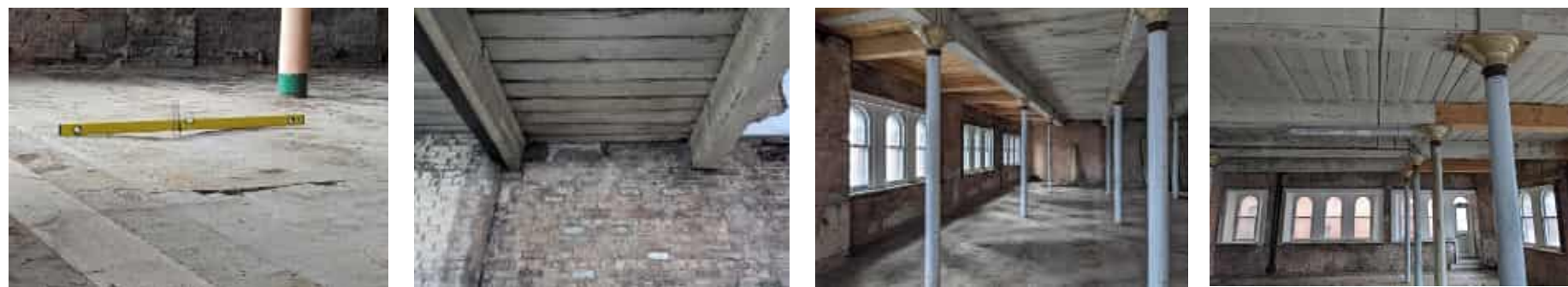
Structural Legend

- Denotes existing timber beam, approx 350mm deep x 240mm width
- Denotes existing metal column, circumference 510mm
- Denotes existing masonry
- Denotes existing board floor span (77mm thick & 222mm wide)
- Denotes existing timber lintel

Project:	Fraser House	Eng:	JB
Title:	Existing Second Floor Structural Layout	Date:	Aug '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0004	Rev:	P01

Existing Second Floor Layout Indicating Structure Over

NTS.



Various Second Floor Photos

General notes

1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/02/22
3. No intrusive investigations were undertaken, additional defects maybe present within the structure.

Structural form

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls.

General Floor Commentary

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 64mm thick.
4. Boxing to timber beams makes it difficult to tell if continuous or not.

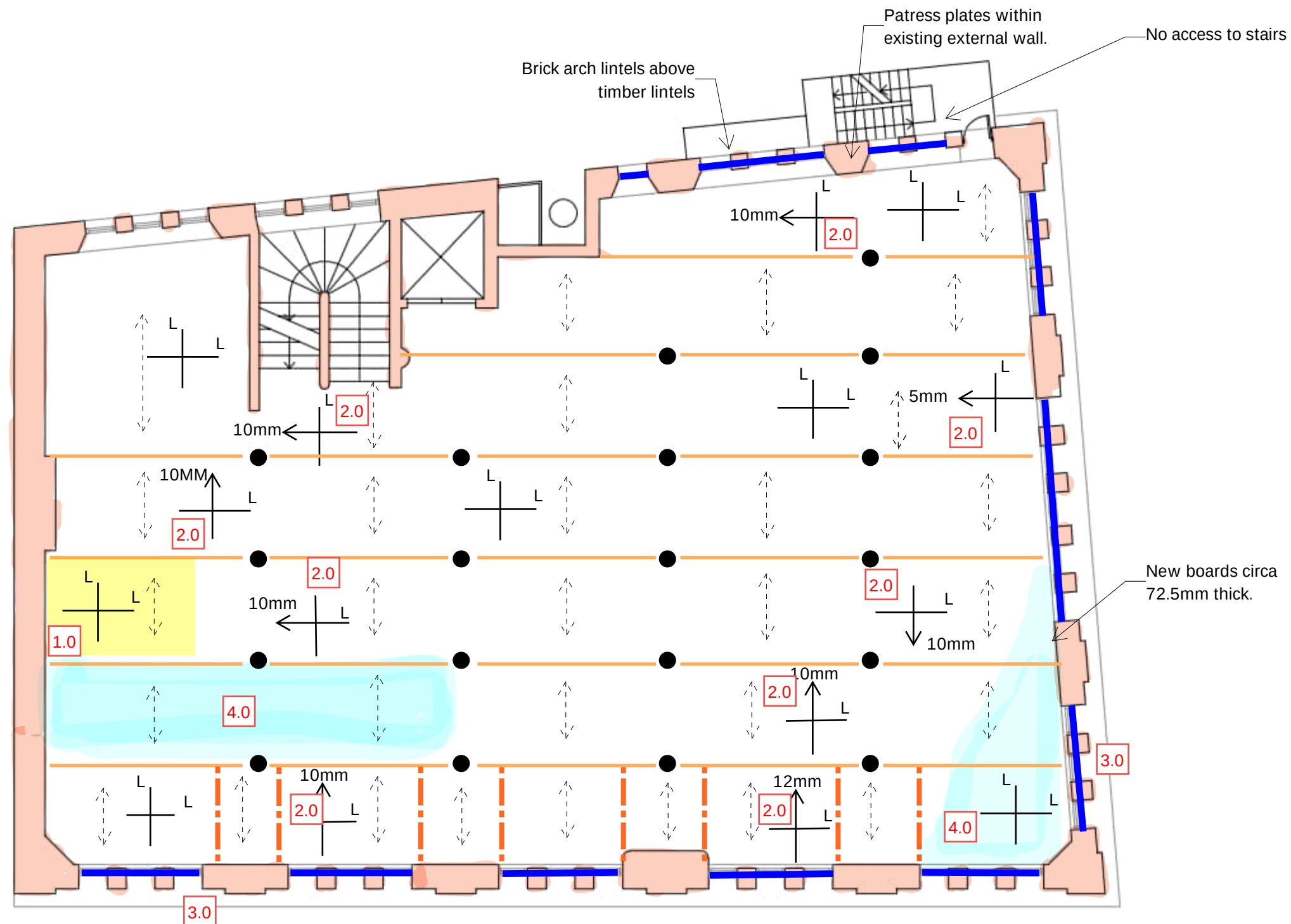
Defects Reference

- 1.0 - Undulation to flooring (yellow hatch)
- 2.0 - Fall to existing floor (mm)
- 3.0 - Loss of section to timber lintel.
- 4.0 - New timber flooring (blue hatch)

Structural Legend

- - Denotes steel column with circumference 490mm
- - Denotes existing masonry wall
- - Denotes existing timber lintel
- - - - - Denotes new timber beam
- ↔ - Denotes existing floor span (64mm thick and 222mm wide)
- - Denotes existing timber beam approx 350mm deep & 240mm wide

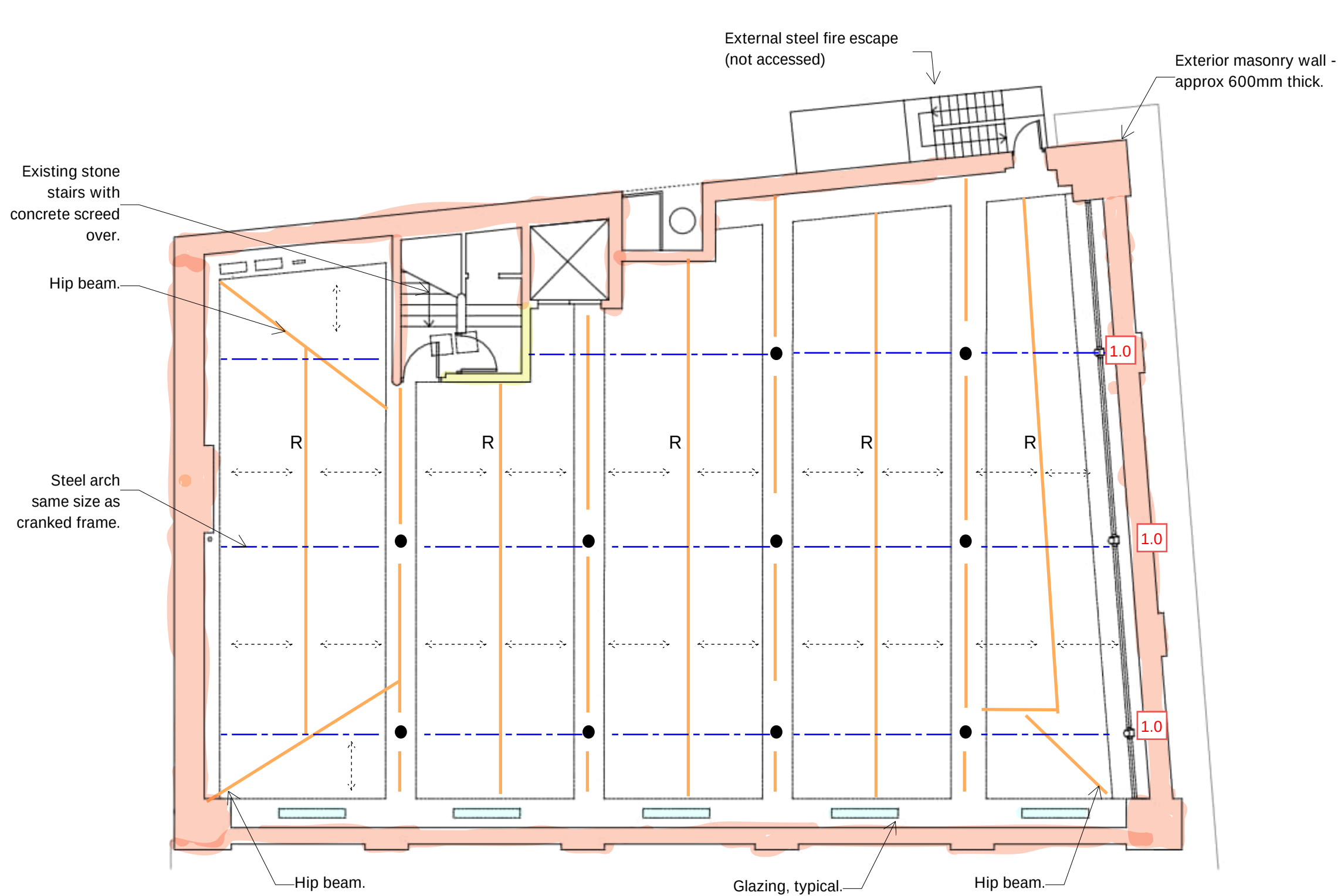
Project:	Fraser House	Eng:	JB
Title:	Existing Third Floor Structural Layout	Date:	Aug '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0005	Rev:	P01



Existing Third Floor Layout Indicating Structure Over
NTS.



Various Third Floor Photos



General notes

1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/02/22
3. No intrusive investigations were undertaken, additional defects maybe present within the structure.

Structural form

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls.

General Floor Commentary

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 64mm thick.
4. Boxing to timber beams prevented a visual assessment of the timber condition.
5. Boarding to ridge beams and hip beams prevented a visual assessment of the existing structure.

Defects Reference

1.0 Cranked frame with minor rusting at bearing end with contact to masonry wall.

Structural Legend	
	- Denotes metal column Circumference - Circa 490mm
	- Denotes beam encased in timber boarding
	- Denotes steel framing, typically 127x76x13 UB's
	- Denotes ridge beam
	- Denotes masonry wall
	- Denotes existing roof span
	- Denotes non-structural stud partition

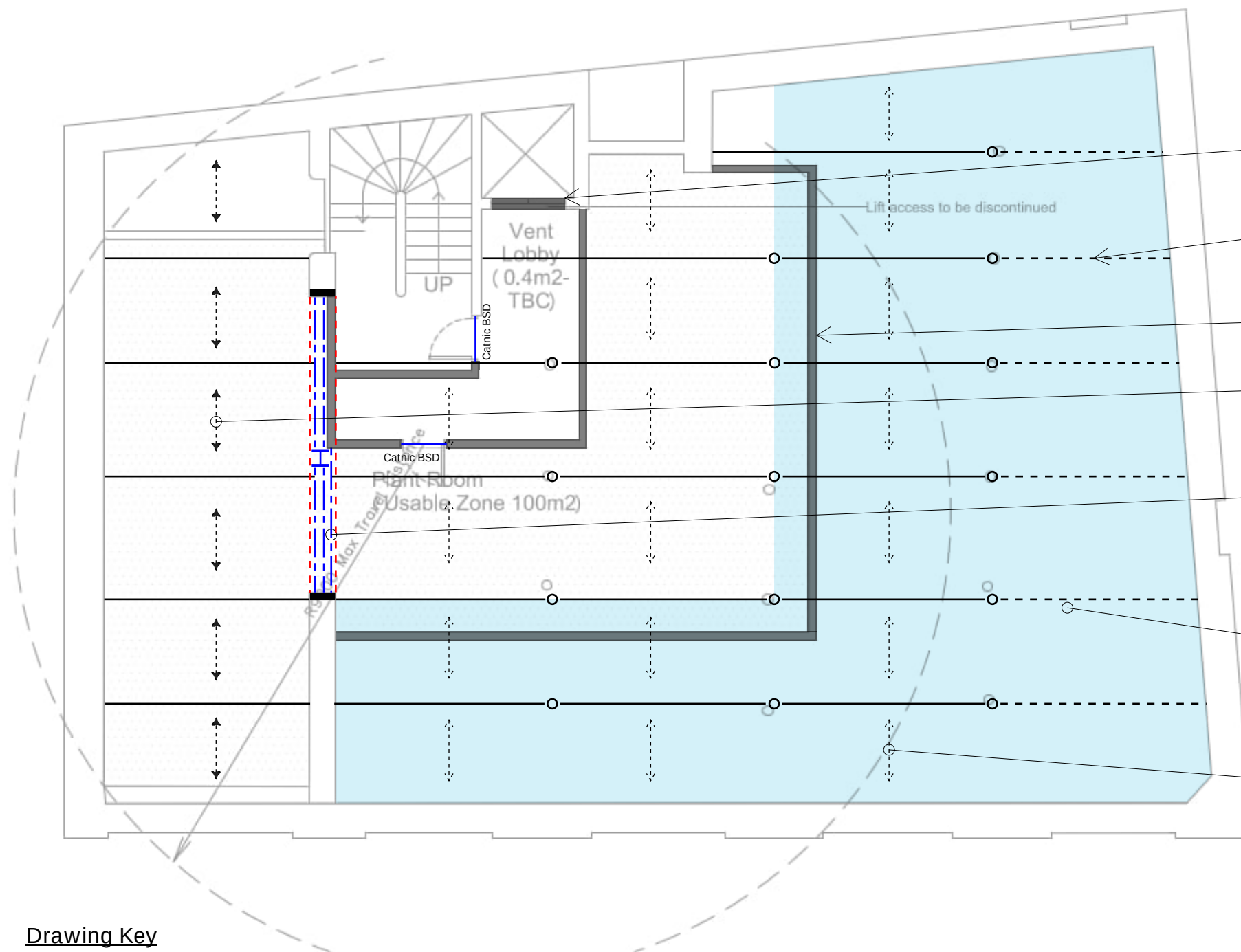
Existing Fourth Floor Indicating Roof Structure Over

NTS.



Various Fourth Floor Photos

Project:	Fraser House	Eng:	JB
Title:	Existing Fourth Floor Structural Layout	Date:	Aug'22
No:	LM21346-DYSE-XX-ZZ-SK-S-0006	Rev:	P01



New blockwork infill to existing lift shaft opening. New infill to be fully toothed and bonded into the original masonry.

Assumed location of the existing structure. To be confirmed once access is available.

New non-structural blockwork wall partitions to be built up off the existing basement slab.

Existing jack arch floor structure to be retained.

New structural framing required to facilitate the demolition of the existing load bearing masonry wall.

Hatched area denotes area of no access during initial walkover survey. Further survey works required to confirm the nature of the existing structure in this area.

Existing structural wide span floor boards to be retained and sanded, with new insulation and services to be under drawn.

Drawing Key

- Existing timber beams
- - - Existing metal beams
- o Existing metal columns
- New non-structural studwork fire compartmentation walls
- New non-structural studwork walls
- New non-structural blockwork fire compartmentation walls
- - - New structural steel beams
- New structural timber beams

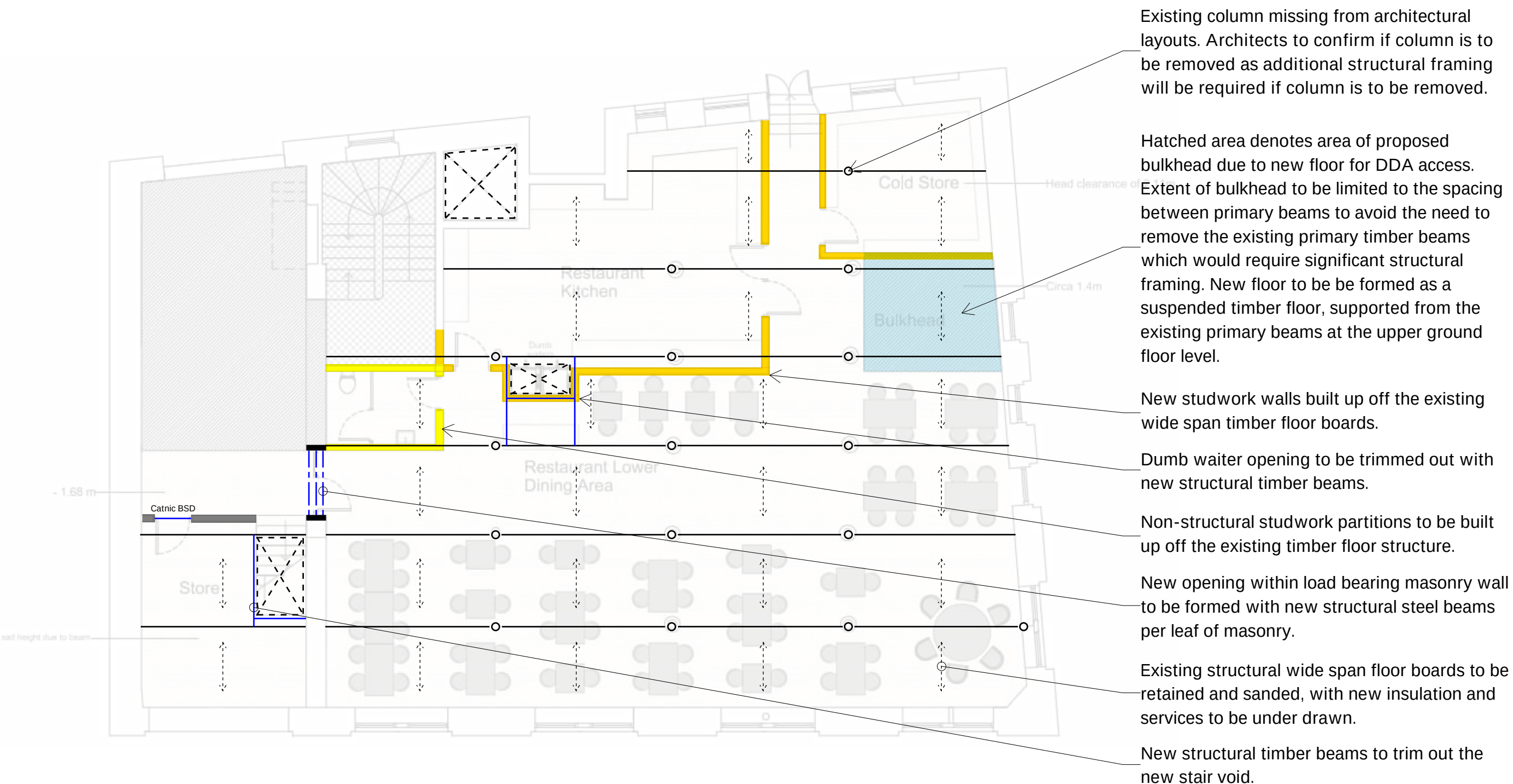
General Notes

1. The scheme shown is indicative and is subject to detailed design.
2. Locations of the existing structure are indicative and are based on the survey information provided by the client.
3. Scheme shown is based on Architectural Feasibility Study Rev E.

Basement Level Indicating Lower Ground Floor Structure Over

Scale:

Project:	Fraser House	Eng:	MWS
Title:	Basement floor layout	Date:	Nov '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0020	Rev:	P01



Drawing Key

- Existing timber beams
- - - Existing metal beams
- o Existing metal columns
- New non-structural studwork fire compartmentation walls
- New non-structural studwork walls
- New non-structural blockwork fire compartmentation walls
- - - New structural steel beams
- New structural timber beams

General Notes

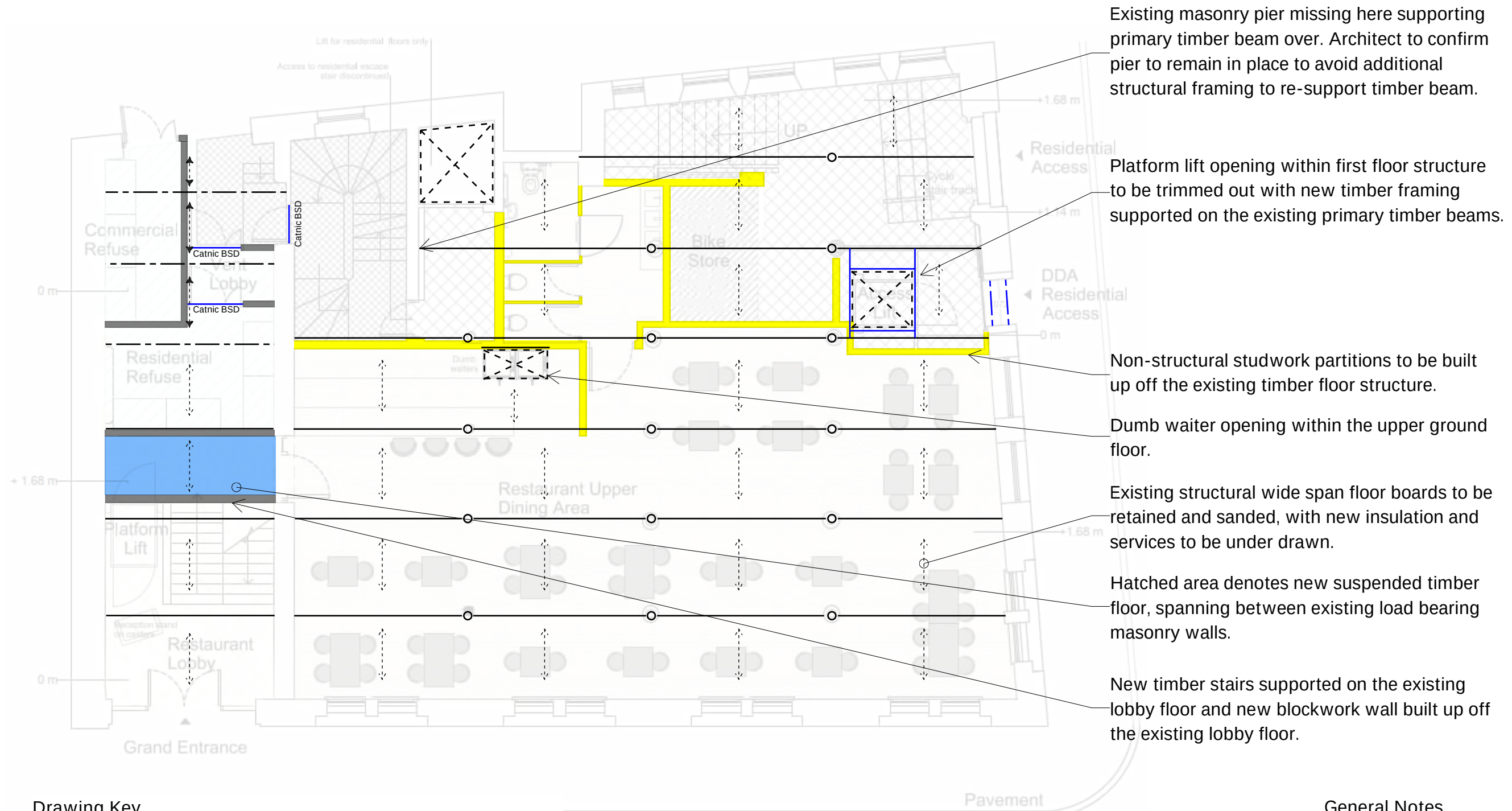
1. The scheme shown is indicative and is subject to detailed design.
2. Locations of the existing structure are indicative and are based on the survey information provided by the client.
3. Scheme shown is based on Architectural Feasibility Study Rev E.

Lower Ground Floor Structure Indicating Upper Ground Floor Structure Over

Scale: 1:100

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Project:	Fraser House	Eng:	MWS
Title:	Lower ground floor structure	Date:	Nov '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0021	Rev:	P01



Drawing Key

- Existing timber beams
- - - Existing metal beams
- Existing metal columns
- New non-structural studwork fire compartmentation walls
- New non-structural studwork walls
- New non-structural blockwork fire compartmentation walls
- - - New structural steel beams
- New structural timber beams

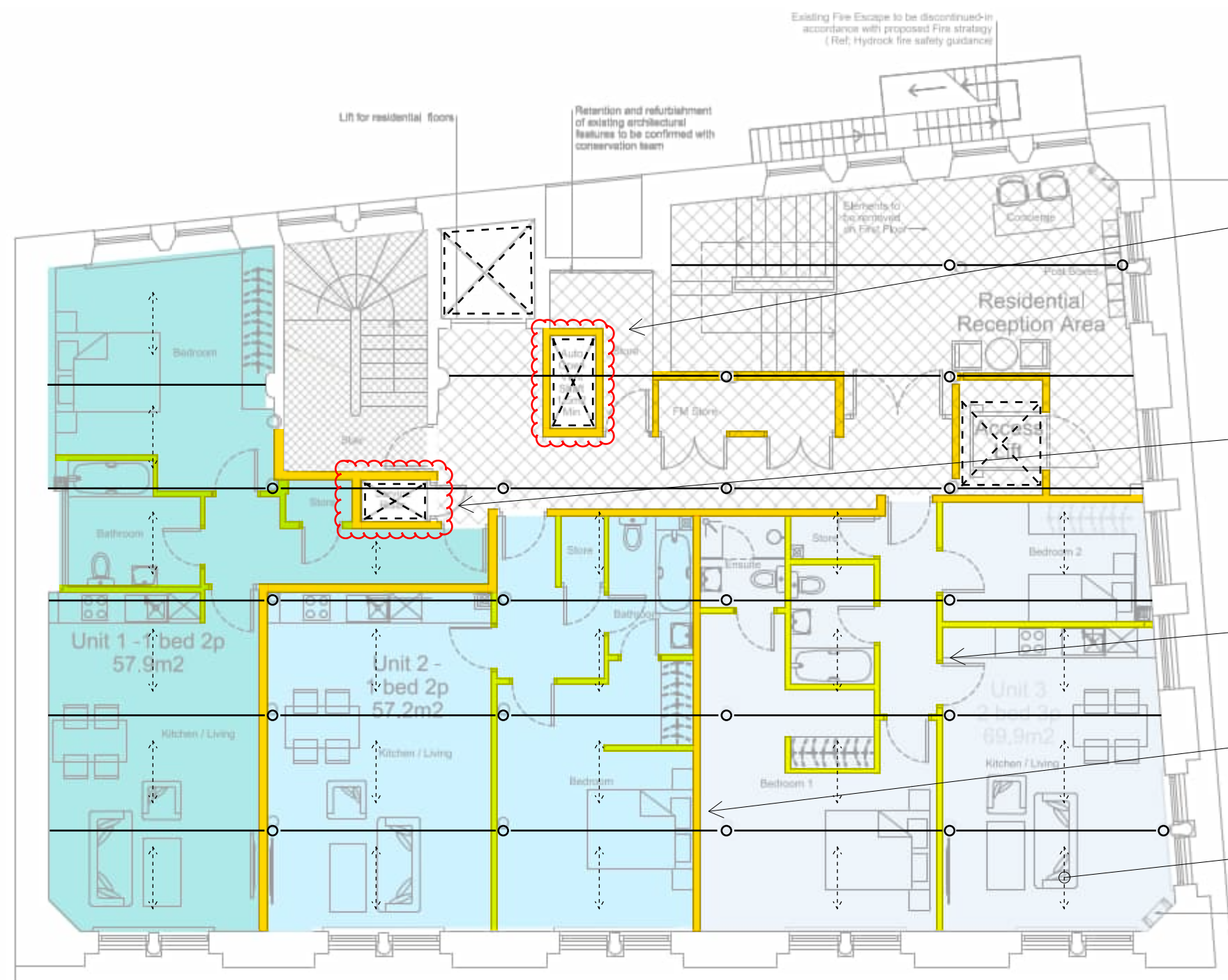
General Notes

1. The scheme shown is indicative and is subject to detailed design.
2. Locations of the existing structure are indicative and are based on the survey information provided by the client.
3. Scheme shown is based on Architectural Feasibility Study Rev E.

Upper Ground Floor Structure Indicating First Floor Structure Over

Scale: 1:100

Project:	Fraser House	Eng:	MWS
Title:	Upper ground floor structure	Date:	Nov '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0022	Rev:	P01



Location of smoke vent cuts through existing primary timber floor beam. Can smoke vent be moved to avoid additional significant structural framing to trim out void for smoke vent. Architects to confirm acceptance.

Location of service riser cuts through existing primary timber floor beam. Can beam continue to pass through service riser to avoid additional significant structural framing to trim out void for smoke vent. Architects & M&E consultants to confirm acceptance.

Non-structural studwork partitions to be built up off the existing timber floor structure.

Structural studwork walls to be built up off the existing timber floor structure.

Existing structural wide span floor boards to be retained and sanded, with new insulation and services to be under drawn.

Drawing Key

- Existing timber beams
- - - Existing metal beams
- o Existing metal columns
- New non-structural studwork fire compartmentation walls
- New non-structural studwork walls
- New non-structural blockwork fire compartmentation walls
- - - New structural steel beams
- New structural timber beams

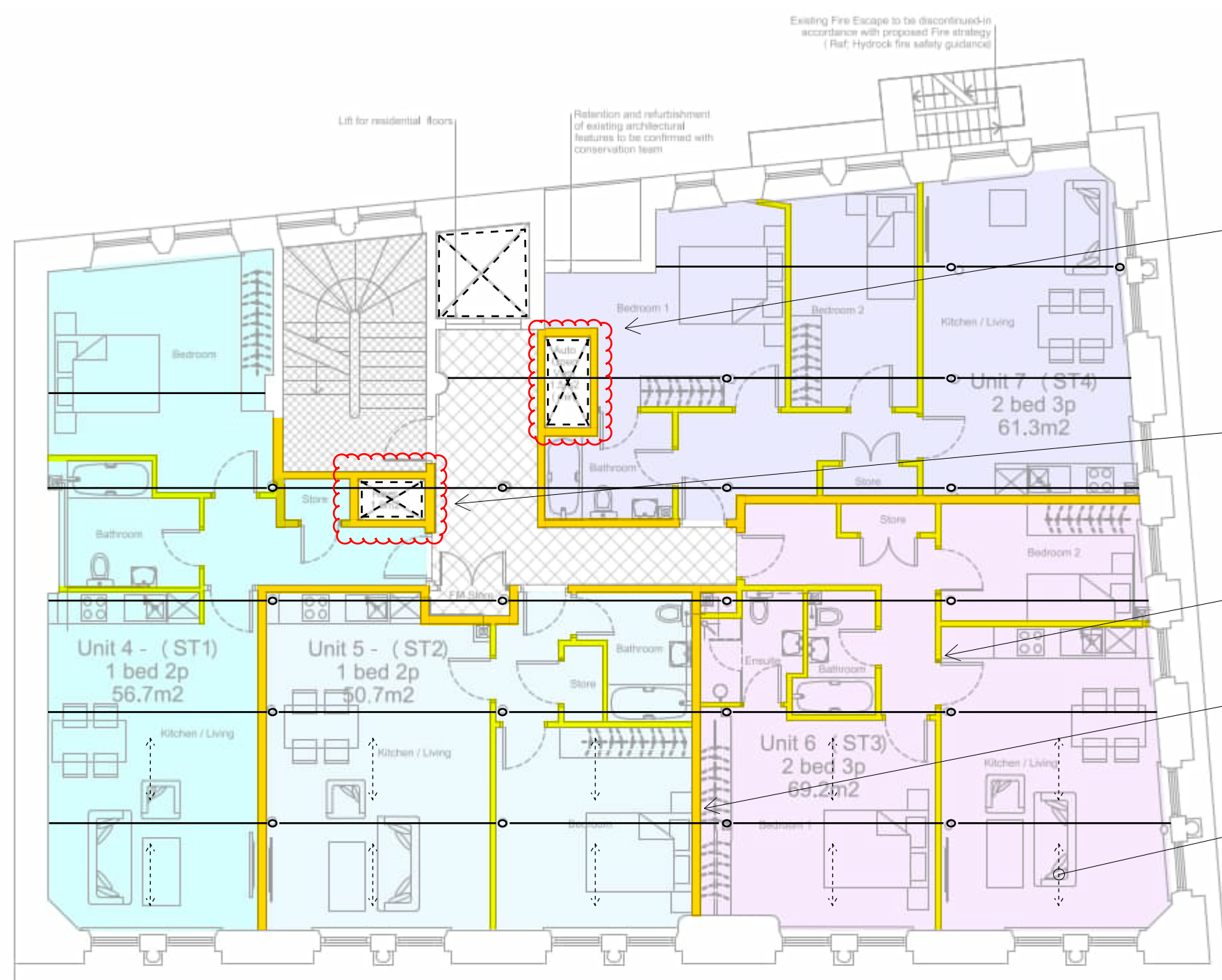
General Notes

1. The scheme shown is indicative and is subject to detailed design.
2. Locations of the existing structure are indicative and are based on the survey information provided by the client.
3. Scheme shown is based on Architectural Feasibility Study Rev E.

First Floor Structure Indicating Second Floor Structure Over

Scale: 1:100

Project:	Fraser House	Eng:	MWS
Title:	First floor structure	Date:	Nov '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0023	Rev:	P01



Location of smoke vent cuts through existing primary timber floor beam. Can smoke vent be moved to avoid additional significant structural framing to trim out void for smoke vent. Architects to confirm acceptance.

Location of service riser cuts through existing primary timber floor beam. Can beam continue to pass through service riser to avoid additional significant structural framing to trim out void for smoke vent. Architects & M&E consultants to confirm acceptance.

Non-structural studwork partitions to be built up off the existing timber floor structure.

Structural studwork walls to be built up off the existing timber floor structure.

Existing structural wide span floor boards to be retained and sanded, with new insulation and services to be under drawn.

Drawing Key

- Existing timber beams
- - - Existing metal beams
- Existing metal columns
- New non-structural studwork fire compartmentation walls
- New non-structural studwork walls
- New non-structural blockwork fire compartmentation walls
- New structural steel beams
- New structural timber beams

General Notes

1. The scheme shown is indicative and is subject to detailed design.
2. Locations of the existing structure are indicative and are based on the survey information provided by the client.
3. Scheme shown is based on Architectural Feasibility Study Rev E.

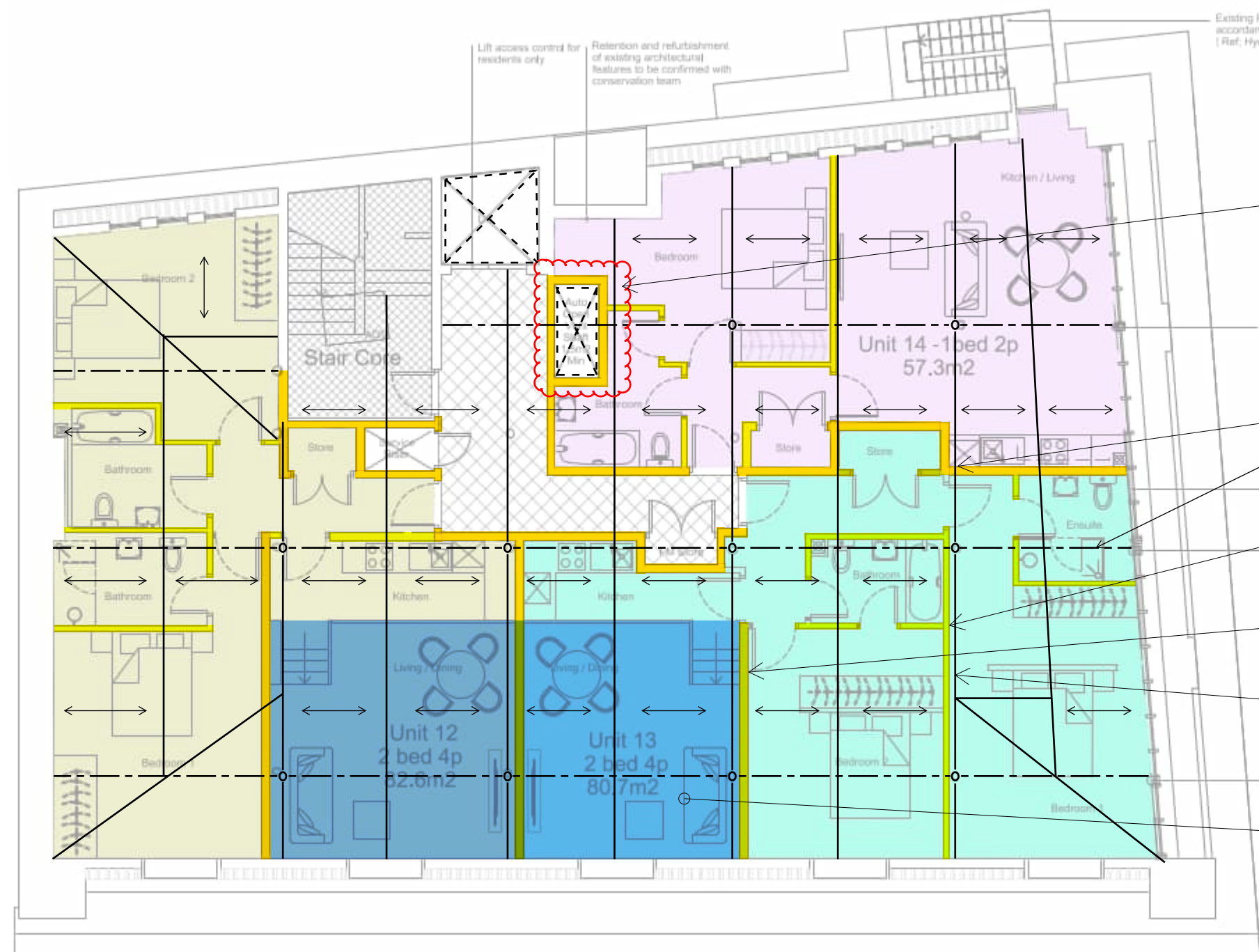
Second Floor Structure Indicating Third Floor Structure Over

Scale: 1:100

Project:	Fraser House	Eng:	MWS
Title:	Second floor structure	Date:	Nov '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0024	Rev:	P01

Existing structural wide span floor boards to be retained and sanded, with new insulation and services to be under drawn.

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Location of smoke vent cuts through existing roof purlin. Can smoke vent be moved to avoid additional significant structural framing to trim out void for smoke vent. Vent within roof to be trimmed out with new structural timber. Architects to confirm acceptance.

Existing timber ridge beams and supporting steel frames to be retained as part of the proposed refurbishment works.

New non-structural studwork partitions built up off the existing timber floor.

New structural studwork partitions built up off the existing timber floor.

Secondary glazing to north light roof lights to be installed.

Hatched area denotes new raised podium floor to be formed from new timber joists spanning between structural studwork party walls built up off the existing wide plank floor boards.

Drawing Key

- Existing timber beams
- - - Existing metal beams
- o Existing metal columns
- New non-structural studwork fire compartmentation walls
- New non-structural studwork walls
- New non-structural blockwork fire compartmentation walls
- - - New structural steel beams
- New structural timber beams

General Notes

1. The scheme shown is indicative and is subject to detailed design.
2. Locations of the existing structure are indicative and are based on the survey information provided by the client.
3. Scheme shown is based on Architectural Feasibility Study Rev E.

Fourth Floor Structure Indicating Roof Structure Over

Scale: 1:100

Project:	Fraser House	Eng:	MWS
Title:	Fourth floor structure	Date:	Nov '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0026	Rev:	P01

Appendix D - Designers Risk Assessment

LM21346-DYSE-XX-ZZ-HS-S-0001 P01 Designers Risk Assessment

Ref	Activity / Location	Hazard	Mitigating Action	Residual Risk	ERIC	COMD
CDM-0.1	Client responsibility under CDM regulations.	Client unaware of their obligations under the CDM regulations and so has not taken any steps to carry them out.	DYSE to inform client of their duties and ensure a Principle Designer is appointed. Contractor to manage temporary works in accordance with BS 5975.	Yes	C	C/O/M/D
CDM-1.00 Enabling/highway works						
CDM-1.01	-	-	-	-	-	-
CDM-2.00 Site wide issues						
CDM-2.01	Asbestos.	Inhalation of fibres during referbishment works.	Given the age of the building, Asbestos is anticipated to be present within the existing building fabric. An asbestos survey has been undertaken for the building. The contractor is advised to review the report prior to commencing with any demolition works and to undertake further inspections as necessary. Any recommendations made in the Asbestos reports are to be adhered to by the contractor.	Yes	I	C/D

Ref	Activity / Location	Hazard	Mitigating Action	Residual Risk	ERIC	COMD
CDM-2.02	Timber condition.	Poor condition of existing timber.	A timber condition survey has previously been undertaken for the existing building. The contractor is advised to review the findings of this report and follow the recommendations made to ensure that the existing timber is serviceable. The contractor is advised to consider undertaking an additional survey prior to commencing the demolition works.	Yes	I	C/D
CDM-2.03	General.	Contact with services within the existing walls, resulting in personal injury, eg contact with electrical wires.	Due care to be taken around areas of potential services. Contractor to work to own SSOW.	Yes	I	C/D
CDM-2.04	General.	Void within existing timber floor.	Voids within the existing floors are to be cordoned off with edge protection provided to mitigate the risk of falls during the initial survey and inspection works.	Yes	I	C/D
CDM-3.00 Existing buried and overhead services						
CDM-3.01	Underground services.	Striking underground services.	Prior to undertaking any excavation works, the contractor is to scan for buried services, marking the locations of any detected services. Contractor to work to own SSOW.	Yes	I	C/D

Ref	Activity / Location	Hazard	Mitigating Action	Residual Risk	ERIC	COMD
CDM-4.00 Excavations and foundations						
CDM-4.01	Foundations.	Contamination.	Given the nature and location of the existing building, contamination has been considered and is unlikely to be an issue. This is to be verified on site by the contractor, in conjunction with building control.	Yes	I	C/O
CDM-4.02	Foundations.	Ground gas.	Given the nature and location of the existing building, ground gas has been considered and is unlikely to be an issue. This is to be verified on site by the contractor in conjunction with building control.	Yes	I	C/O
CDM-4.03	Foundations.	Radon.	Radon has been considered according to BRE 211 and Radon Map UK and is unlikely to be an issue. This is to be verified by the contractor in conjunction with building control.	Yes	I	C/O
CDM-5.00 Demolition						

Ref	Activity / Location	Hazard	Mitigating Action	Residual Risk	ERIC	COMD
CDM-5.01	Demolition works.	Uncontrolled collapse.	Contractor to design and implement adequate temporary works in accordance with BS 5975 as required to facilitate the demolition of the structure to allow the installation of the permanent works.	Yes	I	C/D
CDM-5.02	Demolition works.	Existing structure not as assumed.	The existing structure has been inspected visually to confirm the configuration although finishes have not been removed. The existing structural arrangement assumed is indicated on the structural drawings. Contractor to confirm the existing arrangement is as assumed and contact DYSE immediately if not.	Yes	I	C/D
CDM-6.00 Materials and processes						
CDM-6.01	-	-	-	-	-	-
CDM-7.00 Erecting structures and placing components						

Designer's Risk Assessment

Doc Ref: LM21346-DYSE-XX-ZZ-HS-S-0001

Description: Referbishment



Rev: P01

By: MWS

Date: 02/12/22

Chk: JDY

Design Stage: Preliminary

App: JDY

Ref	Activity / Location	Hazard	Mitigating Action	Residual Risk	ERIC	COMD
CDM-7.01	Installation of new structural framing to new voids within the existing floors.	Manual handling.	Weights of the structural framing elements have been desinged to be the minimum weight feasible. The contractor is to consider lifting aids as necessary during the installation.	Yes	R	C
CDM-7.02	Installation of new structural framing to new voids within the existing floors.	Temporary stability.	Contractor to design and implement adequate temporary works in accordance with BS 5975 as required.	Yes	I	C
CDM-8.00 Access and maintenance						
CDM-8.01	North light windows.	Access for maintenance works to northlight roof.	A man safe system is to be provided to enable safe access to for maintenance to the northlight roof windows.	Yes	I	O/M
CDM-9.00 Client operation						
CDM-9.01	-	-	-	-	-	-

Appendix E - Structural Feasibility Report

Fraser House Structural Feasibility Report

Ref: LM21346-DYSE-XX-ZZ-RP-S-0001

Rev: P01

Date: 06/09/2022

Client: The Space Studio

Document Control

Originator:

Mark Saville MEng (Hons)

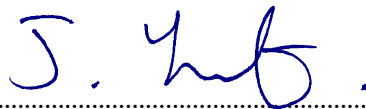


Date:

06/09/2022

Checker:

Jonny Yusuf MEng(Hons) CEng MIStructE



Date:

06/09/2022

Approver:

Jonny Yusuf MEng(Hons) CEng MIStructE



Date:

06/09/2022

Rev	Issue	Date	Originator	Checker	Approver
P01	First Issue	06/09/2022	MWS	JDY	JDY

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www.dyse.com

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1 Introduction

1.1 Brief

DYSE have been appointed by the Space Studio to act as consulting structural engineers for the proposed alterations at Fraser House.

The report outlines the structural feasibility of the proposed alterations to convert the building into a mixed use commercial (restaurant) and residential building.

The purpose of this report is to provide outline structural design and specifications for informing architectural and M&E service design, and to inform a cost plan. The structural scheme considered is subject to detailed design and further consideration with both architectural and M&E services design.

1.2 Site walkover

A site walkover was undertaken on the 29th June 2022. Access to the building was provided by the client via Charlotte Street.

The walkover survey was undertaken by Mark Saville MEng (Hons) and Jake Billington MEng (Hons).

Access to the building was by foot from ground level.

No survey of the external walls was undertaken. The survey of the high areas was limited to a visual inspection only from ground level.

No intrusive investigation works were undertaken during the walk over such as breaking out structural fabric or lifting of floor finishes. It is noted that a soft strip of the building has previously been undertaken to remove the floor finishes.

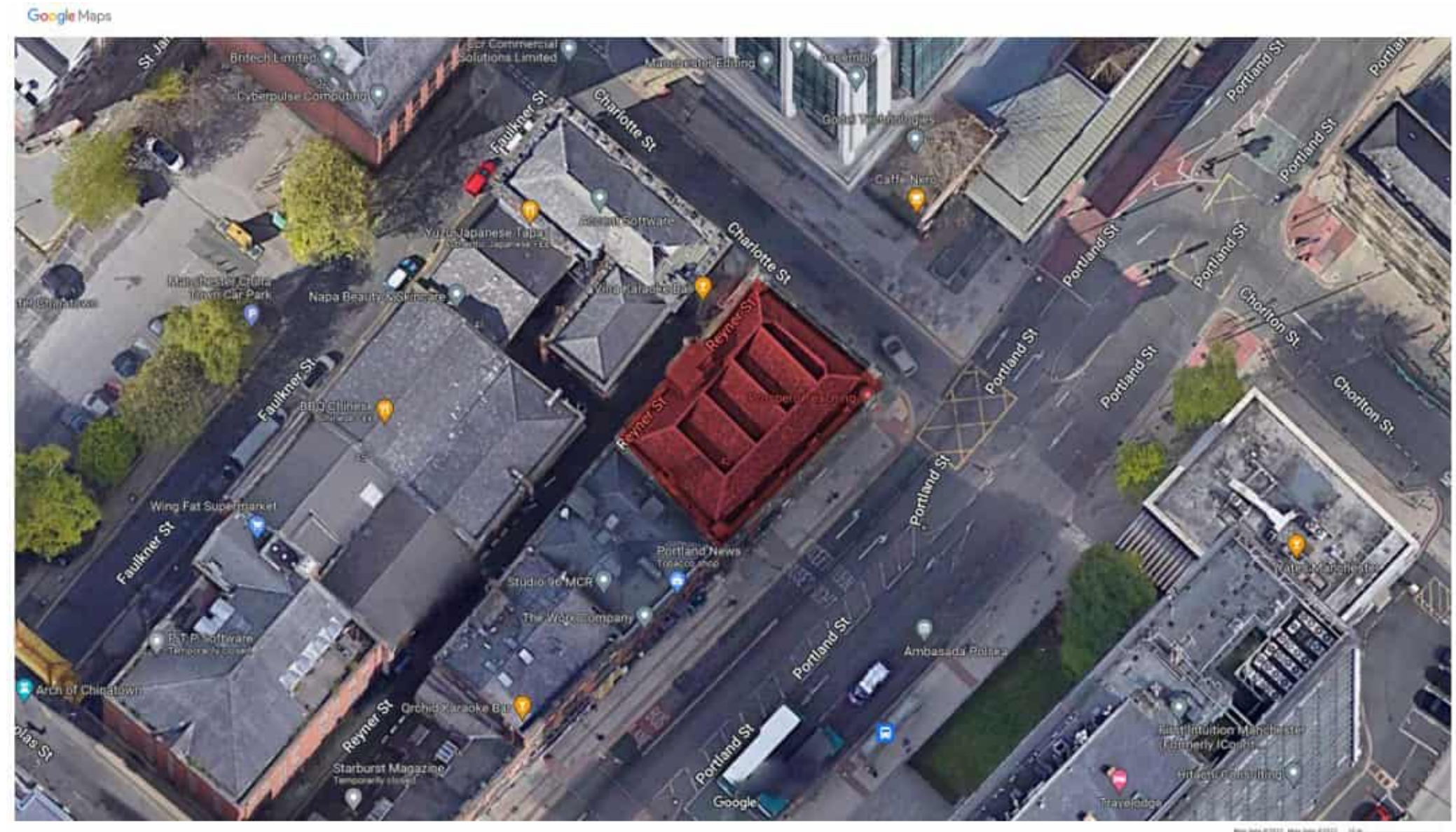


Figure 1 Aerial view of Fraser House.

2 Site

2.1 Location

The site is located within Manchester City Centre at 36 Charlotte Street, Manchester, M1 4FD.

The site is accessed via both Portland Street and Charlotte Street. The site is bounded to the North by Charlotte Street and to the South by adjoining buildings. Portland street bounds the site to the East with Reyner Street bounding the site to the West. Reyner Street is noted as being very narrow, with limited access.

2.2 Topography

The site is currently developed with the existing building occupying the entire footprint of the site. The site is generally level in both orthogonal directions.

2.3 Existing building

The existing building was constructed in 1855 and is formed as a seven storey building; two basement stories and five above ground stories. The floors of the building are formed with wide plank timber floor boards spanning between primary timber beams supported on metal columns and external load bearing masonry walls. The roof is formed as a north light roof, with timber rafters spanning between timber purlins. Timber purlins span between metal beams supported on metal columns. Glazed elevations of the north light roof are supported on timber beams spanning between metal columns.

2.4 Geology

2.4.1 British Geological Survey (BGS) records

Review of publicly available BGS records indicates the following stratigraphy:

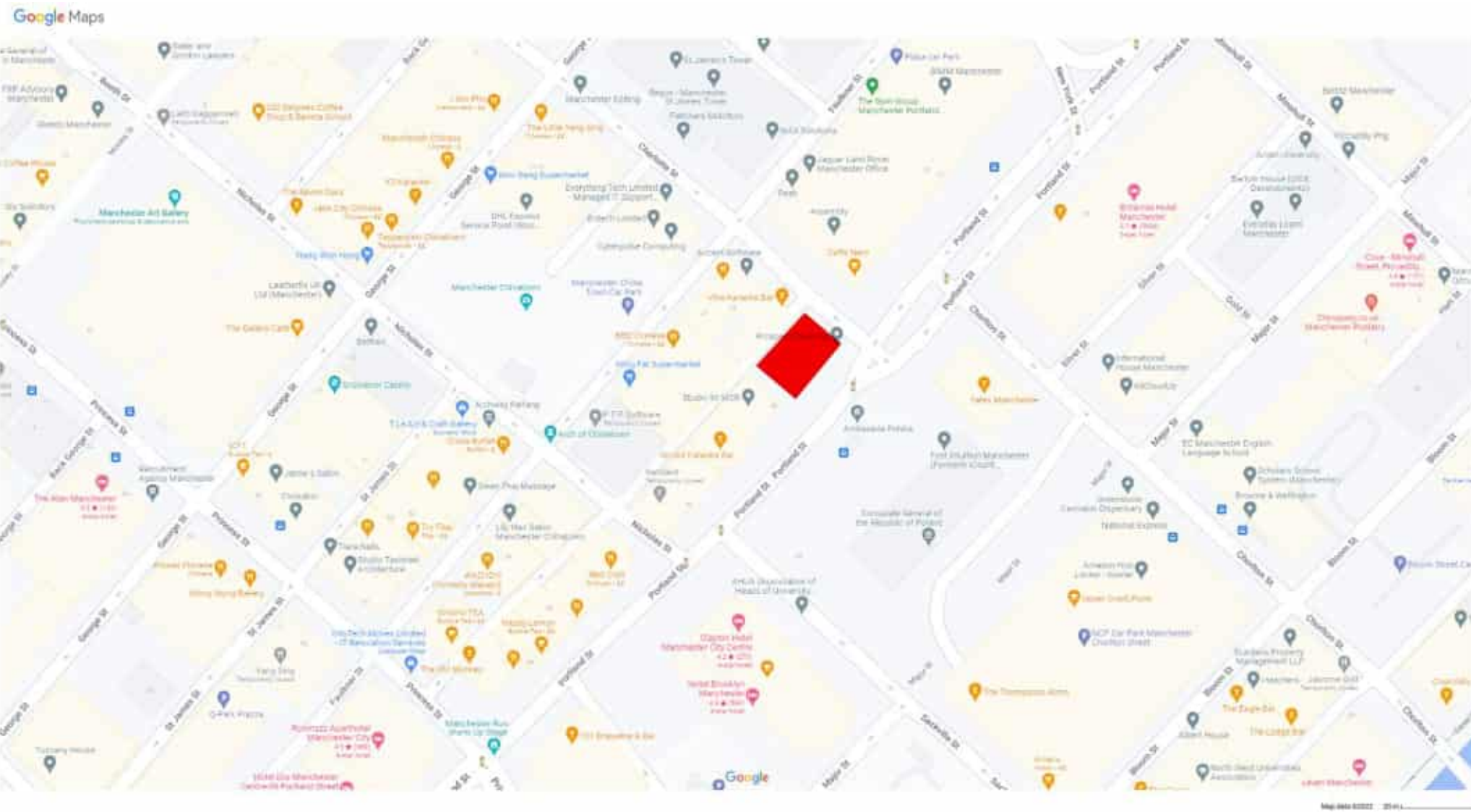


Figure 2 Site location.

- Superficial deposits: Till, Devensian. (Clay)
- Bedrock: Chester formation, Sandstone.

Review of publicly available BGS borehole records from within a few hundred metres of the site indicates the stratigraphy to be clay to a depth circa 8.4m BGL, overlying sandstone.

2.4.2 Phase 1 and 2 geo-environmental investigations

No physical geo-environmental investigations have taken place in relation to this project to date.

2.4.3 Radon

A review of BRE 211 and Radon Map UK indicates that the site is located in an area not requiring Radon protection.

2.4.4 Gas

Given the location of the site, ground gas has been considered and is unlikely to be an issue. This is to be confirmed on site by the contractor in conjunction with building control.

3 Existing Building

3.1 History

As per the findings of the preliminary heritage assessment undertaken by Paul Butler Associates, the building is thought to have originally been constructed in 1855 by Edward Walters as a textile warehouse building in the Italianate style. Since, the building has been used for a variety of purposes including restaurant use across the lower ground, ground and first floors.

The building has also been used for banking, art and exhibition space and offices across the upper floors.

The building is currently vacant and it is understood that the building has been vacant for a number of years.

3.2 Building records

A measured survey of the existing building has been undertaken.

No existing building records have been obtained as part of the proposed assessment works for the proposed alteration works.

3.3 Structural form

An initial walkover survey has been undertaken with the purpose of determining the existing structural form. This does not constitute a general structural inspection. At the time of the initial walkover survey, a soft strip of the building has been previously undertaken, with some areas of remediation works previously undertaken. The structural form of the building is summarised on sketches SK-S-0001-0007 appended to this document.

The following description of the structure makes assumptions based upon review of observations from the walkover inspection and knowledge of similar buildings of this age in this locality.

3.3.1 Floors

The structural form of the building was generally consistent across all floors, with a change in structural form at the roof level.

Generally, the building comprises of wide plank timber floor boards, circa 70-80mm thick, spanning between primary timber beams.



Figure 3 Typical view of upper floors.

3.3.2 Floor framing

The primary timber beams span between metal columns and load bearing external masonry walls. The locations of the metal columns are consistent throughout the building.

3.3.3 Roof

The roof is formed as a northlight roof, which is a typical feature of industrial buildings of this age and type. Pitched roofs are formed with timber rafters, with timber purlins at rafter mid spans.

3.3.4 Roof framing

Purlins span between arched metal beams, spanning between metal columns. Timber beams are located to the underside of the glazed infills to the northlight roofs, spanning between metal columns and the load bearing masonry walls.



Figure 4 Typical view of internal roof structure.

3.3.5 Lateral stability

Typically masonry buildings are stabilised against horizontal wind loads by masonry walls acting as one way spanning panels to transfer lateral loads into the floor and roof plates. Roofs and floors act as rigid diaphragms transferring lateral load to buttressing masonry walls acting as shear walls to transfer lateral load down to the foundations. To achieve diaphragm action, the floors of the building are required to be secured to the external masonry walls. This was historically achieved by providing sufficient embedment of the timber floor boards within the external masonry walls.

3.3.6 External walls

External walls are formed as solid masonry walls, circa 385mm thick.

3.3.7 Lintels

Generally, lintels within the external walls are formed from timber internally, with the external opening form from a stone arch.

3.3.8 Basement retaining walls

The basement retaining walls are constructed from load bearing masonry and align with the load bearing masonry walls above. Internal walls within the basement space provide buttressing

action to the external retaining walls to resist lateral earth loads.

3.3.9 Foundations

No intrusive works have been undertaken to expose the foundations, however it is assumed that the foundations to the external masonry walls will be formed as corbeled brick footings. Local pad foundations are assumed to be provided to the underside of the columns within the basement space.

3.3.10 Basement floor

The basement floor is assumed to be formed as a ground bearing concrete slab cast directly onto the ground.

3.3.11 Stairs

A central stone stair case runs from the lower ground floor up to the fourth floor. Flanking load bearing masonry walls and a central masonry spine wall provide support to the stone stair case.

3.3.12 Lifts

A single lift shaft is present within the building and runs from lower ground up to the fourth floor adjacent to the stone stair.

3.4 Areas of inaccessible structure

During the walkover survey, several areas of the building were not surveyed due no safe access available. These areas are noted on the existing floor layout sketches.

- Void within upper ground floor level facing Charlotte Street.
- Void at second floor level facing Reyner Street.
- Basement area due to debris and poor lighting.
- External metal access staircase.

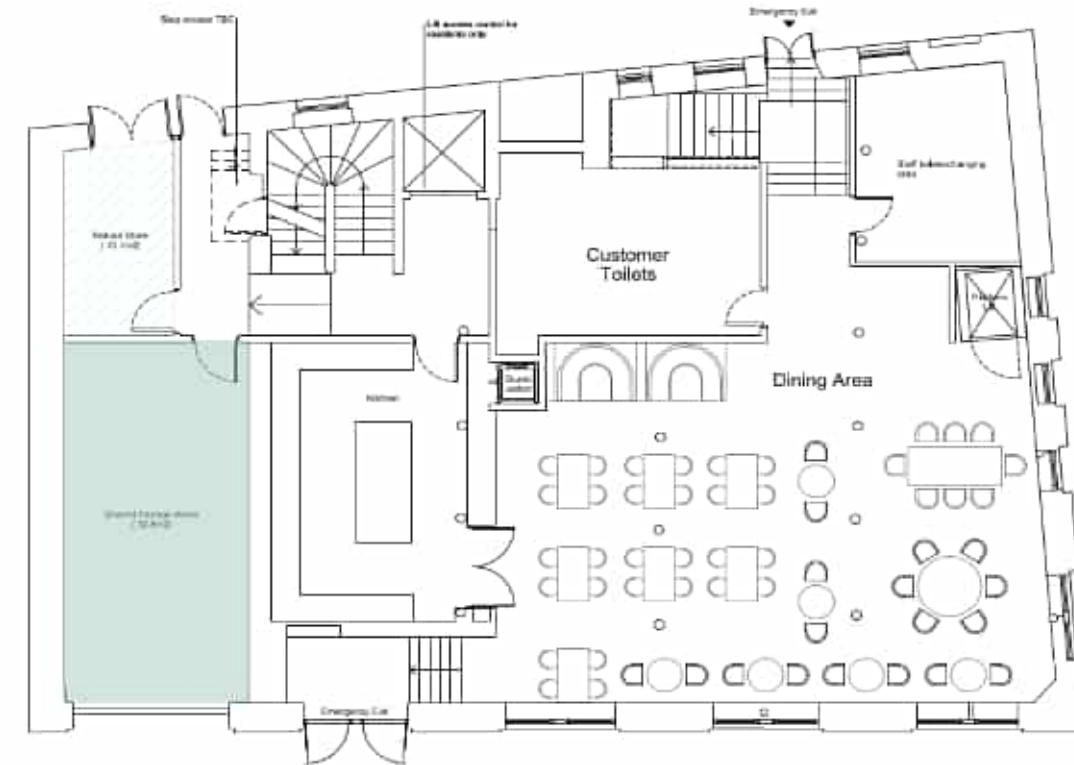
4 Proposed building

4.1 Intended use

The architectural proposals are summarised on the architectural drawings appended to this document.

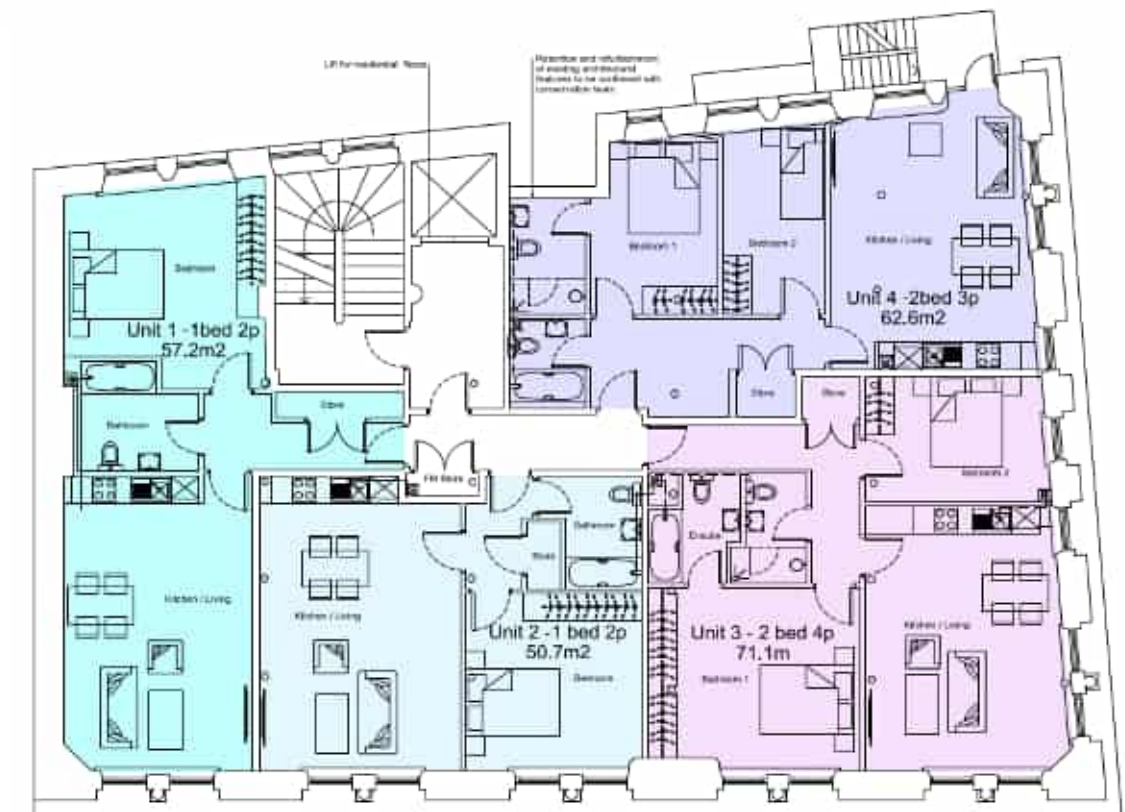
The architectural proposals are to include:

- Formation of restaurant and dining space across the lower ground, upper ground and first floor levels. To include:
 - Kitchen, storage, refuse store, customer facilities and staff changing facilities to be accommodated within the lower ground floor.
- Dining and bar space to be provided at the first floor level.
- A new dumb waiter installed from the lower ground floor up to the first floor level.
- Changes to access to include:
 - Restaurant and residential access provided at the upper ground floor level.
- New platform lifts to provide access to the upper ground floor level from street level at both the residential and restaurant entrances.
- Change of use to upper floors, to include:
 - Apartments to the second, third and fourth floors.
 - New access lift e accommodated within the original lift shaft. The existing access stairs are to be utilised within the proposed conversion.
 - A new raised deck within three of the apartments at the fourth floor overlooking Portland Street.



Lower Ground Floor Plan - F&B (Seats 62 persons)

Figure 5 Extract from Lower Ground Floor Plan (restaurant).



Second Floor Plan

Figure 6 Extract from Second Floor Plan (residential).

5 Structural Interventions

5.1 Change of use

As there is a proposed change of use and floor upgrades within the redevelopment of the building, a load appraisal will be required to assess the suitability of the existing floor for potential changes in loading.. This is further considered in chapter 7.

5.2 Demolition works

5.2.1 Lower ground floor level

Currently, the internal walls at the lower ground floor level are formed from a mix of both blockwork and timber studwork, both of which are non-structural. A central blockwork spine wall divides the lower ground floor into two spaces. These are likely to be retrofitted interventions, and not part of the original structural fabric. spaces.

No additional structural works are anticipated to be required to facilitate the demolition of the existing walls at the lower ground floor level.

5.2.2 Upper ground floor level

Existing non-structural studwork walls are to be demolished, along with the creation of new voids within the floor to allow the installation of the new dumb waiter and platform lifts.

5.2.3 First floor level

Existing non-structural studwork walls are to be demolished, along with the creation of new voids within the floor to allow the installation of new dumb waiter and platform lifts.

5.2.4 Second, third and fourth floor levels

Localised areas of floor are to be broken out to allow for the integration of a service riser.

5.3 New structural interventions

Structural interventions are summarised on sketches SK-S-0010 – SK-S-0015 and are appended to this document.

5.3.1 Lower ground floor

Localised trimming will be required to facilitate the creation of a new opening within the floor to allow the installation of a new dumb waiter.

The floor structure is to be ungraded as part of the proposed alteration works, with new architectural finishes and new acoustical treatment.

New non-structural studwork walls are to be installed within the lower ground floor and are to be built up off the existing timber floor.

A new staircase is to be installed to provide access to the upper floors. New trimming will be required to be installed within the floor space to allow the creation of the void within the floor.

A new floor will be required, along with new floor framing, to the left of the plan for the new proposed storage and refuse areas.

5.3.2 Upper ground floor level

Localised trimming will be required to facilitate the creation of a new opening within the floor to allow the installation of a new dumb waiter.

New non-structural studwork walls are to be installed within the upper ground floor and are to be built up of the existing timber floor.

The floor structure is to be upgraded as part of the proposed alteration works, with new architectural finishes and new acoustical treatment.

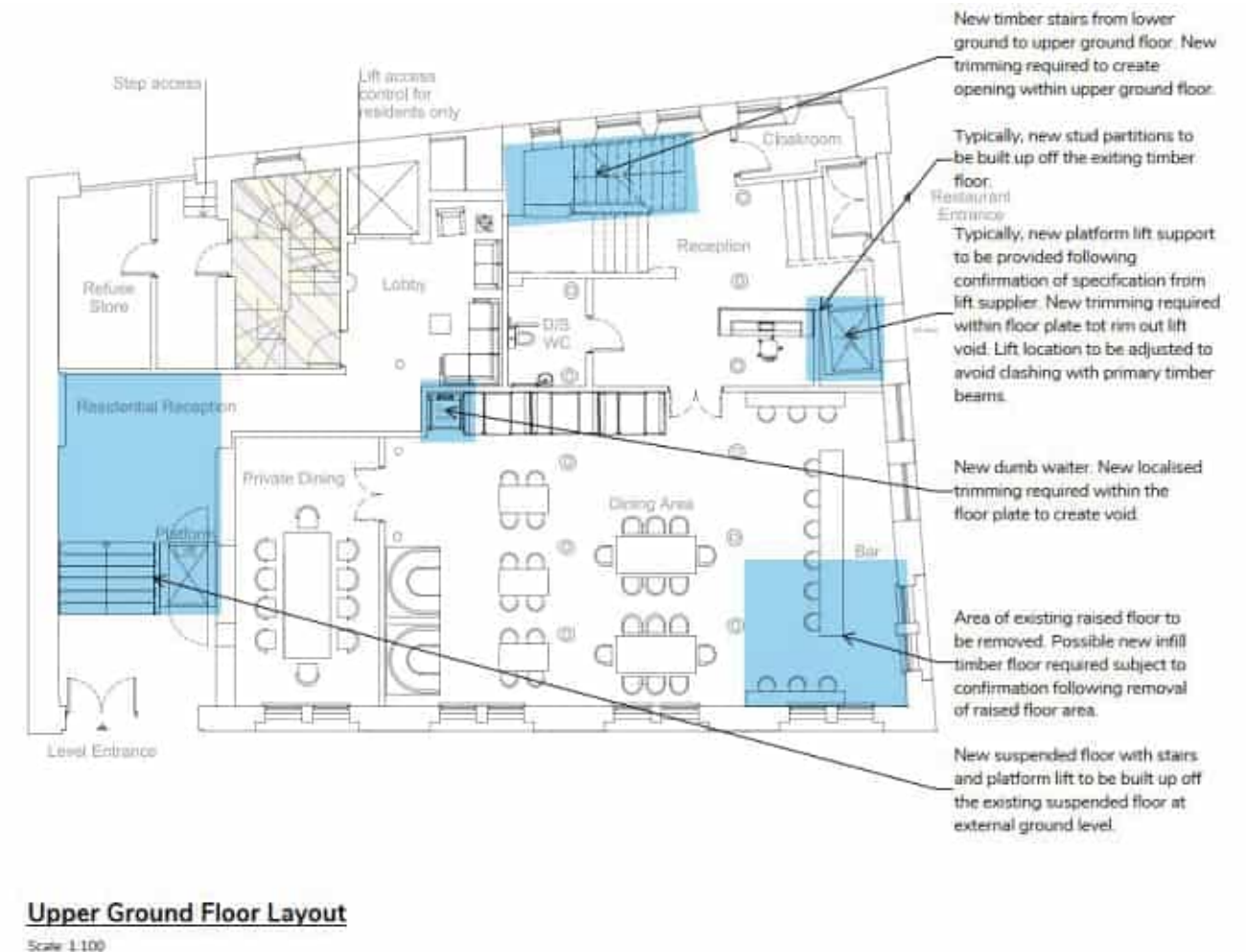


Figure 7 Extract from SK-S-0011 upper ground floor layout.

5.3.3 First floor level

Localised trimming will be required to facilitate the creation of a new opening within the floor to allow the installation of a new dumb waiter.

New non-structural studwork walls are to be installed within the upper ground floor and are to be built up of the existing timber floor.

The floor structure is to be upgraded as part of the proposed alteration works, with new architectural finishes and new acoustical treatment.

5.3.4 Second, third and fourth floor levels

Localised trimming will be required to facilitate the creation of a new opening within the floor to allow the installation of service risers.

New non-structural studwork walls are to be installed within the upper floor and built up off the existing timber floor.

The floor structure is to be upgraded as part of the proposed alteration works, with new architectural finishes and new acoustical treatment.

5.3.5 Substructure

It is not proposed to make any structural alterations that physically affect the substructure.

Based on the review of the ground conditions and the findings of the load appraisal, it is likely the original foundations will be suitable for reuse within the proposed alteration works. Refer to chapter 7.

5.3.6 Elevations

No information is available with regards to the proposed aesthetic or elevational treatment. We anticipate that the elevational treatment will be minimal with the original elevations largely retained.

5.3.7 Lifts

It is anticipated that new platform lift will be included as part of the proposed alteration works. It is anticipated that new structural support will be required to support the new platform lifts. The exact arrangement is to be further considered once an exact lift specification is provided.

6 Load appraisal approach

A load appraisal is required to assess the potential for an increase in load on the existing structure, and the ability of the existing structure (both super and sub structure) to resist any increase in load.

6.1 Assumptions

Various assumptions have been made in this load appraisal. The key assumptions made are reasonable for buildings of this age and construction and are summarised below:

- The building is currently serviceable.
- The building was designed to current and relevant codes of practice at the time of construction.
- No imposed load reduction factors were used within the original design.

6.2 Approach

The approach to appraisal is based on the recommendations within Appraisal of Existing Structures (The Institution of Structural Engineers, 2010).

There are generally three stages to an appraisal:

- **Preliminary:** a broad assessment of the appropriateness for the intended use and apparent physical condition, robustness and strength of the structure, using simple calculations where necessary. If these checks are satisfactory no further investigation is required.
- **Detailed:** a detailed assessment including, but not exclusively based on numerical checks on the stability and integrity of the structure including the strength of each member.
- **In-depth:** Where stages 1 and 2 are non conclusive, a more in-depth analysis may be required. This may require further

intrusive investigations to determine the material properties through testing.

This document constitutes a preliminary appraisal.

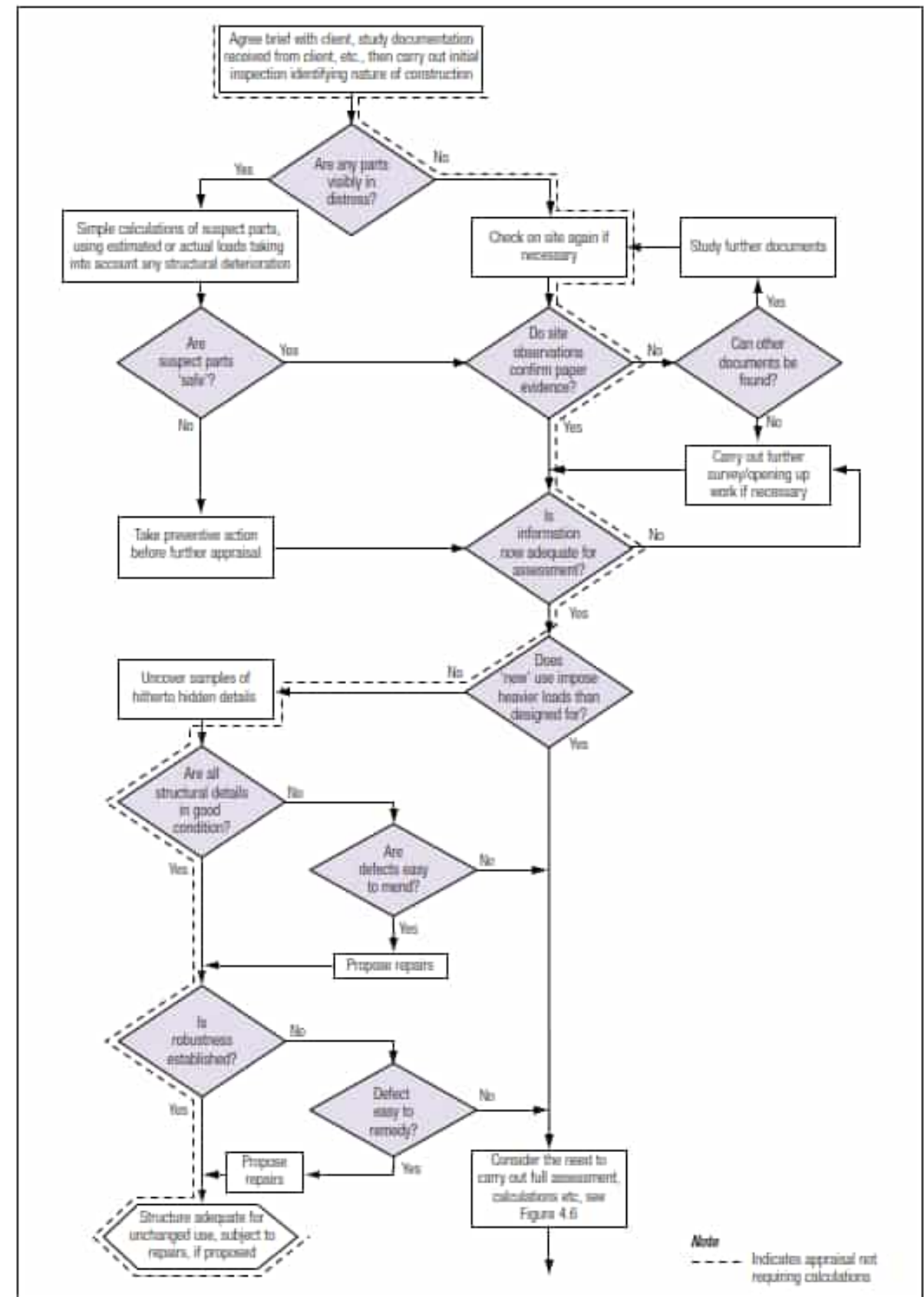


Figure 4.5 Initial stage of appraisal

Figure 8 Figure 4.5 from Appraisal of Existing Structures.

7 Load appraisal

Appraisal calculations are appended to this document.

For a preliminary appraisal, consideration is given to whether the change in load from the proposed development results in a significant increase in load on the structure. If the applied loading in the proposed configuration is similar to that of the applied loading in the existing configuration, it is reasonable to consider that there is no increase in stress within the structural elements and, providing the structure is currently serviceable, the existing structure will be able to accommodate the change in use. This can be considered as load balance. Both permanent (self weight of the structure) and variable (the loads from people using the building or the environment (wind)) are considered.

7.1 Original variable loading

At the time the original building was constructed, unified codes of practice were not in place, with most designs undertaken on the basis of rules of thumb. Guidance within CIRIA C111 indicates that no statutory guidance on load requirements was published before the 1909 London Building Acts.

As there is no codified guidance on the anticipated original design loads, consider derivation of a likely imposed load based on first principles. As the building was originally designed as a textile warehouse, it is reasonable to assume that the building will have been used to store textiles. Manchester was an integral part of the wool industry. Therefore it is reasonable to assume that the building will have been used to store woollen textiles.

Considering a 1.5m high stack of woollen textiles, and assuming a density of 3kN/m³ for wool, an approximate original floor load of 4.5kN/m² can be derived.

Considering the various useages of the building, a planning application was submitted in 1988 for a change of use to a Chinese Arts Centre including exhibition space, workshop area, craft shop and tea house.

The code of practice at the time of the planning permission was BS 6399-1. As such it is reasonable to assume this is the basis in which the building was assessed.

The below table summarises the original design loading.

Sub-category	Variable design load (kN/m ²)
C3 – Museum floors and art galleries for exhibition purposes	4.0
Original loading due to textile storage	4.5
Roof	0.6

In accordance with clause 5.1.4 of BS 6399-1 a partition allowance of 1.0 kN/m² will be accounted for as part of the original design loading.

The following load appraisal will be undertaken using the lower imposed load of Museum and exhibition space as this is a conservative approach.

7.2 Original permanent loading

As part of the loading appraisal, the following permanent floor loading will be assumed:

- 20mm thick Plywood over boarding
- 70mm thick wide plank timber boards
- Nominal services allowance
- 19mm lath and plaster ceiling

7.3 Proposed variable loading

The below table summarises the proposed design loading to the current Eurocode.

Sub-category	Variable design load (kN/m ²)
A1, All usages within self contained dwelling units	1.5
C11, Public, institutional & communal dining rooms, cafes and restaurants	2.0
C31, Corridors, hallways, aisles communal areas in blocks of flats	3.0
C32, Stairs, landings in institutional type buildings	3.0
H, roofs	0.6

In accordance with clause 6.3.1.2 of BS EN 1991-1-1 an allowance of 1.2 kN/m² will be accounted for in the proposed loading for partitions.

7.4 Proposed permanent loading

As part of the loading appraisal, the following permanent floor loading will be assumed. This will be reviewed as the architectural design develops to confirm the proposed floor loading build up.

- Allowance for finishes
- 70mm thick wide plank timber boards
- Services allowance
- Plasterboard and skim ceiling
- Acoustic build up allowance

7.5 Vertical loads

Change in vertical load from the existing to the proposed development are considered below.

Total loads (Lower ground, upper ground & first floor)

The below summary of total loads for the lower ground, upper ground and first floors are indicated below based on the original and proposed useages.

	Permanent load kN/m ²	Imposed load kN/m ²	Partitions kN/m ²	% change
Existing	0.7	4	1	5.7
Proposed	1.9	2	1.2	5.1
Change	+1.2	-2	+0.2	-0.6
% Change	+163%	-50%	+20%	-11%

Based on the above, an overall reduction of 11% is anticipated over the previous usage.

Total loads (Second floor, Third floor & fourth floor)

The below summary of total loads for the second, third and fourth floors are indicated below based on the original and proposed useages.

	Permanent load kN/m ²	Imposed load kN/m ²	Partitions kN/m ²	% change
Existing	0.72	4	1	5.72
Proposed	1.9	1.5	1.2	4.6
Change	+1.18	-2.5	+0.2	-1.12
% Change	+163%	-62.5%	+20%	-20%

Generally, the preliminary load appraisal indicates that the load on the floor plates, and this the rest of the superstructure and

substructure will decrease. As such no structural interventions are required to strengthen the floors.

The above loading has considered a uniform residential live load, with allowance for partitions, across the full floor, however areas of corridors will experience a greater imposed load. There are no partitions within the corridors, thus the increased imposed load can be accommodated through the removal of partition load allowance.

This should be further reviewed as the technical design progresses. It would be prudent to review the proposed floor finishes, acoustic and fire treatment and services and ceiling finishes to refine the proposed loading assumptions.

7.6 Horizontal loading

As part of the proposed alteration works, no extension works are proposed, thus there is no increase the overall surface area of the proposed building. As a result there is no increase in load applied to the existing stability system.

Given there is no change in lateral load, providing the building is currently serviceable, no structural interventions are required to resist horizontal load.

8 Legislative requirements

All structures within the UK are required to comply with the current Building Regulations.

The civil and structural aspects of the proposed development are covered under the following Approved Documents (AD) of the building regulations.

1. AD-A Structure
2. AD-B1 Fire
3. AD-H Drainage and waste disposal

The civil and structural design is to be in accordance with the ADs and their references.

9 Considerations for change of use

9.1 General

This report so far has considered the structural aspects with regards the proposed change of use. The following sections consider the implications on structural robustness as part of the proposed change of use.

9.2 Requirements of the building regulations

9.2.1 Disproportionate collapse

Part A3 of Approved Document A (AD-A) of the building regulations considers disproportionate collapse.

The existing building is seven stories, two basement stories and five above ground stories. The upper floors have historically been used as a warehouse, office and restaurants.

The lower ground floor has been used as a restaurant, with the basement understood to have historically been used for storage and plant.

AD-A classifies 'warehouses and industrial buildings over 4 stories' within Consequence Class 3.

AD-A classifies 'offices greater than 4 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A classifies 'retailing premises greater than 3 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A classifies 'Hotels, flats and apartments and other residential buildings greater than 4 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A states that for buildings intended for more than one type of use the Consequence Class should be the most onerous type. Therefore, the existing building is classed within Consequence Class 3.

The change of use converts the building with restaurant use at the lower ground, upper ground and first floor level and residential use from second floor up to the fourth floor.

AD-A classifies 'retailing premises greater than 3 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A classifies 'Hotels, flats and apartments and other residential buildings greater than 4 storeys but not exceeding 15 storeys' within Consequence Class 2b.

AD-A states that for buildings intended for more than one type of use the Consequence Class should be the most onerous type. Therefore, the proposed building is classed within Consequence Class 2b.

Chapter 2.6 of BCS Technical Guidance Note 21 considers conversions, alterations and extensions to existing buildings including change of use. Regulation 5 considers that given "(b) the building contains a flat where previously it did not" a material change of use applies.

Regulation 6 requires that:

Where a material change of use takes place compliance works aren't required due to a change of use involving category (b), but additional works and/or checks on the structure maybe necessary where 'building work' is being undertaken.

No significant building work is considered as taking place, therefore no additional structural requirements are required with regards to disproportionate collapse. This approach should be confirmed acceptable by building control.

The proposed building is class 2b. AD-A states that there are several ways of justifying the existing building for the proposed change in consequence class as outlined below in order of preference:

- Consider notional element removal (70m² or 15% of the floor area at that storey)
- As there is a regular column grid within the building it is conceivable that notional element removal achieved. This is to be further investigated.
- Check the capacity of the existing columns as key elements.
- This would require further intrusive investigations to be undertaken to confirm the thickness and capacity of the existing columns.
- Check the existing connections between the timber beams and metal columns.
- Given the age of the building it is unlikely that the connections will be suitable to provide both vertical and horizontal tying action, and would require significant strengthening.

Disproportionate collapse will be further considered outside of this document.

9.3 Fire

For a residential building of this type, AD-B requires structural elements to have a minimum of 60 minutes fire resistance. Roof beams do not need to be fire rated if it is ensured that cladding cannot fall beyond the site boundary during a potential fire.

Fire protection will typically be provided to steelwork with intumescent paint as it is assumed that the steelwork will be exposed. No architectural information detailing proposed finishes is currently available.

Fire protection to timber floors and beams will be typically provided by encasing floors and beams with fire rated plasterboard.

The exact fire strategy is to be further considered as the design progresses. Specific guidance is to be provided by the fire consultant.

10 Below ground drainage

The statutory undertaker for the area is United Utilities (UU). It is anticipated that foul water is routed via a private drainage network to a combined sewer within the adjacent highway to the rear of the building in Reyner Street.

Surface water is assumed to partly discharge into this system.

10.1 Surface water

The change of use of the existing building will not change the hard surface area which is currently drained. As such, providing the existing gullies, downpipes and drains are in good working order, no changes to the surface water below ground drainage is envisaged. However, it is noted that some of the drainage is in poor condition and for a building of this age we would anticipate repair to and/or replacement of some of the existing below ground drainage will be required. We would recommend that a CCTV condition survey is undertaken to identify defects within the system.

New developments are currently required to utilise sustainable urban drainage systems (SuDS) to manage surface water runoff. Typically, in order of preference, SuDS systems would require:

1. Infiltration into the ground.
2. Discharge to a watercourse.
3. Discharge to a surface water carrier drain.
4. Discharge to a highways carrier drain.
5. Discharge to a combined carrier drain.

Given the constraint of the site, we anticipate that it would not be reasonably viable to provide SuDS in the context of this project.

10.2 Foul water

The proposed change of use will increase the number of bathrooms within the building significantly. However, subject to detailed assessment, it is likely that owing to the previous use, the foul drainage network has previously been subjected to similar discharges to the proposed use. As such providing the existing below ground drainage outlet to the sewerage undertakers network is in good working order, no changes to the foul below ground drainage network are envisaged.

Given the age of the existing building we would anticipate the existing below ground drainage may not be in good working order. We would recommend that a CCTV condition survey is undertaken to identify the location and arrangement of the system as well as identify defects to be repaired as part of the proposed works.

A new network of above ground, underslung, foul drainage will be required. This will route drainage to the rear of the building and into the existing drainage connection.

11 Construction considerations

The scheme is relatively straightforward, with the majority of works within common building practices.

It should be noted that heavy materials (such as stacks of plasterboard) should not be placed on the existing floors.

Debris should be removed from the basement space, along with the demolition of the existing dividing wall within the basement space, are to be removed to allow for an uninterrupted survey of the basement areas to be undertaken.

12 Health and safety considerations

Significant and unusual hazards within the project include:

- Voids within the upper ground floor and the second floor structure.
- The external stairs have not been accessed and are assumed unsafe.
- Risk of asbestos within the existing fabric of the building.
- Proximity to neighbouring buildings.
- Temporary loading on existing timber floors during construction.
- Working in close proximity to the highway.
- Working within a constrained site.

13 Sustainability

13.1 Overview

The activities of the construction industry have a clear and direct impact on the environment. Buildings and construction activities account for nearly 40% of energy-related carbon dioxide emissions which have contributed to the current climate emergency. Over the next few years we anticipate that embodied carbon in structures will become legislated as we approach a NetZero target. In a building, up to **55%** of the whole life carbon is **A0-A5 capital carbon** in the form of **raw material, transport, manufacture and construction**. In the context of structural design, reduction in the embodied carbon of the structure can have a significant impact on the whole life carbon of a structure.

We are committed to ensuring that our engineering activities and designs have a positive impact on the environment. We believe collaboration with all members of the design team is critical, with early engagement offering the greatest opportunity to derive well-considered structurally and carbon efficient solutions.

13.2 What we are doing

We are a signatory of the **UK Structural Engineers Declare** declaration and are committed to minimising upfront carbon for all projects and maximising material utilisation to provide more structurally efficient designs. We are embedding the core commitments of the declaration within each project, including:

- Promoting reuse and refurbishment of existing buildings and infrastructure first above new build.
- Minimise wasteful use of resources and adopt regenerative design principles.
- Evaluate all new projects against the aspiration to contribute positively to the mitigation of climate breakdown.
- Raising awareness of the climate emergency and the need for urgent action with our clients and collaborators

For all projects, we strongly believe that reducing embodied carbon is a fundamental requirement of a design and client team. The earlier the design team addresses embodied carbon, the more impact they can have.

13.3 Benchmarking

13.3.1 IStructE SCORS

The Institution of Structural Engineers (IStructE) have released the SCORS (Structural Carbon Rating Scheme) alongside a publication 'how to calculate embodied carbon'. This allows structural engineers to calculate the embodied carbon of a structure and then rate a scheme based on per m² of Gross Internal Area (GIA). The calculation method has been developed in coordination with LETI.

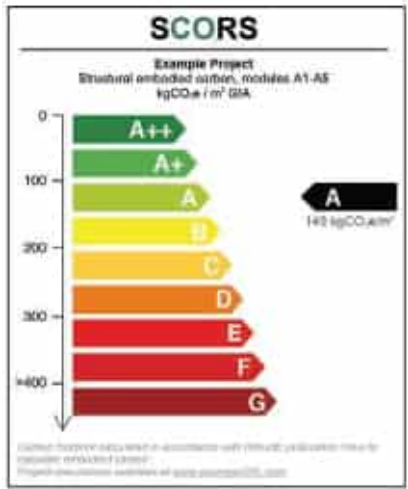


Figure 10 Example SCORS rating table.

13.3.2 RIBA 2030

The Royal Institute of British Architects (RIBA) have developed the [2030 Climate Challenge](#) to help designers on a climate conscious trajectory. The challenge sets a series of targets to adopt for building refurbishment and new building design to address the global climate crisis in order to achieve NetZero.

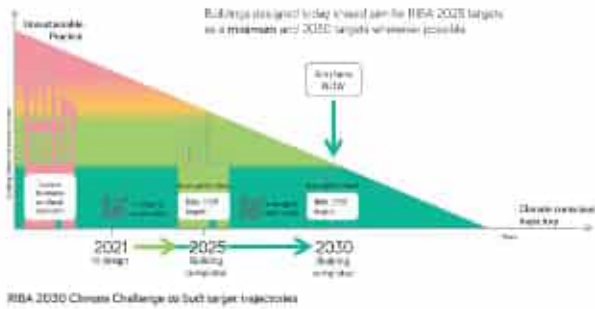


Figure 11 RIBA climate challenge.

13.4 Embodied carbon project targets

Primarily, re-use of an existing building is the best approach to reducing carbon within development projects. As such, this scheme is considered favourably.

With regards to sustainability there are several ways that a well-designed structure can help contribute to a building with responsible environmental credentials. Clearly a well-refined solution, which as a result uses less raw-material, is important in reducing the environmental impact of a scheme.

Providing as much flexibility of layout as possible, in this instance in the form of non-structural internal partitions, will ensure that the building can be adapted to suit potential future changes with less likelihood of wholesale re-construction necessary in the future.

Locally sourcing materials and labour will significantly reduce transport requirements greatly improving the carbon footprint of the build process.

Within the scope of this scheme, the choice of structural materials and architectural finishes is likely to have the most significant impact.

For a carbon minimal design, we feel the approach to the design of new structures should focus on:

- Early involvement of the wider design team.

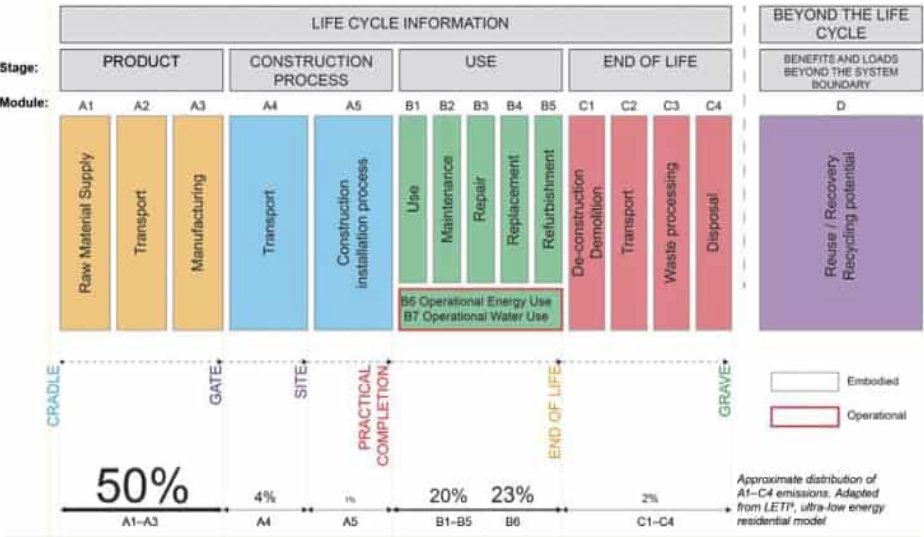


Figure 9 Whole life cycle carbon (from IStructE How to Calculate Embodied Carbon)

- Use of structural timber rather than concrete and steel.
- Exposing the structural framing to limit finishes.

14 Next steps

14.1 General

An initial structural walkover survey has been undertaken to date to confirm the nature of the existing structure. A detailed structural inspection should now be undertaken of the existing building to confirm location and severity of any defects within the building to advise on suitable repair works to safeguard the existing structure.

Proposed structural sketch layouts can be derived based on revised architectural layouts to incorporate the proposed dual restaurant arrangement.

14.2 Vertical loading

Following the findings of the preliminary vertical load appraisal, stress checks are to be undertaken on the wide plank floor board and the primary timber beams to confirm the capacity of the existing structure is adequate for the proposed change of use.

14.3 Robustness

Disproportionate collapse is to be further considered outside of this report. Various methods of demonstrating compliance with the building regulations can be used within consequence class 2b buildings, which are to be further considered.

15 Bibliography

Preliminary Heritage Assessment

Appraisal of Existing Structures (The Institution of Structural Engineers, 2010).

C111 Structural renovation of traditional buildings (CIRIA, 1994)

Appendix A - Surveys, investigations and searches schedules

The below tables identifies surveys, investigations and searches which are likely to be required. Note that some of the surveys have already been undertaken or commissioned.

Survey / Investigation / Searches etc.	Scope	Notes
Services records.	Statutory services records for connection to the site including water, gas, electricity & telecommunications.	Required
Below ground CCTV drainage survey.	Verify size, levels, positions and condition of existing drainage on site in areas.	Required
Asbestos survey.	Asbestos R&D survey of the existing building.	Already available
Existing building records.	Identify and retrieve construction drawings from the local authority building control.	Desirable
Measured building survey	Required to convey the existing structure.	Already available
Topographical survey.	Topographical survey to convey levels of existing site.	Assumed to already be available
Intrusive investigations.	Opening up works to the basement of the existing structure to allow for coordination.	Required
Non-intrusive investigations.	Timber rot and damp survey to identify areas of unsafe timber to be removed as part of the remediation works.	Already available and appended to this report.

Note: There may be other surveys, investigation and searches required. These will be confirmed as design progresses.

Appendix B - Structural Sketches

LM21346-DYSE-XX-ZZ-SK-S-0001 P01 Existing Lower Ground Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0002 P01 Existing Upper Ground Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0003 P01 Existing First Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0004 P01 Existing Second Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0005 P01 Existing Third Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0006 P01 Existing Fourth Floor Structural Layout

LM21346-DYSE-XX-ZZ-SK-S-0010 P01 Proposed lower ground floor layout

LM21346-DYSE-XX-ZZ-SK-S-0011 P01 Proposed upper ground floor layout

LM21346-DYSE-XX-ZZ-SK-S-0012 P01 Proposed first floor layout

LM21346-DYSE-XX-ZZ-SK-S-0013 P01 Proposed second floor layout

LM21346-DYSE-XX-ZZ-SK-S-0014 P01 Proposed third floor layout

LM21346-DYSE-XX-ZZ-SK-S-0015 P01 Proposed fourth floor layout

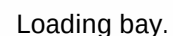
1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/06/22
3. No intrusive investigations were undertaken, additional defects maybe present within the structure.
4. Lower basement not surveyed due to time constraints and lack of lighting.

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 70mm thick.
4. Boxing to timber beams recessed, unclear what size and depth.
5. Overboard thickness 20mm.
6. Flooring has local over boarding.
7. Condition of lintels unknown, no access.
8. Ceiling infill, assume plaster board.

1.0 - Debris pile preventing access.
2.0 - Fall to existing floor (mm)

- - Denotes existing 250mm x 340mm deep timber beams
- - Denotes existing stud work
- - Denotes existing masonry
- - Denotes steel column with circumference 640mm
- - Denotes void area

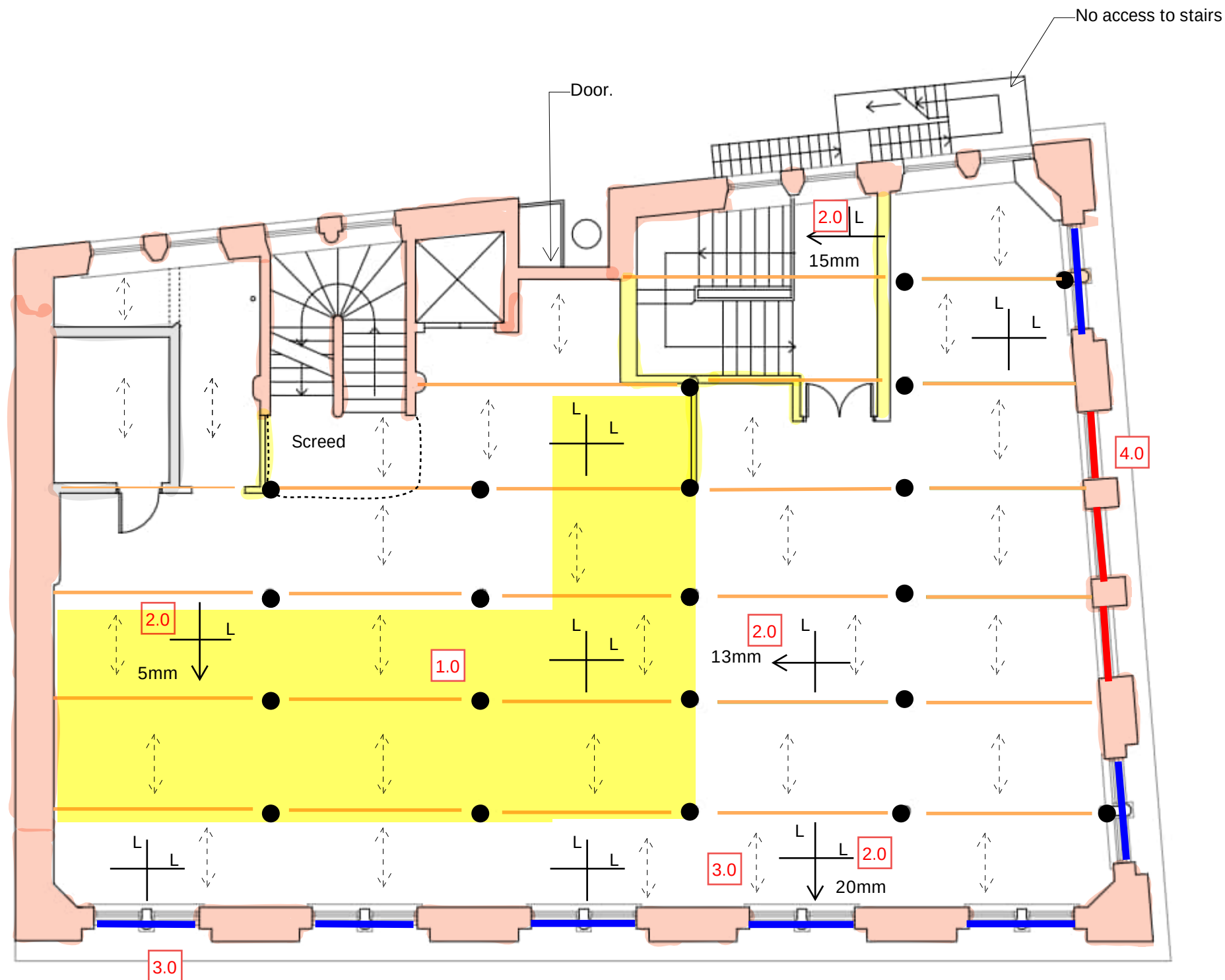
: Aug '22

NTS.



Project:	Fraser House	Eng:	JB
Title:	Existing Upper Ground Floor Structural Layout	Date:	July'22
No:	LM21346-DYSE-XX-ZZ-SK-S-0002	Rev:	P01





Existing First Floor Layout Indicating Structure Over

NTS.



Various First Floor Photos

General notes

1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/02/22
3. No intrusive investigations were undertaken, additional defects maybe present within the structure.

Structural form

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls

General Floor Commentary

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 74mm thick.
4. Boxing to timber beams makes it difficult to tell if continuous or not.
5. Overboard thickness 20mm.
6. Flooring has local over boarding.
7. Masonry in fair condition with small diameter holes throughout.

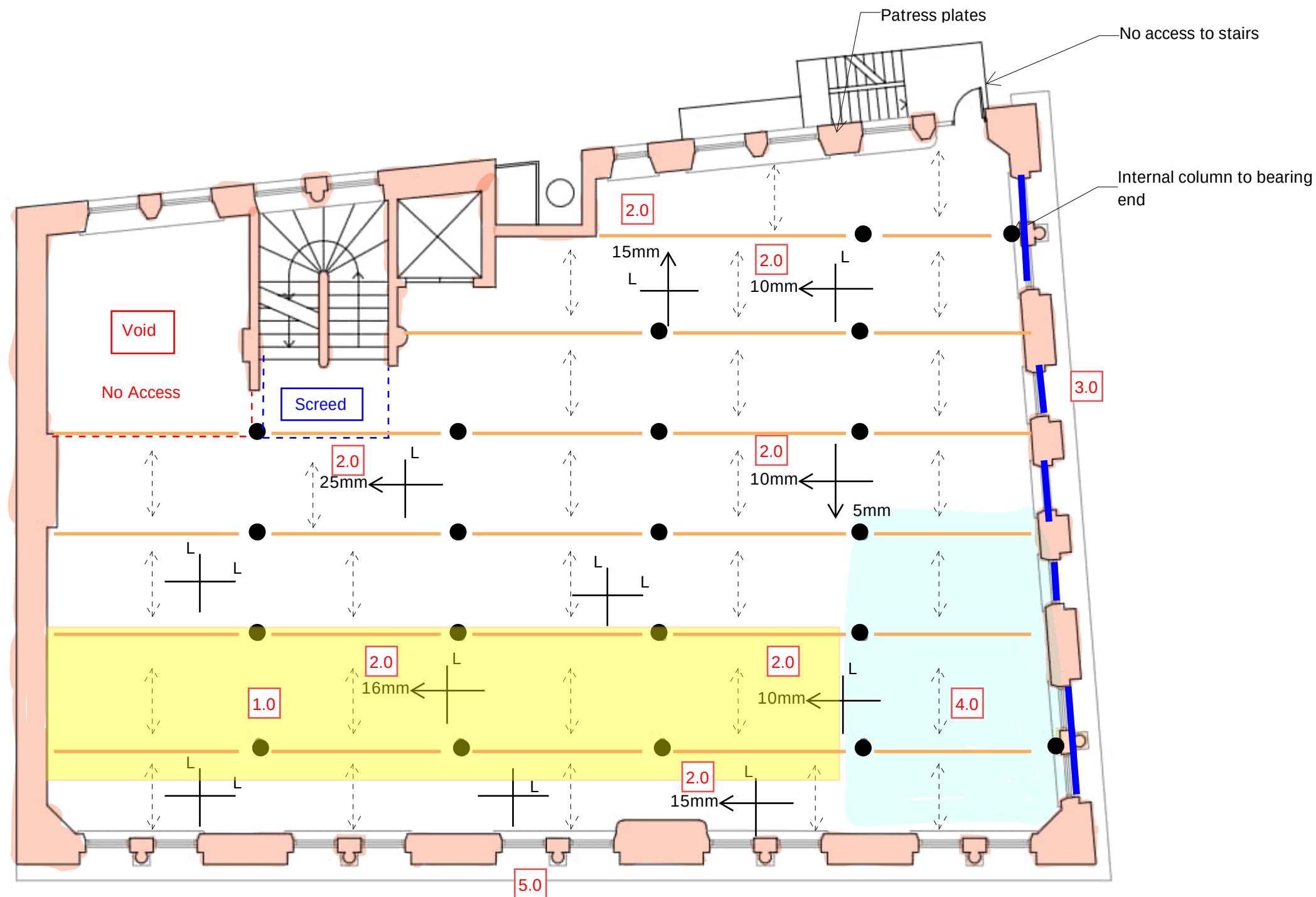
Defects Reference

- 1.0 - Undulation to flooring (yellow hatch).
- 2.0 - Fall to existing floor (mm)
- 3.0 - New timber lintel.
- 4.0 - Steel lintel, fair condition.

Structural Legend

- Denotes existing studwork
- Denotes existing timber beam, approx 350mm deep x 240mm width
- Denotes existing metal column, circumference 510mm
- Denotes existing blockwork
- Denotes existing masonry
- Denotes floor board span (74mm thick & 222mm wide)
- Denotes existing timber lintel
- Denotes existing steel lintel

Project:	Fraser House	Eng:	JB
Title:	Existing First Floor Structural Layout	Date:	Aug '22
No:	LM21346-DYSE-XX-ZZ-KS-S-0003	Rev:	P01



General notes

1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/02/22
3. No intrusive investigations were undertaken, additional defects maybe present within the structure.

Structural form

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls

General Floor Commentary

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 77mm thick.
4. Boxing to timber beams makes it difficult to tell if continuous or not.

Defects Reference

- 1.0 - Undulation to flooring (yellow hatch)
- 2.0 - Fall to existing floor (mm)
- 3.0 - Loss of section to lintel.
- 4.0 - New timber flooring (blue hatch)
- 5.0 - lintel not visible, no inspection.

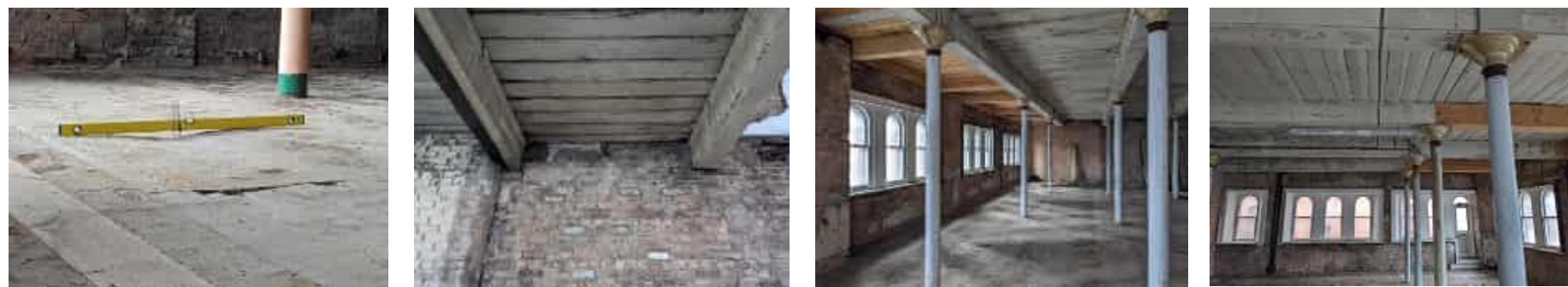
Structural Legend

- Denotes existing timber beam, approx 350mm deep x 240mm width
- Denotes existing metal column, circumference 510mm
- Denotes existing masonry
- Denotes existing board floor span (77mm thick & 222mm wide)
- Denotes existing timber lintel

Project:	Fraser House	Eng:	JB
Title:	Existing Second Floor Structural Layout	Date:	Aug '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0004	Rev:	P01

Existing Second Floor Layout Indicating Structure Over

NTS.



Various Second Floor Photos

General notes

1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/02/22
3. No intrusive investigations were undertaken, additional defects maybe present within the structure.

Structural form

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls.

General Floor Commentary

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 64mm thick.
4. Boxing to timber beams makes it difficult to tell if continuous or not.

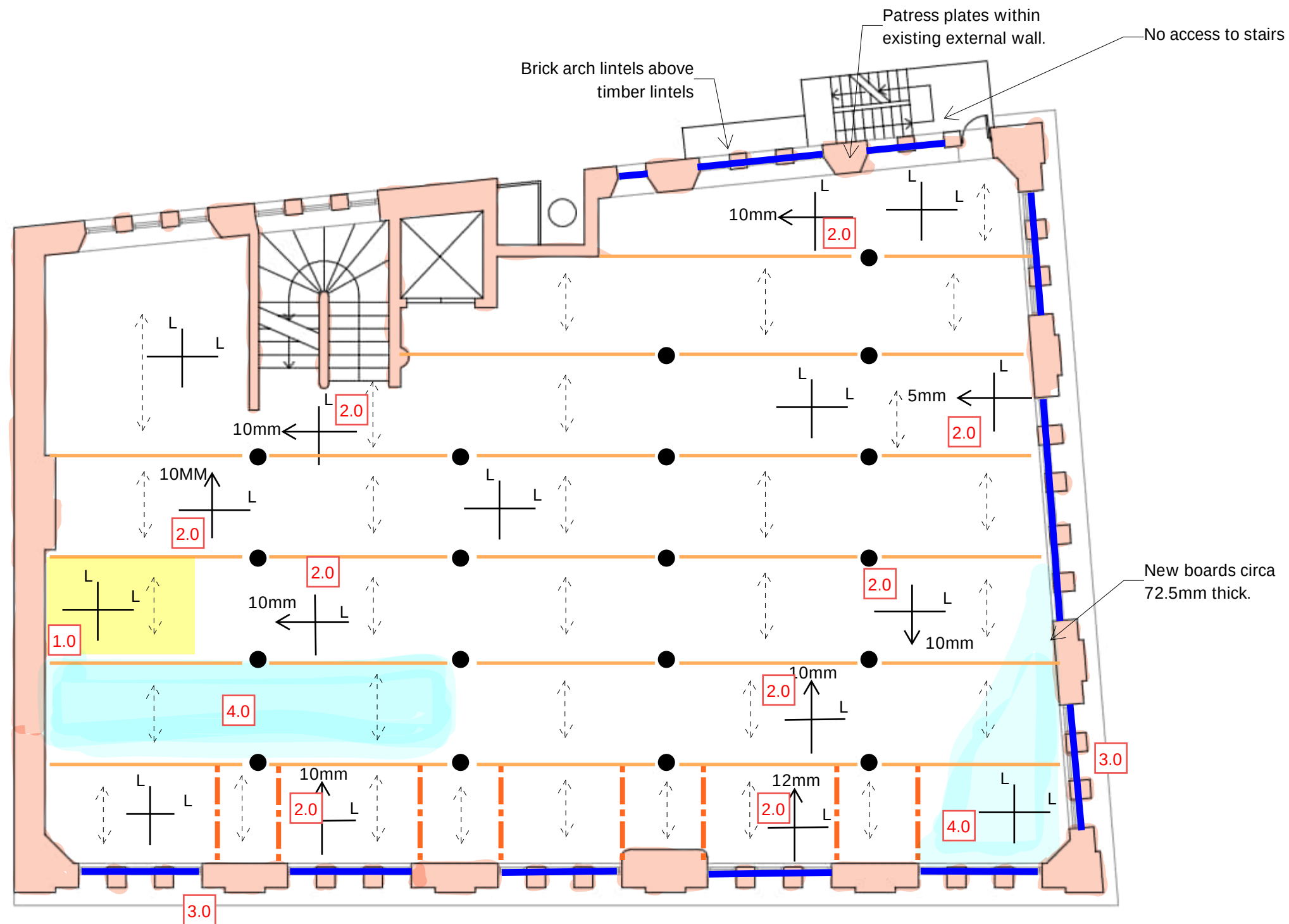
Defects Reference

- 1.0 - Undulation to flooring (yellow hatch)
- 2.0 - Fall to existing floor (mm)
- 3.0 - Loss of section to timber lintel.
- 4.0 - New timber flooring (blue hatch)

Structural Legend

- - Denotes steel column with circumference 490mm
- - Denotes existing masonry wall
- - Denotes existing timber lintel
- - - - - Denotes new timber beam
- ↔ - Denotes existing floor span (64mm thick and 222mm wide)
- - Denotes existing timber beam approx 350mm deep & 240mm wide

Project:	Fraser House	Eng:	JB
Title:	Existing Third Floor Structural Layout	Date:	Aug '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0005	Rev:	P01



Existing Third Floor Layout Indicating Structure Over
NTS.



Various Third Floor Photos

General notes

1. Do not scale from these drawings.
2. Structure shown is based on the findings of the walk over survey undertaken on 29/02/22
3. No intrusive investigations were undertaken, additional defects maybe present within the structure.

Structural form

Wide span timber boards spanning between primary timber beams spanning between metal columns and load bearing masonry walls.

General Floor Commentary

1. Floor generally level, with minor undulations noted predominately at board joints.
2. Columns generally in fair condition given the age of the building.
3. Existing floor boards circa 64mm thick.
4. Boxing to timber beams prevented a visual assessment of the timber condition.
5. Boarding to ridge beams and hip beams prevented a visual assessment of the existing structure.

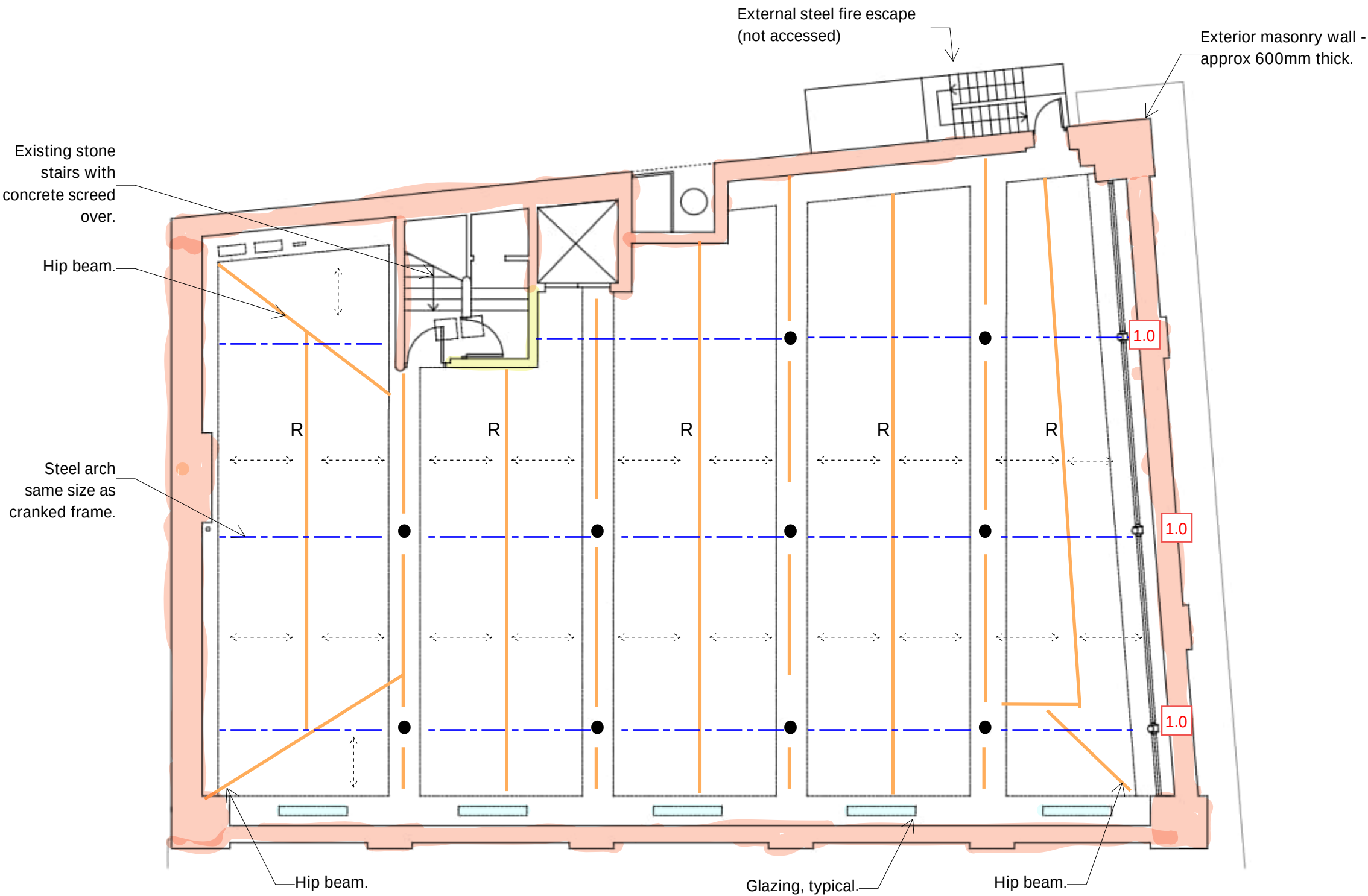
Defects Reference

1.0 Cranked frame with minor rusting at bearing end with contact to masonry wall.

Structural Legend

●	- Denotes metal column Circumference - Circa 490mm
—	- Denotes beam encased in timber boarding
- - - - -	- Denotes steel framing, typically 127x76x13 UB's
R	- Denotes ridge beam
█	- Denotes masonry wall
↔	- Denotes existing roof span
█	- Denotes non-structural stud partition

Project:	Fraser House	Eng:	JB
Title:	Existing Fourth Floor Structural Layout	Date:	Aug'22
No:	LM21346-DYSE-XX-ZZ-SK-S-0006	Rev:	P01

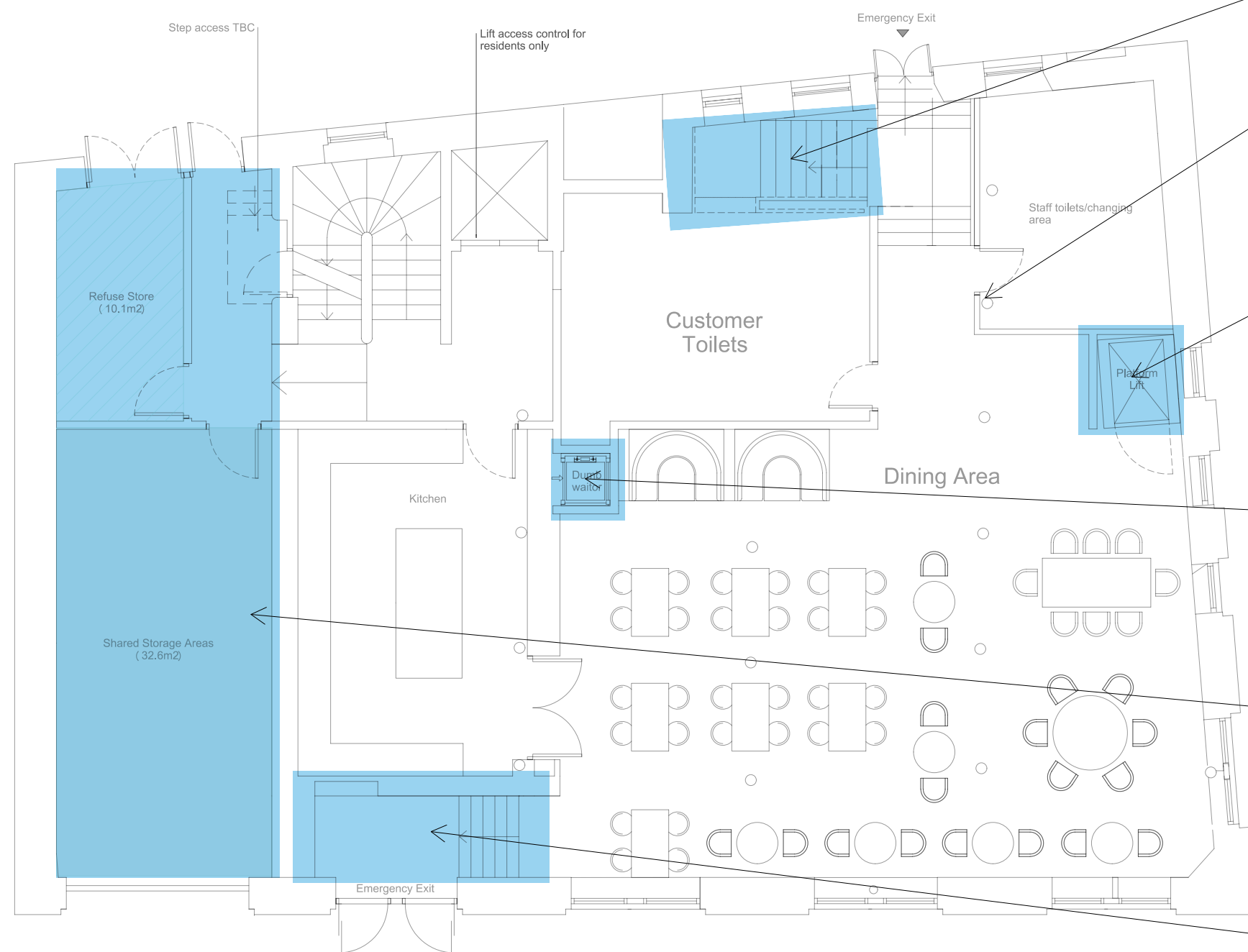


Existing Fourth Floor Indicating Roof Structure Over

NTS.



Various Fourth Floor Photos



New timber stairs from lower ground to upper ground floor. New trimming required to create opening within upper ground floor.

Typically, new stud partitions to be built up off the exiting timber floor.

New platform lift support to be provided following confirmation of specification from lift supplier. New trimming required within floor plate to rim out lift void. Lift location to be adjusted to avoid clashing with primary timber beams.

New dumb waiter. New localised trimming required within the floor plate to create void.

New floor to be provided at lower ground floor level. New structural framing to new floor to be provided. Exact arrangement to be confirmed following review of revised architectural proposals.

New timber stairs from lower ground to upper ground floor. New trimming required to create opening within upper ground floor.

General Notes

1. Do not scale from these drawings.
2. Structural interventions are based on the proposed architectural layouts received on 31/08/2022.
3. These sketches should be reviewed in conjunction with DYSE feasibility report RP-S-0001.

Lower Ground Floor Layout

Scale: 1:100

Project:	Fraser House	Eng:	MWS
Title:	Lower Ground Floor Layout	Date:	Sep '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0010	Rev:	P01



New timber stairs from lower ground to upper ground floor. New trimming required to create opening within upper ground floor.

Typically, new stud partitions to be built up off the exiting timber floor.

Typically, new platform lift support to be provided following confirmation of specification from lift supplier. New trimming required within floor plate to rim out lift void. Lift location to be adjusted to avoid clashing with primary timber beams.

New dumb waiter. New localised trimming required within the floor plate to create void.

Area of existing raised floor to be removed. Possible new infill timber floor required subject to confirmation following removal of raised floor area.

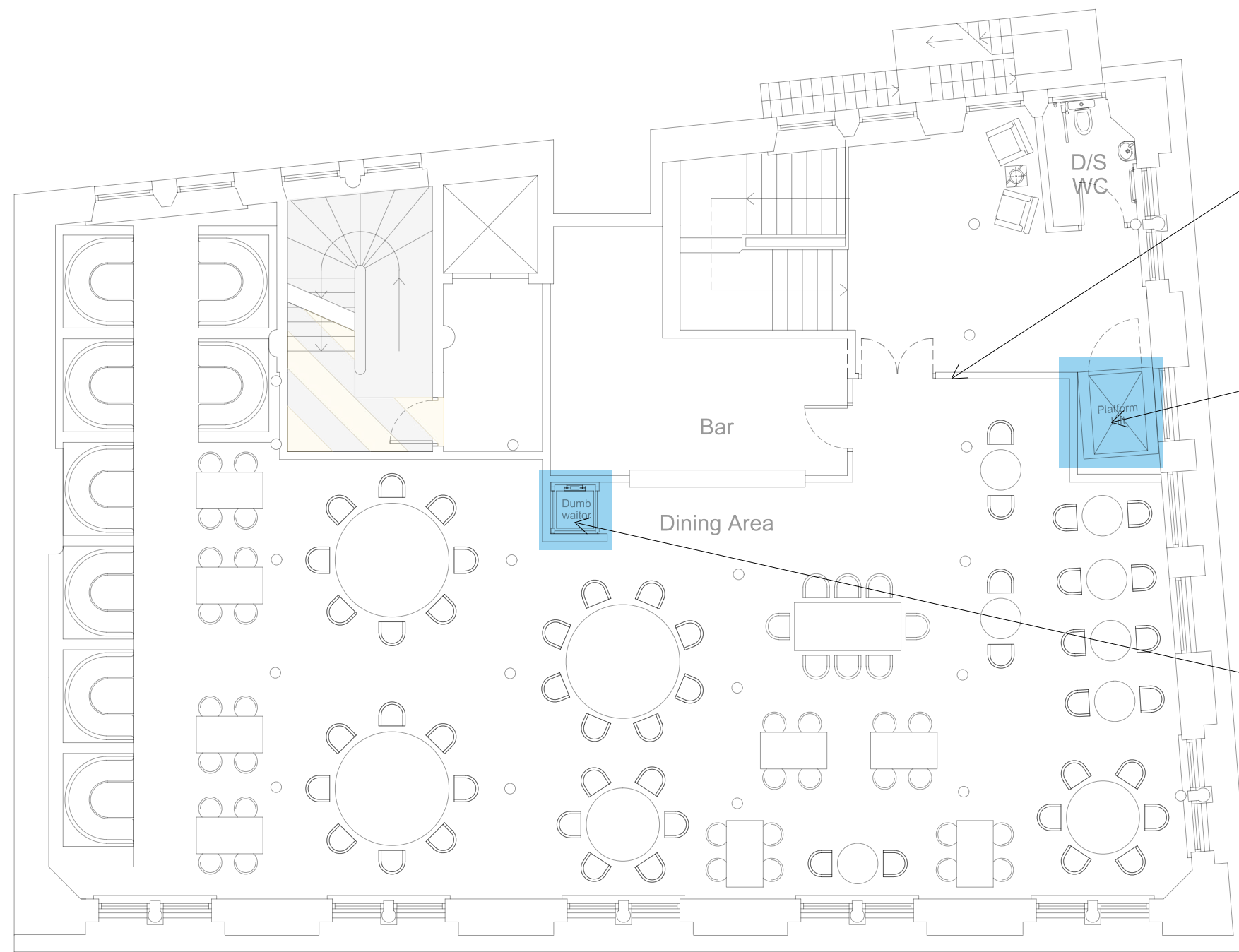
New suspended floor with stairs and platform lift to be built up off the existing suspended floor at external ground level.

- General Notes**
1. Do not scale from these drawings.
 2. Structural interventions are based on the proposed architectural layouts received on 31/08/2022.
 3. These sketches should be reviewed in conjunction with DYSE feasibility report RP-S-0001.

Upper Ground Floor Layout

Scale: 1:100

Project:	Fraser House	Eng:	MWS
Title:	Upper Ground Floor Layout	Date:	Sep '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0011	Rev:	P01



Typically, new stud partitions to be built up off the exiting timber floor.

Typically, new platform lift support to be provided following confirmation of specification from lift supplier. New trimming required within floor plate tot rim out lift void. Lift location to be adjusted to avoid clashing with primary timber beams.

New dumb waiter. New localised trimming required within the floor plate to create void.

General Notes

1. Do not scale from these drawings.
2. Structural interventions are based on the proposed architectural layouts received on 31/08/2022.
3. These sketches should be reviewed in conjunction with DYSE feasibility report RP-S-0001.

First Floor Layout

Scale: 1:100

Project:	Fraser House	Eng:	MWS
Title:	First Floor Layout	Date:	Sep '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0012	Rev:	P01



General Notes
1. Do not scale from these drawings.
2. Structural interventions are based on the proposed architectural layouts received on 31/08/2022.
3. These sketches should be reviewed in conjunction with DYSE feasibility report RP-S-0001.

Second Floor Layout Indicating Structure Over
Scale: 1:100

Project:	Fraser House	Eng:	MWS
Title:	Second Floor Layout	Date:	Sep '22
No:	LM21346-DYSE-XX-ZZ-SK-S-0013	Rev:	P01