Stage 3 Structural & Civil Report

227 Shepherds Bush Rd, London, W6 7AS

SBR-HDR-XX-XX-RP-S-000010

.ondon Blackfriars

January 20, 2026

Document Control

Issue	Date	Status	HDR Author	HDR Approval	Notes
P01	20/01/26	Stage 3 Issue	R. Bowden	D. Staddon	

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Executive Summary

Working with 227 SBR Ltd and their design team, HDR have been instructed to undertake a structural review to assess the feasibility of the proposed refurbishment and extension of the existing building at 227 Shepherds Bush Rd, London, W6 7AS.

This report sets out the RIBA Stage 3 civil & structural concept for the proposed works to inform a cost plan. This document also sets out design strategies and parameters for adoption in the next development stage.

The scope for the project developed at Stage 3 is for a full double storey vertical extension over the existing roof level, to created multiple new residential dwellings. To facilitate this, the existing lightweight roof structures are to be removed, and the existing roof level is to be refurbished, forming the floor structure of the proposed Lvl04.

Two separate planning applications have been submitted to Hammersmith & Fulham council as part of the proposed works. Application (Ref. 2025/01185/PDAA56) for the proposed extension, granted the 31st of October 2025 and Application (Ref. 2025/02040/PMA56) covering the Class E (Office) to C3 (Resi.) change of use, granted the 7th of November.

No critical site constraints have been identified as of the publishing of Stage 3 and the current proposal aims to avoid any form of ground works beyond the installation of new/upgraded service connections.

Intrusive works were undertaken by Moorhead Richardson to quantify the existing frames composition and to analyse the material characteristics. A full report the is included within the appendix. The key points to be highlighted are a low compressive strength of concrete with values of 12N/mm² being typical across columns, beams, walls and slabs. Notable the lowest recorded value during the investigation was 8N/mm². A further testing scope has been developed and is to be undertaken by Moorehead Richardson to provide a wider sample of results and to inform the potential need for strengthening works to the existing structure.

Durability assessments note carbonation as a concern, with depths approaching or exceeding reinforcement in several locations, indicating loss of the protective passive layer and increased vulnerability to corrosion over time. Existing concrete elements exposed to the elements would therefore likely need protective coatings applied to ensure longevity of the structure.

Concrete cover generally met minimum standards set by BS EN 1992-1-1, except for one isolated case with only 5mm cover. Chloride levels were well below the threshold specified in BS 8500, ranging from less than 0.02% to 0.08% by mass of cement. Corrosion risk was assessed as negligible or low in most areas, with moderate risk identified in damp-exposed elements such as ground floor columns and the transfer beam. No HAC was detected visually or through laboratory testing.

Framing options have been developed for the new structure and the proposed structural solution involves hot rolled steel framing, with new columns centred on existing columns. The floor structure is a light weight cold formed joist system with plywood deck. This form of construction has been opted for due to its lightweight nature to minimise additional loadings on the existing structure and to negate the need for foundation strengthening and also due to keeping the overall depth of the structure to a minimum and to within a 10% window of the existing loadings.

Stability of the new structure is via vertical braced bays, which resist lateral loads and transfer loads down to existing shear wall positions. The floor plates have plan bracing to provide diaphragm action and transfer lateral loads from the façade and back to the vertical bracing system.

During the next design stages, there are several areas to be developed as outlined within the report:

- Further design checks on the existing primary structure to confirm capacity and rule out strengthening requirements following further site sampling and testing
- Development of scope for refurbishment/upgrade works to existing services.
- Detailed design and coordination based upon confirmation of load requirements for architectural elements.
- Continued development and coordination of proposed steel framing, flooring and façade strategy.
- Detailed assessment and development of existing to proposed element connection

1 Introduction

1.1 Purpose of Report

Working with 227 SBR Ltd and their design team, HDR have been instructed to undertake a structural review and design to assess the feasibility of the proposed refurbishment of the existing structure at 227 Shepherds Bush Rd, London, W6 7AS.

This report sets out the RIBA Stage 3 structural concept for the building, design criteria, architectural proposals and existing element condition to inform a cost plan.

Design strategies and parameters for adoption in the next stage have also been noted.

1.2 Proposed Development

The scope of the project developed at Stage 3 is for a double storey vertical extension of the existing roof level, to create multiple new residential dwellings. To facilitate this the existing light-weight roof structure is to be removed, and the current roof level replaced to form the floor structure of the proposed Lvl04.

The height of the proposed additional storeys is to be limited to avoid the overall FFL of the highest occupied storey being 18m above ground level. This to ensure the building will not be classified as a high-risk building in accordance with the building safety act.

In addition to the extension a change of use from Class E office to Class C3 residential for Lvl00-03 is proposed and is to be enabled via an internal fit out.

Two separate planning applications have been submitted to Hammersmith & Fulham council as part of the proposed works:

- Application (Ref. 2025/01185/PDAA56), proposed extension.
    - Submitted: 24th of April 2025
    - Granted: 31st of October 2025
- Application (Ref. 2025/02040/PMA56), Class E to C3 change of use.
    - Submitted: 24th of July 2025
    - Granted: 7th of November.

1.3 Design Team

Table 1. Design Team

Discipline	Consultant
Client	227 SBR Ltd, Jeremy Sutton
Architect	Matthias Hamm, Space Agent
M&E	John Oaks, Oakley M&E Design
Structural and Civil	HDR Inc.
Fire	Paul Brown, Freya Comprehensive Fire Solutions Ltd.
Noise & Vibration	Sam Message, ACA Acoustics

1.4 Scope of Work

HDR's scope of work for stage 2 and 3 design of the vertical extension is as follows

- Undertake a single site visit to undertake a visual non-intrusive inspection of the existing building.
- Advise on intrusive structural investigations and opening works to inform the further stages of design. Where survey works are required, we will scope these and coordinate with relevant contractors using our experience.
- Contact Building Control to obtain structural record information
- Develop options for the structural solution to construct the additional storeys. We will coordinate opportunities for the development with the architect and project team, appraising each for sustainability, functionality, cost, and structural implications; specifically reviewing structural zone depths to minimise the height increase to the existing building and alterations to the existing structure.
- Undertake analysis of the existing structure for the proposed additional storeys. This will involve technical load assessments to determine whether there is capacity in the existing structure to incorporate the proposed alterations. We would look to mitigate the requirement for any strengthening works to the existing structure by balancing loading between the proposed works and the change of use from office to residential.
- While the proposed development will utilise the existing below ground drainage network, and there will be no change to the surface water drainage strategy for the site, we understand comments on the Flood Risk and Drainage Strategy will be required for planning. Our proposal includes to provide a Flood Risk Assessment and Drainage Strategy technical note to be included within the planning submission.
- Provide a set of design information to act as the Employers Requirements (ERs)

1.5 Record Information

No previous record information has been provided or been acquired from Building Control as of publication of this report.

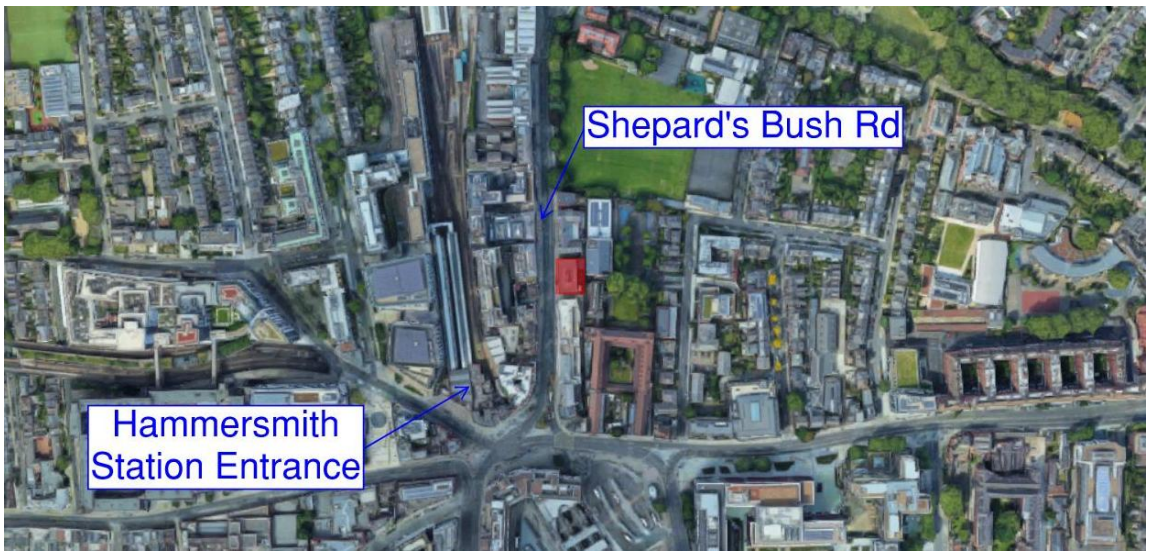
2 The Site

2.1 Site Description

The site is located at 227 Shepherds Bush Rd, London, W6 7AS as shown on Figure 1 and is currently in use as an office space. The site is circa 0.1ha and is located 200m from the Hammersmith underground station to the Southwest with access to the Circle, Hammersmith & City, Picadilly & District lines.

The site is bounded by Hammersmith library to the North, Sacred Heart High School to the East, Premier Inn to the South and the A219 (Shepherds Bush Rd) to the West. The wider area comprises mainly commercial and residential developments. It is understood that the Site is not located within an existing conservation zone and is not a grade listed building.

Figure 1. Site Location (Google)



2.2 Existing Building

The existing building comprises a ground level of a reception area, a car park under croft & small commercial space in addition to the 3 storeys of office space above. The structure is a reinforced concrete frame comprising perimeter columns, flat & ribbed slabs and a central reinforced concrete core forming the elevator shaft and stair walls, which provides lateral stability. Towards the back of the structure a steel frame fire escape staircase has been erected and provides access to ground level from Lvl01-Lvl03.

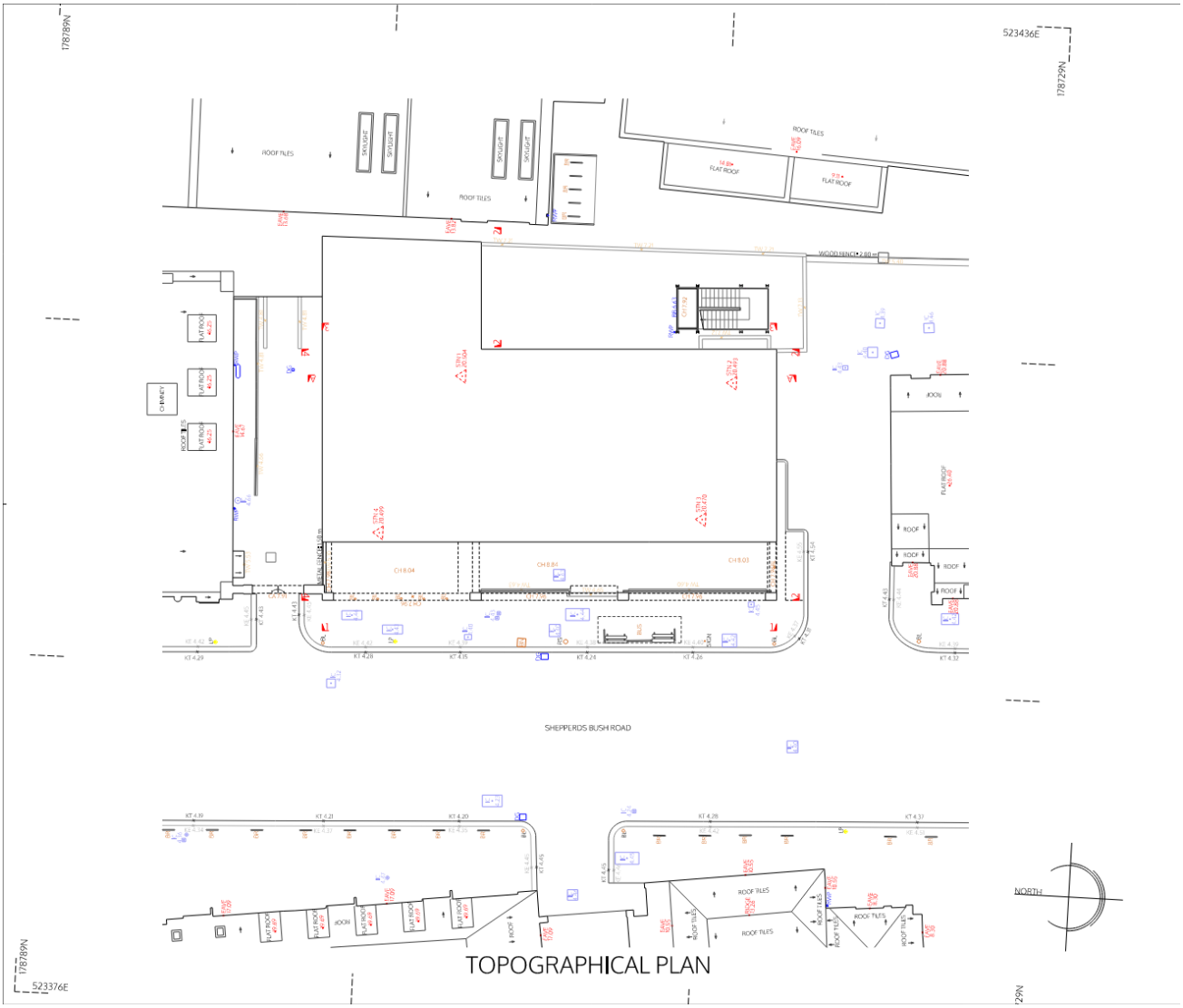
Figure 2. Satellite Site Image (Google), View Looking Northeast

2.3 Site Constraints

2.3.1 Topography

The site is considered to be flat and level with a majority of the site occupied by the existing building footprint, areas outside of the structure are typically level hard standing. Levels are not foreseen to pose an issue during the project and groundworks are envisioned to only be required to assess existing foundations, upgrade below ground drainage and install new services.

Figure 3 - Topographical Plan (spaceAgent, Ref. SHE_EOOa8)



2.3.2 Trees

There are no existing trees within the site boundary. Several mature trees are located to the east, circa 25m from the site boundary within Sacred Heart High School. No impact on the proposed works is foreseen if the foundations are found to be in good condition and remain unaltered during the proposed works.

Figure 4 - Adjacent Trees (Google, 2025)

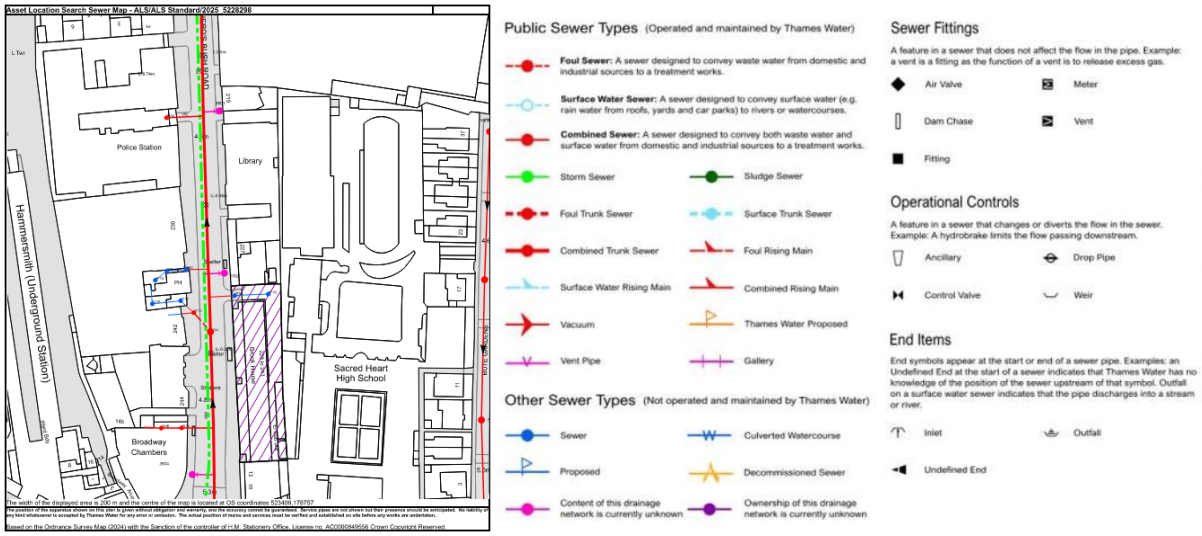
2.3.3 Below Ground Services

Thames water asset records have been obtained during progression of the civils works package. A brief summary and excerpts are provided below, refer to the full report for further information (ALS/ALS Standard/2025_5228298).

Wastewater

A combined sewer is located within Shepherds Bush Road, and the site is indicated to be connected to this via a privately owned connection.

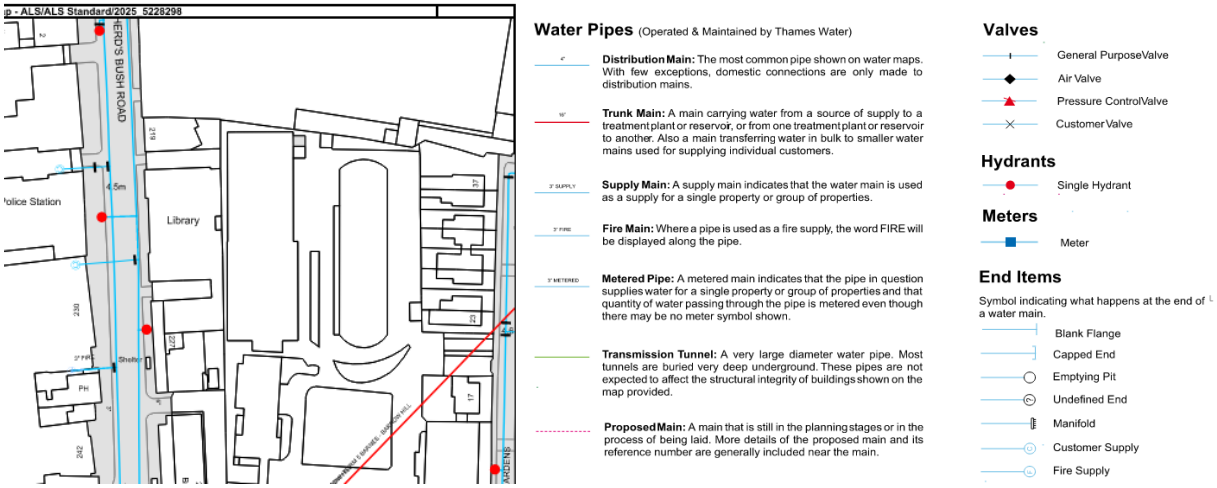
Figure 5 - Fowl Water (Thames Water Asset Report)



Portable Water

Two 6” mains water supplies are located within Shepherds Bush Road, and it is understood that the site connects to the eastern pipe however, Thames Asset records are inconclusive regarding this.

Figure 6 - Portable Water (Thames Water Asset Report)



Additional Services

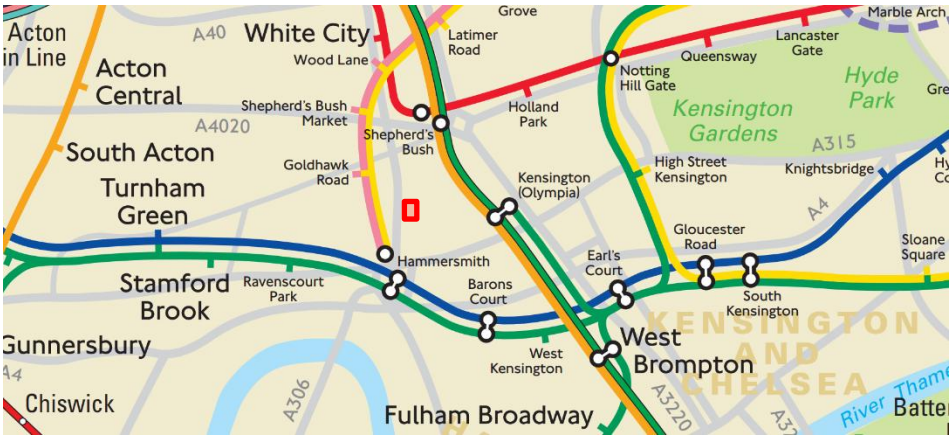
It is envisioned several key services, beyond those under Thames Waters purview are located within Shepard’s Bush Rd to the West and/or under areas of hardstanding within the site boundary to the North and South.

The current proposal seeks to balance existing and proposed loading to avoid changes to the foundations. Further services information is envisioned to only be required to enable the connection of upgraded services and/or a more extensive form of excavation works is required. The type and location of existing services is to be confirmed in later design stages prior to the commencement of onsite works.

2.3.4 Local Third-Party Infrastructure

London Underground tracks serving the Circle and Hammersmith & City lines are located circa 70m to the east of the building (Figure 7). It is understood the distance between the lines and proposed development puts the existing foundations outside of the London Underground 'zone of influence'. As a result, London Underground will not have to be consulted if any new foundation work is undertaken, however the proposed development involves only changes to the superstructure and aims to not increase foundation loading.

Figure 7 - Geographically Accurate TfL Map (FOI Request, August 2014)

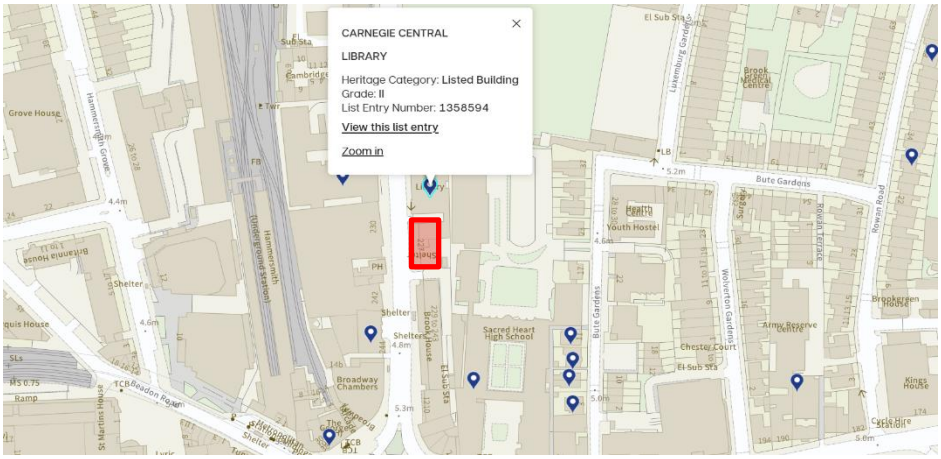


2.3.5 Grade Listed Structures

Listed buildings have been noted within close proximity to the site (Historic England):

- Carnegie Central Library, Ref. 1358594, Grade II, 5m from boundary
- Covent & School of the Sacred Heart, Ref. 1192062, Grade II*, 15m from boundary
- Hammersmith Police Station, Ref. 1362076, Grade II, 15m from boundary
- Hammersmith Fire Station, Ref. 1079777, Grade II, 20m from boundary

Figure 8 - National Heritage Listings (Historic England)



It should be noted the Carnegie Central Library (Hammersmith Library) to the north of the boundary shares multiple party walls with the existing structure. No impact to the neighbouring structures and shared boundaries is foreseen.

2.3.6 Roads and Site Access

Access to the site is via Shepard's Bush Rd (A192) which is a main road running North to South within the Hammersmith district. A bus stop (Stop R for the 72, 283 & N72) is located on the A192 directly in front of the proposed site.

A shared access road lies to the South, between the proposed site and Premier Inn, it provides access to both the parking under croft and Premier Inn's rear parking facilities, it is connected to the A192. Another small area of hard standing lies to the North between the proposed site and Carnegie Central Library. This area is not believed to be within the site domain however, acts as emergency fire pathway and is not to be obstructed during the construction phase.

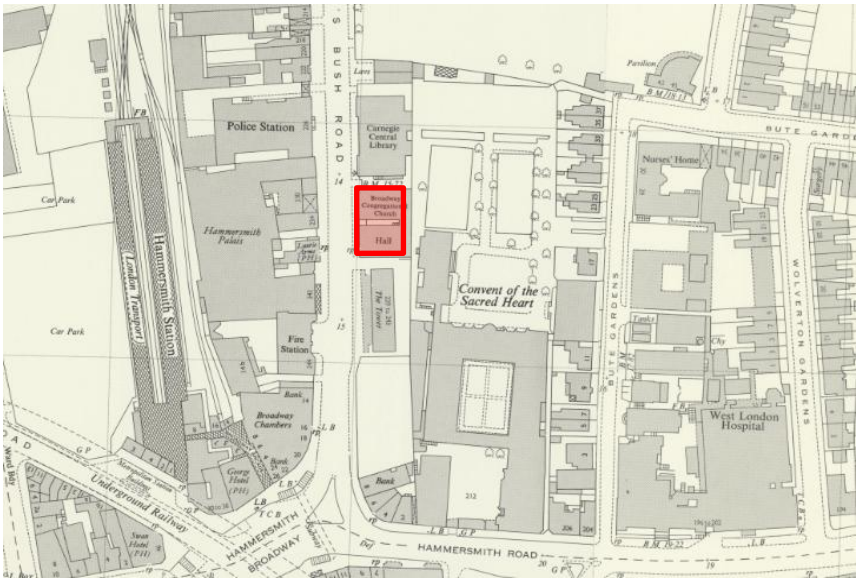
2.4 Site History

The first recorded instance of the site within the historical record appears between 1830-1880 where it is occupied by what is understood to be residential terrace row houses.

Figure 9 - OS 1:1Million-1:2.5K, 19000's (National Library of Scotland)

Further records show it in this state until dates as late as 1892-1914 until a period between 1944-1974, where the terrace rows are developed into the currently adjoining Broadway Congregation Church Hall.

Figure 10 - OS 1:1,250 B ed., 1948-1973 (National Library of Scotland)



During a period after 1974 the site was developed for the final time and has remained in this condition until present day.

2.5 Ground conditions

A geo-environmental assessment to determine, in part, the risks associated with groundwater, contamination and ground gases will be required should groundworks be deemed necessary. This is to be further developed during later stages if required.9

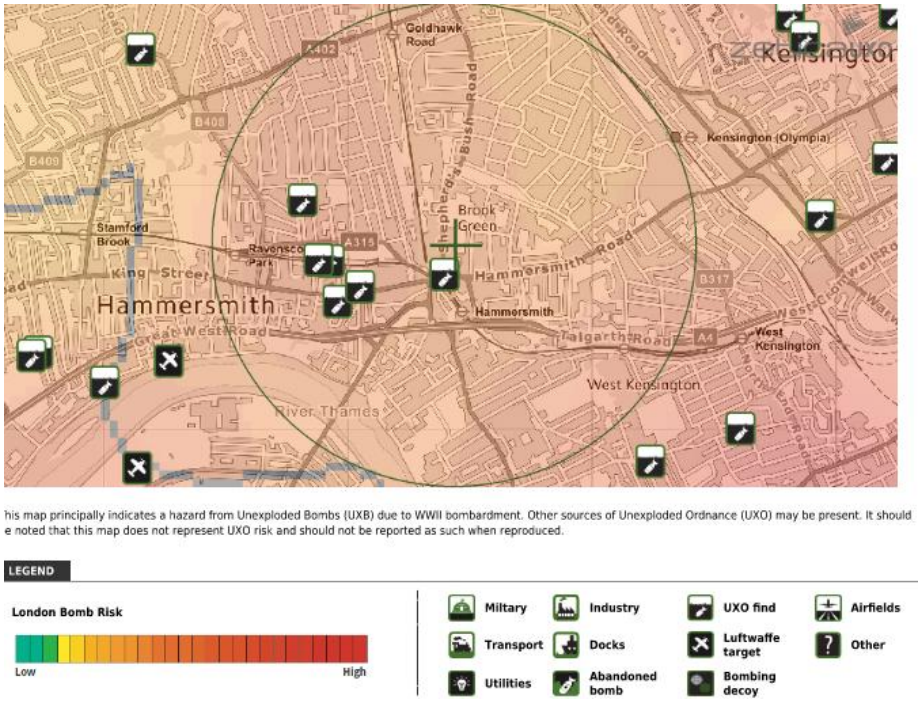
2.6 UXO

The unexploded ordnance risk of the site has been provisionally assessed prior should significant excavation works be required. The site is considered High Risk with regards to unexploded ordnance and therefore should excavation works be deemed required at later development stages contact should be made with a suitably qualified and experienced UXO specialist, prior to any onsite works beginning.

The map in Figure 11 indicates the potential for Unexploded Bombs (UXB) to be present as a result of World War Two (WWII) bombing. The relative risk for the London area is established by plotting the recorded bombing densities. These are represented as counts of high explosive bombs in km² area. The areas coloured green represents a record of less than 10 bombs per km². Compared to other areas of the UK, this still represents a significant density. However, this is much lower than parts of Central London, where the red colouration indicates in excess of 150 bombs falling per km², representing a very significant bombing density.

Typically, if a site is in a moderate risk area, or close to a designated Luftwaffe target or bombing decoy then additional detailed research is recommended. Multiple UXO finds have previously been made in the surrounding areas of site. Should groundworks be required it is recommended that contact is made with a suitably qualified and experienced UXO specialist prior to the commencement of any groundworks.

Figure 11 - UXO Risk Map (ZeticaUXO)

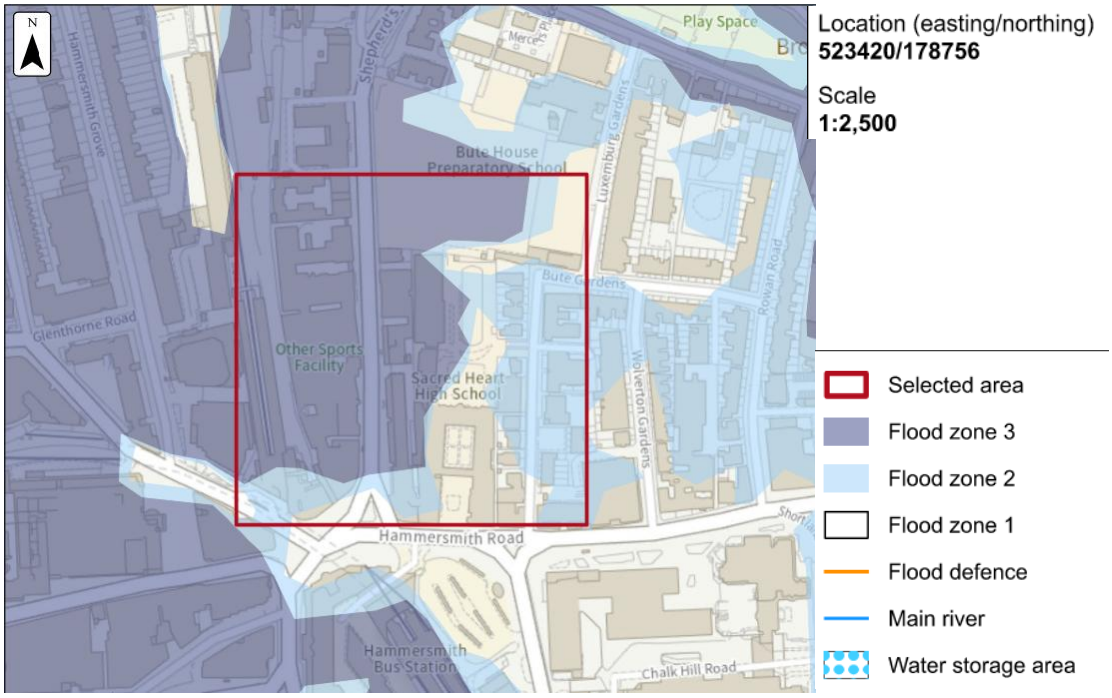


2.7 Flooding & Hydrology

The proposed development is on a 'Brownfield site' and the development would not increase the risk of flooding from fluvial sources.

Land within flood zone 3 (Figure 12) has a high probability of flooding from rivers and the sea, therefore a Flood Risk Assessment (FRA) will be required as part of the planning application for this development.

Figure 12 - Flood Map for Planning (.Gov)



The risk of flooding from surface water overland flow routes is noted to be high and should be further identified/clarified within the proposed Flood Risk Assessment.

Risk of flooding from sewers, groundwater, and artificial sources has also been assessed and is considered to be low, requiring no further actions.

3 Existing Structure

The existing structure is a 4-storey reinforced concrete frame, constructed circa 1980 for use as offices. The frame comprises a RC core and perimeter columns, with flat and ribbed floor slabs spanning between. The primary roof is formed of woodwool slabs supported by a lightweight steel framing system. The façade is double skin plus cavity brick/blockwork wall affixed the edge of the slab. Internal walls within the building are understood to be mostly lightweight partitions with the exception of walls around the staircase core and central hallway, which are circa 100-150mm blockwork. Toward the Southwest a structurally independent steel fire escape staircase has been erected and provides access to ground level from Lvl01-03.

Refer to structural drawings within 7Appendix A for further information.

3.1 Intrusive Investigation Works

As part of the proposed works intrusive investigation works and laboratory testing have been undertaken by Moorhead Richardson to assess the condition and properties of the existing frame. Elements of the report have been summarised below for ease of reference and the full report is appended within 7Appendix C.

The investigation included scanning and breakout of beams, slabs, columns, and walls across all levels, as well as roof parapets, ring beams, and the fire escape staircase. A trial pit was excavated to confirm foundation details, and samples were taken for laboratory testing: twelve concrete cores for compressive strength and twenty-three dust samples for chloride content, carbonation depth, and high alumina cement (HAC) presence.

Concrete strength results revealed relatively low values for structural concrete. Slabs averaged 10.5 N/mm², with the lowest recorded at 8.4 N/mm², while walls averaged 17.2 N/mm², columns 18.9 N/mm², and beams 19.6 N/mm². Although the original design strength is unknown, these figures suggest caution and may warrant further testing such as cement content analysis or petrography. The foundation appeared sound, and the fire escape staircase steel frame was consistent and adequately connected. A second phase of testing has been commissioned in order to broaden the sample of information, so as to draw conclusions from investigations.

Durability assessments note carbonation as a concern, with depths approaching or exceeding reinforcement in several locations, indicating loss of the protective passive layer and increased vulnerability to corrosion over time.

Concrete cover generally met minimum standards set by BS EN 1992-1-1, except for one isolated case with only 5mm cover. Chloride levels were well below the threshold specified in BS 8500, ranging from less than 0.02% to 0.08% by mass of cement. Corrosion risk was assessed as negligible or low in most areas, with moderate risk identified in damp-exposed elements such as ground floor columns and the transfer beam. No HAC was detected visually or through laboratory testing.

3.2 Recommended Remedial Works

The key structural implications highlighted within the report are:

- Low compressive strength of elements across the frame could potentially indicate a systemic strength issue. As such further strength tests have been proposed to gain a wider range of data to review, with the works to be undertaken in the near future. The consultant and contractor in later design stages are to ensure they are confident in the material properties of the frame and its ultimate load bearing capacity. Local strengthening may be required depending on interpretation of the further round of testing results.
- The progressive carbonation could compromise durability, particularly if moisture exposure increases during future refurbishment. Protective measures such as surface treatments and ongoing monitoring are recommended to exposed areas, especially for areas prone to dampness. Additional testing may be necessary to clarify material properties and ensure long-term serviceability.
- Insufficient cover to reinforcement was observed on column 1-C-2, this is the only instance of insufficient cover noted during the scanning. The area should be painted with a suitable protective product by Fosroc of similar to ensure durability and fire protection in the longer term.

3.3 Existing Element Analysis

Existing elements of the frame have been analysed under the proposed loading and current code requirements to ensure feasibility of the scheme and identify required remedial considerations.

Using information provided in the intrusive investigation report and loading allowances as noted in Section 6.0 - Design Data, a worst-case check of each element within the structure has been undertaken. Note the compressive strength findings of Moorhead Richardson have been rationalized for design purposes as follows:

Table 2 – Existing Element Design Concrete grades

Element	Compressive Strength Results (N/mm²)		Design Concrete Grade
Columns	12.3	23.4	C12/15
Slabs	8.4	12.5	C10/12
Beams	16.6	22.5	C16/20
Walls	12.1	19.5	C12/15

The design checks undertaken to verify existing elements for proposed loading scenarios is summarised below, a full breakdown of calculations is provided within 7Appendix C.

Figure 13 - LvlFN, Existing Element Design Checks Markup

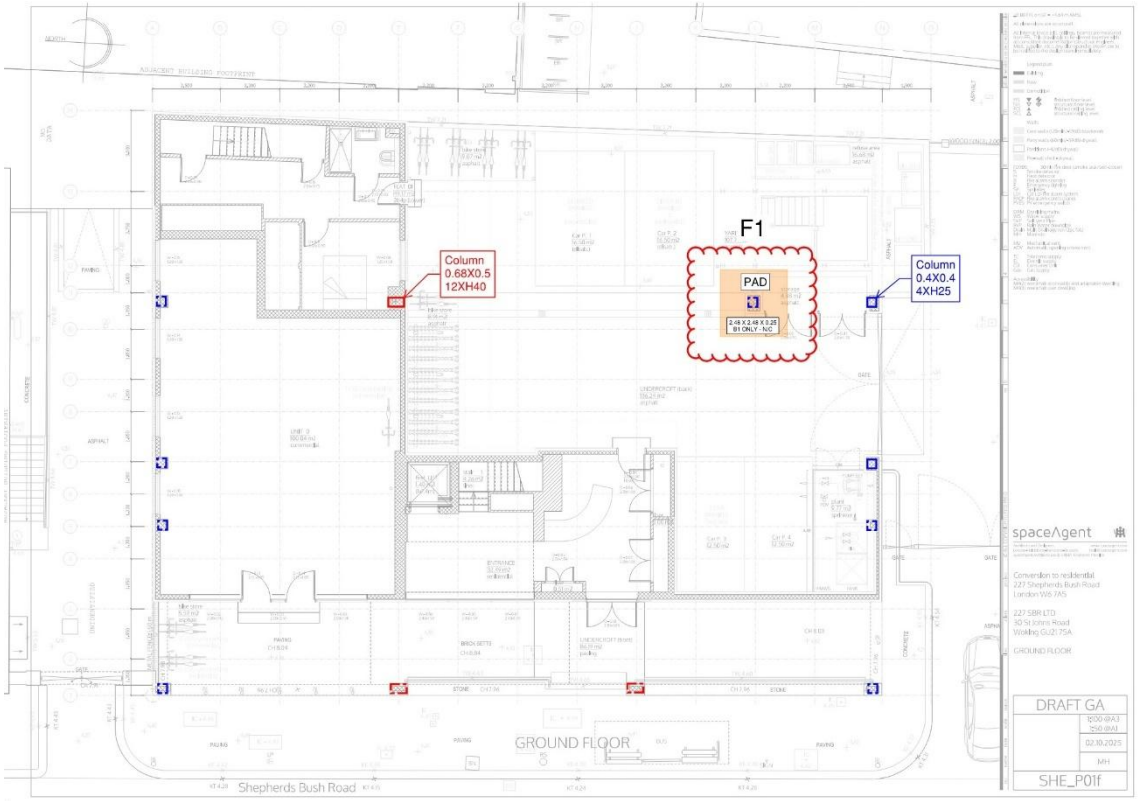


Figure 14 - Lvl00, Existing Element Design Checks Markup

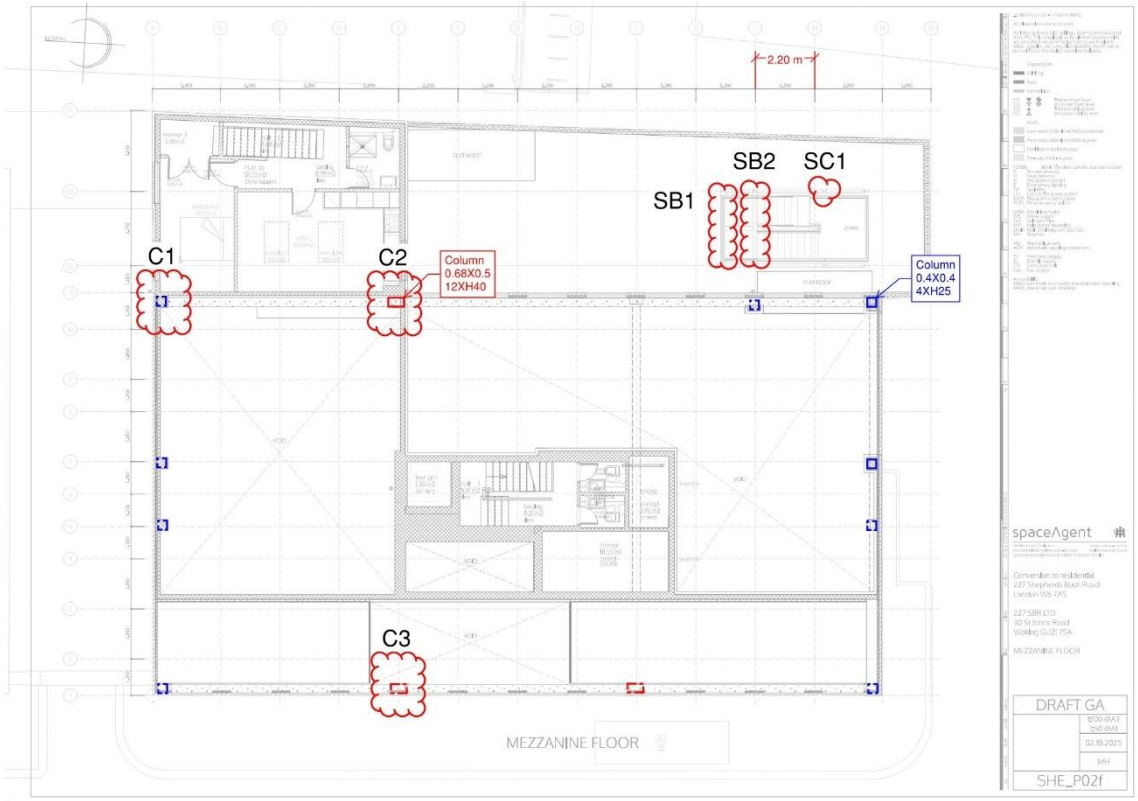


Figure 15 - Lvl01, Existing Element Design Checks Markup

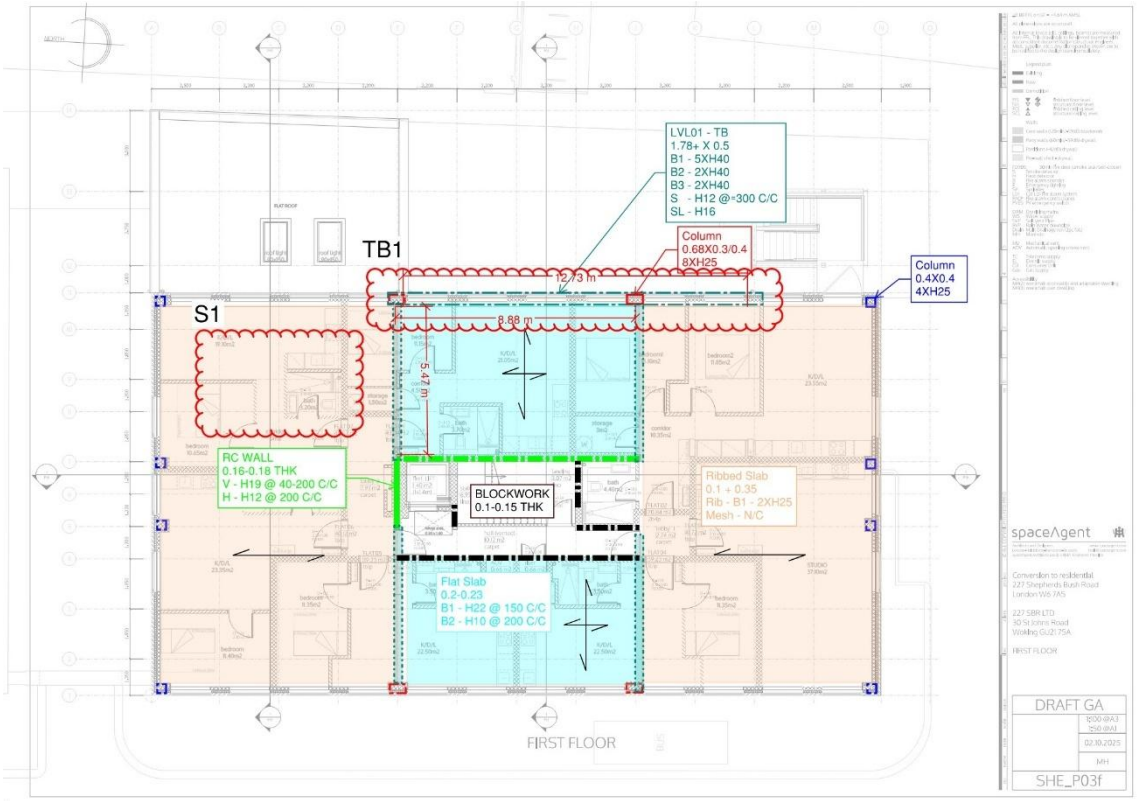
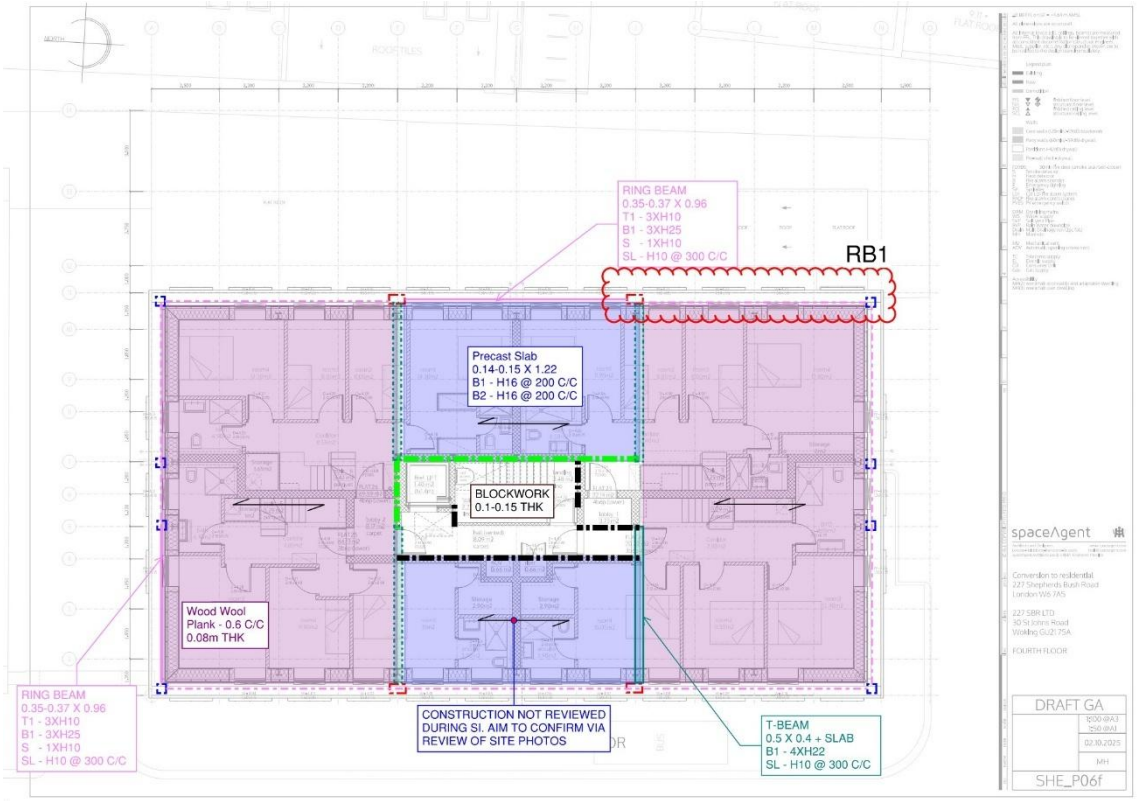


Figure 16 - LvlRF, Existing Element Design Checks Markup



3.3.1 S1 – Floor Slabs

The superstructure utilised several types of floor slab:

- Ribbed slabs, Lvl01-03, North and west sides of core
- Flat slabs, Lvl01-3, East and South side of core
- Pre-cast Slab, LvlRF, East side of core

Structural evaluation of the existing ribbed slabs was undertaken by modelling the ribs and their associated flange as an equivalent T-beam section for simplified analysis. In addition to data taken from the Moorhead Richardson report.

Back analysis indicated the slabs had originally been designed for an imposed load of 4+1kN/m² (circulation loading + a provision for non-structural partition walls) which is consistent with the standard structural design practices (BS6399:Part1, 1984, Table 2) and relevant building codes during the construction period.

3.3.2 F1 - Pad Foundation/Load Run Down

The intrusive investigation works undertook a trial pitting exercise to uncover and document the existing foundation elements. The report indicates a circa 2.5x2.5m reinforced concrete element, approximately 150-190mm thick.

HDR's opinion is that the foundation is deeper than observed and the 150-190mm noted in the report is likely an overpour during casting. There were no visible signs of stress cracking in the observed areas of the foundation and no form of major settlement cracking has been observed in the superstructure.

Design intended at this stage is to limit additional load imposed on foundations from proposed design and quantify original loading allowances. Load rundown analysis of multiple perimeter columns has been undertaken to ensure proposed and existing loads are within the 10% overburden allowance.

3.3.3 TB - Lvl01 Transfer Beam

A transfer beam has been incorporated on LVL01 to eliminate the need for a column within the parking area. The transfer element has been considered as a simply supported beam with the proposed loading from the adjacent floor slab and above column applied.

3.3.4 C1, 2 & 3 - Perimeter Columns

Column checks within the structure have been rationalized with the worst case 400x400mm corner, 400x400mm edge and 650x500mm perp. edge all checked under the proposed load condition on the ground floor.

3.3.5 RB1 - Roof Level Ring Beam

The architect's original proposal sought to repurpose an existing reinforced concrete ring beam at roof level as transfer beams. This would have replaced the proposed transfer steel transfer beams within LVL04 to support the proposed loads and tie the existing

columns. Considering the element as a simply supported beam the proposed loads from the above column were applied and the element failed in both the ULS and SLS conditions.

The ring beam contains insufficient reinforcement to carry the transfer loads proposed. A number of strengthening options have been considered: creating a composite section by bolting on additional steel, hollowing out the existing ring beam to allow for new steelwork to sit within and retention of the element via offsetting of the proposed steelwork. All of these options have been ruled out at this stage due the additional complexity, time and cost of retrofitting the ring beam compared to its removal and replacement.

3.3.6 SB1, SB2 & SC1 – Steel Fire Escape Staircase

The architectural proposal regarding the fire escape staircase would see the flights removed and all the landings extended to create private balconies for residents.

Analysis of the existing framing under

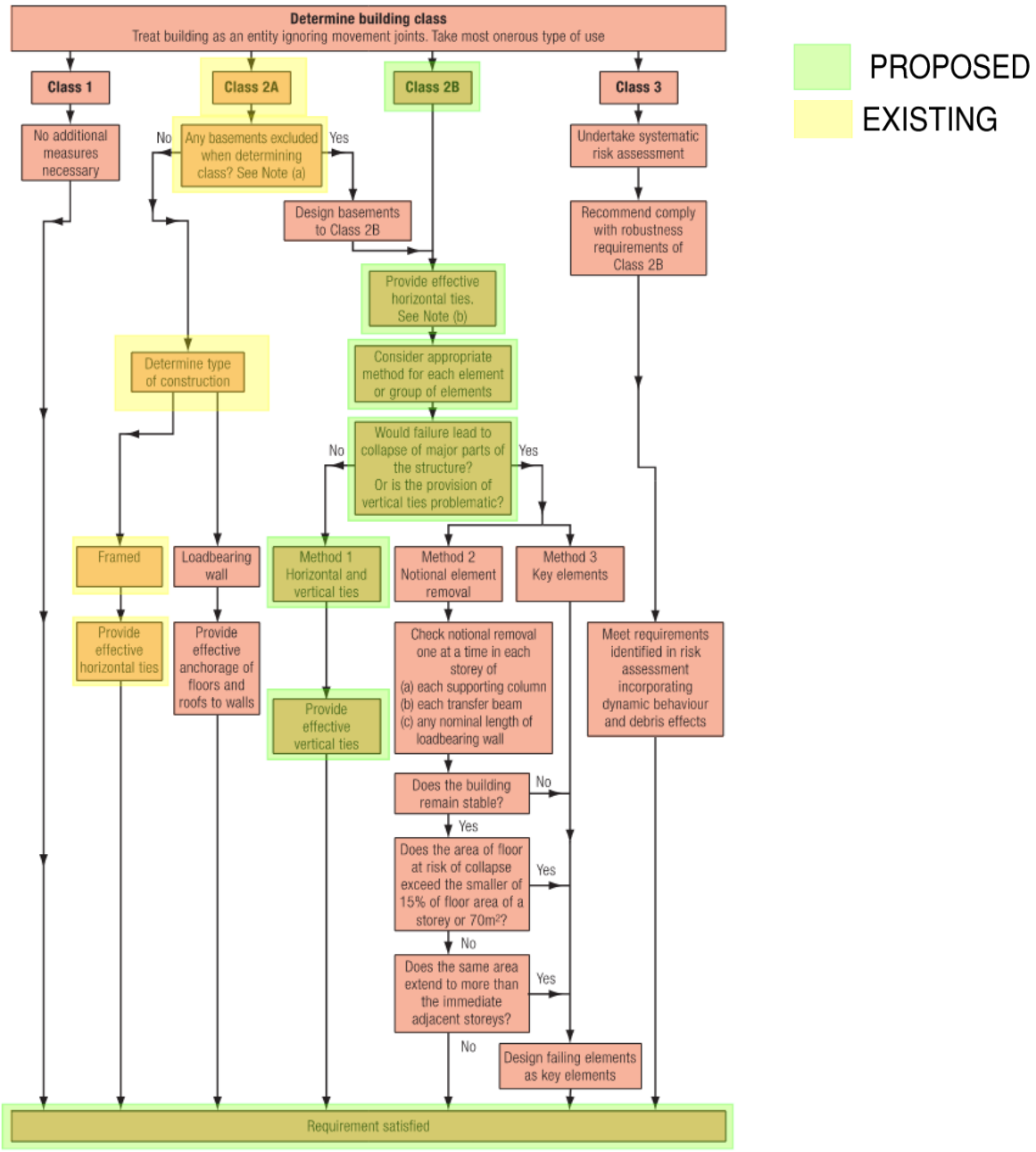
3.3.7 Disproportionate collapse

In accordance with BS EN 1991-1-7: Accidental Actions suitable structural robustness of the structure must be provided according to relevant consequence class. The proposed extension would see the existing consequence class increase from to 2A to 2B due to height increase and residential use.

Figure 17 - Consequence Class Categorisation (BS EN 1991-7, Table A1)

Consequence class	Example of categorisation of building type and occupancy
1	Single occupancy houses not exceeding 4 storeys. Agricultural buildings. Buildings into which people rarely go, provided no part of the building is closer to another building, or area where people do go, than a distance of $1^1/_2$ times the building height.
2a Lower Risk Group	5 storey single occupancy houses. Hotels not exceeding 4 storeys. Flats, apartments and other residential buildings not exceeding 4 storeys. Offices not exceeding 4 storeys. Industrial buildings not exceeding 3 storeys. Retailing premises not exceeding 3 storeys of less than 1 000 m^2 floor area in each storey. Single storey educational buildings All buildings not exceeding two storeys to which the public are admitted and which contain floor areas not exceeding 2000 m^2 at each storey.
2b Upper Risk Group	Hotels, flats, apartments and other residential buildings greater than 4 storeys but not exceeding 15 storeys. Educational buildings greater than single storey but not exceeding 15 storeys. Retailing premises greater than 3 storeys but not exceeding 15 storeys. Hospitals not exceeding 3 storeys. Offices greater than 4 storeys but not exceeding 15 storeys. All buildings to which the public are admitted and which contain floor areas exceeding 2000 m^2 but not exceeding 5000 m^2 at each storey. Car parking not exceeding 6 storeys.
3	All buildings defined above as Class 2 Lower and Upper Consequences Class that exceed the limits on area and number of storeys. All buildings to which members of the public are admitted in significant numbers. Stadia accommodating more than 5 000 spectators Buildings containing hazardous substances and /or processes

Table 3 - Practical Guide to Structural Robustness & Disproportionate Collapse in Buildings, Figure 5.1 (IStructE, 2010)



Under consequence Class 2B both the existing and proposed elements are to provide effective horizontal and vertical ties. The existing superstructure is a reinforced concrete frame and tie force capacity will be achieved via adequate steel area within reinforcement connections.

Connection forces for proposed elements are to be confirmed by the steel fabricator in later design stages.

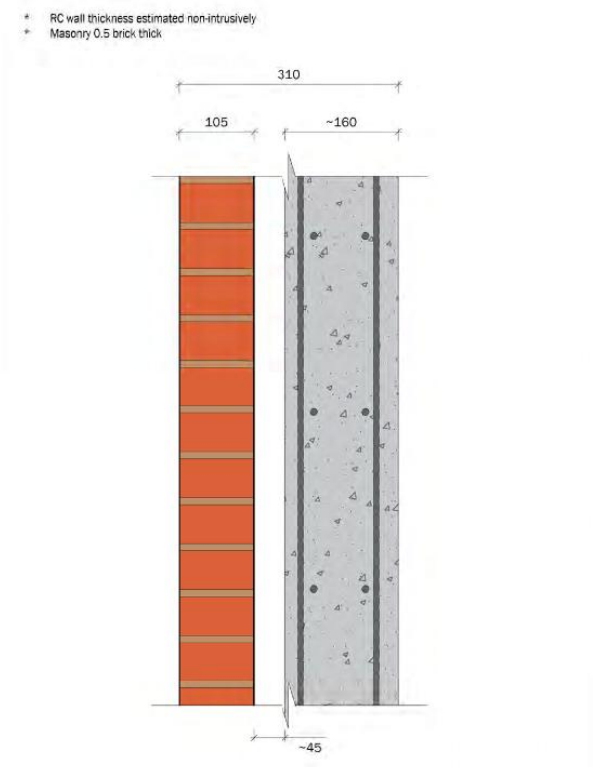
Transfer elements within the structure are to be considered as key elements and designed to withstand a 34kN/m² applied load to the largest face and worst-case location, in the accidental load case. The Lvl01 transfer beam and supporting columns have been checked for this case,

considering a max 6m x 6m area load based on the guidance in the IStructE guidance “Design of transfer slabs” and “Structural robustness and disproportionate collapse in buildings”.

3.3.8 Lateral/Core Stability

Lateral stability of the structure is provided via a reinforced concrete core around the elevator and stair shaft, lined by RC beams. The cores are located centrally within the floorplan. The proposed development seeks to extend the core via braced bays located above the existing core and its capacity has been assessed based on load rundown analysis and the worst-case wind loads.

Figure 18 - Core Wall Analysis (Moorhead Richardson, P01036)



4 Proposed Structure

The proposed extension would see the existing roof and ring beam removed to enable the installation of a new Lvl04 floor below the existing roof level, followed by the erection of a 2-storey vertical extension. Comprising a lightweight steel frame with a cold formed joist & topping flooring system.

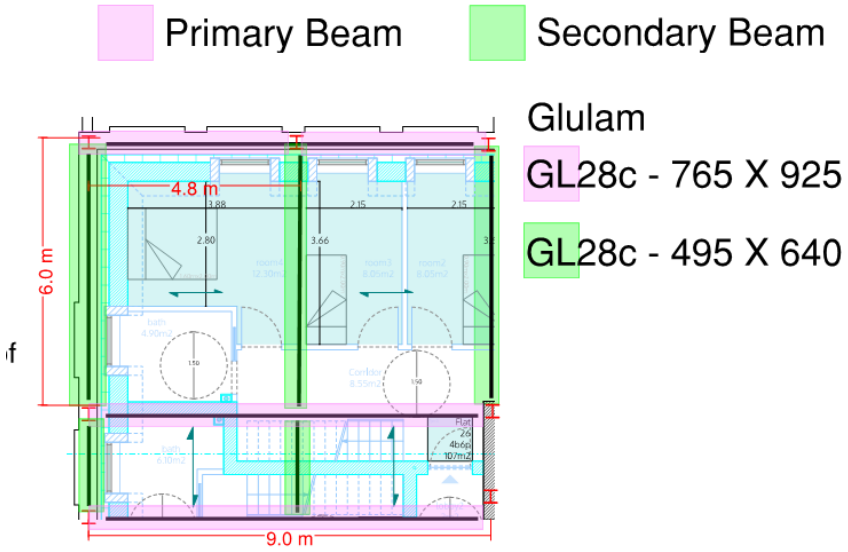
This proposal would also see the existing ground plus 3 storey office levels converted to residential use. A small commercial space would remain & residential amenities would be created on the ground floor.

4.1 Framing Options

During the design development, a range of framing and floor structure options were evaluated to achieve the most efficient solution. Key considerations included minimizing additional loads on the existing foundations from proposed self-weight, maintaining suitable internal head height, ensuring buildability within site constraints, and mitigating vibration/sound transfer.

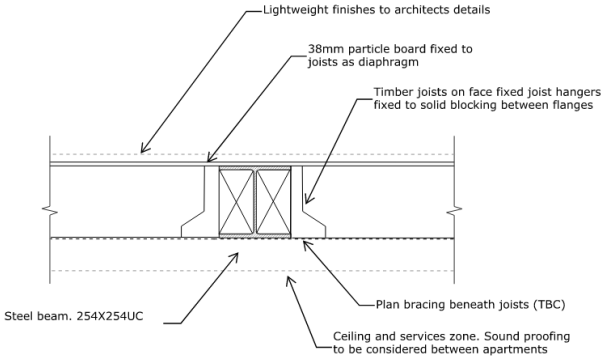
Options reviewed for the primary structural frame covered both traditional steel framing and timber-based solutions including Glulam and LVL products. A traditional steel frame was ultimately chosen based upon the impact timber solutions has on headlight, due to increased section sizes.

Figure 19 - Glulam Section Sizes For Typical Bay



A range of potential floor structure solutions were also considered for the proposed development. Composite metal deck slabs, CLT Slabs, traditional timber joints and Cee purlins were all proposed to the client. Ultimately the cold formed joist and topping floor solution provided a low self-weight while facilitating construction speed, buildability and services integration.

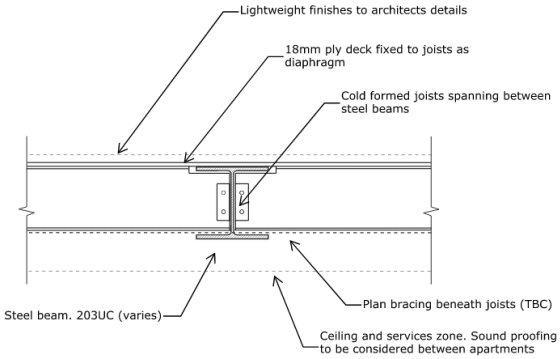
Figure 20 - Floor Optioneering Markups



Typical Floor Section - Timber Joist Option

Pros
- Lightweight sections will aid on-site handling/construction
- Typical construction, standard for a construction consultant
- Creates additional room for architectural build-up/services between purlin intervals - Lower loads imposed on existing foundations

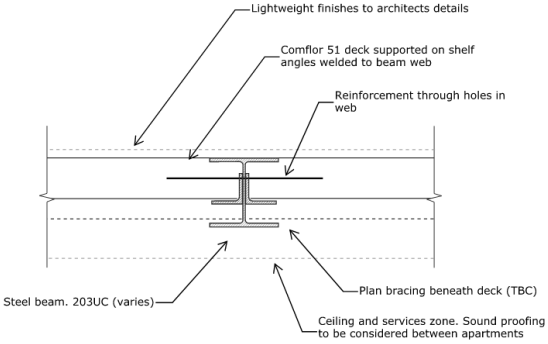
Cons
- Structure is susceptible to issues associated with vibration/noise. Additional architectural build-ups may be required to prevent transfer of vibrations through floors



Typical Floor Section - Cold Formed Joist Option

Pros
- Lightweight sections will aid on-site handling/construction
- Easy assembly
- Creates additional room for architectural build-up/services between section intervals
- Lower loads imposed on existing foundations

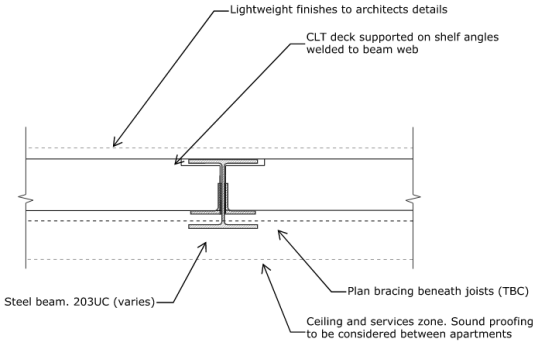
Cons
- Structure is susceptible to issues associated with vibration/noise. Additional architectural build-ups may be required to prevent transfer of vibrations through floors



Typical Floor Section - Composite slab Option

Pros
- High self weight of slabs gives good sound/vibration deadening properties
- Hard wearing, little risk of damage during construction
- Would maintain current building aspects (Concrete construction)

Cons
- Increase foundation loading
- Construction requires would require pumping, casting and curing of concrete
- Maximum Reasonable Span of Comflor is 3.4m, additional beams & connections will be required



Typical Floor Section - CLT Deck Option

Pros
- Low Embodied Carbon values/environmentally conscious
- Provides a single clean soffit lever for mounting services
- Denser structure offers less issues with vibration
- Lower loads imposed on existing foundations

Cons
- Large slabs (4.8x6.1x0.16m) will have to be delivered and installed on-site
- Additional architectural details may be required to ensure breathability of structural envelope, to prevent moisture damage to elements
- CLT slabs are more expensive than the traditional alternatives proposed

4.2 Proposed Superstructure

Refer to the structural drawings included in 7Appendix A for further details.

4.2.1 Structural Intent

In accordance with the client brief and existing structure constraints the proposed superstructure comprises a steel frame supporting a cold formed joist and timber topping floor. This is to limit loading applied to the existing structure while providing maximised head height area and clear uninterrupted spans.

Table 4 - Proposed Framing Sections

Reference	Section Type	Section	Notes
B1	UC	203X203X46	Secondary Beam
B2	UC	203X203X71	Secondary Beam
B3	UC	203X203X86	Secondary Beam
B4	UC	305X305X240	Main Grid/Perimeter Beam
B5	UC	254X254X71	Staircase Framing Beam
TB1	UC	305X305X240	Transfer Beam, 15mm pre-camber (U.N.O.)

To achieve the required spans while minimizing impacts to head height, all floor beams are specified as Universal Column (UC) sections. Secondary floor beams are typically UC203 sections, while larger UC305 sections are utilized in areas requiring greater spans or at transfer column locations. UC254 sections have been used to frame the staircases due to the required span distances decreasing between Lvl04 and Lvl05. One of the key drivers of the design of a lightweight floor system is vibration and serviceability. As such, unrestrained beams have been designed for a minimum of 8Hz to limit vibration under normal foot traffic.

Figure 21 – Proposed fourth floor plan

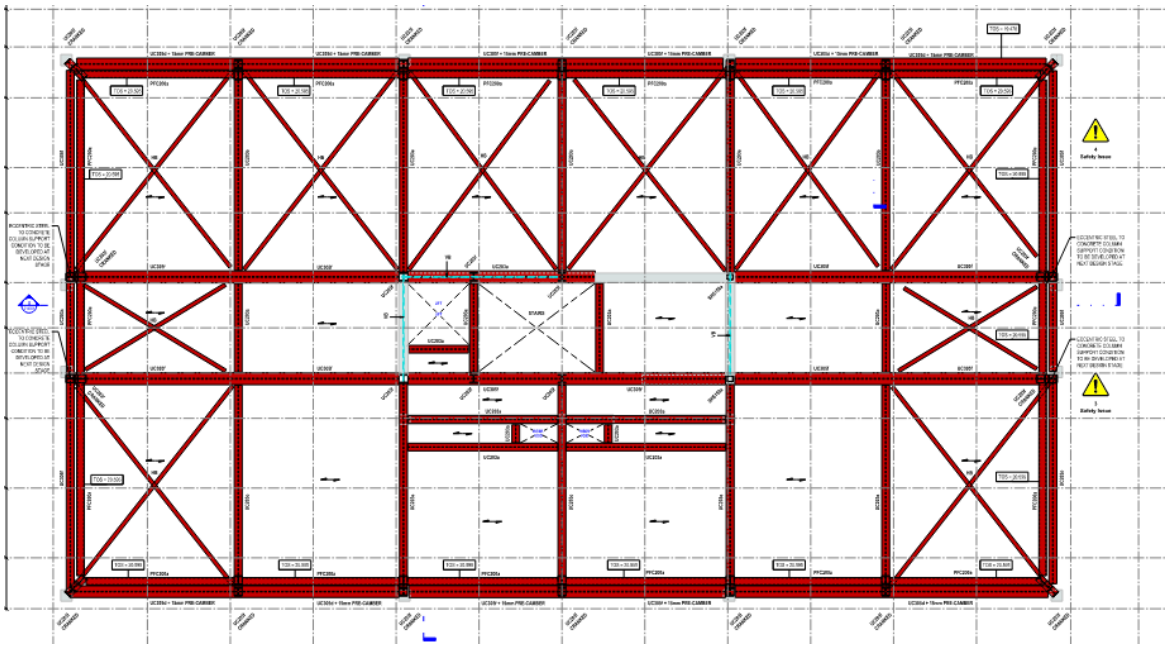
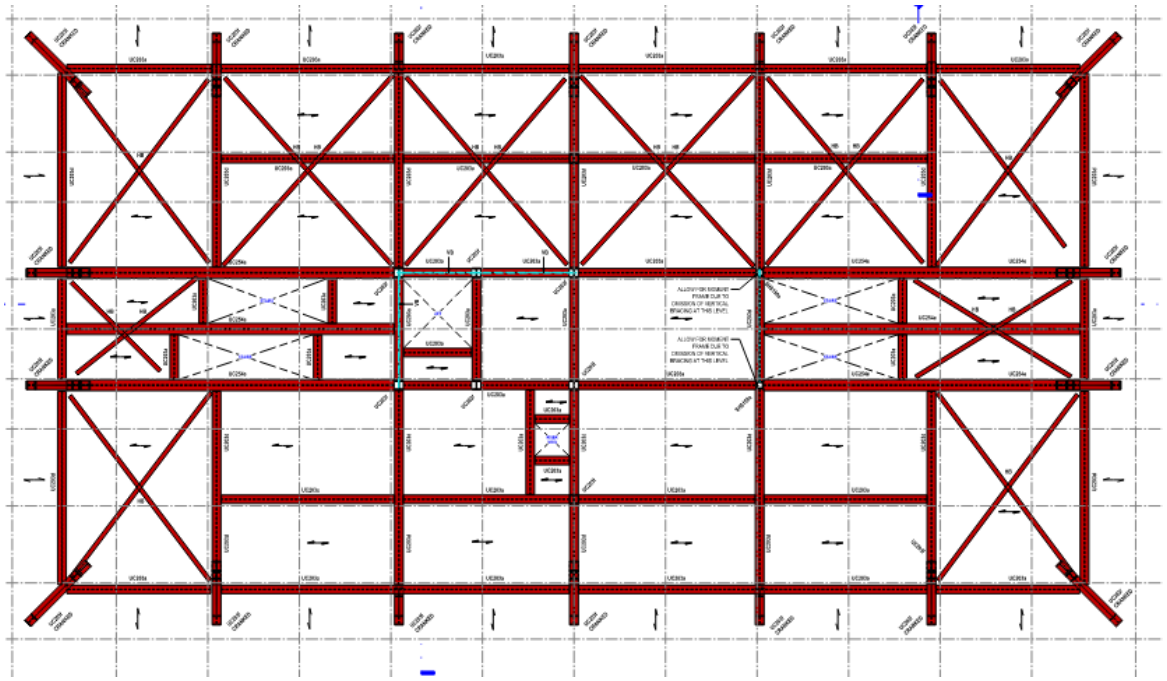


Figure 22 – Proposed fifth floor plan



Floor joists are proposed as 150mm butted C purlins 400mm C/C spacing topped with 18mm flooring grade particle board or similar. Affixed using appropriate self-drilling, self-tapping screws at a spacing not greater than 1150mm along the span to provide torsional stiffness.

Joists are to span into the web of the beams to minimise the floor profile, with a cleated connection between the joist and beam. The topping is to be continuous over the beams to provide a uniform and uninterrupted floor level.

Figure 23. Indicative Steel Frame & Joist Inset System

Columns throughout the structure are typically UC203 sections to mitigate lost floor area and provide space at the baseplate connections for holding down bolts. Due to architectural requirements, columns located centrally that cannot be fully concealed within partition walls are instead specified as Square Hollow Sections (SHS150X150X5).

4.2.2 Lateral Stability

The current proposal for providing lateral stability to the extension seeks to extend the existing core within the structure via braced bays located upon the existing core. Lateral loads applied to the extension will be carried to the bracing via diaphragm action of the floor slabs and into the existing lateral bracing systems.

A secondary option of moment frames has also been considered to transfer lateral loading should the existing core lack adequate capacity, or if the inclusion of bracing is not viable due to architectural constraints. Moment frames would be located around the extension’s perimeter framing and would distribute load to multiple existing columns at the Lvl04 interface.

This is to be confirmed in later design stages and under advisement from the steel fabricator.

4.2.3 Existing to Proposed Structure Connections

Post removal of the existing roof level and ring beam we envision the Lvl03 column tops taken down to a uniform level close to the ring beam soffit. The exposed tops are then to be sufficiently levelled, via cleaning and bedding where required and post fix bolts installed, allowing a level connection for the steel column baseplates. Post fixed bolts should be coordinated carefully with existing reinforcement and existing columns should be propped to the temporary works engineers details as noted on the drawings.

4.2.4 Disproportionate Collapse Requirements

The building is categorised as consequence class 2B to Building Regulations Approved Document A for robustness and response to disproportionate collapse. Therefore, effective horizontal and vertical ties will be designed in accordance with current standards. Transfer elements within the proposed structure may utilise tie forces or be considered as key elements dependant upon cost, feasibility and appropriate current standard guidance.

4.3 Construction Sequence

An indicative construction sequence is noted below. This is to be reviewed and developed as the design progresses, alongside input by stakeholders and contractors.

Enabling Works

- Site preparation, construction of hoarding
- Soft strip of Lvl03 and LvlRF to facilitate access of demolition works.

Demolition

- Installation of temporary works and crash deck, where required
- Staged removal of existing roof structure (woodwool slabs/purlins/beams/ring beam)
- Staged installation of new Lvl04 floor frame

Superstructure

- Construct Superstructure frame
- Lateral restraint to existing party walls to be installed
- Staged removal of temporary works as the construction progresses

Groundworks

- Excavation of existing services to enable capacity upgrades

Post-Construction Works

Due to planning restrictions these works items are to be undertaken post completion of the vertical extension.

- Installation of new services risers within existing floors
- Soft strip of Lvl00-03 to remove existing office fit out
- Fit out of Lvl00-03 for high end residential purposes.

5 Post- Stage 3

5.1 Areas to be developed

The following areas of the design are to be developed in the next design stage:

- Further design checks on the existing primary structure to confirm capacity and rule out strengthening requirements following further site sampling and testing
- Development of scope for refurbishment/upgrade works to existing services.
- Detailed design and coordination based upon confirmation of load requirements for architectural elements.
- Development of fire protection strategy.
- Continued development and coordination of proposed steel framing, flooring and façade strategy.
- Detailed assessment and development of existing to proposed element connection

5.2 Key Technical Risks

The following key technical risks have been identified in the structural design:

- Inconsistent construction techniques/materials between the intrusive inspection and as built condition.
- Poor condition of existing structural elements requiring repair or reinstatement.
- Additional vertical and lateral loading to existing elements.
- Unknown structural arrangement of foundation elements.
- Building Control agreement to 10% overstress of the foundations.

6 Design Data

6.1 Design Standards

Proposed Structure designs are to be carried out according to the following current Eurocodes.

Table 5. Design Standards: Eurocode

Material	Notes
Concrete	BS EN 1992-1:2004 Design of Concrete Structures
Steel	BS EN 1993-1:2005 Design of Steel Structures/BS5950-1
Composite	BS EN 1994-1:2004 Design of Composite Steel and Concrete Structures
Masonry	BS EN 1996-1:2005 Design of Masonry Structures
Timber	BS EN 1995-1:2004 Design of Timber Structures
Foundations	BS EN 1997-1:2004 Geotechnical Design
	Code of Practice for foundations, BS 8004: 1986
Loadings	BS EN 1990:2002 Basis of Structural Design
	BS EN 1991-1.1:2002 Actions on Structures – SW & Imposed
	BS EN 1991-1.2:2002 Actions on Structures – Fire
	BS EN 1991-1.3:2003 Actions on Structures – Snow
	BS EN 1991-1.4:2005 Actions on Structures – Wind
	BS EN 1991-1.7:2006 Actions on Structures – Accidental
Structural Steel	Hot rolled products of Structural Steel, BS EN 10025-1: 2004
	Hot finished Structural Hollow Sections of non-alloy and fine-grain steels, BS EN 10210-2: 2019
Reinforcement	Steel for the Reinforcement of Concrete, BS 8666: 2020
Steel Wire	Steel Wire for the Reinforcement of Concrete Products, BS 4482: 2005
Steel Fabric	Steel Fabric for the reinforcement of Concrete, BS 4483: 2005

6.2 Design Material Data

The following material data has been assumed and is to be reviewed within the structural design and construction specifications.

Table 6. Design Material Data

Material	Type	Notes
Concrete	Below Ground	Grade C32/40
	Superstructure RC	Grade C32/40
	Reference is made to BRE special digest	
Reinforcement	Main	Grade H500B
	Shear	Grade H500B
Structural Steel	Rolled Sections	Grade S355 JO
	Hollow Sections	Grade S355 JO
Timber	Glulam	GL28c
	CLT	GL24
Masonry	Block Work	10.4N/mm²
	Mortar	M6 (18N/mm²

6.3 Fire Resistance

The original design fire resistance period for the structure has not been confirmed during the design process but is understood to be 60 minutes due cover thicknesses typically being +35mm for vertical elements.

The existing and proposed structures are to be designed/considered for a fire resistance period of 60 minutes typically as defined by the fire building regulations. Exception is taken to the fire escape routes, which are designed for a fire resistance as noted below. This is to be confirmed by the fire consultant.

- Superstructure 60 minutes
- Fire Escape Route 120 minutes

Fire protection for the proposed structural steel frame is envisioned to be provided by a fire boarding system specified by the Architect and the Fire Specialist during later design stages.

Concrete cover to existing elements has generally been observed to achieve the required fire periods. The ribbed slabs have been specifically verified given the traditional weakness to fire exposure due to minimal cover of reinforcement. Typical slab thicknesses (inc. screed toppings) exceed the required 125mm and cover is considered sufficient for the required fire time.

As noted in the Intrusive Investigation specific an isolated column location with insufficient cover (approx. 5mm) was observed. This is understood to be an outlying reinforcing bar based upon conversations with the intrusive works team. The contractor is to review the concrete cover to all existing elements to identify deficiencies and where required a remedial application of Fosroc or similar, as specified by the Fire Specialist is to be applied.

6.4 Deflection Limit States

Vertical live load deflections of horizontal members shall be limited to the least of span/360 or 25mm, where members require pre-cambering, this shall be done to a standard 15mm cambered based upon their calculated SLS deflection.

Lateral deflections under wind loading shall not exceed Span/500.

Table 7. Steel Deflection Limit States

Structural Member	Live	Dead + Live
Beams	Span/360 or 25mm	Span/250
Columns	-	Span/500

6.5 Vibration

One of the key drivers of the design of a lightweight floor system is vibration and serviceability. As such, unrestrained beams have been designed for a minimum of 8Hz to limit vibration under normal foot traffic.

6.6 Tolerances

For any steel elements, the requirements of the National Structural Steelwork Specification for Building Construction 7th Edition (NSSS) and forthcoming HDR specification shall apply.

Tolerances of the concrete structure are to be in accordance with the National Structural Concrete Specification for Building Construction 4th Edition) (NSCS) and forthcoming HDR specification shall apply.

6.7 Durability

The design life is to be 50 years (Cat. 4) in accordance with Table 2.1 of BS EN 1990.

6.8 Robustness and Disproportionate Collapse

The building is categorised as Consequence Class 2B to Building Regulations Approved Document A for robustness and response to disproportionate collapse. Therefore, effective horizontal and vertical ties will be designed in accordance with current standards. Refer to appendix D for tie force checks on existing elements. Connection forces for proposed elements is to be checked in later design stages.

Table 8 – Consequence Class Comparison Table

Structure Height	Building Use Case	Consequence Class	Disproportionate Collapse Requirements
4 Storeys	Office + Lvl00 Commercial Space	2A	Horizontal Ties
6 Storeys	Residential + Lvl00 Commercial Space	2B	Horizontal & Vertical Ties

6.9 Design Loading

The following are typical preliminary design loads and are to be reviewed and updated as the project progresses. Existing loading allowances have also been noted below, based upon BS6399-1:1984 and BS6399-3:1984.

Table 9. Existing & Proposed Design Loading – Lvl00

			Existing kN/m²	BS 6399-1:1984	Proposed kN/m²	NA to BS EN 1991-1
Permanent	Slab self-weight – RC Slab (300mm)	=	7.5	N/A	Unchanged	N/A
	SDL	=	0.3	N/A	Unchanged	N/A
Imposed	Shopping Areas	=	4.0	Table 9	4	D1
	Car park	=	2.5	Table 12	2.5	F
	Corridors	=	4.0	Table 8	4	C33
	Offices	=	2.5	Table 8	3	B2

Table 10. Existing & Proposed Design Loading – Lvl01-03

			Existing kN/m²	BS 6399-1:1984	Proposed kN/m²	BS EN 1991-1 Category
Permanent	Slab self-weight – RC Slab (300mm)	=	7.5	N/A	Unchanged	N/A
	SDL	=	0.3	N/A	Unchanged	N/A
Imposed	Corridors (Office)	=	4.0	Table 8	4	C33
	Residential	=	-	-	1.5+0.5	A2
	Balconies	=	-	N/A	3.0	A6

Table 11. Existing & Proposed Design Loading – Lvl04 (Existing RF)

			Existing kN/m²	BS 6399-1:1984	Proposed kN/m²	BS EN 1991-1 Category
Permanent	Existing - Woodwool Slab + Secondary Steel	=	1	N/A	-	-
	Proposed – Cee Purlin (4.4kg/m @ 400mm C/C)+Topping (18mm)	=	-	-	0.25	N/A
	SDL	=	0.3	N/A	Unchanged	N/A
	Finishes	=	-	-	0.15	N/A
	Ceiling	=	-	-	0.25	N/A
	Sound Buildup	=	-	-	0.1	N/A
	Services	=	-	-	0.25	N/A
Imposed	Plant	=	7.5	Sec. E	-	-
	Access for Maintenance	=	0.6	BS 6399 -3:1984, 4.3.1, c	-	-
	Residential	=	-	-	1.5	A2
	Corridors	=	-	-	4	C33

Table 12. Proposed Design Loading – Lvl05

			Proposed kN/m²	BS EN 1991-1 Category
Permanent	Floor Self-Weight – Cee Purlin (4.4kg/m @ 400mm C/C)+Topping (18mm)	=	0.25	N/A
	Finishes	=	0.15	N/A
	Ceiling	=	0.25	N/A
	Sound Buildup	=	0.1	N/A
	Services	=	0.25	N/A
Imposed	Residential	=	1.5	A2
	Corridors	=	4	C33

Table 13. Proposed Design Loading – Lvl06 (Proposed RF)

			Proposed kN/m²	BS EN 1991-1 Category
Permanent	Floor Self-Weight – Cee Purlin (4.4kg/m @ 400mm C/C)+Topping (18mm)	=	0.25	N/A
	Finishes	=	0.15	N/A
	Ceiling	=	0.25	N/A
	Sound Buildup	=	0.1	N/A
	Services	=	0.25	N/A
Imposed	Access for Maintenance	=	0.6	H

6.10 Wind Loading

Wind loads acting on the main building frame and the various elements of cladding will be defined in accordance with the requirements of BS EN 1991-1-4 assuming the following:

Wind Loading - Site Located in London			
Basic wind speed	Vb	=	21.4
Altitude factor	Calt	=	1.0
Directional Factor	Cdir	=	1.0
Seasonal factor	Cseason	=	1.0
Probability factor	Cprob	=	1.0
Terrain Category	-	=	Town
(Corresponds to 50-year return period)			

7 Appendices

Appendix A. Structural Drawings

A - GENERAL NOTES

1. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE RELEVANT ARCHITECT'S, SERVICE ENGINEER'S, SPECIALIST'S AND HDR DRAWINGS AND SPECIFICATIONS. SEE ARCHITECT'S DRAWINGS FOR SETTING-OUT OF THE BUILDING AND GRID LINES. WHEREVER DIMENSIONS DIFFER FROM THOSE SHOWN ON THE ARCHITECT'S DRAWINGS, VERIFICATION IS TO BE OBTAINED FROM THE ARCHITECT / ENGINEER PRIOR TO CONSTRUCTION.
2. UNLESS NOTED OTHERWISE ALL DIMENSIONS ARE GIVEN IN MILLIMETRES (mm). ALL LEVELS ARE IN METRES (m) ABOVE ORDNANCE DATUM, INDICATING STRUCTURAL SLAB LEVEL (S.S.L.), TOP OF CONCRETE (T.O.C.), TOP OF UPSTAND (T.O.U.), TOP OF STEEL (T.O.S.), FINISHED FLOOR LEVEL (F.F.L.) TOP OF FOUNDATION (T.O.F.) OR FINISHED GROUND LEVEL (F.G.L.).
3. DO NOT SCALE FROM THE DRAWINGS. WORK TO FIGURED DIMENSIONS ONLY. ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE. ANY DISCREPANCIES ARE TO BE REFERRED TO THE STRUCTURAL ENGINEER BEFORE WORK IS PUT IN HAND. ALL DRAWINGS ARE PRODUCED ELECTRONICALLY AND MAY HAVE BEEN PHOTO REDUCED OR ENLARGED WHEN COPIED. HENCE, DO NOT RELY ON ANY SCALES QUOTED. WORK ONLY TO FIGURED DIMENSIONS (DO NOT SCALE). ALL DIMENSIONS ARE TO BE CHECKED ON SITE. ANY ERRORS OR OMISSIONS ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
4. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL SITE AND SETTING OUT DIMENSIONS, INCLUDING "AS BUILT" POSITIONS OF TEMPORARY WORKS, BEFORE COMMENCING THE WORKS.
5. ANY DISCREPANCIES BETWEEN THE ARCHITECTS & ENGINEERS DRAWINGS MUST BE VERIFIED WITH THE ARCHITECT.
6. ANY DISCREPANCIES OR AMBIGUOUS INFORMATION CONTAINED WITHIN THE DRAWINGS OR ASSOCIATED DOCUMENTS SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY.
7. THE "CONTRACTOR" REFERRED TO IN ALL NOTES SHALL APPLY TO THE MAIN CONTRACTOR OR ANY OF THEIR APPOINTED SUB-CONTRACTORS.
8. BEFORE ANY NEW CONSTRUCTION COMMENCES THE CONTRACTOR IS TO SET OUT THE NEW GRIDS ON SITE, AS SHOWN ON THE ARCHITECT'S SETTING-OUT DRAWING, TO ALLOW A CHECK OF THE PROPOSED GRID LAYOUT TO BE MADE BY THE CONTRACTOR. THE STRUCTURAL ENGINEER AND THE ARCHITECT SHALL BE INFORMED OF ANY DISCREPANCY IMMEDIATELY. IT SHOULD BE NOTED THAT SOME CHANGES TO THE DESIGN MAY BE REQUIRED AND THEREFORE IT IS IMPERATIVE THAT THE CONTRACTOR ALLOWS AMPLE PROGRAMME TIME FOR THIS ELEMENT OF WORKS.
9. THE CONTRACTOR MUST ENSURE THAT ALL THEIR SUB-CONTRACTORS ARE AWARE OF THEIR RESPONSIBILITIES TO THE PROJECT, PARTICULARLY AT ANY INTERFACE WITH OTHER SUB-CONTRACTORS.
10. THE CONTRACTOR IS TO PROVIDE METHOD STATEMENTS AND RISK ASSESSMENTS PRIOR TO COMMENCING ANY WORKS FOR APPROVAL BY THE CONTRACT ADMINISTRATOR, THE LOCAL BUILDING SAFETY REGULATOR AND ALL OTHER INTERESTED PARTIES AND STATUTORY AUTHORITIES. THE CONTRACTOR IS TO PROVIDE DETAILS OF ALL TEMPORARY WORKS REQUIRED BY THE BUILDING METHOD, AND SUBMIT THEM FOR REVIEW AND COMMENT BY THE STRUCTURAL ENGINEER.
11. THE PROVISION OF ANY CRANES AND HOIST BASES ARE DESIGNED BY THE CONTRACTOR TO SUIT THE PERMANENT WORKS. ANY ADDITIONAL WORK THAT THE CONTRACTOR REQUIRES ARE TO BE SUBMITTED TO THE STRUCTURAL ENGINEER FOR REVIEW AND COMMENT.
12. FOR CONSTRUCTION, THE CONTRACTOR SHALL REFER TO THE SERVICE ENGINEER'S / SPECIALIST'S DRAWINGS FOR ALL BUILDERS WORK DETAILS AND LOCATIONS RELATED TO HOLES, SERVICES, PUDDLE FLANGES, MANHOLES, SUMPS, DRAINAGE etc. ANY HOLES THROUGH NEW SLABS SMALLER THAN 200mm X 200mm ARE NOT, GENERALLY SHOWN ON HDR DRAWINGS. FOR BUILDERS WORK DETAILS FOR LIGHTNING PROTECTION REFER TO SERVICES DRAWINGS. THE POSITIONS OF ALL HOLES ON THESE DRAWINGS ARE TO BE CROSS CHECKED BY THE CONTRACTOR, AND THE STRUCTURAL ENGINEER INFORMED PRIOR TO CONSTRUCTION IF ANY OF THE DETAILS RELATING TO HOLES THROUGH THE STRUCTURE DIFFER BETWEEN THOSE SHOWN ON THE ARCHITECT'S, SERVICE ENGINEER'S AND STRUCTURAL ENGINEER'S DRAWINGS.
13. ON NO ACCOUNT SHALL HOLES OR OTHER OPENINGS, IRRESPECTIVE OF SIZE BE CUT OR PLACED IN ANY PART OF THE STRUCTURE WITHOUT PRIOR APPROVAL BY THE ENGINEER IN WRITING.
14. FOR TYPES OF FIRE PROTECTION AND FIRE RATINGS SEE THE ARCHITECT 'S SPECIFICATIONS AND DRAWINGS. THE FIRE PROTECTION PERIOD TO THE NEW STRUCTURE SHALL BE 60 MINUTES UNLESS NOTED OTHERWISE ON THE DRAWINGS AS SPECIFIED IN THE FIRE STRATEGY BY THE SPECIALIST. THE FIREFIGHTING STAIR CORE WALLS ARE TO HAVE A FIRE PROTECTION PERIOD OF 120 MINUTES.
15. FOR ALL CLADDING AND CURTAIN WALLING DETAILS REFER TO THE ARCHITECT'S AND/OR SPECIALIST'S DRAWINGS.
16. FOR RESTRAINTS AND FIXINGS TO NON-LOAD BEARING PARTITIONS REFER TO THE ARCHITECT'S DRAWINGS.
17. ALL WORK BY THE CONTRACTOR MUST BE CARRIED OUT IN SUCH A WAY THAT ALL REQUIREMENTS UNDER THE HEALTH AND SAFETY ACT, BUILDING SAFETY ACT, AND CDM REGULATIONS ARE SATISFIED.
18. BOUNDARY LINES SHOWN ON HDR DRAWINGS HAVE BEEN TAKEN FROM ARCHITECTURAL DRAWINGS AND ARE INDICATIVE ONLY. HDR TAKE NO RESPONSIBILITY FOR THE ACCURACY OF THIS INFORMATION.
19. FOR ALL ABOVE GROUND DRAINAGE DETAILS REFER TO THE SERVICE ENGINEER 'S DRAWINGS.
20. ALL WATERPROOFING AND DAMP PROOFING DETAILS SHALL BE TO ARCHITECT 'S REQUIREMENTS EXCEPT FOR THE STRUCTURAL WATERPROOFING DETAILS FOR THE SUB-STRUCTURE WORKS SHOWN ON THE ENGINEER 'S DRAWINGS.
21. FOR DETAILS OF ASPHALT TUCKS, DRIP NOTCHES etc. REFER TO ARCHITECT 'S DRAWINGS.
22. THE STRUCTURE HAS NOT BEEN DESIGNED FOR ANY FUTURE EXTENSIONS.

B - SITE PREPARATION / TEMPORARY WORKS

1. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY CALCULATIONS FOR ANY TEMPORARY STRUCTURE AND, WHERE NECESSARY, DETAILED MEMBER CHECKS AND STABILITY CHECKS FOR ALL RELEVANT MEMBERS IN THE PERMANENT STRUCTURE. ALL ADDITIONAL WORK REQUIRED FOR THE TEMPORARY STABILITY OF THE STRUCTURE SHALL BE DEEMED TO BE INCLUDED BY THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE ON THE COMPLETION OF THE PERMANENT STRUCTURE. IT IS THE CONTRACTORS RESPONSIBILITY TO CHECK THE PERMANENT WORKS FOR ANY LOADS APPLIED BY THE TEMPORARY WORKS TO ENSURE THAT THE PERMANENT STRUCTURE DOES NOT BECOME OVERSTRESSED OR DAMAGED DURING THE WORKS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DIVERSION OF ALL BELOW GROUND SERVICES. THE CONTRACTOR SHALL IDENTIFY ALL SERVICES AND CONFIRM THEIR LOCATIONS.
3. THE STRUCTURAL ENGINEER SHALL BE INFORMED IMMEDIATELY OF ANY BURIED SERVICES ENCOUNTERED, SUCH AS OLD SEWERS, DRAINS, WELLS, FOUNDATIONS ETC. THAT HAVE NOT BEEN PREVIOUSLY NOTED.
4. IF ANY ELEMENT OF THE PERMANENT WORKS IS TO BE USED AS SUPPORT FOR EXCAVATIONS THEN THE CONTRACTOR IS TO SUBMIT A SEQUENCE OF WORKS TO EXCAVATIONS, CONSTRUCTION AND BACKFILLING.
5. ALL DIMENSIONS AND LEVELS OF EXISTING STRUCTURE ARE AS SHOWN ON SURVEY DRAWINGS AND MAY NOT BE AS CONSTRUCTED ON SITE. CONTRACTOR TO VERIFY THE ACCURACY OF THE INFORMATION.

C - EARTHWORKS & EXCAVATIONS

1. THE EXCAVATIONS SHALL BE KEPT FREE FROM WATER BY PUMPING, BAILING OR OTHER APPROVED MEANS. THE CONTRACTOR SHALL PROVIDE, MAINTAIN AND OPERATE SUITABLE PUMPING EQUIPMENT AND PLANT AND SHALL, IF NECESSARY, CONSTRUCT SUCH DRAINS AND SUMPS, ETC. AS MAY BE REQUIRED TO REMOVE WATER FROM THE EXCAVATIONS OR PREVENT ENTRY THERETO. WATER IN THE EXCAVATIONS SHALL BE DEALT WITH IN SUCH A MANNER SO AS TO PREVENT THE DETERIORATION OF THE SURFACE ON WHICH FOUNDATIONS OR OTHER WORK WILL BE CONSTRUCTED.
2. THE CONTRACTOR SHALL NOTIFY THE STRUCTURAL ENGINEER IMMEDIATELY IF ANY AREAS OF SOFT OR UNSUITABLE MATERIAL ARE ENCOUNTERED.
3. ALL SOFT SPOTS AND OVER DIG BELOW THE FORMATION LEVEL OF THE FOUNDATIONS ARE TO BE BACKFILLED WITH MASS CONCRETE.
4. THE STRUCTURAL ENGINEER AND LOCAL AUTHORITY ARE TO BE GIVEN AMPLE OPPORTUNITY TO INSPECT FORMATION LEVELS AND TEMPORARY SURFACES. SUCH FORMATIONS ARE TO BE PROTECTED FROM DETERIORATION. NO CONCRETE SHALL BE PLACED ON FROST, ICE, SNOW OR WATER.
5. THE CONTRACTOR IS TO TAKE PRECAUTIONS TO CONTROL NOISE AND VIBRATION BEING TRANSMITTED TO THE SURROUNDING BUILDINGS AND SHALL AVOID DISTURBANCE TO THE EXISTING FOUNDATIONS TO THE NEIGHBOURING BUILDINGS AND ADJACENT INFRASTRUCTURE. REFER TO HDR DEMOLITION SPECIFICATION & DEMOLITION & ENABLING WORKS DRAWINGS.
6. THE STABILITY OF ALL EXCAVATIONS IS THE RESPONSIBILITY OF THE CONTRACTOR. THE DESIGN OF SLOPES AND TEMPORARY WORKS SHOULD MAKE REFERENCE TO THE S.I. INFORMATION AND ANY OTHER INVESTIGATION WORKS AND TESTING CONSIDERED NECESSARY BY CONTRACTOR.
7. EXCAVATIONS MUST NOT UNDERMINE OR DISTURB THE FOUNDATIONS OF NEIGHBOURING BUILDINGS, ROADS OR PAVEMENTS.

D - BACKPROPPING OF REINFORCED CONCRETE SLABS

1. ON ANY GIVEN FLOOR, PROPS OF DIFFERENT MATERIALS (E.G. STEEL AND ALUMINIUM) MUST NOT BE MIXED.
2. PROPS MUST BE SET OUT IN SUCH A WAY THAT A UNIFORM LOAD IS PRODUCED ON ANY SUPPORTING SLAB.
3. PROPS ARE TO BE INSTALLED WITH ZERO PRE-LOAD.
4. THE MAXIMUM ALLOWABLE CONSTRUCTION LOAD ON ANY FLOOR IS 1.5kN/m² (UNO)
5. ALL BACKPROPPING MUST BE INSTALLED IMMEDIATELY AFTER THE 'NEW' SLAB HAS BEEN STRUCK.
6. NO BACKPROPPING IS TO BE REMOVED UNTIL THE FORM WORK TO THE 'NEW' SLAB HAS BEEN STRUCK.
7. DESIGN OF BACKPROPPING AND OTHER RELATED TEMPORARY WORKS TO SPECIALIST DETAILS.

E - SITE CONSTRAINTS

1. THERE ARE EXISTING UTILITIES AROUND THE SITE. REFER TO ALL EXISTING UTILITIES DRAWINGS FOR DETAILS OF THE UTILITIES ON AND AROUND THE SITE. THE CONTRACTOR IS RESPONSIBLE FOR THE MANAGEMENT OF THE EXISTING UTILITIES THROUGHOUT THE WORKS.
2. POTENTIAL CLOSE EXISTING UTILITIES ON AND AROUND THE SITE REQUIRE A FULL SITE SURVEY. REFER TO THE EXISTING UTILITIES DRAWINGS FOR DETAILS OF THE UTILITIES ON AND AROUND THE SITE.

CLOSE PROXIMITY OF BUILDING SITE TO:

- ADJACENT STRUCTURES INCLUDING HAMMERSMITH LIBRARY.

F - CDM

1. THE ENGINEER'S ROLE IN THIS PROJECT IS THAT OF DESIGNER AS DEFINED BY THE CDM REGULATIONS 2015 (REGULATON 10 – DUTIES OF DESIGNERS). IN CARRYING OUT DESIGN WORK, ENGINEERING JUDGEMENT HAS BEEN APPLIED TO ELIMINATE OR WHERE NOT REASONABLY PRACTICABLE, TO REDUCE DESIGN HAZARDS AND RISKS ASSOCIATED WITH THE CONSTRUCTION AND SUBSEQUENT PHASES OF THE STRUCTURE.

   THE CONTRACTOR IS REMINDED OF THEIR RESPONSIBLILITIES UNDER THE CDM REGULATIONS 2015 AND THEIR OBLIGATIONS UNDER OTHER APPLICABLE HEALTH AND SAFETY LEGISLATION WHEN UNDERTAKING CONSTRUCTION OPERATIONS BOTH ON AND OFF SITE. THIS ALSO APPLIES TO ALL SUB-CONTRACTORS AND SUPPLIERS.

   REFER TO THE PROJECT RISK REGISTERS INCLUDING THE HDR DESIGN RISK REGISTER "HSE - SAFETY IN DESIGN".
2. FOR CDM PURPOSES, THE DESIGN ASSUMES THE WORKS WILL BE UNDERTAKEN BY A COMPETENT CONTRACTOR CO-OPERATING WITH OTHER CONTRACTORS AND OPERATING IN ACCORDANCE WITH AGREED METHOD STATEMENTS.
3. H&S COORDINATION & RISK REGISTER SHALL BE SOUGHT FROM THE APPOINTED PRINCIPAL DESIGNER PRIOR TO CARRYING OUT WORK ON SITE.

G - CLADDING

1. LOADING TO THE PRIMARY STRUCTURE FROM THE CLADDING HAS BEEN DESIGNED BASED ON THE ARCHITECT'S DRAWINGS. LOADINGS ARE TO BE CROSS REFERENCED AGAINST THE DESIGN DETAILS PROVIDED BY THE RELEVANT SPECIALIST SUB-CONTRACTOR.
2. REFER TO HDR MOVEMENT & TOLERANCES REPORT FOR SLAB EDGE DEFLECTION LIMITS.
3. TYPICALLY, THE STRUCTURE HAS BEEN DESIGNED TO SUPPORT THE CLADDING ON EVERY FLOOR **U.N.O**.
4. SEE LOAD PLANS FOR LOCATION & INTENSITY OF COORDINATED CLADDING & LOADING.
5. REFER TO THE SPECIALIST CLADDING DESIGNERS INFORMATION FOR CONNECTIONS DETAILS TO THE PRIMARY STRUCTURE, INCLUDING CAST IN CHANNELS TO THE SLAB EDGE.

H - CODES

1. THE STRUCTURAL DESIGN COMPLIES WITH THE BUILDING REGULATIONS 1991. THIS IS ACHIEVED BY COMPLYING WITH THE BRITISH STANDARD CODES OF PRACTICE AS 'APPROVED DOCUMENTS.' THE CODES OF PRACTICE USED IN THE DESIGN ARE AS FOLLOW:

BS EN 1990	BASIS OF STRUCTURAL DESIGN.
BS EN 1991-1-1	ACTIONS ON STRUCTURES. GENERAL ACTIONS. DENSITIES, SELF WEIGHT, IMPOSED LOADS FOR BUILDINGS.
BS EN 1991-1-2	ACTIONS ON STRUCTURES. GENERAL ACTIONS. ACTIONS ON STRUCTURES EXPOSED TO FIRE.
BS EN 1991-1-3	ACTIONS ON STRUCTURES. GENERAL ACTIONS. SNOW LOADS.
BS EN 1991-1-4	ACTIONS ON STRUCTURES. GENERAL ACTIONS. WIND ACTIONS
BS EN 1992-1-1	DESIGN OF CONCRETE STRUCTURES. GENERAL RULES AND RULES FOR BUILDINGS.
BS EN 1992-1-2	DESIGN OF CONCRETE STRUCTURES. GENERAL RULES- STRUCTURAL FIRE DESIGN.
BS EN 1993-1-1	DESIGN OF STEEL STRUCTURES. GENERAL RULES AND RULES FOR BUILDINGS.
BS EN 1997-1	GEOTECHNICAL DESIGN. GENERAL RULES.
BS EN 1996-1-1	DESIGN OF MASONRY STRUCTURES - GENERAL RULES FOR REINFORCED AND UNREINFORCED MASONRY STRUCTURES.
BS EN 13670	EXECUTION OF CONCRETE STRUCTURES.

BS EN 1990:2002	BASIS OF STRUCTURAL DESIGN.
BS EN 1991-1-1:2002	ACTIONS ON STRUCTURES. GENERAL ACTIONS. DENSITIES, SELF WEIGHT, IMPOSED LOADS FOR BUILDINGS.
BS EN 1991-1-2:2002	ACTIONS ON STRUCTURES. GENERAL ACTIONS. ACTIONS ON STRUCTURES EXPOSED TO FIRE.
BS EN 1991-1-3:2003	ACTIONS ON STRUCTURES. GENERAL ACTIONS. SNOW LOADS.
BS EN 1991-1-4:2005	ACTIONS ON STRUCTURES. GENERAL ACTIONS. WIND ACTIONS
BS EN 1992-1-1:2004	EUROCODE 2. DESIGN OF CONCRETE STRUCTURES. GENERAL RULES AND RULES FOR BUILDINGS.
BS EN 1992-1-2:2004	EUROCODE 2. DESIGN OF CONCRETE STRUCTURES. GENERAL RULES - STRUCTURAL FIRE DESIGN.
BS EN 1993-1-1:2005	EUROCODE 3. DESIGN OF STEEL STRUCTURES. GENERAL RULES AND RULES FOR BUILDINGS.
BS EN 1996-1-1	EUROCODE 6. DESIGN OF MASONRY STRUCTURES. GENERAL RULES FOR REINFORCED AND UNREINFORCED MASONRY STRUCTURES.
BE EN 1997-1:2004	EUROCODE 7. GEOTECHNICAL DESIGN. GENERAL RULES.

K - CONTRACTOR DESIGN ITEMS

THE FOLLOWING IS A LIST OF SUB-CONTRACTOR DESIGN ITEMS WITH RESPECT TO THE STRUCTURAL ASPECTS OF THE PROJECT PERMANENT WORKS:

1. TEMPORARY WORKS, INCLUDING TOWER CRANE FOUNDATIONS, LOCATION, AND INTEGRATION WITH PRIMARY BUILDING FOUNDATIONS.
2. CONCRETE MIXES.
3. PRE-STRESSED AND PRE-CAST CONCRETE ELEMENTS.
4. STEEL STAIRS/PRECAST STAIRS.
5. STRUCTURAL STEELWORK CONNECTIONS.
6. MASONRY/ CLADDING SUPPORT SYSTEMS, WIND POSTS AND SUPPORT ANGLES AND COLD ROLLED CLADDING METAL STUD BACKING SYSTEMS. DESIGN AGAINST PROGRESSIVE COLLAPSE ASSOCIATED WITH CLADDING.
7. SECONDARY STEELWORK INCLUDING THAT ASSOCIATED WITH THE FORUM SEATING, PLANT/ACOUSTIC ENCLOSURE SCREENS (AND ASSOCIATED PLINTHS), PV PLATFORMS (AND ASSOCIATED PLINTHS), FLUE EXTRACT SUPPORT STRUCTURE, AND CLADDING AND ROOF BUILD-UPS AND SUPPORT SYSTEMS.
8. ARCHITECTURAL METALWORK, HANDRAILS, BALUSTRADES, GLAZING AND GLAZING SYSTEMS AND ASSOCIATED FIXINGS TO STRUCTURES, MEP PLANT SUPPORTS.
9. LIFTING BEAMS AND SUPPORT CONSTRAINTS FOR STRUCTURAL LOADING BY LIFT GUIDE STEELWORK.
10. BALCONY ARCHITECTURAL METALWORK, TIMBER CARCASSING, ACM PANELS AND DRAINAGE PROPOSALS.
11. PROPRIETARY FIRE AND CORROSION PROTECTION SYSTEMS.
12. STRUCTURAL TIMBER TO TIMBER CONNECTIONS.

L - STEELWORK

1. ALL STEELWORK, DETAILING, FABRICATION AND ERECTION TO BE IN ACCORDANCE WITH BS EN 1993 AND THE HDR SPECIFICATION
2. STEELWORK GRADES TO BE IN ACCORDANCE WITH BS EN 10025, GRADE S355, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
3. THE DESIGN AND FABRICATION DETAILS FOR ALL NEW CONNECTIONS, FIXING BRACKETS, SPLICES AND STANCHION BASE PLATES SHALL BE BY THE STEELWORK SUB-CONTRACTOR TO THE LOADS AND CONCEPT DETAILS INDICATED ON THE DRAWINGS AND SHALL BE TO THE APPROVAL OF THE CONTRACT ADMINISTRATOR AND LOCAL AUTHORITY.
4. EXCEPT AS NOTED, ALL CONNECTIONS SHALL BE MADE USING A MINIMUM OF 4no. M16, GRADE 8.8 BOLTS, OR AN EQUIVALENT 6mm FILLET WELD. CONNECTIONS TO BRACING ELEMENTS SHALL BE MADE WITH 2no. NON SLIP TENSION CONTROL BOLTS. ALL BEAM CONNECTIONS SHALL BE DESIGNED FOR A MINIMUM FACTORED ULTIMATE SHEAR CONNECTION OF 75kN AND CONNECTIONS FOR BRACING MEMBERS FOR A MINIMUM AXIAL FORCE OF 50kN UNLESS NOTED OTHERWISE. TIE FORCES FOR CONNECTION DESIGN SHALL COMPLY WITH STRUCTURAL INTEGRITY REQUIREMENTS OF BS EN 1993 WITH ALL HORIZONTAL MEMBERS CAPABLE OF RESISTING A MINIMUM TENSILE LOAD OF 75kN UNO.
5. THE STEELWORK SUB-CONTRACTOR IS TO ALLOW FOR THE MINIMUM FACTORED ULTIMATE AXIAL TENSILE FORCE, IN ALL PRIMARY AND SECONDARY BEAM CONNECTIONS, AS SPECIFIED IN BS EN 1993.
6. ALL BRACING CONNECTIONS AND ASSOCIATED BEAM CONNECTIONS ARE TO BE MADE USING M20 HSFG BOLTS. A MINIMUM OF TWO BOLTS IS REQUIRED AT EACH CONNECTION.
7. ALL TEMPORARY BRACING IS TO BE SET OUT ON THE CENTROIDS OF THE BRACING MEMBERS AND ON THE CENTRE LINES OF BEAMS.
8. DETAILS AND CALCULATIONS OF CONNECTIONS TO BE SUBMITTED TO THE BUILDING CONTROL OFFICER, THE STRUCTURAL ENGINEER AND, WHERE REQUIRED, THE ARCHITECT AND SERVICE ENGINEER, FOR APPROVAL PRIOR TO THE FABRICATION OF THE STEELWORK.
9. ALL MEMBER LOADS, FORCES AND END REACTIONS INDICATED ON THE DRAWINGS ARE FACTORED AND ULTIMATE (IN kN AND kNm).
10. COLUMN SHAFTS TO BASEPLATES AND TOP SURFACES TO BASEPLATES SHALL BE MACHINED FOR BEARING. LENGTH AND THICKNESS SHOWN AFTER MACHINING. ALL TOLERANCES FOR MACHINING ARE TO BE ALLOWED FOR BY THE STEELWORK SUB-CONTRACTOR. THE AIR GAP BETWEEN BEARING SURFACES MEASURED IN ANY DIRECTION SHALL NOT EXCEED :-
    a) OVER 50% OF THE LENGTH MEASURED; 0.5mm.
    b) OVER 10% OF THE LENGTH MEASURED; 0.1mm.
11. ALL PERMANENTLY EXPOSED STEEL SHALL BE FIRE PROTECTED, AS REQUIRED, AND PREPARED AND PAINTED IN ACCORDANCE WITH THE RELEVANT SPECIFICATIONS. ALL UNPAINTED STEELWORK TO BE CLEANED BY WIRE BRUSHING TO REMOVE ALL LOOSE MILLSCALE AND GREASE, ALL IN ACCORDANCE WITH HDR SPECIFICATION.
12. ALL EXTERNAL / EXPOSED STEELWORK TO BE GALVANISED. GALVANISED STEELWORK SHALL BE HOT DIPPED GALVANISED TO BS EN ISO 1461 THICKNESS 85 MICRONS AND SHALL BE PASSIVATED USING 'TWASH' TO BS 5493 PRIOR TO ANY SUBSEQUENT COATINGS.
13. THE STEELWORK SUB-CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STEELWORK STRUCTURE DURING ALL STAGES OF ERECTION, I.E. IT'S TEMPORARY CONDITION, INCLUDING THE EFFECTS FROM WIND, TOWER CRANES AND HOISTS WHERE THESE ARE SUPPORTED AND/OR RESTRAINED BY THE STRUCTURE. THE STEELWORK SUB-CONTRACTOR MUST TAKE INTO ACCOUNT THE ERECTION PROGRAMME BY THE CONTRACTOR, AND BE RESPONSIBLE FOR THE DESIGN, DETAILING AND SUPPLY OF ALL NECESSARY TEMPORARY BRACING, etc. THAT MAY BE REQUIRED TO ENSURE THE STABILITY OF THE STRUCTURE DURING ERECTION AND UNTIL THE CONCRETE SHEAR WALLS AND SLABS HAVE MATURED. THESE DETAILS ARE TO BE SUPPLIED TO THE STRUCTURAL ENGINEER FOR REVIEW BEFORE FABRICATION COMMENCES. ALL TEMPORARY BRACING, etc. TO REMAIN IN PLACE UNTIL THE CONCRETE SLABS HAVE FULLY MATURED SUFFICIENTLY TO FORM A HORIZONTAL DIAPHRAGM CARRYING ALL TEMPORARY LOADS BACK TO THE CONCRETE SHEAR WALLS.
14. NO PENETRATIONS THROUGH STEEL MEMBERS ARE PERMITTED WITHOUT PRIOR APPROVAL OF THE STRUCTURAL ENGINEER.
15. FOR DETAILS OF SIZES AND POSITIONS OF ALL BRACKETRY REQUIRED BY OTHER TRADES, E.G. LIFTS, CLADDING, STAIRS, LIGHTNING PROTECTION, etc. SEE RELEVANT SPECIALIST'S DRAWINGS. THESE DRAWINGS ARE TO BE ISSUED FOR APPROVAL TO THE STRUCTURAL ENGINEER PRIOR TO ISSUING FOR CONSTRUCTION.
16. ALL BOLTS IN DIRECT TENSION TO BE PROVIDED WITH LOCK NUTS.
17. BUTT WELDS SHALL BE ULTRASONICALLY TESTED BY AN INDEPENDENT TESTING AUTHORITY. FILLET WELDS SHALL BE EXAMINED BY MAGNETIC PARTICLE TESTING. ULTRASONIC TESTING OF WELDS TO BE IN ACCORDANCE WITH BS EN 1714. MAGNETIC TESTING TO BE IN ACCORDANCE WITH BS EN ISO 9934. VISUAL INSPECTION OF WELDS TO BE IN ACCORDANCE WITH BS EN 970.
18. IN ADDITION TO THE VISUAL INSPECTION OF 100% OF ALL WELDS TO THE STEELWORK, ADDITIONAL NON-DESTRUCTIVE TESTING SHALL BE PERFORMED IN ACCORDANCE WITH BS EN 1011.
19. ALL VISIBLE WELDS TO ARCHITECTURALLY EXPRESSED STEELWORK ARE TO BE GROUND SMOOTH TO THE APPROVAL OF THE ARCHITECT AND STRUCTURAL ENGINEER. ADEQUATE NOTICE IS TO BE GIVEN BY THE STEELWORK SUB-CONTRACTOR FOR INSPECTION OF THE FINISH TO SUCH WELDS PRIOR TO PAINTING.
20. THE STEELWORK SUB-CONTRACTOR SHALL ENSURE THAT EVERY SITE CONNECTION IS CORRECTLY TIGHTENED PRIOR TO OFFERING THE STEELWORK FOR INSPECTION. A COLOUR CODING SYSTEM SHALL BE USED ON SITE TO IDENTIFY THOSE CONNECTIONS THAT HAVE BEEN CHECKED AND PASSED FOR INSPECTION.
21. NEW COLUMN SPLICE CONNECTIONS ARE TO ALLOW FOR TENSILE LOADS EQUIVALENT TO 2/3rd's OF LOAD APPLIED TO THE COLUMN FROM THE FLOOR BELOW.
22. THE CONTRACTOR IS TO ALLOW FOR PROBING AND THE USE OF COVER METRES WHEN FORMING CONNECTIONS FOR THE NEW STEELWORK INTO THE CONCRETE. NO REINFORCEMENT IS TO BE CUT OR DRILLED WITHOUT THE EXPRESS PERMISSION OF THE STRUCTURAL ENGINEER.
23. FOR STEEL TO CONCRETE CONNECTIONS, THE CONTRACTOR SHALL CONSIDER AND ALLOW FOR SITE DRILLED HOLES THROUGH BASEPLATES AND END PLATES TO SUIT THE ACTUAL BOLT POSITIONS POSTDRILLED INTO THE CONCRETE AND LOCATED TO AVOID REINFORCEMENT.
24. STEEL STIFFENERS SHALL BE PROVIDED WHERE REQUIRED TO SUIT THE FORCES, END REACTIONS AND BENDING MOMENTS INDICATED ON THE DRAWINGS.
25. ALL BOLTS SHALL BE GRADE 8.8 UNLESS NOTED OTHERWISE ON DRAWINGS.
26. ALL WELDS SHALL BE CONTINUOUS 6mm FILLETS MINIMUM, UNLESS NOTED OTHERWISE ON THE DRAWINGS, ALL SHELF ANGLES TO BE INTERMITTENT 6mm FILLET WELD 150mm HIT/MISS.
27. WHERE STANCHION BASE PLATES ARE FOUNDED ON CONCRETE BASES OR SLABS, SUITABLE STEEL SHIMS SHALL BE USED TO LEVEL AND PLUMB THE STANCHION. GROUT TO STANCHION BASE PLATES SHALL BE 25mm DEEP PROPRIETARY NON-SHRINK CEMENTITIOUS GROUT SUCH AS CONBEXTRA HF BY FOSROC OR SIMILAR APPROVED. ALL BASE PLATES SHALL BE PROVIDED WITH 25mm DIAMETER GROUT HOLES.
28. UNLESS NOTED OTHERWISE ON THE DRAWINGS, THE CENTRE LINES OF STANCHIONS AND BEAMS SHALL ALIGN AND ALL BRACING MEMBERS SHALL HAVE NODE POINTS ON THE INTERSECTIONS OF THE MEMBER CENTRE LINES.
29. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPILING AND SUBMITTING STRUCTURAL CALCULATIONS AND DETAILS FOR THE ELEMENTS NOTED IN 3 ABOVE TO THE ENGINEER, LOCAL AUTHORITY FOR BUILDING CONTROL AND OTHER STATUTORY APPROVALS PRIOR TO COMMENCING ANY FABRICATION OF STEELWORK OR WORK ON SITE.
30. ALL SECONDARY STEELWORK AND BRACKETS AND FIXINGS REQUIRED FOR THE INSTALLATION OF LIFTS, CLADDING, WINDOWS, M & E SERVICES AND OTHER TRADES SHALL BE DESIGNED, FABRICATED, SUPPLIED AND INSTALLED BY THE RELEVANT TRADE CONTRACTOR UNLESS SPECIFICALLY AGREED WITH THE MAIN CONTRACTOR. METHOD OF FIXING TO THE MAIN STRUCTURE SHALL BE AGREED WITH THE CONTRACT ADMINISTRATOR AT AN EARLY STAGE DURING THE DESIGN DEVELOPMENT OF THE STEELWORK DETAILS.
31. FOR DETAILS OF SIZES AND POSITIONS OF ALL BRACKETRY AND FIXINGS REQUIRED BY OTHER TRADES SUCH AS CLADDING, LIFTS etc. REFER TO RELEVANT TRADE CONTRACTORS' DRAWINGS.

M - MASONRY

1. GENERALLY, NOT STRUCTURAL. SEE ARCHITECT'S DRAWINGS AND SPECIFICATIONS FOR GENERAL GUIDANCE, WHEN DEVELOPED.
2. ALL NON-LOADBEARING BLOCKWORK IS TO HAVE A MINIMUM 20mm GAP TO THE SOFFIT OF ALL CONCRETE SLABS AND IS TO BE FIXED TO SLAB USING "FHR HEAD RESTRAINTS" BY ANCON FIXED AT 900mm C/C. THE LAST COURSE MUST BE UNCUT UNIT.
3. ALL CAVITY TIES TO BE STAINLESS STEEL AND FIXED AT 900mm C/C HORIZONTALLY AND 450mm C/C VERTICALLY. ALL TIES TO BE AT 225mm C/C VERTICALLY AND HORIZONTALLY AROUND WINDOWS, DOORS AND CONTROL JOINTS, AND NOT MORE THAN 225MM FROM OPENING OR JOINT.
4. ALL MASONRY WALLS ARE TO BE PROPPED TO RESIST WIND AND ACCIDENTAL FORCES UNTIL HEAD RESTRAINTS ARE IN PLACE.
5. BRICKWORK WITHIN THE GROUND OR WITHIN 150 OFF GROUND LEVEL SHOULD BE LAID WITH SULPHATE RESISTING MORTAR.
6. DETAILS FOR SUBSTATION ALLOW BRICKWORK TO BE MIN. 10kN/mm² WITH MORTAR STRENGTH CLASS M4. REFER TO PROJECT SPECIFIC SUBSTATION SPECIALIST DRAWINGS WHEN AVAILABLE FOR SETTING OUT.

N - LINTELS

1. PROVIDE PROPRIETARY LINTELS OVER ALL OPENINGS OR RECESSES IN NON-LOAD BEARING MASONRY WALLS, INCLUDING THOSE FOR MECHANICAL OR ELECTRICAL SERVICE OR EQUIPMENT IN ACCORDANCE WITH THE TABLE BELOW.
2. REFER TO THE ARCHITECTS DRAWINGS FOR INTERNAL WALLS LAYOUTS AND LOCATIONS OF OPENINGS
3. REFER TO THE ARCHITECTS DRAWINGS FOR FIRE STRATEGY AND FIRE RESISTANCE PERIOD OF NON-LOADING BEARING WALLS

TABLE 2

WALL TYPE	WALL FIRE RATING	CLEAR OPENING	LINTEL REFERENCE
140mm BLOCK	UP TO 90 MINUTES	UP TO 1500mm	140x100 DEEP, NAYLORS FIRE R3
140mm BLOCK	UP TO 90 MINUTES	UP TO 1800mm	140x100 DEEP NAYLORS FIRE S5
250mm BLOCK	UP TO 90 MINUTES	UP TO 1200mm	140x100 DEEP NAYLORS FIRE R3 + 100x100 DEEP NAYLORS XFS4
140mm BLOCK	120 MINUTES	UP TO 1800mm	140x140 DEEP NAYLORS XFS5
250mm BLOCK	120 MINUTES	UP TO 1500mm	140x140 DEEP NAYLORS XFS5 + 100x140 DEEP NAYLORS XFR6

O - APPROVALS

1. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING THE S106 CONSENT TO DISCHARGE AGREEMENT FROM THAMES WATER.
2. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING LONDON UNDERGROUND APPROVAL PRIOR TO ANY PILING WORKS.
3. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING TFL APPROVAL FOR WORKS IMPACTING THE PUBLIC FOOTPATH.

P - LOADING

1. THE PRIMARY STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE LOADING REQUIREMENTS OF BS EN 1991, DESIGN LOADING FOR BUILDINGS. FOR FLOOR LOADINGS REFER TO THE HDR LOADING PLANS.
2. PERMANENT (DEAD) LOADS HAVE BEEN CALCULATED BASED ON THE ARCHITECTURAL BUILD UP DRAWINGS
3. VARIABLE (LIVE) LOADS HAVE BEEN ASSIGNED BASED ON BS EN 1991 AND THE UK NATIONAL ANNEX ACCORDING THE THE USES SHOWN ON THE ARCHITECTURAL LAYOUTS.

REV	DATE	REVISION DESCRIPTION
P01	16/01/26	STAGE 3 ISSUE.

SUITABILITY STATUS:

A3 - STAGE 3 AUTHORISED / ACCEPTED

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CLIENT:

227 SBR LTD, LONDON

PROJECT:

227 SHEPHERDS BUSH ROAD

TITLE:

GENERAL NOTES

HDR NUMBER:	REV DRAWN BY:	REV CHKD/APPD BY:
10428560	SM	DS/GLC
MODEL NAME:	REV DATE:	SCALE @ A1:
10428560-HDR-ZZ-XX-M3-S-209100	16/01/26	1 : 1

DRAWING NUMBER: **10428560-HDR-XX-XX-DR-S-000010** REVISION: **P01**

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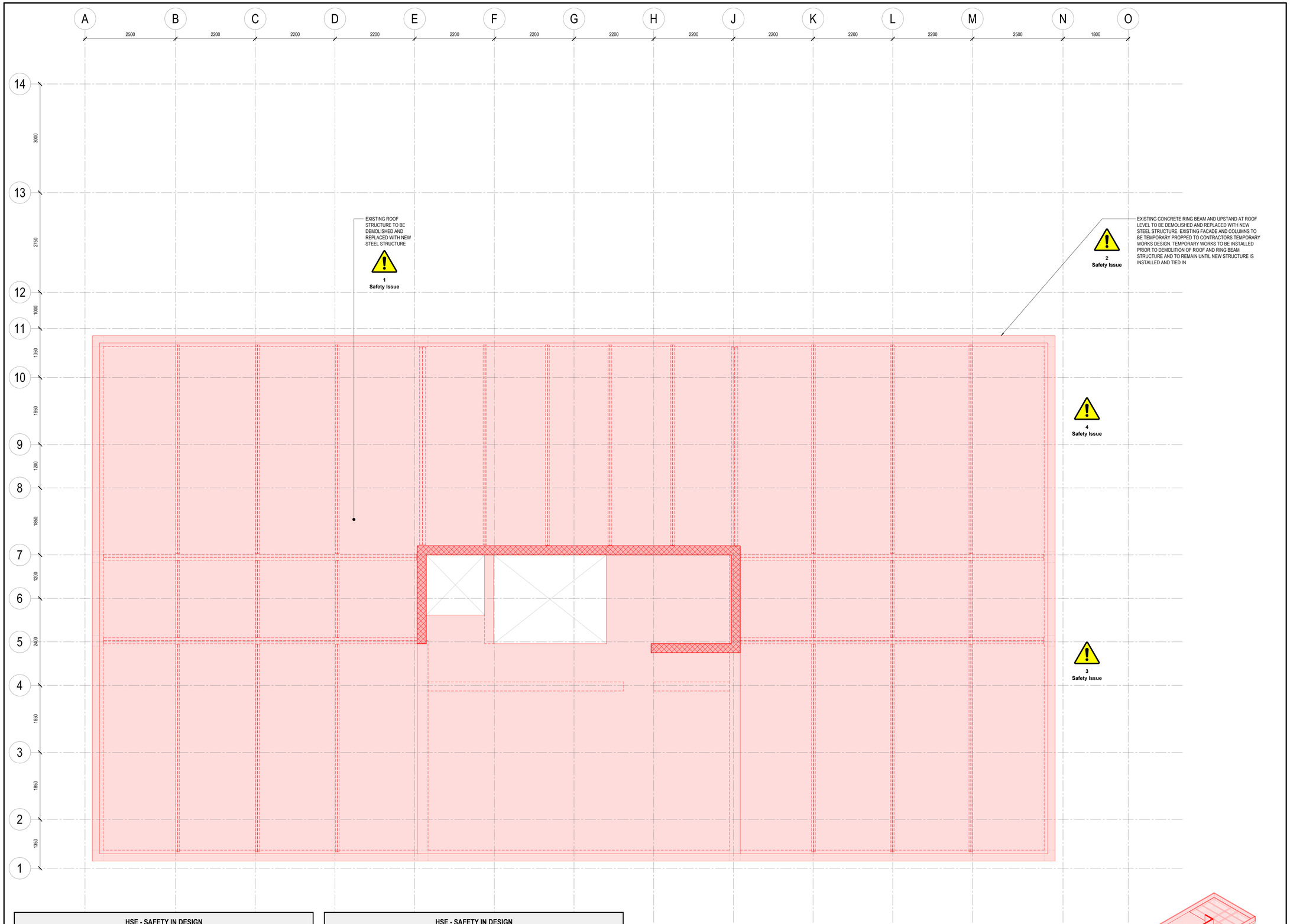
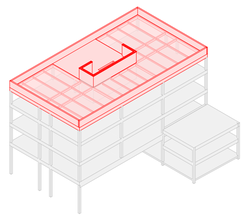


HSE - SAFETY IN DESIGN

RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
1	Safety Issue	COLLAPSE OF EXISTING ROOF STRUCTURE DURING DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS, WHERE REQUIRED, IS INSTALLED IN ACCORDANCE WITH TEMPORARY WORKS ENGINEER `S DESIGN AND SEQUENCE OF WORKS.	Unknown
2	Safety Issue	COLLAPSE OF EXISTING FACADE DURING RING BEAM DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS IN PLACE TO FACADE AND EXISTING COLUMNS TO TEMPORARY WORKS ENGINEER `S DESIGN. TO REMAIN IN PLACE UNTIL PERMANENT STRUCTURE IS INSTALLED AND TIED INTO EXISTING FACADE.	Unknown

HSE - SAFETY IN DESIGN

RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
3	Safety Issue	COLLAPSE OF EXISTING COLUMNS DURING ERECTION OF STEEL FRAME. NEW AND EXISTING COLUMNS TO ALIGN CENTRALLY TO AVOID ECCENTRIC FORCES BEING INDUCED ON EXISTING COLUMNS. TEMPORARY WORKS TO TEMPORARY WORKS ENGINEER `S DETAILS TO BE INSTALLED TO EXISTING COLUMNS TO BRACE THEM UNTIL PERMANENT STEELWORK IS COMPLETELY INSTALLED TO RESIST LATERAL FORCES INDUCED BY RAKING COLUMNS DURING CONSTRUCTION.	Unknown
4	Safety Issue	STABILITY DURING CONSTRUCTION. CONTRACTOR TO ENSURE TEMPORARY STABILITY OF THE FACADE AND FRAME DURING CONSTRUCTION TO TEMPORARY WORKS ENGINEER`S DETAILS.	Unknown



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LEGEND

CUT	PRO	
		EXISTING STRUCTURE TO REMAIN (MATERIAL VARIES)
		EXISTING STRUCTURE TO BE DEMOLISHED (MATERIAL VARIES)

NOTE:

ALL EXISTING STRUCTURE SHOWN INDICATIVELY. EXISTING STRUCTURAL LAYOUT IS BASED OFF 'MODELLING ARCHITECTURE LTD DRAWINGS A101-A105 ISSUED 12/03/25

REV	DATE	REVISION DESCRIPTION
P01	16/01/26	STAGE 3 ISSUE.

SUITABILITY STATUS:

A3 - STAGE 3 AUTHORISED / ACCEPTED

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United Kingdom

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e: info@hdrinc.com
w: www.hdrinc.com

CLIENT:

227 SBR LTD, LONDON

PROJECT:

227 SHEPHERDS BUSH ROAD

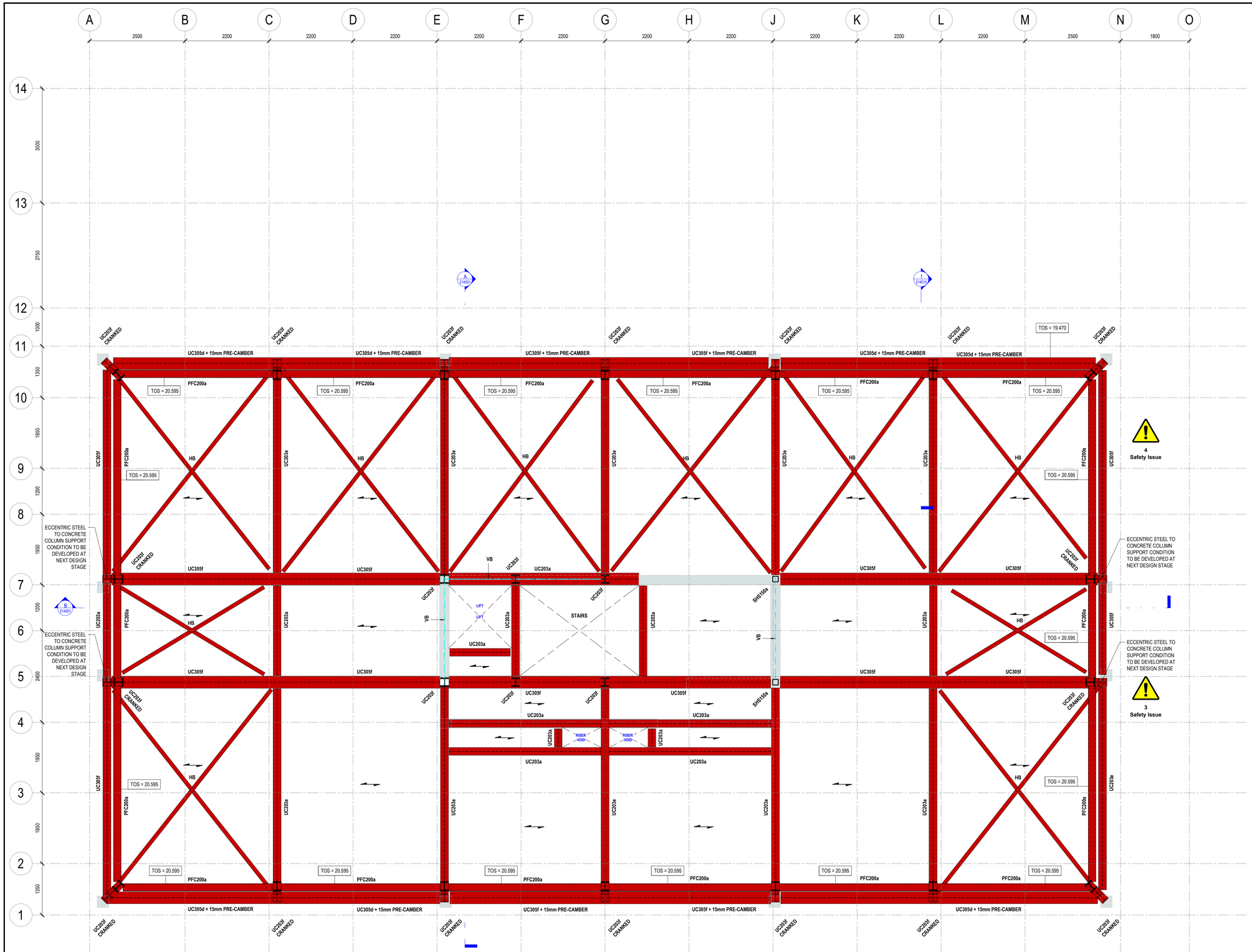
TITLE:

EXISTING & DEMOLITION WORKS FOURTH FLOOR GENERAL ARRANGEMENT

HDR NUMBER:	REV DRAWN BY:	REV CHKD/APPD BY:
10428560	SM	DS/GLC
MODEL NAME:	REV DATE:	SCALE @ A1:
10428560-HDR-ZZ-XX-M3-S-209100	16/01/26	As indicated

DRAWING NUMBER: 10428560-HDR-ZZ-04-DR-S-152105

REVISION: P01



STEEL COLUMN SCHEDULE

TYPE MARK	COLUMN SIZE
RHS150a	RHS150x100x4.0
SHS150a	SHS150x150x5.0
UC203f	UC203x203x100

STEEL BEAM SCHEDULE

TYPE MARK	BEAM SIZE
PFC150a	PFC150x75x18
PFC200a	PFC200x75x23
UC203a	UC203x203x46
UC203d	UC203x203x71
UC203e	UC203x203x86
UC203f	UC203x203x100
UC254e	UC254x254x167
UC305d	UC305x305x158
UC305f	UC305x305x240

TOS = 19.470 U.N.O

STEEL BRACING SCHEDULE

TYPE MARK	BEAM SIZE
HB	ALLOW FOR 60x60x8 RSA, OR 100x10 FLAT
VB	100X10 FLAT CROSS BRACING

ALL BUILDERS WORK TO BE COORDINATED

ALL NEW STEEL COLUMNS TO BE CENTRED ON EXISTING CONCRETE COLUMNS

EXISTING TOP FACADE TO BE RESTRAINED BY NEW STEEL FRAME. TIE DETAIL TO BE DEVELOPED UPON OPENING UP OF FACADE

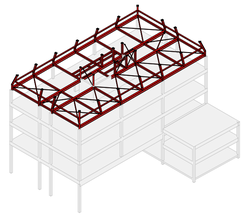
PLAN BRACING TO BE COORDINATED WITH BEAMS DURING STAGE 4

HSE - SAFETY IN DESIGN

RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
1	Safety Issue	COLLAPSE OF EXISTING ROOF STRUCTURE DURING DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS, WHERE REQUIRED, IS INSTALLED IN ACCORDANCE WITH TEMPORARY WORKS ENGINEER 'S DESIGN AND SEQUENCE OF WORKS.	Unknown
2	Safety Issue	COLLAPSE OF EXISTING FACADE DURING RING BEAM DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS IN PLACE TO FACADE AND EXISTING COLUMNS TO TEMPORARY WORKS ENGINEER 'S DESIGN. TO REMAIN IN PLACE UNTIL PERMANENT STRUCTURE IS INSTALLED AND TIED INTO EXISTING FACADE.	Unknown

HSE - SAFETY IN DESIGN

RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
3	Safety Issue	COLLAPSE OF EXISTING COLUMNS DURING ERECTION OF STEEL FRAME. NEW AND EXISTING COLUMNS TO ALIGN CENTRALLY TO AVOID ECCENTRIC FORCES BEING INDUCED ON EXISTING COLUMNS. TEMPORARY WORKS TO TEMPORARY WORKS ENGINEER 'S DETAILS TO BE INSTALLED TO EXISTING COLUMNS TO BRACE THEM UNTIL PERMANENT STEELWORK IS COMPLETELY INSTALLED TO RESIST LATERAL FORCES INDUCED BY RAKING COLUMNS DURING CONSTRUCTION.	Unknown
4	Safety Issue	STABILITY DURING CONSTRUCTION. CONTRACTOR TO ENSURE TEMPORARY STABILITY OF THE FACADE AND FRAME DURING CONSTRUCTION TO TEMPORARY WORKS ENGINEER 'S DETAILS.	Unknown



NOTES

1. ALL STEEL MEMBERS ARE TO POSITIONED CENTRALLY ON GRIDS UNO.
2. BEAMS TO BE CENTRED ON COLUMNS UNLESS NOTED OTHERWISE.
3. ALL MOMENTS, FORCES AND LOADS SHOWN ARE ULTIMATE VALUES.
4. MOMENT FORCES DO NOT INCLUDE THE ADDITIONAL CONNECTION FORCES DUE TO CONNECTION ECCENTRICITY.
5. ALL STEEL TO STEEL CONNECTIONS TO BE DESIGNED BY STEELWORK FABRICATOR, INCLUDING COLUMN BASEPLATES.
6. PAINTING AND PREPARATION AND PROTECTIVE COATINGS OF STEELWORK TO BE IN ACCORDANCE WITH THE SPECIFICATION.
7. ALL BOLTS TO BE GRADE 8.8 (UNO).
8. REFER TO THE SPECIFICATION FOR FULL DETAILS.
9. STEEL GRADE AND SUBGRADE SHALL BE AS SHOWN ON THE DESIGN DRAWINGS.

LEGEND

CUT PRO

- EXISTING STRUCTURE TO REMAIN (MATERIAL VARIES)
- PRIMARY STRUCTURAL STEEL FRAME
- SECONDARY STEEL FRAME
- PROPOSED 150 DP COLD FORMED STEEL JOISTS TO KINGSPAN (OR SIMILAR APPROVED) DETAILS
- STEEL FRAMING SYSTEM AND EXTERNAL CLADDING (TO BE CONFIRMED BY ARCHITECT)

NOTE:

ALL EXISTING STRUCTURE SHOWN INDICATIVELY. EXISTING STRUCTURAL LAYOUT IS BASED OFF 'MODELLING ARCHITECTURE LTD DRAWINGS A101-A105 ISSUED 12/03/25

REV	DATE	REVISION DESCRIPTION
P01	16/01/26	STAGE 3 ISSUE.

SUITABILITY STATUS:

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CLIENT:

227 SBR LTD, LONDON

PROJECT:

227 SHEPHERDS BUSH ROAD

TITLE:

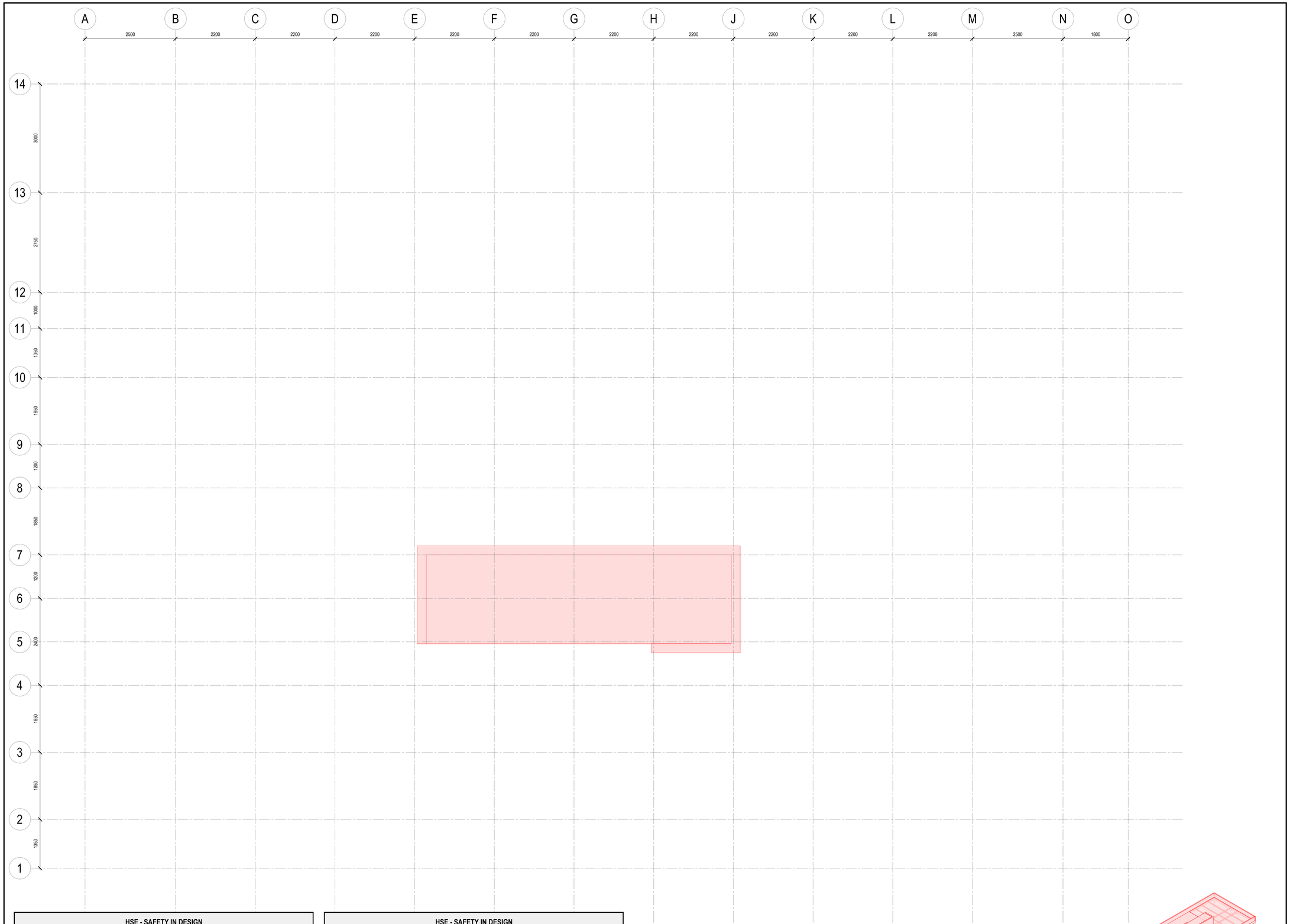
PROPOSED WORKS FOURTH FLOOR

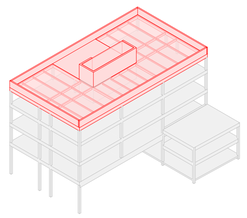
HDR NUMBER:	REV DRAWN BY:	REV CHKD/APPD BY:
10428560	SM	DS/GLC
MODEL NAME:	REV DATE:	SCALE @ A1:
10428560-HDR-ZZ-XX-M3-S-209100	16/01/26	50

DRAWING NUMBER: 10428560-HDR-ZZ-04-DR-S-202105

REVISION: P01

cm 0 1 2 3 4 5 Plot Check v.24.2





HSE - SAFETY IN DESIGN			
RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
1	Safety Issue	COLLAPSE OF EXISTING ROOF STRUCTURE DURING DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS, WHERE REQUIRED, IS INSTALLED IN ACCORDANCE WITH TEMPORARY WORKS ENGINEER `S DESIGN AND SEQUENCE OF WORKS.	Unknown
2	Safety Issue	COLLAPSE OF EXISTING FACADE DURING RING BEAM DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS IN PLACE TO FACADE AND EXISTING COLUMNS TO TEMPORARY WORKS ENGINEER `S DESIGN. TO REMAIN IN PLACE UNTIL PERMANENT STRUCTURE IS INSTALLED AND TIED INTO EXISTING FACADE.	Unknown

HSE - SAFETY IN DESIGN			
RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
3	Safety Issue	COLLAPSE OF EXISTING COLUMNS DURING ERECTION OF STEEL FRAME. NEW AND EXISTING COLUMNS TO ALIGN CENTRALLY TO AVOID ECCENTRIC FORCES BEING INDUCED ON EXISTING COLUMNS. TEMPORARY WORKS TO TEMPORARY WORKS ENGINEER `S DETAILS TO BE INSTALLED TO EXISTING COLUMNS TO BRACE THEM UNTIL PERMANENT STEELWORK IS COMPLETELY INSTALLED TO RESIST LATERAL FORCES INDUCED BY RAKING COLUMNS DURING CONSTRUCTION.	Unknown
4	Safety Issue	STABILITY DURING CONSTRUCTION. CONTRACTOR TO ENSURE TEMPORARY STABILITY OF THE FACADE AND FRAME DURING CONSTRUCTION TO TEMPORARY WORKS ENGINEER`S DETAILS.	Unknown

LEGEND

CUT	PRO	
		EXISTING STRUCTURE TO REMAIN (MATERIAL VARIES)
		EXISTING STRUCTURE TO BE DEMOLISHED (MATERIAL VARIES)

REV	DATE	REVISION DESCRIPTION
P01	16/01/26	STAGE 3 ISSUE.

SUITABILITY STATUS:

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CLIENT:

227 SBR LTD, LONDON

PROJECT:

227 SHEPHERDS BUSH ROAD

TITLE:

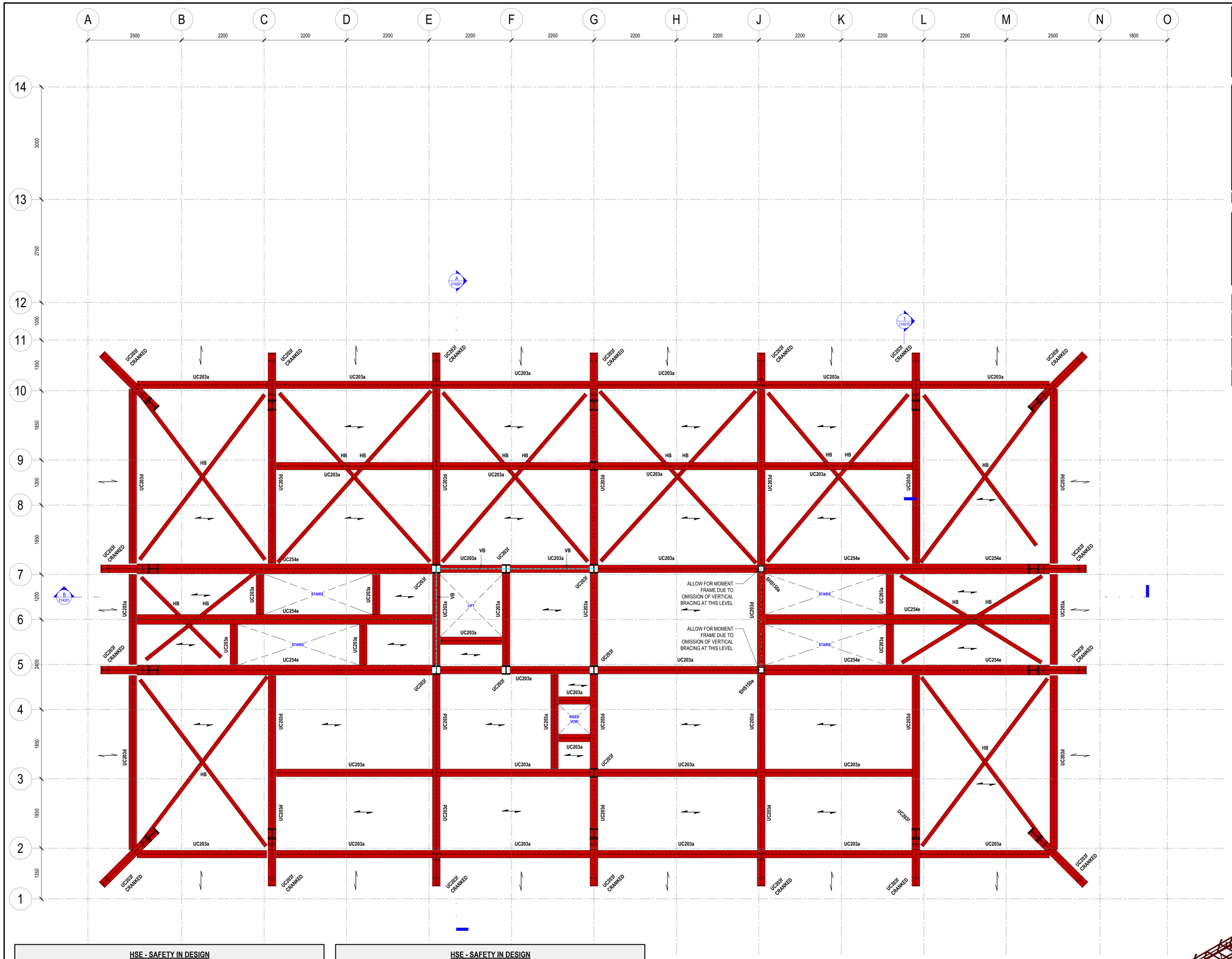
EXISTING & DEMOLITION WORKS FIFTH FLOOR GENERAL ARRANGEMENT

HDR NUMBER:	REV DRAWN BY:	REV CHKD/APPD BY:
10428560	SM	DS/GLC
MODEL NAME:	REV DATE:	SCALE @ A1:
10428560-HDR-ZZ-XX-M3-S-209100	16/01/26	As indicated

DRAWING NUMBER: 10428560-HDR-ZZ-05-DR-S-152106

REVISION: P01

cm 0 1 2 3 4 5 Plot Check v.24.2



STEEL COLUMN SCHEDULE

TYPE MARK	COLUMN SIZE
RHS150a	RHS150x100x4.0
SHS150a	SHS150x150x5.0
UC203f	UC203x203x100

STEEL BEAM SCHEDULE

TYPE MARK	BEAM SIZE
PFC150a	PFC150x75x18
PFC200a	PFC200x75x23
UC203a	UC203x203x46
UC203d	UC203x203x71
UC203e	UC203x203x86
UC203f	UC203x203x100
UC254e	UC254x254x167
UC305d	UC305x305x158
UC305f	UC305x305x240

TOS = 22.220 U.N.O

STEEL BRACING SCHEDULE

TYPE MARK	BEAM SIZE
HB	ALLOW FOR 60x60x8 RSA, OR 100x10 FLAT
VB	100X10 FLAT CROSS BRACING

ALL BUILDERS WORK TO BE COORDINATED

ALL NEW STEEL COLUMNS TO BE CENTRED ON EXISTING CONCRETE COLUMNS

EXISTING TOP FACADE TO BE RESTRAINED BY NEW STEEL FRAME. TIE DETAIL TO BE DEVELOPED UPON OPENING UP OF FACADE

PLAN BRACING TO BE COORDINATED WITH BEAMS DURING STAGE 4

NOTES

1. ALL STEEL MEMBERS ARE TO POSITIONED CENTRALLY ON GRIDS UNO.
2. BEAMS TO BE CENTRED ON COLUMNS UNLESS NOTED OTHERWISE.
3. ALL MOMENTS, FORCES AND LOADS SHOWN ARE ULTIMATE VALUES.
4. MOMENT FORCES DO NOT INCLUDE THE ADDITIONAL CONNECTION FORCES DUE TO CONNECTION ECCENTRICITY.
5. ALL STEEL TO STEEL CONNECTIONS TO BE DESIGNED BY STEELWORK FABRICATOR, INCLUDING COLUMN BASEPLATES.
6. PAINTING AND PREPARATION AND PROTECTIVE COATINGS OF STEELWORK TO BE IN ACCORDANCE WITH THE SPECIFICATION.
7. ALL BOLTS TO BE GRADE 8.8 (UNO).
8. REFER TO THE SPECIFICATION FOR FULL DETAILS.
9. STEEL GRADE AND SUBGRADE SHALL BE AS SHOWN ON THE DESIGN DRAWINGS.

LEGEND

CUT *PRO*

- EXISTING STRUCTURE TO REMAIN (MATERIAL VARIES)
- PRIMARY STRUCTURAL STEEL FRAME
- SECONDARY STEEL FRAME
- PROPOSED 150 DP COLD FORMED STEEL JOISTS TO KINGSPAN (OR SIMILAR APPROVED) DETAILS
- STEEL FRAMING SYSTEM AND EXTERNAL CLADDING (TO BE CONFIRMED BY ARCHITECT)

NOTE:

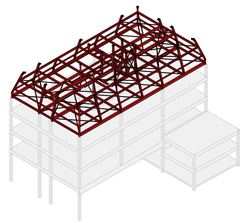
ALL EXISTING STRUCTURE SHOWN INDICATIVELY. EXISTING STRUCTURAL LAYOUT IS BASED OFF 'MODELLING ARCHITECTURE LTD DRAWINGS A101-A105 ISSUED 12/03/25

HSE - SAFETY IN DESIGN

RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
1	Safety Issue	COLLAPSE OF EXISTING ROOF STRUCTURE DURING DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS, WHERE REQUIRED, IS INSTALLED IN ACCORDANCE WITH TEMPORARY WORKS ENGINEER 'S DESIGN AND SEQUENCE OF WORKS.	Unknown
2	Safety Issue	COLLAPSE OF EXISTING FACADE DURING RING BEAM DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS IN PLACE TO FACADE AND EXISTING COLUMNS TO TEMPORARY WORKS ENGINEER 'S DESIGN. TO REMAIN IN PLACE UNTIL PERMANENT STRUCTURE IS INSTALLED AND TIED INTO EXISTING FACADE.	Unknown

HSE - SAFETY IN DESIGN

RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
3	Safety Issue	COLLAPSE OF EXISTING COLUMNS DURING ERECTION OF STEEL FRAME. NEW AND EXISTING COLUMNS TO ALIGN CENTRALLY TO AVOID ECCENTRIC FORCES BEING INDUCED ON EXISTING COLUMNS. TEMPORARY WORKS TO TEMPORARY WORKS ENGINEER 'S DETAILS TO BE INSTALLED TO EXISTING COLUMNS TO BRACE THEM UNTIL PERMANENT STEELWORK IS COMPLETELY INSTALLED TO RESIST LATERAL FORCES INDUCED BY RAKING COLUMNS DURING CONSTRUCTION.	Unknown
4	Safety Issue	STABILITY DURING CONSTRUCTION. CONTRACTOR TO ENSURE TEMPORARY STABILITY OF THE FACADE AND FRAME DURING CONSTRUCTION TO TEMPORARY WORKS ENGINEER 'S DETAILS.	Unknown



REV	DATE	REVISION DESCRIPTION
P01	16/01/26	STAGE 3 ISSUE.

SUITABILITY STATUS:

A3 - STAGE 3 AUTHORISED / ACCEPTED

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w: www.hdrinc.com

CLIENT:

227 SBR LTD, LONDON

PROJECT:

227 SHEPHERDS BUSH ROAD

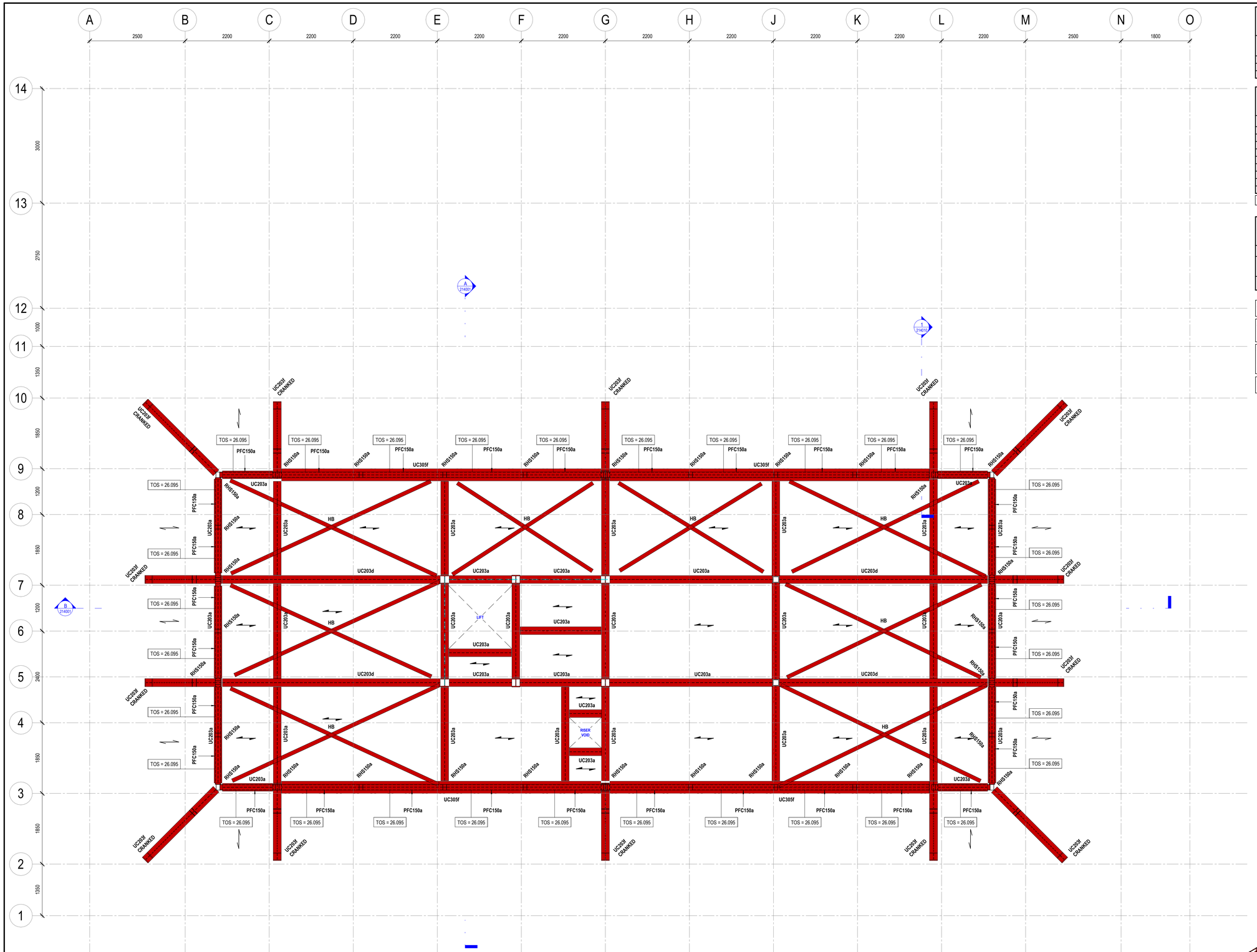
TITLE:

PROPOSED WORKS
FIFTH FLOOR

HDR NUMBER:	REV DRAWN BY:	REV CHKD/APPD BY:
10428560	SM	DS/GLC
MODEL NAME:	REV DATE:	SCALE @ A1:
10428560-HDR-ZZ-XX-M3-S-209100	16/01/26	As indicated

DRAWING NUMBER: 10428560-HDR-ZZ-05-DR-S-202106

REVISION: P01



STEEL COLUMN SCHEDULE

TYPE MARK	COLUMN SIZE
RHS150a	RHS150x100x4.0
SHS150a	SHS150x150x5.0
UC203f	UC203x203x100

STEEL BEAM SCHEDULE

TYPE MARK	BEAM SIZE
PFC150a	PFC150x75x18
PFC200a	PFC200x75x23
UC203a	UC203x203x46
UC203d	UC203x203x71
UC203e	UC203x203x86
UC203f	UC203x203x100
UC254e	UC254x254x167
UC305d	UC305x305x158
UC305f	UC305x305x240

TOS = 25.120 U.N.O

STEEL BRACING SCHEDULE

TYPE MARK	BEAM SIZE
HB	ALLOW FOR 60x60x8 RSA, OR 100x10 FLAT
VB	100X10 FLAT CROSS BRACING

ALL BUILDERS WORK TO BE COORDINATED

ALL NEW STEEL COLUMNS TO BE CENTRED ON EXISTING CONCRETE COLUMNS

EXISTING TOP FACADE TO BE RESTRAINED BY NEW STEEL FRAME. TIE DETAIL TO BE DEVELOPED UPON OPENING UP OF FACADE

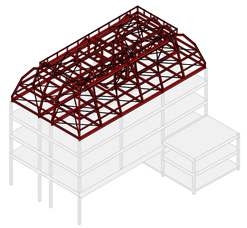
PLAN BRACING TO BE COORDINATED WITH BEAMS DURING STAGE 4

HSE - SAFETY IN DESIGN

RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
1	Safety Issue	COLLAPSE OF EXISTING ROOF STRUCTURE DURING DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS, WHERE REQUIRED, IS INSTALLED IN ACCORDANCE WITH TEMPORARY WORKS ENGINEER 'S DESIGN AND SEQUENCE OF WORKS.	Unknown
2	Safety Issue	COLLAPSE OF EXISTING FACADE DURING RING BEAM DEMOLITION. CONTRACTOR TO ENSURE TEMPORARY WORKS IN PLACE TO FACADE AND EXISTING COLUMNS TO TEMPORARY WORKS ENGINEER 'S DESIGN. TO REMAIN IN PLACE UNTIL PERMANENT STRUCTURE IS INSTALLED AND TIED INTO EXISTING FACADE.	Unknown

HSE - SAFETY IN DESIGN

RISK NAME	RISK CATEGORY (OPTIONAL)	RISK DESCRIPTION	LEVEL OF RISK (OPTIONAL)
3	Safety Issue	COLLAPSE OF EXISTING COLUMNS DURING ERECTION OF STEEL FRAME. NEW AND EXISTING COLUMNS TO ALIGN CENTRALLY TO AVOID ECCENTRIC FORCES BEING INDUCED ON EXISTING COLUMNS. TEMPORARY WORKS TO TEMPORARY WORKS ENGINEER 'S DETAILS TO BE INSTALLED TO EXISTING COLUMNS TO BRACE THEM UNTIL PERMANENT STEELWORK IS COMPLETELY INSTALLED TO RESIST LATERAL FORCES INDUCED BY RAKING COLUMNS DURING CONSTRUCTION.	Unknown
4	Safety Issue	STABILITY DURING CONSTRUCTION. CONTRACTOR TO ENSURE TEMPORARY STABILITY OF THE FACADE AND FRAME DURING CONSTRUCTION TO TEMPORARY WORKS ENGINEER 'S DETAILS.	Unknown



NOTES

1. ALL STEEL MEMBERS ARE TO POSITIONED CENTRALLY ON GRIDS UNO.
2. BEAMS TO BE CENTRED ON COLUMNS UNLESS NOTED OTHERWISE.
3. ALL MOMENTS, FORCES AND LOADS SHOWN ARE ULTIMATE VALUES.
4. MOMENT FORCES DO NOT INCLUDE THE ADDITIONAL CONNECTION FORCES DUE TO CONNECTION ECCENTRICITY.
5. ALL STEEL TO STEEL CONNECTIONS TO BE DESIGNED BY STEELWORK FABRICATOR, INCLUDING COLUMN BASEPLATES.
6. PAINTING AND PREPARATION AND PROTECTIVE COATINGS OF STEELWORK TO BE IN ACCORDANCE WITH THE SPECIFICATION.
7. ALL BOLTS TO BE GRADE 8.8 (UNO).
8. REFER TO THE SPECIFICATION FOR FULL DETAILS.
9. STEEL GRADE AND SUBGRADE SHALL BE AS SHOWN ON THE DESIGN DRAWINGS.

LEGEND

CUT	PRO	
		EXISTING STRUCTURE TO REMAIN (MATERIAL VARIES)
		PRIMARY STRUCTURAL STEEL FRAME
		SECONDARY STEEL FRAME
		PROPOSED 150 DP COLD FORMED STEEL JOISTS TO KINGSPAN (OR SIMILAR APPROVED) DETAILS
		STEEL FRAMING SYSTEM AND EXTERNAL CLADDING (TO BE CONFIRMED BY ARCHITECT)

NOTE:

ALL EXISTING STRUCTURE SHOWN INDICATIVELY. EXISTING STRUCTURAL LAYOUT IS BASED OFF 'MODELLING ARCHITECTURE LTD DRAWINGS A101-A105 ISSUED 12/03/25

REV	DATE	REVISION DESCRIPTION
P01	16/01/26	STAGE 3 ISSUE

SUITABILITY STATUS:

A3 - STAGE 3 AUTHORISED / ACCEPTED

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United Kingdom

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e: info@hdrinc.com
w: www.hdrinc.com

CLIENT:

227 SBR LTD, LONDON

PROJECT:

227 SHEPHERDS BUSH ROAD

TITLE:

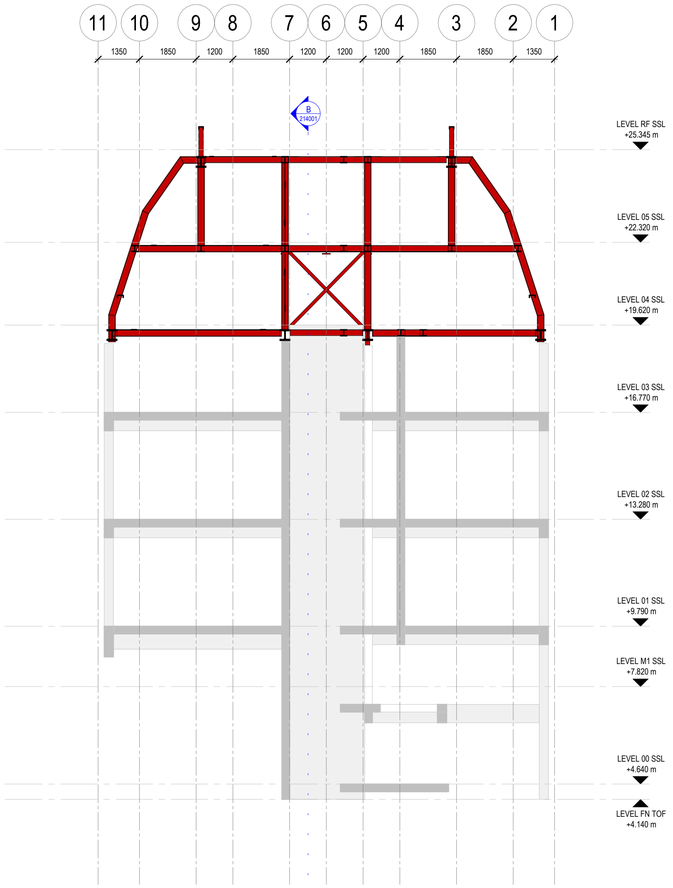
PROPOSED WORKS
ROOF LEVEL

HDR NUMBER:	REV DRAWN BY:	REV CHKD/APPD BY:
10428560	SM	DS/GLC
MODEL NAME:	REV DATE:	SCALE @ A1:
10428560-HDR-ZZ-XX-M3-S-209100	16/01/26	As indicated

DRAWING NUMBER: 10428560-HDR-ZZ-RF-DR-S-202107

REVISION: P01

0 1 2 3 4 5 cm Plot Check v.24.2



A **BUILDING SECTION A**
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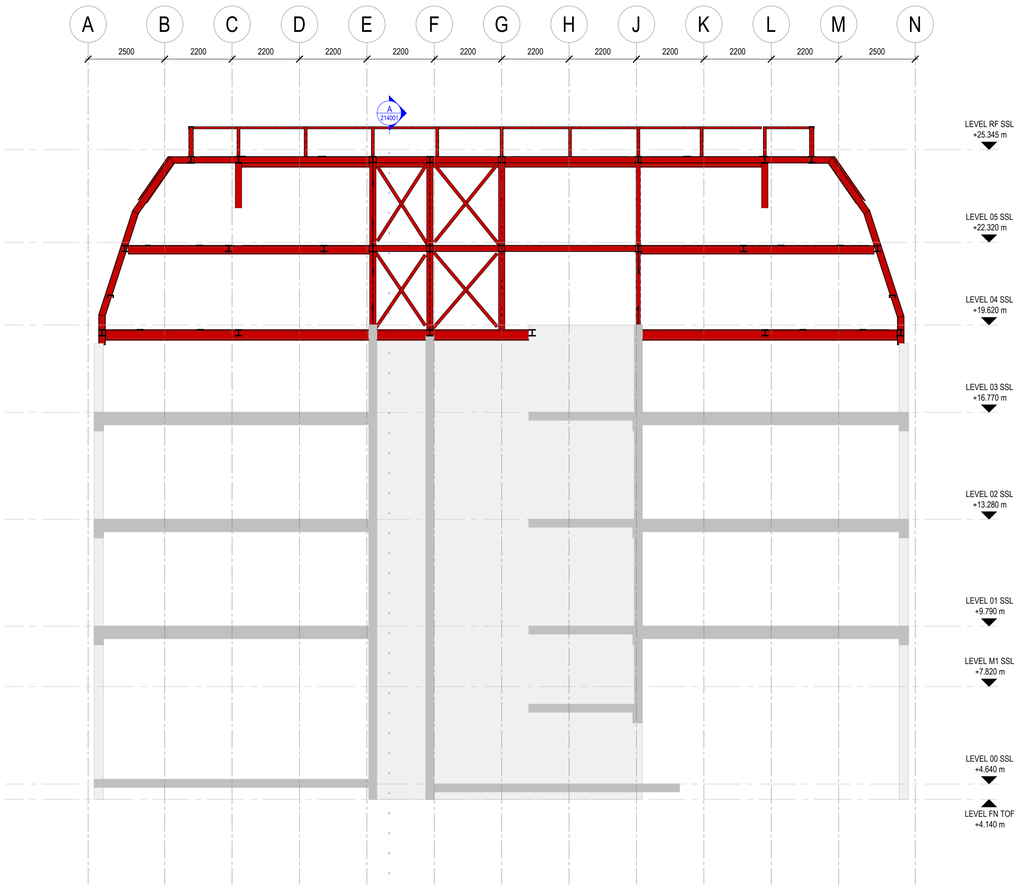
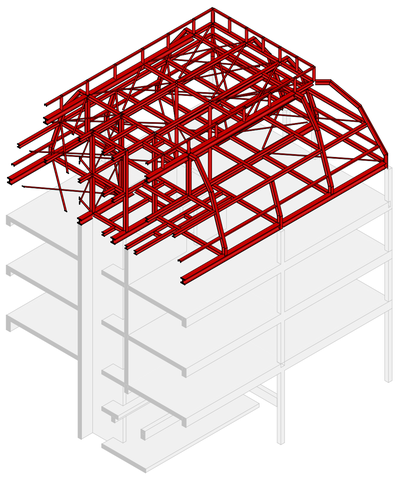
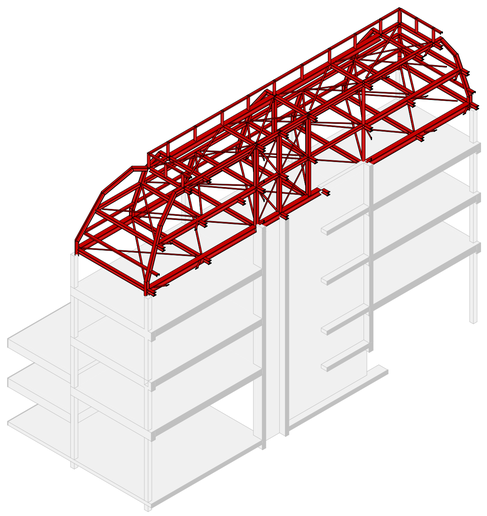


B **BUILDING SECTION B**
1 : 100





NOTE:

ALL EXISTING STRUCTURE SHOWN INDICATIVELY. EXISTING STRUCTURAL LAYOUT IS BASED OFF 'MODELLING ARCHITECTURE LTD DRAWINGS A101-A105 ISSUED 12/03/25

REV	DATE	REVISION DESCRIPTION
P01	16/01/26	STAGE 3 ISSUE.

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CLIENT:
227 SBR LTD, LONDON

PROJECT:
227 SHEPHERDS BUSH ROAD

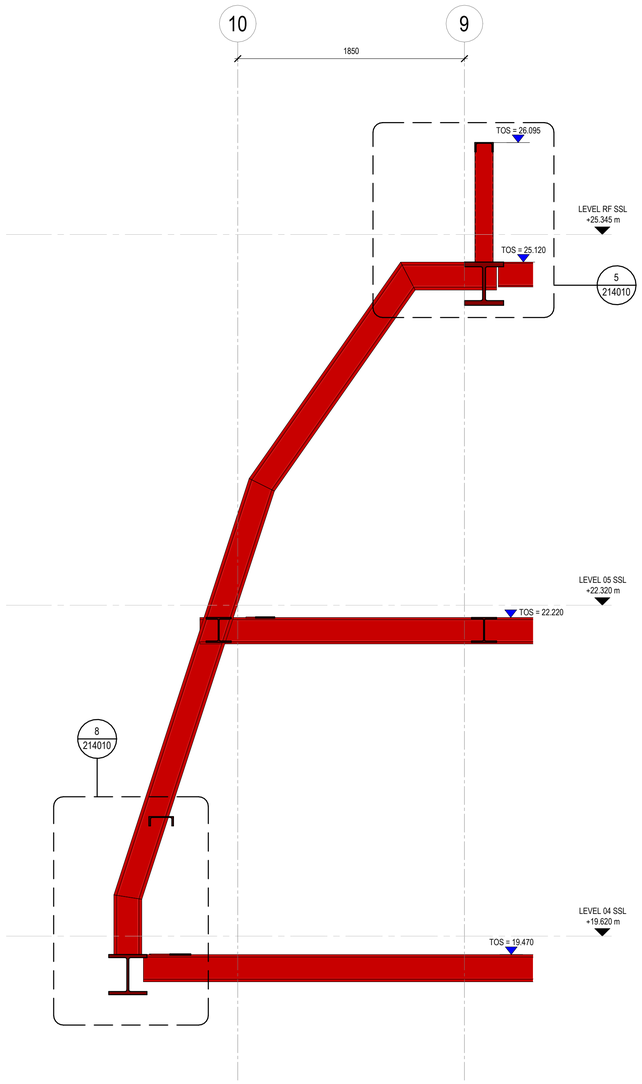
TITLE:
PROPOSED WORKS
BUILDING SECTIONS

HDR NUMBER:	REV DRAWN BY:	REV CHKD/APPD BY:
10428560	SM	DS/GLC
MODEL NAME:	REV DATE:	SCALE @ A1:
10428560-HDR-ZZ-XX-M3-S-209100	16/01/26	1 : 100

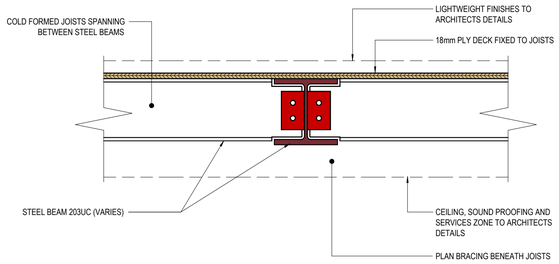
DRAWING NUMBER: 10428560-HDR-ZZ-ZZ-DR-S-214001

REVISION: P01

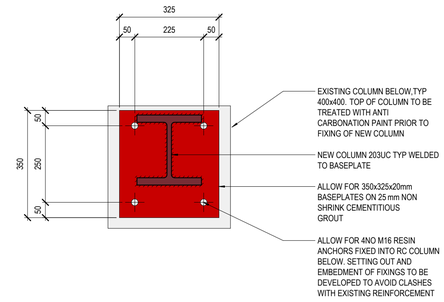
cm 0 1 2 3 4 5 Plot Check v.24.2



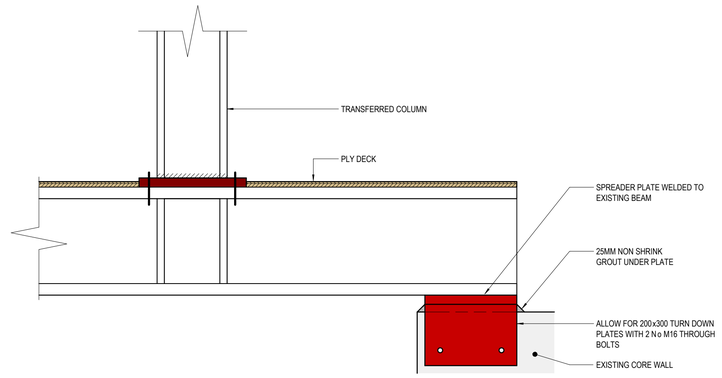
1 TYPICAL CRANKED FRAME SECTION
1 : 25



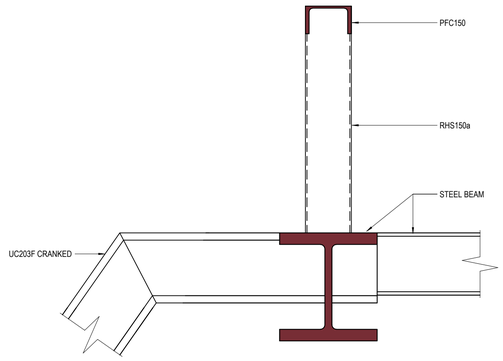
2 TYPICAL FLOOR SECTION
1 : 10



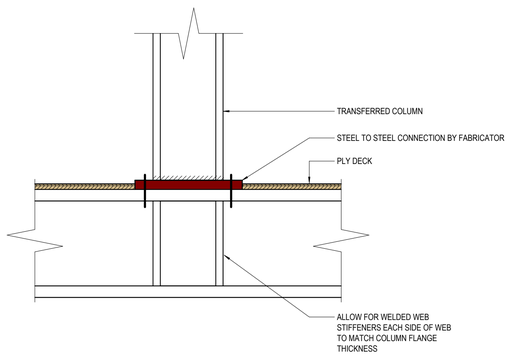
3 TYPICAL NEW STEEL COLUMN TO EXISTING RC COLUMN CONNECTION INTENT
1 : 10



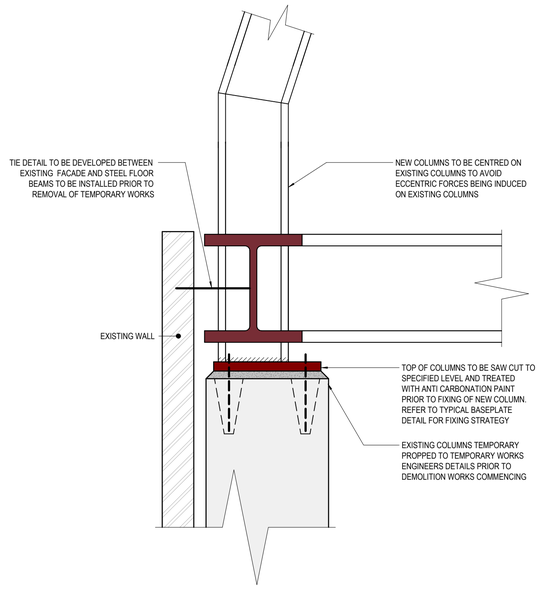
4 TYPICAL STEEL BEAM TO EXISTING RC CORE WALL INTERFACE
1 : 10



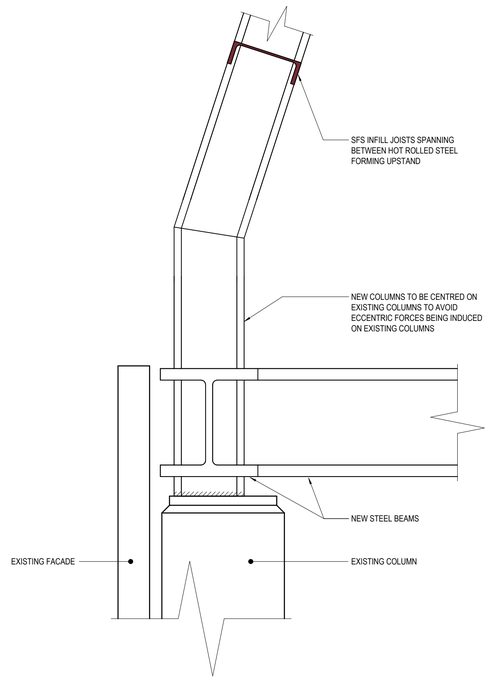
5 TYPICAL UPSTAND DETAIL
1 : 10



6 TYPICAL TRANSFER BEAM TO COLUMN INTERFACE
1 : 10



7 TYPICAL RC TO STEEL COLUMN CONNECTION INTENT
1 : 10



8 TYPICAL BALCONY BALUSTRADE DETAIL
1 : 10

0 1 2 3 4 5 cm Plot Check v.24.2

NOTES

1. ALL STEEL MEMBERS ARE TO POSITIONED CENTRALLY ON GRIDS UNO.
2. BEAMS TO BE CENTRED ON COLUMNS UNLESS NOTED OTHERWISE.
3. ALL MOMENTS, FORCES AND LOADS SHOWN ARE ULTIMATE VALUES.
4. MOMENT FORCES DO NOT INCLUDE THE ADDITIONAL CONNECTION FORCES DUE TO CONNECTION ECCENTRICITY.
5. ALL STEEL TO STEEL CONNECTIONS TO BE DESIGNED BY STEELWORK FABRICATOR, INCLUDING COLUMN BASEPLATES.
6. PAINTING AND PREPARATION AND PROTECTIVE COATINGS OF STEELWORK TO BE IN ACCORDANCE WITH THE SPECIFICATION.
7. ALL BOLTS TO BE GRADE 8.8 (UNO).
8. REFER TO THE SPECIFICATION FOR FULL DETAILS.
9. STEEL GRADE AND SUBGRADE SHALL BE AS SHOWN ON THE DESIGN DRAWINGS.

LEGEND

CUT	PRO	
		EXISTING STRUCTURE TO REMAIN (MATERIAL VARIES)
		PRIMARY STRUCTURAL STEEL FRAME
		SECONDARY STEEL FRAME
		PROPOSED 150 DP COLD FORMED STEEL JOISTS TO KINGSPAN (OR SIMILAR APPROVED) DETAILS
		STEEL FRAMING SYSTEM AND EXTERNAL CLADDING (TO BE CONFIRMED BY ARCHITECT)

REV	DATE	REVISION DESCRIPTION
P01	16/01/26	STAGE 3 ISSUE.

SUITABILITY STATUS:

A3 - STAGE 3 AUTHORISED / ACCEPTED

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SE1 8NW
United Kingdom

t: +44 (0)20 7429 3333
e: info@hdrinc.com
w: www.hdrinc.com

CLIENT:
227 SBR LTD, LONDON

PROJECT:
227 SHEPHERDS BUSH ROAD

TITLE:
PROPOSED WORKS
TYPICAL DETAILS
SHEET 01

HDR NUMBER:	REV DRAWN BY:	REV CHKD/APPD BY:
10428560	SM	DS/GLC
MODEL NAME:	REV DATE:	SCALE @ A1:
10428560-HDR-ZZ-XX-M3-S-209100	16/01/26	As indicated

DRAWING NUMBER: 10428560-HDR-ZZ-ZZ-DR-S-214010 REVISION: P01

Appendix B. Below Ground Drainage Technical Note

Project:	**227 Shepherds Bush Road**	Job No.:	**10428560**
Subject:	**Drainage Technical Note.**		
Prepared by: **SA**	Checked by: **IM**	Approved by: **JL**	Date: **12.01.26**

Introduction

This Technical Note has been prepared to outline the feasibility and approach for the reuse of the existing below ground drainage system serving 227 Shepherds Bush Road. The purpose is to confirm whether the retained network can continue to operate effectively and compliantly for the proposed development works, identify any targeted upgrades or remedial measures required.

The proposed development will convert the existing building from office use to residential accommodation, incorporating a two-storey vertical extension.

Information and Surveys Reviewed

This Technical Note has been informed by a review of all available information relating to the existing below ground drainage system serving 227 Shepherds Bush Road. The key documents and surveys used to support this assessment are summarised in Table 1.

Table 1 Table of information and surveys reviewed

Document / Survey	Source	Date	Description
CCTV Drain Survey	Hardy Drainage	04/06/2019	CCTV Survey to locate where the drainage flows to and the condition of the pipe work.
Proposed Building Plans	SpaceAgent Architects	18/07/2025	Shows all existing floor plans along with the proposed changes.
Asset Location Search	Thames Water	24/09/2025	Provides details of existing site connection point and existing sewers within Shepherds Bush Road.

Existing System

The existing system details have been taken from the Hardy Drainage CCTV Report (Appendix A). It highlights the drainage layout, as shown in Figure 1, the pipe diameters, materials and conditions. As noted in the conclusion of the report, the system is a combined drainage system with the foul and storm drains discharging into the same main drain run.

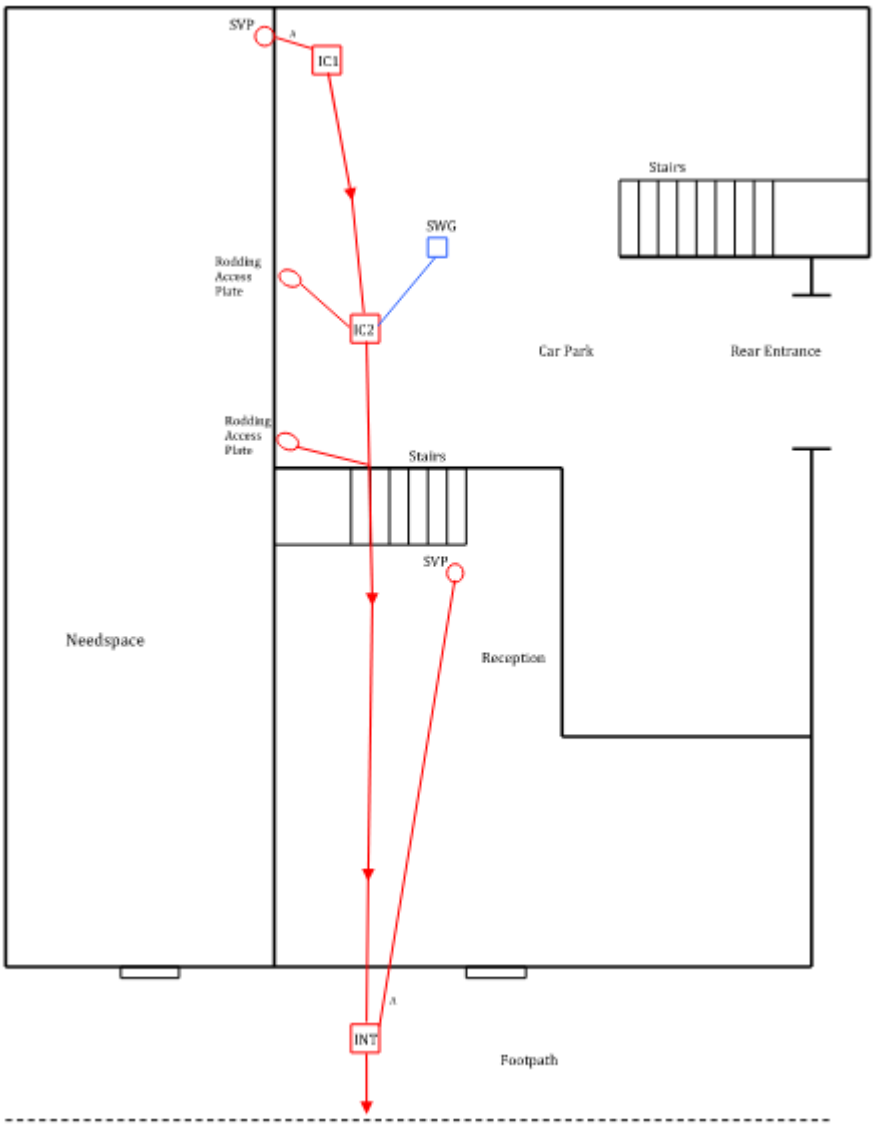


Figure 1 Diagram of existing drainage (Hardy Drainage, 2019)

The report states that all pipework is 100 mm diameter, made clay material and in good structural and free-flowing conditions. No flooding or surcharging was noted at the time of survey.

The CCTV survey does not appear to show any rainwater pipes connected to the surveyed network. It is therefore not currently known how rainwater from the building's roof is currently discharged.

The existing building plans (Appendix B) have been reviewed to understand how the proposal will affect the existing drainage system. The plans indicate the existing building areas and usage. Utilising this, an assessment of existing foul flows (Appendix C) has been undertaken using Employment Densities Guide 3rd Edition and British Water Flows and Loads 2. It has been estimated that the peak flow of the existing building is 1.28 l/sec. Existing surface water runoff has been calculated using InfoDrainage software, a summary the combined discharge for each storm event can be seen in Table 2.

A Thames Water Asset Location Search (Appendix D) was requested to ascertain the details of the discharge manhole within the public footpath. It is shown within the Asset Location Search that TWMH 3702 sits within the public footpath, however, TWMH 3702 is deemed to not be the current discharge point, and that manhole “INT” as shown in Figure 1 is a private manhole located in the footpath.

Table 2 Existing discharge summary

Storm Event	Foul (l/s)	Surface Runoff (l/s)	Total (l/s)
1 in 1	1.28	10.6	11.88
1 in 30	1.28	26	27.28
1 in 100	1.28	33.8	35.08
1 in 100 + 40% CC	1.28	47.4	48.68

Proposed System

As the hardstanding areas remain unchanged under the proposed development, surface water runoff will remain unaffected. The anticipated increase in foul drainage has been assessed using the proposed building plans to ascertain the discharge units (DU) in accordance with table 2 of BS EN 12056-2-2000. DU has been calculated to be 138.1. The foul flowrate has been derived using the formula set out in BS EN 12056-2-2000:

$$Q = k\sqrt{\sum DU}$$

Where the coefficient k has been taken from table 3 of BS EN 12056-2-2000 as 0.5. Applying this methodology, the calculated foul flowrate for the proposal is 5.87 l/s. Table 3 summarises the discharge of the proposed layout.

Table 3 Proposed discharge summary

Storm Event	Foul (l/s)	Surface Runoff (l/s)	Total (l/s)
1 in 1	5.87	10.6	16.47
1 in 30	5.87	26	31.87
1 in 100	5.87	33.8	39.67
1 in 100 + 40% CC	5.87	47.4	53.27

Drainage calculations (Appendix E), based on conservative assumptions outlined in the Assumptions section, indicate that two existing pipes must be upsized from 100 mm to 150mm in diameter to prevent flooding up to the 1 in 100-year storm event plus 40% climate change allowance. It is acknowledged that actual pipe gradients may be more favourable than assumed, which would improve overall capacity. Furthermore, there may be a potential for surface water runoff to discharge via an alternative route, subject to further investigation

Assumptions

This technical note and the associated drainage capacity checks have been prepared on the basis of the following assumptions. Where data is not available, conservative engineering judgment has been applied.

- Cover and invert levels for manholes / inspection chambers are not provided in the CCTV report; therefore, conservative pipe gradients have been assumed for hydraulic checks. The head of the run (IC1) is approximately 800 mm deep, and downstream inverts have been estimated on the basis of these assumed gradients.
- The system is assumed to operate as a combined foul and surface water system.
- Surface water from roof and carpark runoff is assumed to discharge through the combined system.
- All pipes are assumed to be in good structural condition as reported in the 2019 CCTV survey.
- “INT” in Figure 1 is assumed to discharge at an uncontrolled rate into the existing Thames Water combined sewer system under Shepherds Bush Road.

Recommendations

Prior to commencement of works, a full CCTV survey of all drainage on site is recommended, including cover and invert levels of all manholes / inspection chambers.

Reuse Strategy

The existing below ground drainage system serving 227 Shepherds Bush Road operates as a combined system and is generally in good structural condition. The existing downstream connection into the Thames Water combined sewer running under Shepherds Bush Road will be retained subject to Thames Water approval. As noted in the Proposed System section above, the two downstream pipes may require upsizing to 150 mm pipes to deal with the increased foul flows from the proposal, subject to further investigation and Thames Water approval.

Appendix A - Drainage CCTV Survey

HARDY DRAINAGE
AVAILABLE 24/7 | NO CALL OUT FEE

t 0800 242 5823
e info@hardydrainage.co.uk
w www.hardydrainage.co.uk

CCTV DRAIN SURVEY

Date of Survey -
4th June 2019

Site Address –
Needspace, Shepherds Bush Road, W6 7AS

Client – Needspace

Purchase Order No. – N/A

Reason for Survey:

The reason for the CCTV drains Survey was to locate where the drains flow too and condition of the pipe work, report on findings.

With reference to the recent survey completed at the aforementioned site.
We have pleasure in submitting the details as follows (please refer to drawing for details).

HARDY DRAINAGE
AVAILABLE 24/7 | NO CALL OUT FEE

t 0800 242 5823
e info@hardydrainage.co.uk
w www.hardydrainage.co.uk

CCTV DRAIN SURVEY INSPECTION REPORT

IC1 INVERT LEVEL – 0.800mm

Pipe Reference: **IC1 Upstream Line – A**		
Pipe Size: 100mm	Pipe Use: Foul	Pipe Material: Clay

0.00m Start of Survey.
0.87m End of Survey, SVP.
Comments:
All this section of pipe work is in a good structural condition with no visual defects and is in a free flowing condition.

Pipe Reference: **IC1 Downstream Line – B**		
Pipe Size: 100mm	Pipe Use: Foul	Pipe Material: Clay

0.00m Start of Survey.
10.26m Camera Enters IC2, unable to inspect IC2, IC2 is located under a car.
11.29 Pipe changes to a combined system.
11.97m Lateral connection at 3 o'clock.
19.95m End of Survey, INT.
Comments:
All this section of pipe work is in a good structural condition with no visual defects and is in a free flowing condition.

Pipe Reference: **INT Upstream Line – A**		
Pipe Size: 100mm	Pipe Use: Foul	Pipe Material: Clay

0.00m Start of Survey.
0.49m End of Survey, tight bend unable to continue but serves SVP highlighted on the diagram.
Comments:
All this section of pipe work is in a good structural condition with no visual defects and is in a free flowing condition

t 0800 242 5823
e info@hardydrainage.co.uk
w www.hardydrainage.co.uk

CONCLUSION

Pipe work is a combined drainage system with the foul and storm drains discharging into the same main drain runs.
The main drains surveyed were the foul/storm drains that flow from the rear and front of the property highlighted on the diagram.
Survey has shown all pipe work to be in a good condition and free flowing.

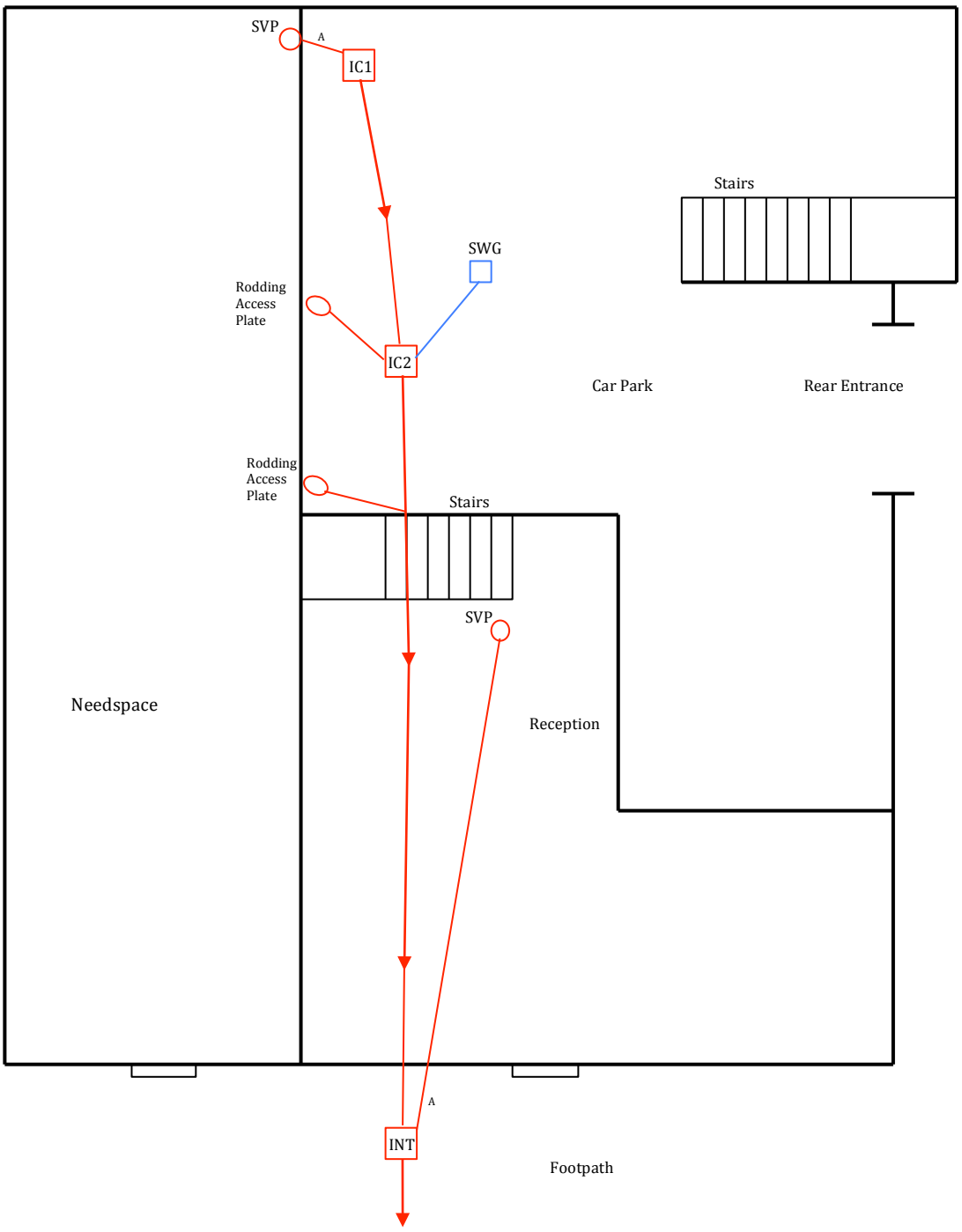
We could not survey IC2 this was because a car was parked over the chamber; the occupant who owned this car was on holiday.
IC2 is serving a service water gully highlighted on the diagram, on the recording you can see other slippers flowing into this chamber.
We have assumed these slippers are serving services from soil stacks or rainwater downpipes.

INT Line-A flows to a soil stack located where the reception area is highlighted on the diagram.

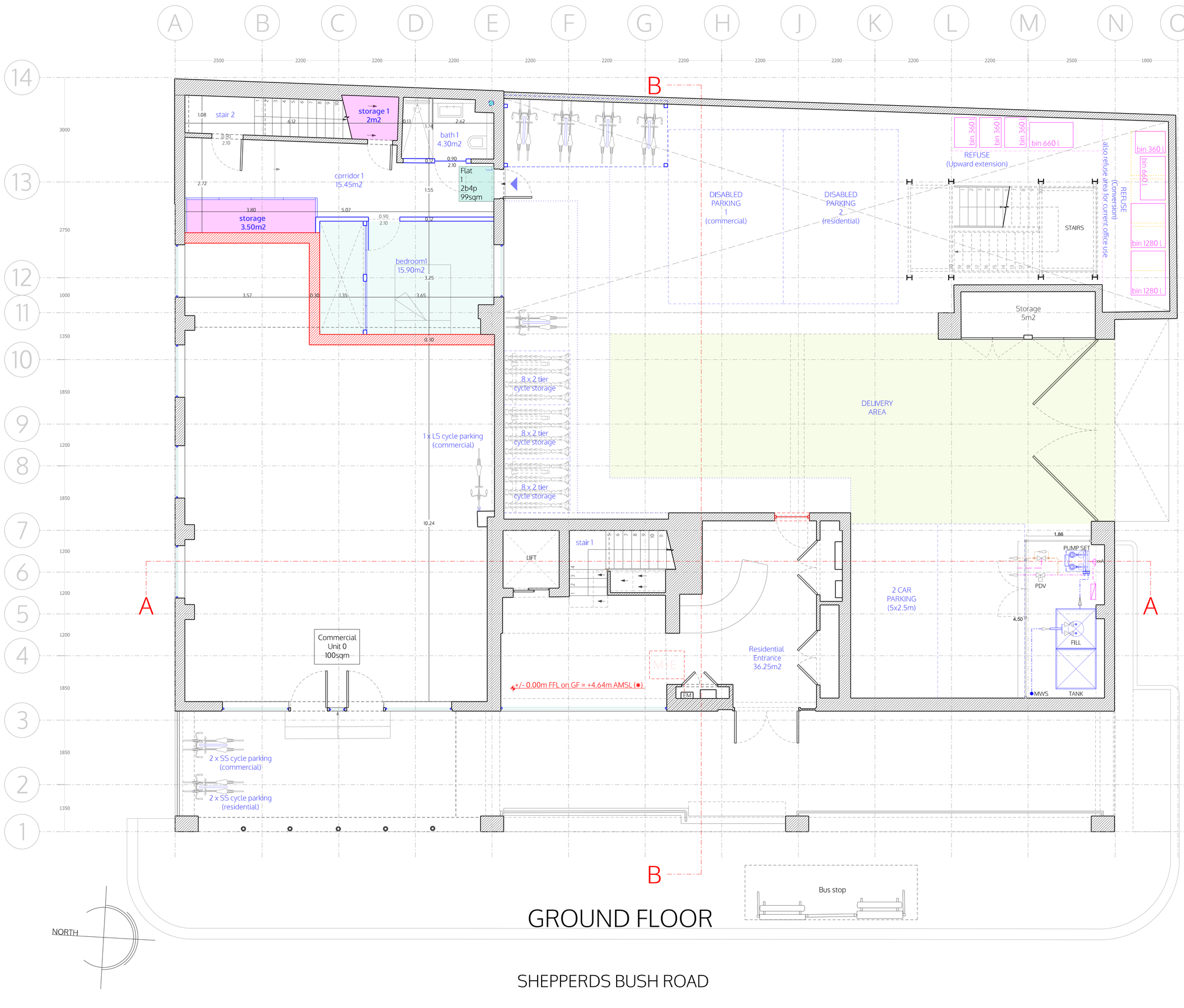
We trust this meets your requirements, if however you have any comments or questions please do not hesitate to contact this office.

Your Sincerely
Ian Hardy

NOT TO SCALE diagram is only a guide.



Appendix B - Proposed Building Plans



GROUND FLOOR

SHEPPERDS BUSH ROAD

LEGEND

- Existing
- Demolition
- Partitions between flats
- Fire rated and sound proofing
- Internal partitions

ALL DIMENSIONS TO BE CHECKED ON SITE

spaceAgent
Architects and Designers mail@spaceagent.com
London-Heidelberg-Barcelona-Brussels spaceagent.com
spaceAgent Architects Ltd is a RIBA Chartered Practice

project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
Ground floor plan
as proposed
rev. A= scheme ALL (combined)

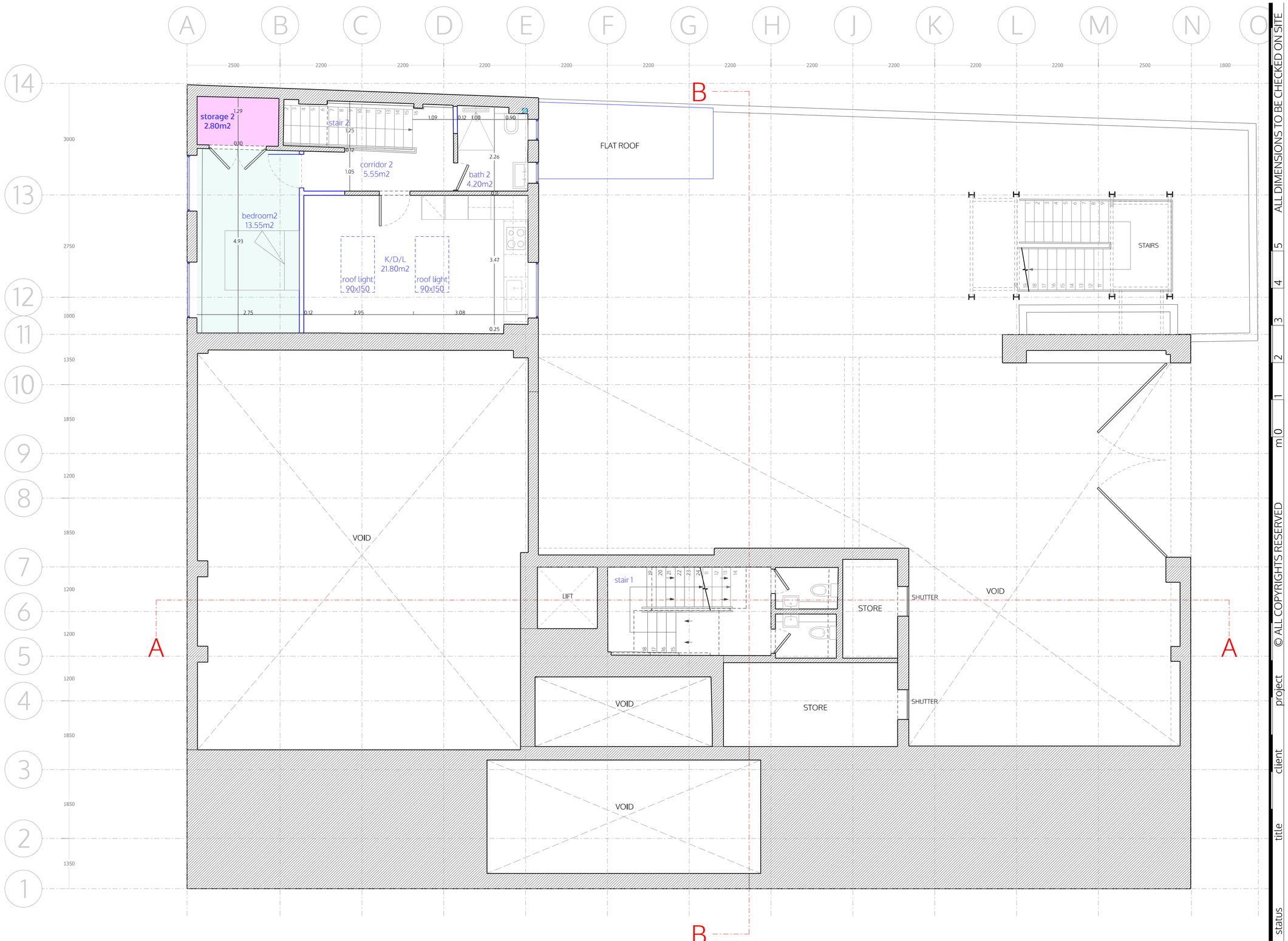
status
DRAFT

scale
1:100 @A3
1:50 @A1

date
18.07.2025

drawn
I.Iezzi

no.
SHE_P01a16c



MEZZANINE

LEGEND

- Existing
- Demolition
- Partitions between flats
  Fire rated and sound proofing
- Internal partitions

ALL DIMENSIONS TO BE CHECKED ON SITE

m|0 1 2 3 4 5

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London-Heidelberg-Barcelona-Brussels spaceagent.com
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project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
Mezzanine plan
as proposed
rev. A= scheme ALL (combined)

status
DRAFT

scale
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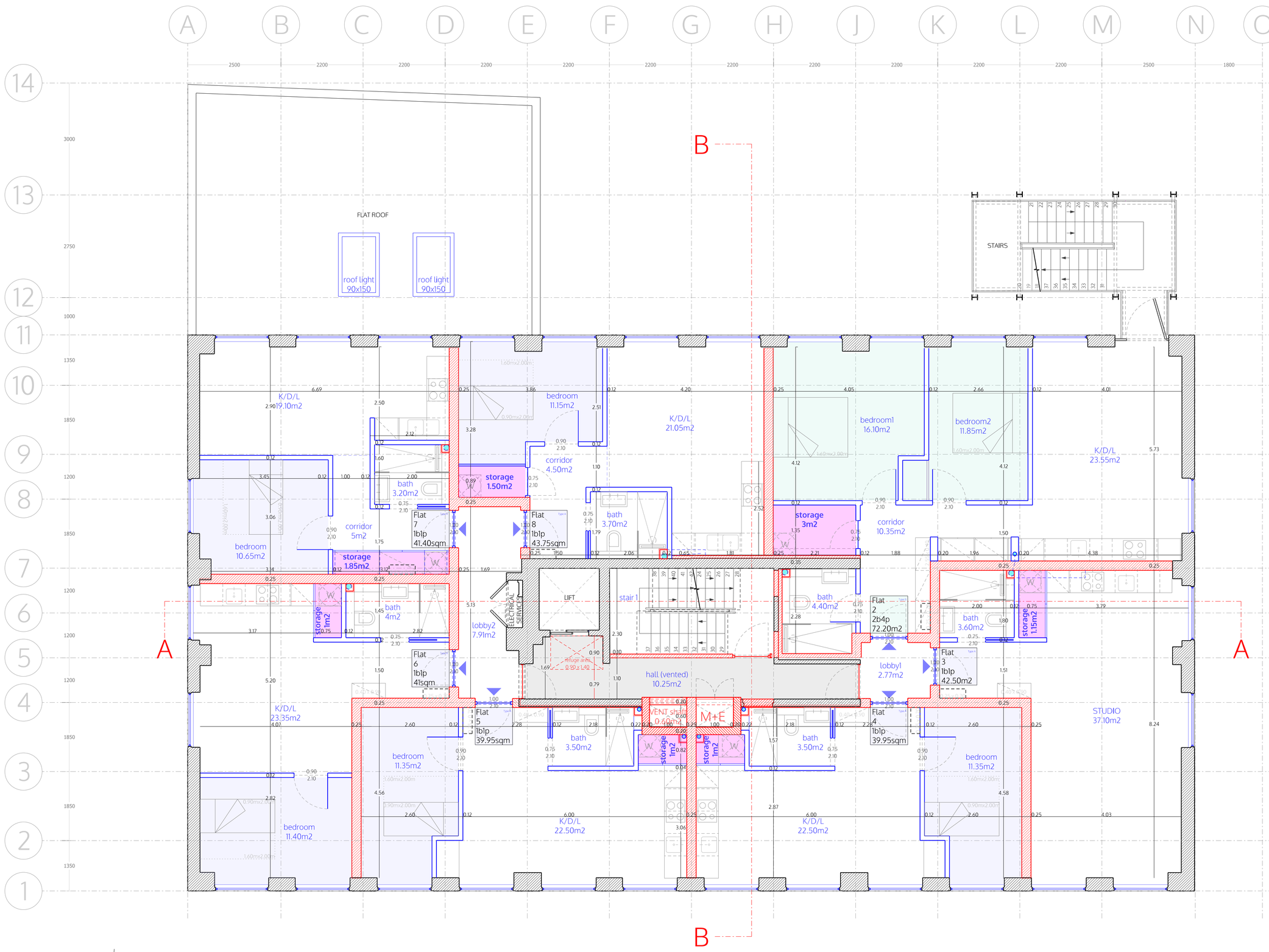
1:50 @A1

date
18.07.2025

drawn
I.Iezzi

no.
SHE_P02a16c



FIRST FLOOR

LEGEND

- Existing
- Demolition
- Partitions between flats
- Fire rated and sound proofing
- Internal partitions

ALL DIMENSIONS TO BE CHECKED ON SITE

0 1 2 3 4 5 m

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London-Heidelberg-Barcelona-Brussels spaceagent.com
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project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
First floor plan
as proposed
rev. A= scheme ALL (combined)

status
DRAFT

scale
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1:50 @A1

date
18.07.2025

drawn
I.Iezzi

no.
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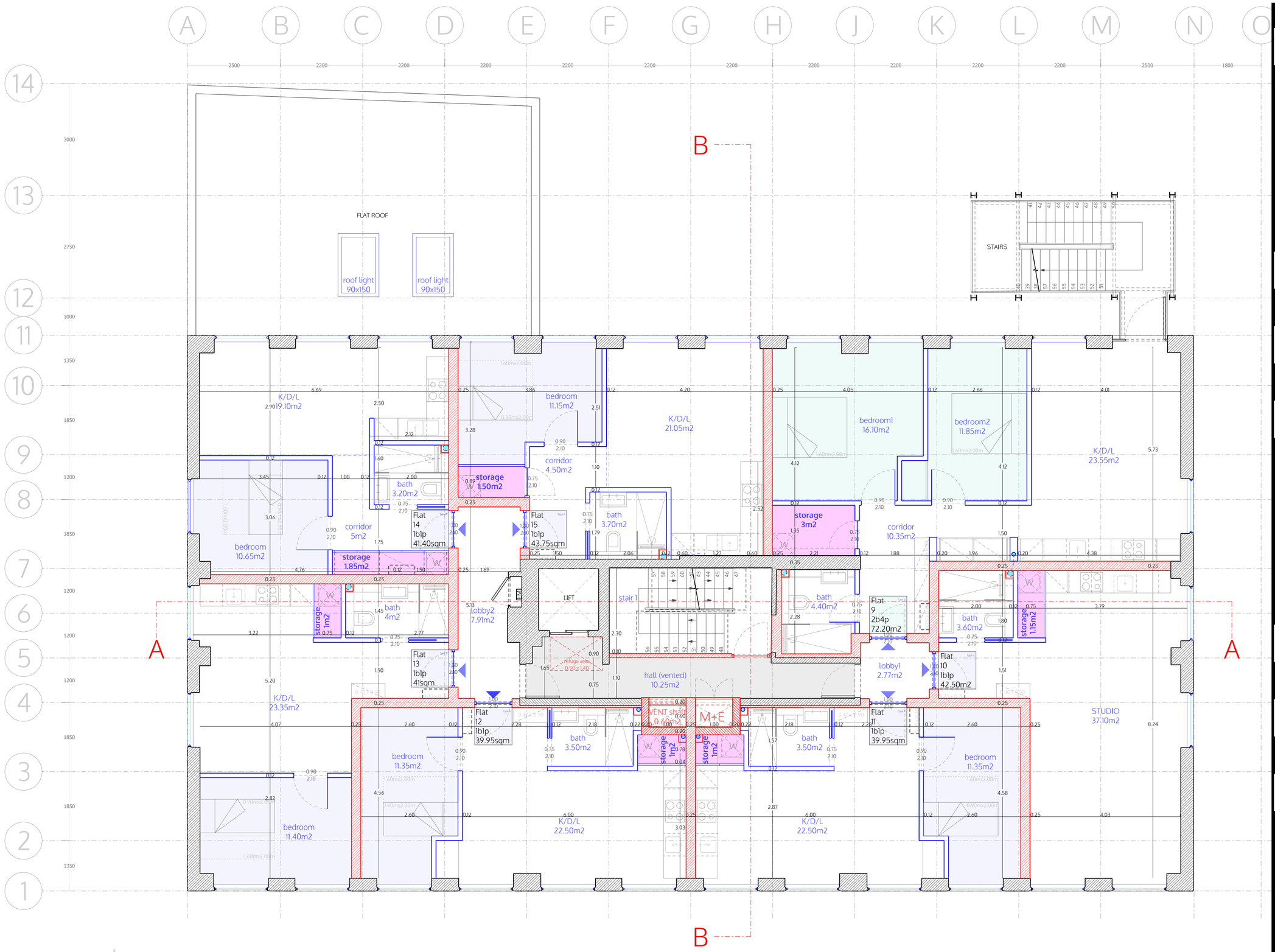

SECOND FLOOR

LEGEND

- Existing
- Demolition
- Partitions between flats
- Fire rated and sound proofing
- Internal partitions

ALL DIMENSIONS TO BE CHECKED ON SITE

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project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
Second floor plan
as proposed
rev. A= scheme ALL (combined)

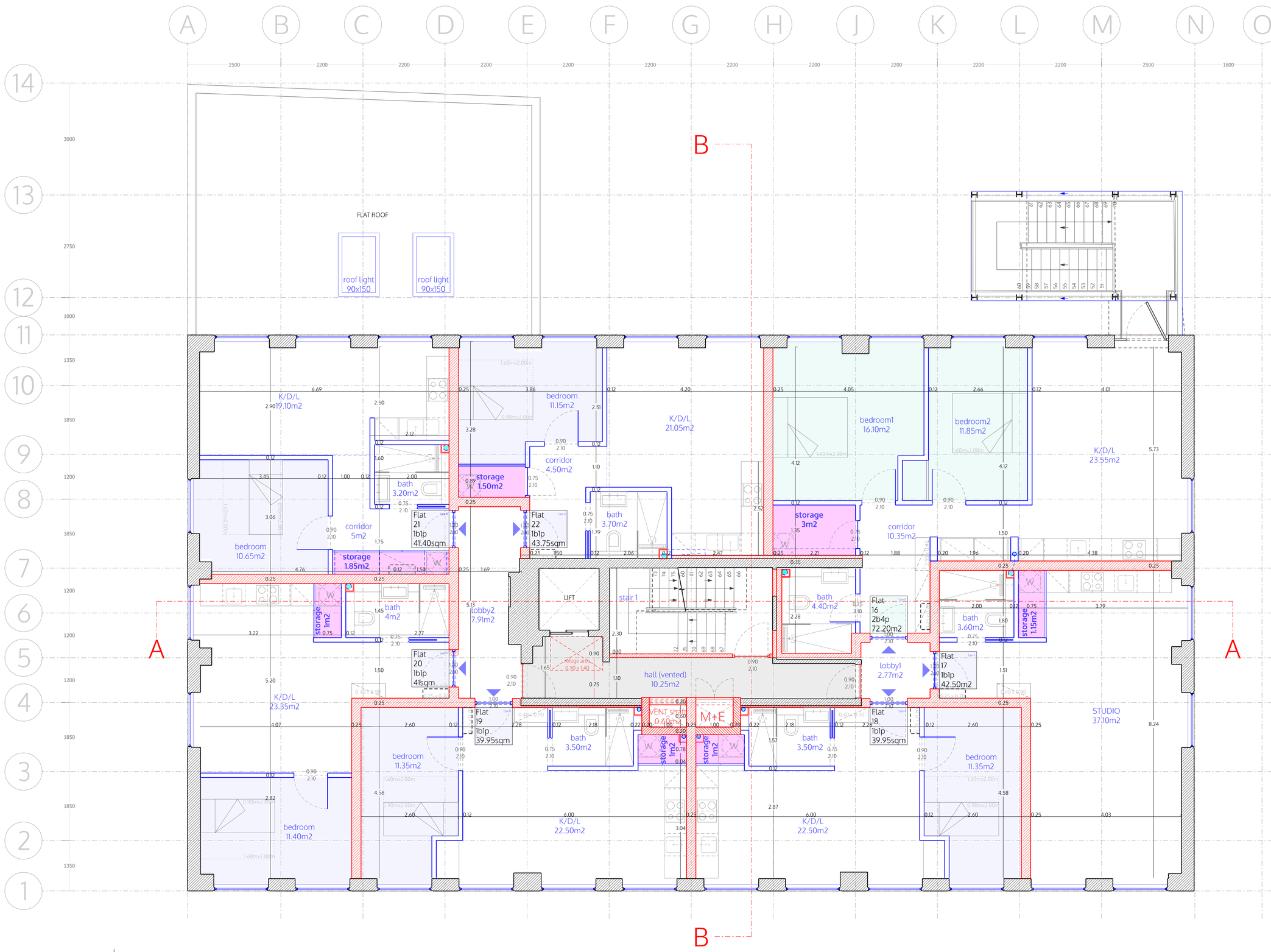
status: DRAFT

scale: 1:100 @A3
1:50 @A1

date: 18.07.2025

drawn: I.Iezzi

no. SHE_P04a16c



NORTH

THIRD FLOOR

LEGEND

- Existing
- Demolition
- Partitions between flats
- Fire rated and sound proofing
- Internal partitions

ALL DIMENSIONS TO BE CHECKED ON SITE

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London-Heidelberg-Barcelona-Brussels spaceagent.com
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project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
Third floor plan
as proposed
rev. A= scheme ALL (combined)

status: DRAFT

scale: 1:100 @A3
1:50 @A1

date: 18.07.2025

drawn: I.Iezzi

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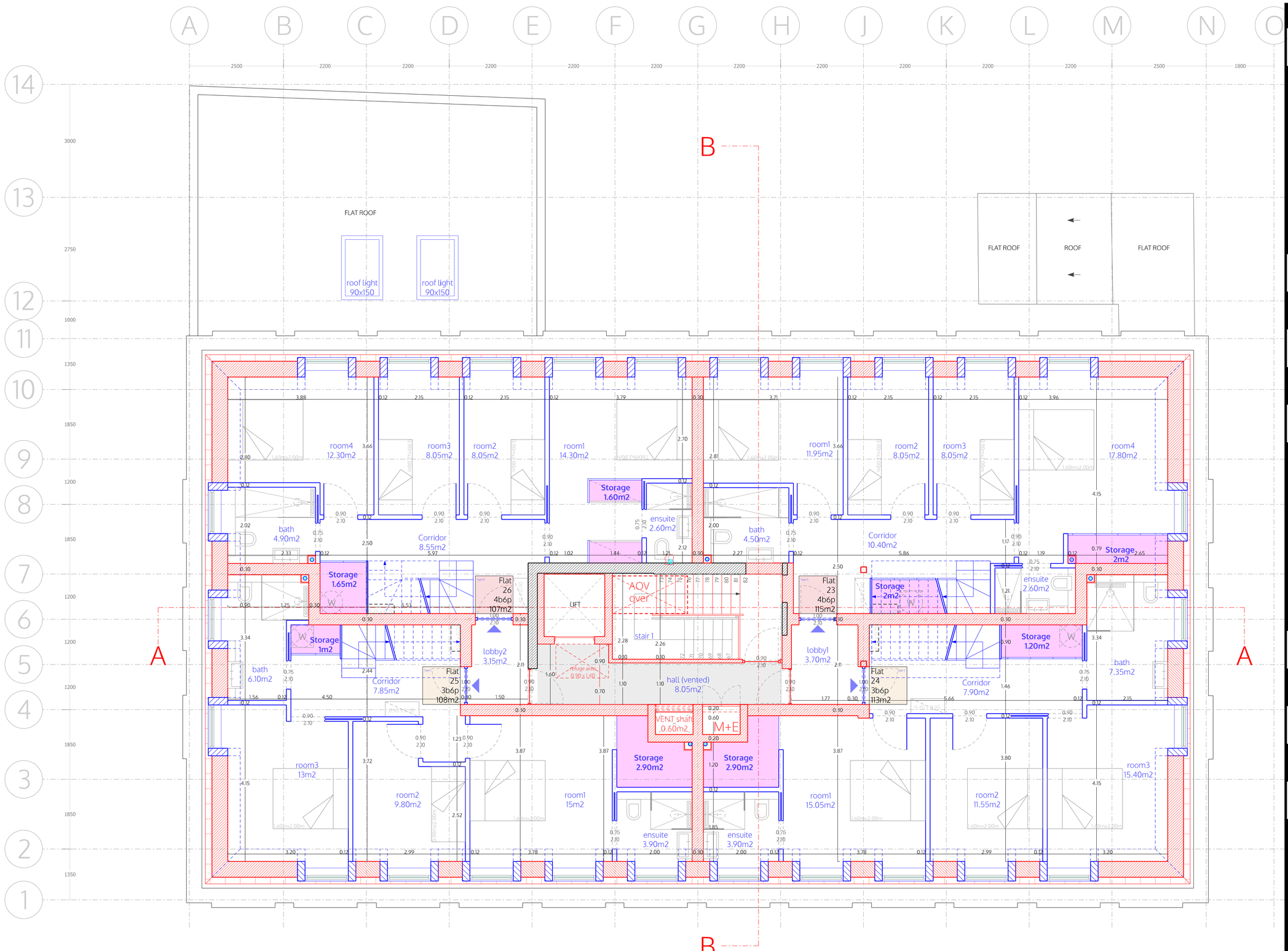

FOURTH FLOOR

LEGEND

- Existing
- Demolition
- Partitions between flats
- Fire rated and sound proofing
- Internal partitions

ALL DIMENSIONS TO BE CHECKED ON SITE

project

Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client

227 SBR LTD
London

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Architects and Designers mail@spaceagent.com
London-Heidelberg-Barcelona-Brussels spaceagent.com
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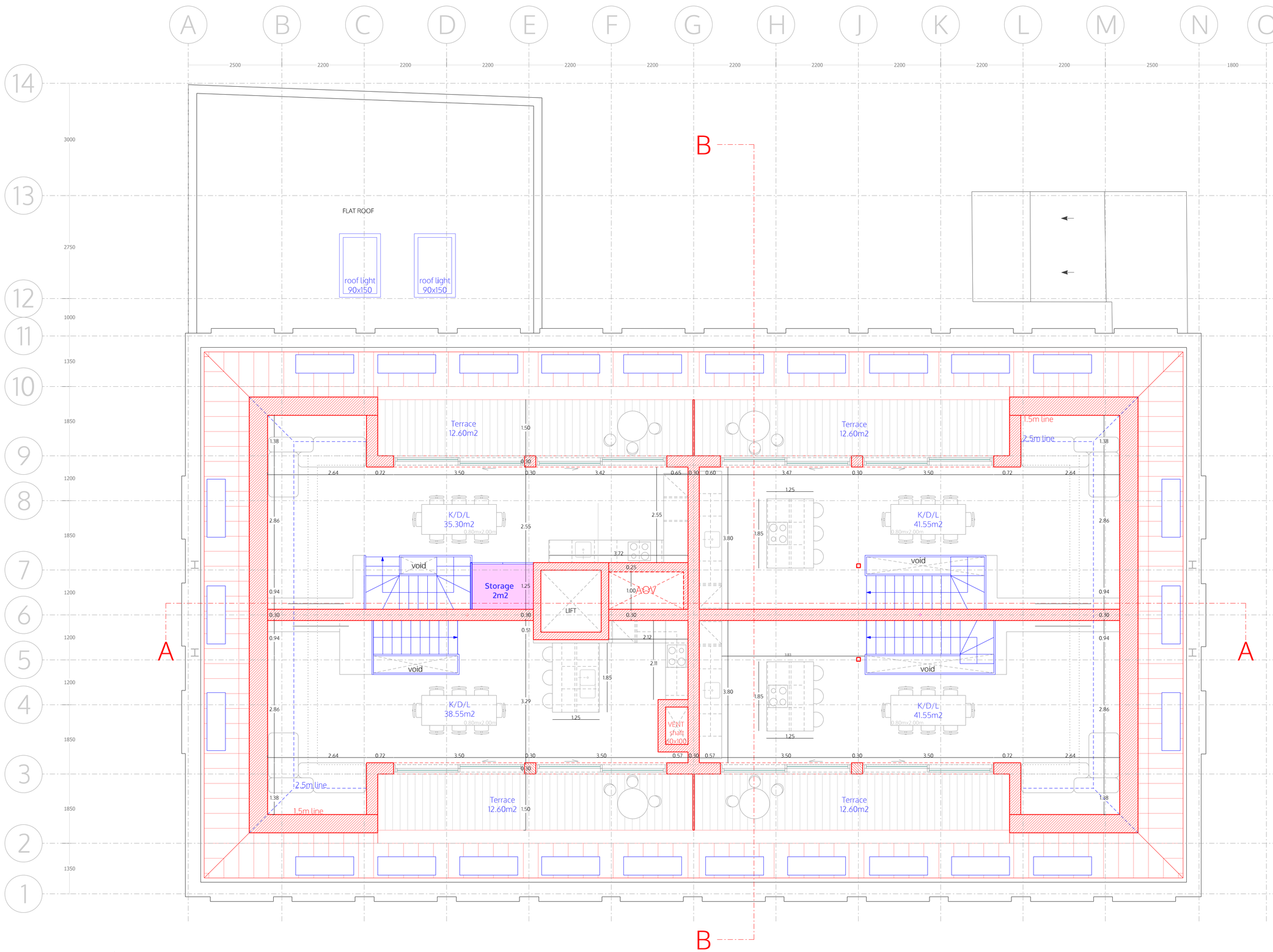
title

Fourth floor plan
as proposed
rev. A= scheme ALL (combined)

status	scale	date	drawn	no.
DRAFT	1:100 @A3 1:50 @A1	18.07.2025	I.Iezzi	SHE_P06a16c



FIFTH FLOOR

NORTH

LEGEND

- Existing
- Demolition
- Partitions between flats
- Fire rated and sound proofing
- Internal partitions

ALL DIMENSIONS TO BE CHECKED ON SITE

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project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
Fifth floor plan
as proposed
rev. A= scheme ALL (combined)

status: DRAFT

scale: 1:100 @A3
1:50 @A1

date: 18.07.2025

drawn: I.Iezzi

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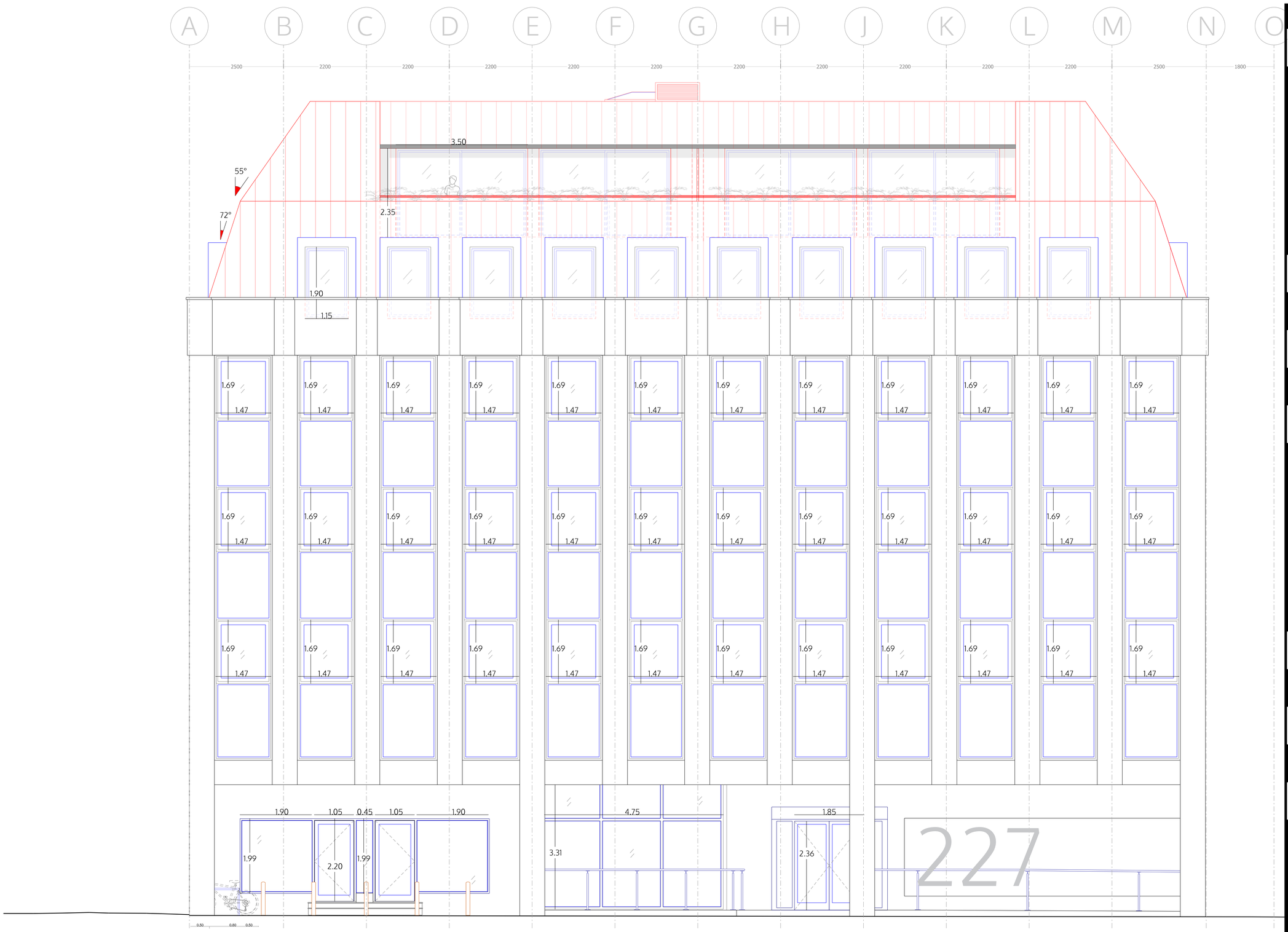

FRONT ELEVATION (WEST)

ALL DIMENSIONS TO BE CHECKED ON SITE

m|0

no.	drawn	date	scale	status
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SHE_P08a16c

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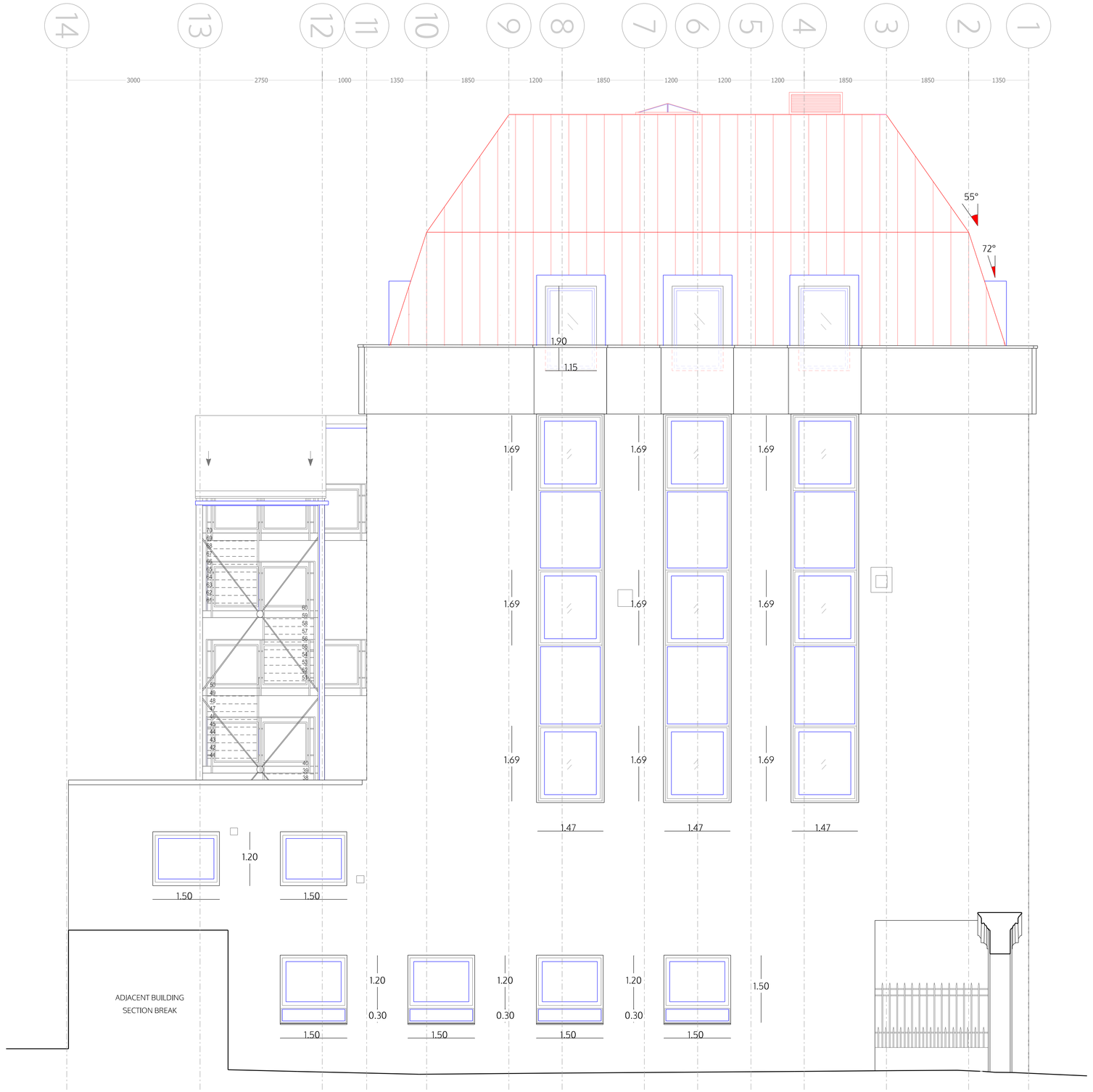
client
227 SBR LTD
London

project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

title
Front elevation (West)
as proposed
rev. A= scheme ALL (combined)



NORTH ELEVATION

no.	drawn	date	scale	status
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ALL DIMENSIONS TO BE CHECKED ON SITE

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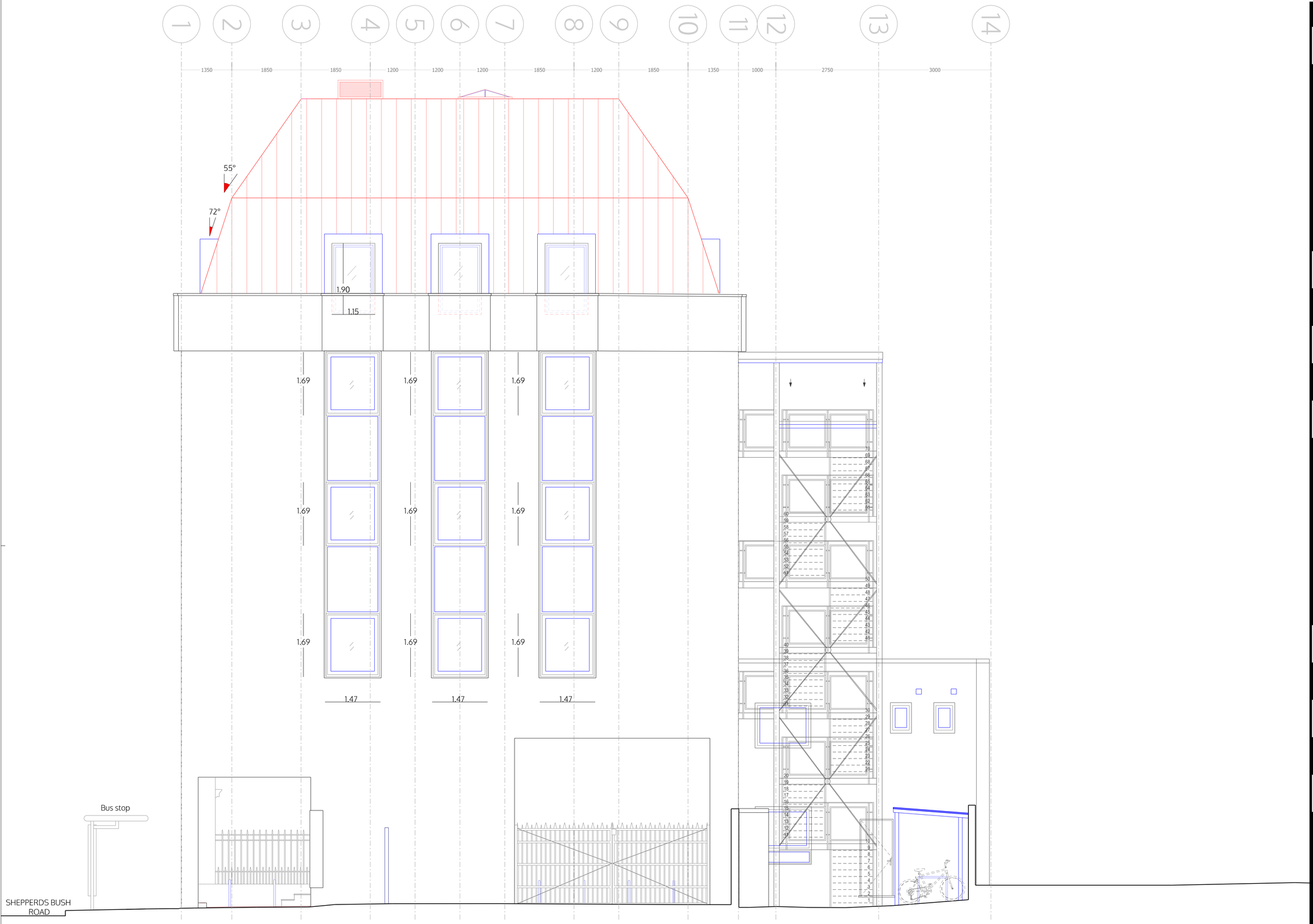
London-Heidelberg-Barcelona-Brussels spaceagent.com
spaceAgent Architects Ltd is a RIBA Chartered Practice

project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
North elevation
as proposed
rev. A= scheme ALL (combined)

SHE_P09a16c



SOUTH ELEVATION

no.	drawn	date	scale	status
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ALL DIMENSIONS TO BE CHECKED ON SITE

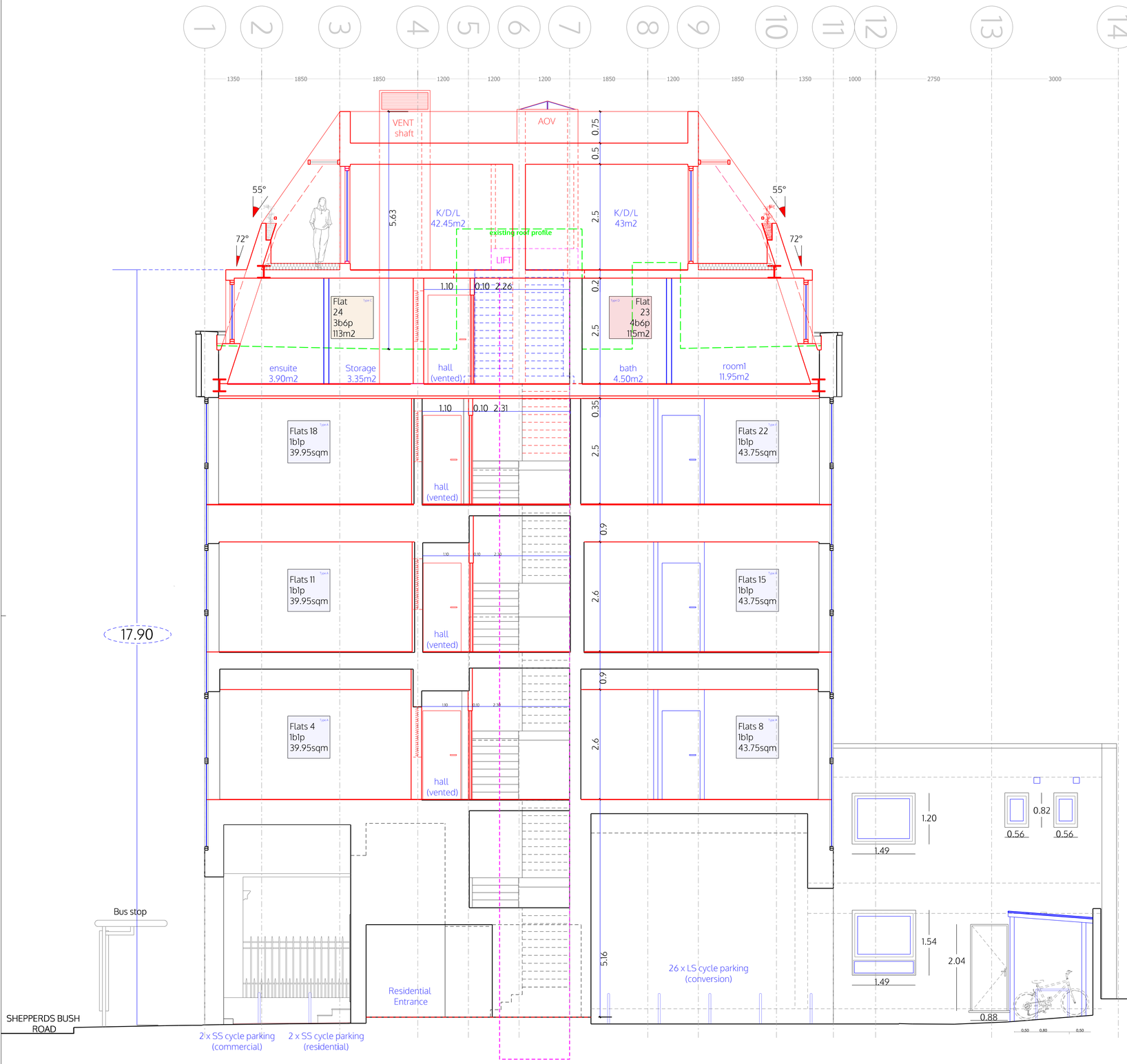
spaceAgent
Architects and Designers mail@spaceagent.com
London-Heidelberg-Barcelona-Brussels spaceagent.com
spaceAgent Architects Ltd is a RIBA Chartered Practice

project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
South elevation
as proposed
rev. A= scheme ALL (combined)

SHE_P10a16c



SECTION B-B

LEGEND

- Existing
- Demolition
- Partitions between flats
- Fire rated and sound proofing
- Internal partitions

no. | drawn | date | scale | status

ALL DIMENSIONS TO BE CHECKED ON SITE | m|0 | 1 | 2 | 3 | 4 | 5

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project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
Section B-B
as proposed
rev. A= scheme ALL (combined)

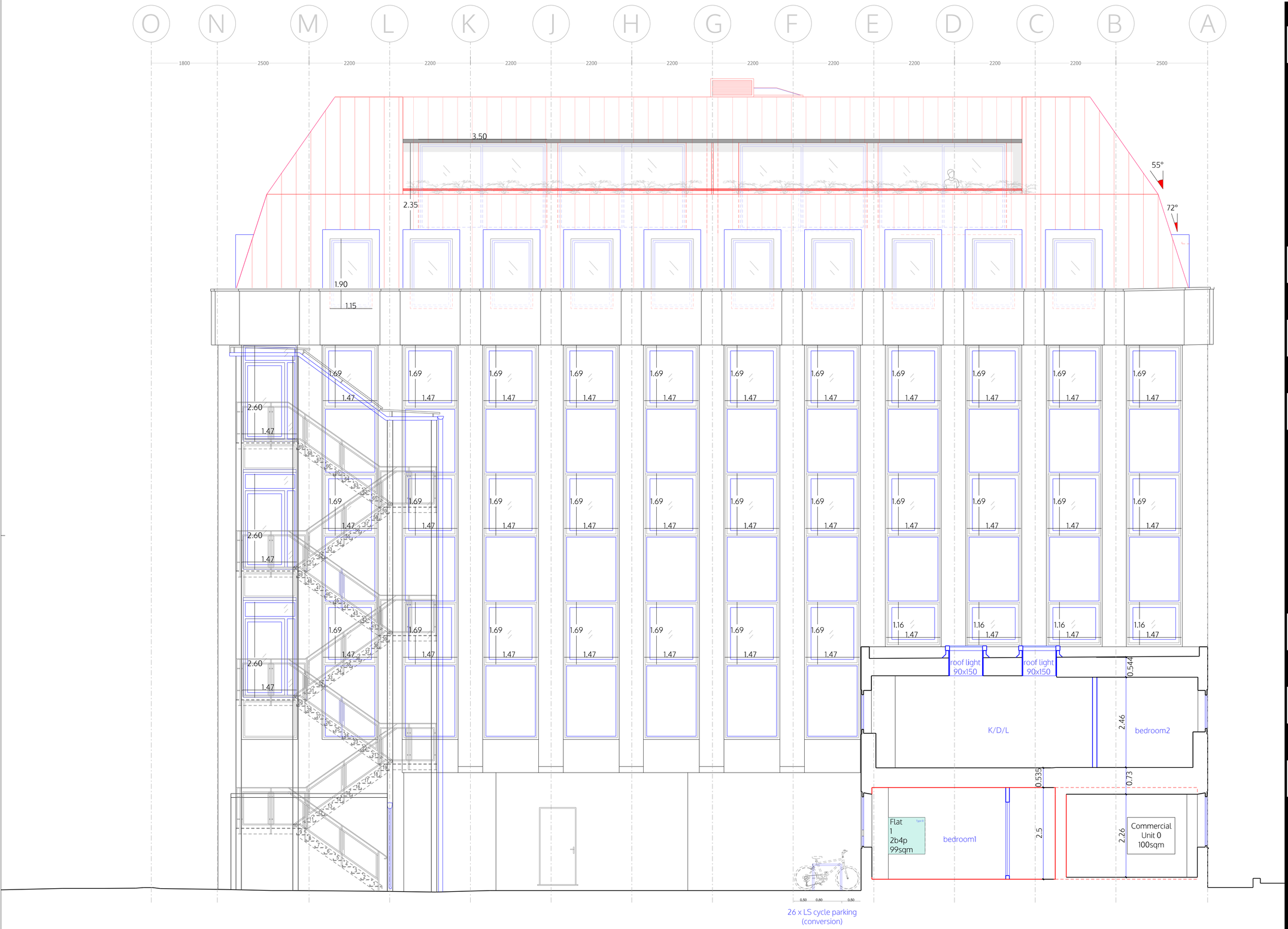
status
DRAFT

scale
1:100 @A3
1:50 @A1

date
18.07.2025

drawn
I.Iezzi

no.
SHE_P11a16c



BACK ELEVATION (EAST)

ALL DIMENSIONS TO BE CHECKED ON SITE

ADJACEI

spaceAgent
Architects and Designers mail@spaceagent.com
London-Heidelberg-Barcelona-Brussels spaceagent.com
spaceAgent Architects Ltd is a RIBA Chartered Practice

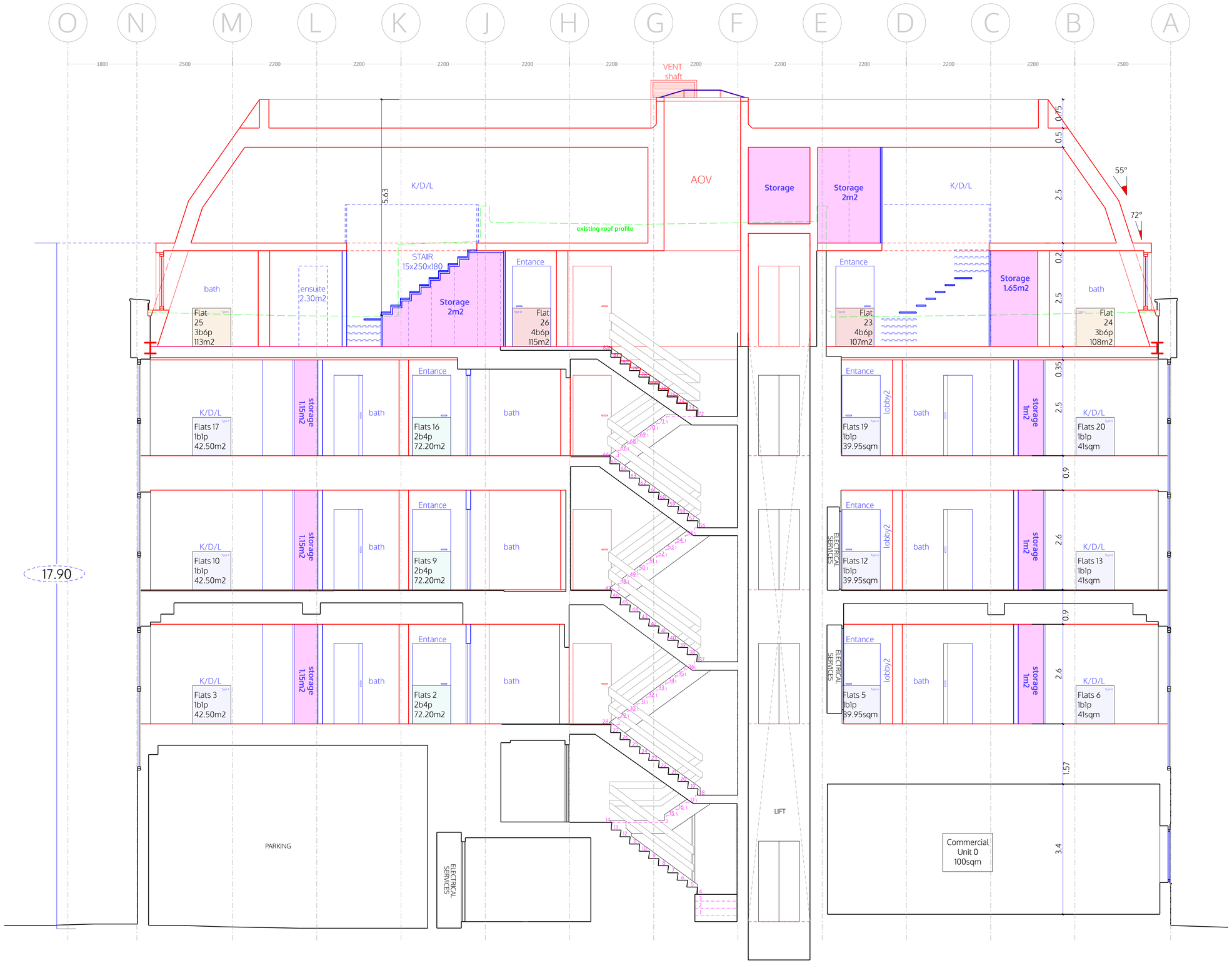
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

227 SBR LTD
London

Back elevation (East)
as proposed
rev. A= scheme ALL (combined)

no.	drawn	date	scale	status
	I.Iezzi	18.07.2025	1:100 @A3 1:50 @A1	DRAFT

SHE_P12a16c



SECTION A-A

LEGEND

- Existing
- Demolition
- Partitions between flats
  Fire rated and sound proofing
- Internal partitions

ALL DIMENSIONS TO BE CHECKED ON SITE

spaceAgent
Architects and Designers mail@spaceagent.com
London-Heidelberg-Barcelona-Brussels spaceagent.com
spaceAgent Architects Ltd is a RIBA Chartered Practice

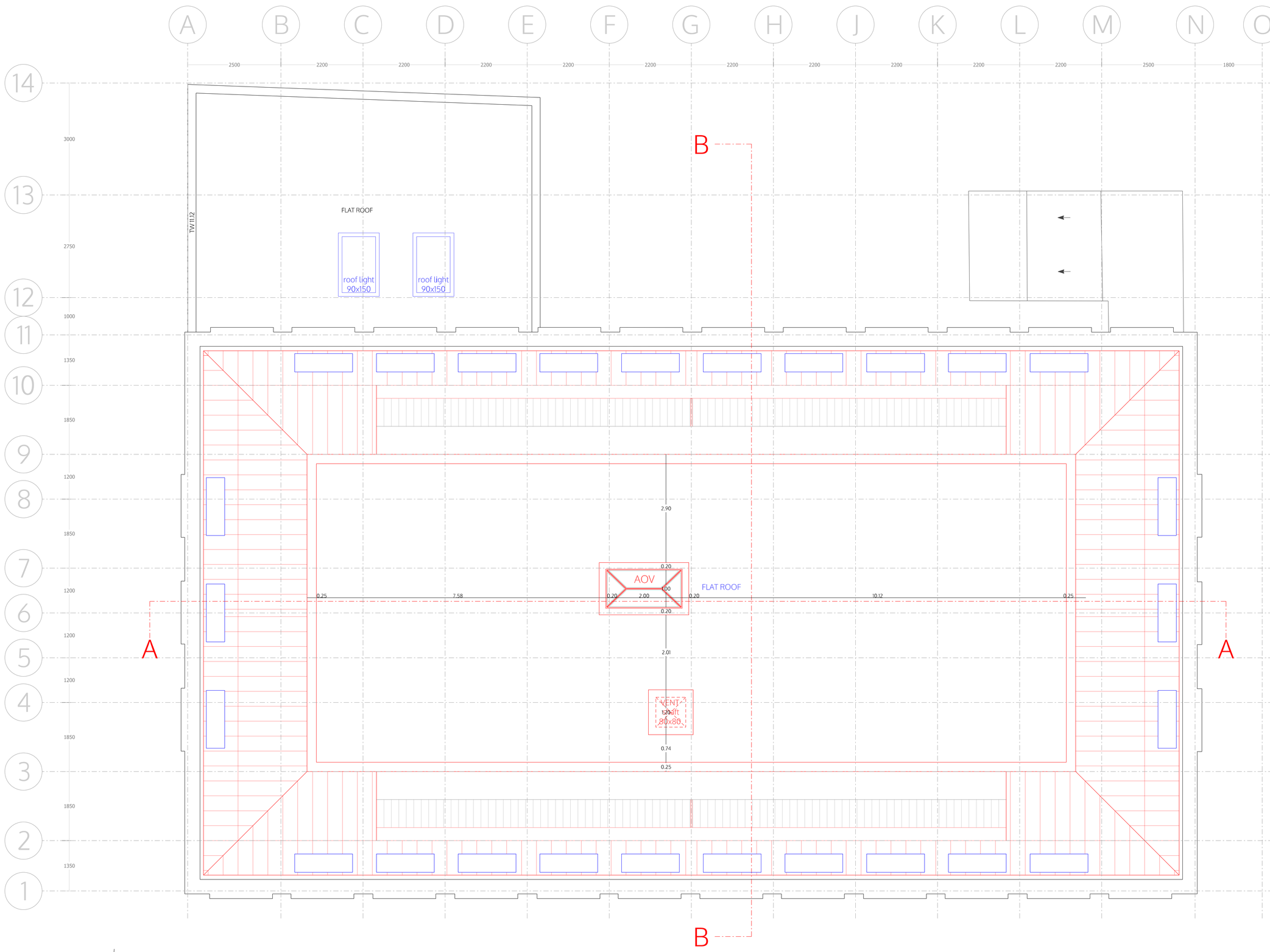
project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
Section A-A
as proposed
rev. A= scheme ALL (combined)

status	scale	date	drawn
DRAFT	1:100 @A3 1:50 @A1	18.07.2025	I.Iezzi

no. SHE_P13a16c



ROOF

LEGEND

- Existing
- Demolition
- Partitions between flats
  Fire rated and sound proofing
- Internal partitions

ALL DIMENSIONS TO BE CHECKED ON SITE

no. | drawn | date | scale | status

spaceAgent
Architects and Designers mail@spaceagent.com
London-Heidelberg-Barcelona-Brussels spaceagent.com
spaceAgent Architects Ltd is a RIBA Chartered Practice

project
Conversion to residential
227 Shepherds Bush Road
London W6 7AS

client
227 SBR LTD
London

title
Roof plan
as proposed
rev. A= scheme ALL (combined)

DRAFT	
	1:100 @A3 1:50 @A1
	18.07.2025
	I.Iezzi

SHE_P14a16c

Appendix C - Assessment of Existing Foul Flows

10428560 – 227 Shepherds Bush Road

Assessment of existing foul flows (by SA)

Initial calculations to give an estimate of discharge of the building in its current state

Areas taken from SpaceAgent Architects Plans

Estimate of peak foul flow

Total floor area of existing building = **445.5m^2**

From Employment Densities Guide 3rd Edition – November 2015;

Office = 1 person per 13m^2 (B1a)

445.5m^2 / 13 = 35 persons

4 existing floors

Total number of persons on site = 35 * 4 = **140 persons**

From British Water – Flows and Loads 2;

flow loading per person per day = 100 litres (office/factory with canteen as worst-case scenario)

140 x 100 l/p/day = 14,000 litres

DWF (based on 12 hour working day) = 14,000 / 12 x 60 x 60 = **0.32 l/sec**

Peak flow = 4 x DWF = 4 x 0.32 = **1.28 l/sec**

Appendix D - Thames Water Asset Location Search

Asset Location Search

Thames Water Property Searches

HDR
HURLEY PALMER FLATT, 240 BLACK
LONDON
SE1 8NW

Search address supplied Cleveland Travel
227
Shepherds Bush Road
London
W6 7AS

Your reference 10428560

Our reference ALS/ALS Standard/2025_5228298

Search date 24 September 2025

Keeping you up-to-date

Notification of price changes

We're changing our report prices from 4th June 2025. The price will increase by 3.5% based on Retail Price Index (RPI).

Find our new prices on our website thameswater.co.uk/property-searches

Any Questions? We're happy to talk through the changes with you – give our Property Searches team a call on 0800 009 4540 .

Thames Water Utilities Ltd
Property Searches,
Clearwater Court, Vastern Road, Reading RG1 8DB

property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches

0800 009 4540

Asset Location Search

Property Searches

Search address supplied: Cleveland Travel, 227, Shepherds Bush Road, London, W6 7AS

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position and size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the contact details below:

Thames Water Utilities Ltd
Property Searches
Clearwater Court
Vastern Road
Reading
RG1 8DB

Email: property.searches@thameswater.co.uk
Web: thameswater.co.uk/propertysearches

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority. Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners. The public sewer map relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus. The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies. For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can

also arrange for a full flow and pressure test to be carried out for a fee.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. You can do this by emailing customer.feedback@thameswater.co.uk with the email subject header 'Enquiry – TWOSA', along with details of the request.

If you have any questions regarding sewer connections, budget estimates, diversions or building over issues please direct them to our service desk which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

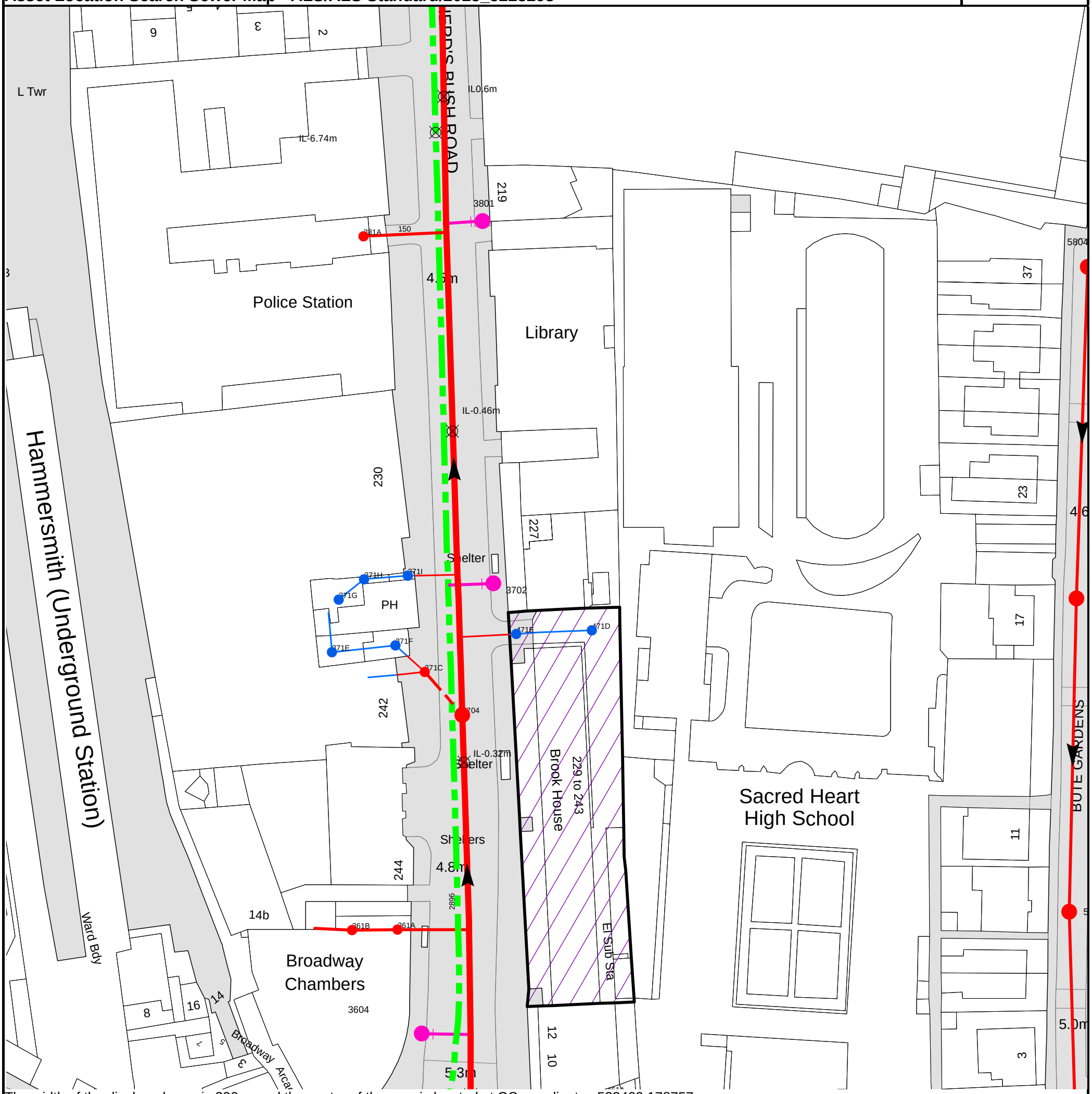
Clean Water queries

Should you require any advice concerning clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2025_5228298



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 523409,178757

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
371E	n/a	n/a
371G	n/a	n/a
361B	n/a	n/a
381A	n/a	n/a
371H	n/a	n/a
371F	n/a	n/a
361A	n/a	n/a
371I	n/a	n/a
3604	5.15	n/a
371C	n/a	n/a
3704	n/a	n/a
3801	4.21	n/a
3702	4.37	n/a
471E	4.4	2.41
471D	4.34	2.88
5604	4.91	.54
5702	4.6	1.22
5804	4.85	2.37

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement

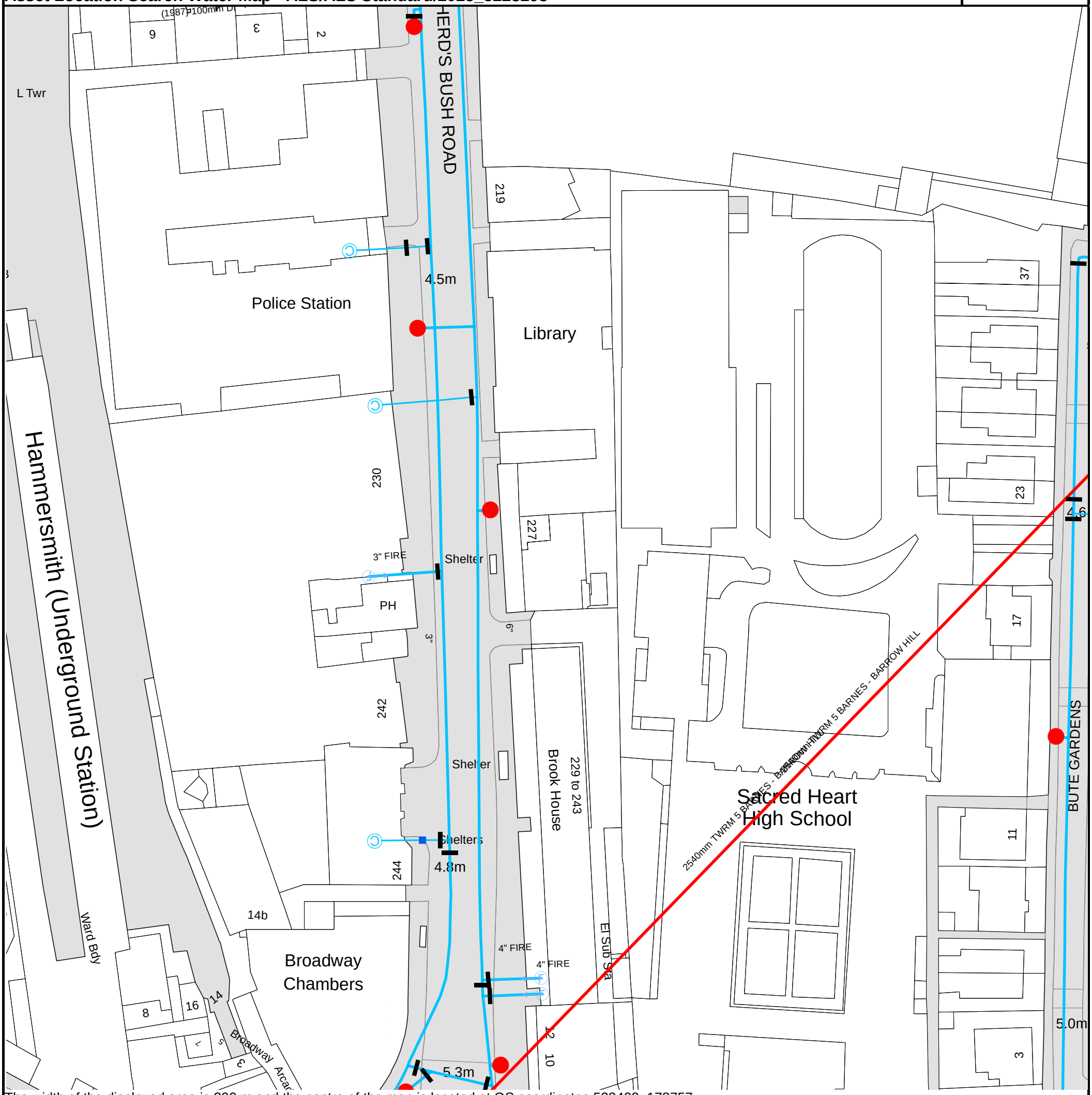
Ducts may contain high voltage cables. Please check with Thames Water.

- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2025_5228298



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 523409, 178757.

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger
- **Casement:** Ducts may contain high voltage cables. Please check with Thames Water.

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Appendix E - Drainage Calculations

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Title: Rainfall Analysis Criteria	Company Address: 240 Blackfriars Road London SE1 8NW		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflows Summary Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Roof Area	FSR: 1 years: +0 %: 15 mins: Summer	0.05	8.7	3.783
Car Park Area	FSR: 1 years: +0 %: 15 mins: Summer	0.01	2.3	0.996
Foul Base Flow	FSR: 1 years: +0 %: 15 mins: Summer	-	5.9	10.584

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflows Summary Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Roof Area	FSR: 30 years: +0 %: 15 mins: Summer	0.05	20.6	9.344
Car Park Area	FSR: 30 years: +0 %: 15 mins: Summer	0.01	5.4	2.458
Foul Base Flow	FSR: 30 years: +0 %: 15 mins: Summer	-	5.9	10.584

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflows Summary Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

FSR: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Roof Area	FSR: 100 years: +0 %: 15 mins: Summer	0.05	26.8	12.130
Car Park Area	FSR: 100 years: +0 %: 15 mins: Summer	0.01	7.0	3.194
Foul Base Flow	FSR: 100 years: +0 %: 15 mins: Summer	-	5.9	10.584

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflows Summary Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Roof Area	FSR: 100 years: +40 %: 15 mins: Summer	0.05	37.5	16.991
Car Park Area	FSR: 100 years: +40 %: 15 mins: Summer	0.01	9.9	4.471
Foul Base Flow	FSR: 100 years: +40 %: 15 mins: Summer	-	5.9	10.584

Roof Area
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	8.7
Total Inflow Volume (m³)	3.783

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.9
10	8.7
15	2.0
20	0.0
25	0.0
30	0.0

Car Park Area
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	2.3
Total Inflow Volume (m³)	0.996

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	0.5
10	2.3
15	0.5
20	0.0
25	0.0
30	0.0

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflow Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Foul Base Flow
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Base Flow

Inflow

Max. Inflow (L/s)	5.9
Total Inflow Volume (m³)	10.584

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	5.9
10	5.9
15	5.9
20	5.9
25	5.9
30	5.9

IC2

Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Inlet (1)(L/s)	Inlet (2)(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)
0	0.0	0.0	0.0	0.0	0.0	0.000	0.000
5	8.3	0.5	5.9	1.9	8.3	0.075	0.012
10	16.9	2.3	5.9	8.7	16.9	0.127	0.020
15	8.4	0.5	5.9	2.0	8.4	0.076	0.012
20	5.9	0.0	5.9	0.0	5.9	0.061	0.010
25	5.9	0.0	5.9	0.0	5.9	0.061	0.010
30	5.9	0.0	5.9	0.0	5.9	0.061	0.010

Time (mins)	Flooded Volume (m³)	Outlet(L/s)	Total Outflow (L/s)
0	0.000	0.0	0.0
5	0.000	8.2	8.2
10	0.000	16.6	16.6
15	0.000	8.6	8.6
20	0.000	6.0	6.0
25	0.000	5.9	5.9
30	0.000	5.9	5.9

INT

Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Outlet(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	8.2	8.2	8.2	0.078	0.088	0.000	8.1
10	16.6	16.6	16.6	0.128	0.144	0.000	16.0
15	8.6	8.6	8.6	0.083	0.094	0.000	9.1
20	6.0	6.0	6.0	0.066	0.074	0.000	6.1
25	5.9	5.9	5.9	0.064	0.073	0.000	5.9
30	5.9	5.9	5.9	0.064	0.073	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	8.1
10	16.0
15	9.1
20	6.1
25	5.9
30	5.9

IC1

Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Outlet(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	5.9	5.9	5.9	0.092	0.015	0.000	5.9
10	5.9	5.9	5.9	0.092	0.015	0.000	5.9
15	5.9	5.9	5.9	0.092	0.015	0.000	5.9
20	5.9	5.9	5.9	0.092	0.015	0.000	5.9
25	5.9	5.9	5.9	0.092	0.015	0.000	5.9
30	5.9	5.9	5.9	0.092	0.015	0.000	5.9

Time (mins)	Total Outflow (L/s)
0	0.0
5	5.9
10	5.9
15	5.9
20	5.9
25	5.9
30	5.9

TW

Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Free Discharge(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	8.1	8.1	8.1	0.071	0.000	0.000	8.1
10	16.0	16.0	16.0	0.110	0.000	0.000	16.0
15	9.1	9.1	9.1	0.076	0.000	0.000	9.1
20	6.1	6.1	6.1	0.060	0.000	0.000	6.1
25	5.9	5.9	5.9	0.059	0.000	0.000	5.9
30	5.9	5.9	5.9	0.059	0.000	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	8.1
10	16.0
15	9.1
20	6.1
25	5.9
30	5.9

Pipe
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.085	5.9
10	0.085	5.9
15	0.085	5.9
20	0.085	5.9
25	0.085	5.9
30	0.085	5.9

Pipe (1)
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.076	8.2
10	0.127	16.6
15	0.079	8.6
20	0.063	6.0
25	0.063	5.9
30	0.063	5.9

Pipe (2)
Critical by Return Period: FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.074	8.1
10	0.119	16.0
15	0.079	9.1
20	0.063	6.1
25	0.062	5.9
30	0.062	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflow Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Roof Area
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	20.6
Total Inflow Volume (m³)	9.344

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	4.7
10	20.6
15	5.6
20	0.0
25	0.0
30	0.0

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflow Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Car Park Area
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	5.4
Total Inflow Volume (m³)	2.458

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.2
10	5.4
15	1.5
20	0.0
25	0.0
30	0.0

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflow Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Foul Base Flow
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Base Flow

Inflow

Max. Inflow (L/s)	5.9
Total Inflow Volume (m³)	10.584

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	5.9
10	5.9
15	5.9
20	5.9
25	5.9
30	5.9

IC2

Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Inlet (1)(L/s)	Inlet (2)(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)
0	0.0	0.0	0.0	0.0	0.0	0.000	0.000
5	11.9	1.2	5.9	4.7	11.9	0.094	0.015
10	29.0	5.4	3.0	20.6	29.0	0.514	0.082
15	15.7	1.5	8.7	5.6	15.7	0.216	0.034
20	5.9	0.0	5.9	0.0	5.9	0.062	0.010
25	5.9	0.0	5.9	0.0	5.9	0.061	0.010
30	5.9	0.0	5.9	0.0	5.9	0.061	0.010

Time (mins)	Flooded Volume (m³)	Outlet(L/s)	Total Outflow (L/s)
0	0.000	0.0	0.0
5	0.000	11.7	11.7
10	0.000	26.1	26.1
15	0.000	18.6	18.6
20	0.000	6.1	6.1
25	0.000	5.9	5.9
30	0.000	5.9	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

INT
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Outlet(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	11.7	11.7	11.7	0.097	0.110	0.000	11.3
10	26.1	26.1	26.1	0.259	0.293	0.000	25.3
15	18.6	18.6	18.6	0.190	0.215	0.000	19.4
20	6.1	6.1	6.1	0.067	0.076	0.000	6.5
25	5.9	5.9	5.9	0.064	0.073	0.000	5.9
30	5.9	5.9	5.9	0.064	0.073	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	11.3
10	25.3
15	19.4
20	6.5
25	5.9
30	5.9

IC1

Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Outlet(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	5.9	5.9	5.9	0.092	0.015	0.000	5.9
10	5.9	5.9	5.9	0.436	0.069	0.000	3.0
15	5.9	5.9	5.9	0.237	0.038	0.000	8.7
20	5.9	5.9	5.9	0.092	0.015	0.000	5.9
25	5.9	5.9	5.9	0.092	0.015	0.000	5.9
30	5.9	5.9	5.9	0.092	0.015	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	5.9
10	3.0
15	8.7
20	5.9
25	5.9
30	5.9

TW

Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Free Discharge(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	11.3	11.3	11.3	0.087	0.000	0.000	11.4
10	25.3	25.3	25.3	0.150	0.000	0.000	25.4
15	19.4	19.4	19.4	0.150	0.000	0.000	19.2
20	6.5	6.5	6.5	0.062	0.000	0.000	6.4
25	5.9	5.9	5.9	0.059	0.000	0.000	5.9
30	5.9	5.9	5.9	0.059	0.000	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	11.4
10	25.4
15	19.2
20	6.4
25	5.9
30	5.9

Pipe
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.085	5.9
10	0.100	3.0
15	0.100	8.7
20	0.085	5.9
25	0.085	5.9
30	0.085	5.9

Pipe (1)
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.096	11.7
10	0.150	26.1
15	0.150	18.6
20	0.065	6.1
25	0.063	5.9
30	0.063	5.9

Pipe (2)
Critical by Return Period: FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.092	11.3
10	0.150	25.3
15	0.150	19.4
20	0.065	6.5
25	0.062	5.9
30	0.062	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflow Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Roof Area
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	26.8
Total Inflow Volume (m³)	12.130

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	6.1
10	26.8
15	7.3
20	0.0
25	0.0
30	0.0

Car Park Area
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	7.0
Total Inflow Volume (m³)	3.194

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	1.6
10	7.0
15	1.9
20	0.0
25	0.0
30	0.0

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflow Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Foul Base Flow
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Base Flow

Inflow

Max. Inflow (L/s)	5.9
Total Inflow Volume (m³)	10.584

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	5.9
10	5.9
15	5.9
20	5.9
25	5.9
30	5.9

IC2
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Inlet (1)(L/s)	Inlet (2)(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)
0	0.0	0.0	0.0	0.0	0.0	0.000	0.000
5	13.6	1.6	5.9	6.1	13.6	0.105	0.017
10	35.4	7.0	1.6	26.8	35.4	0.756	0.120
15	19.6	1.9	10.4	7.3	19.6	0.442	0.070
20	5.9	0.0	5.9	0.0	5.9	0.062	0.010
25	5.9	0.0	5.9	0.0	5.9	0.061	0.010
30	5.9	0.0	5.9	0.0	5.9	0.061	0.010

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Flooded Volume (m³)	Outlet(L/s)	Total Outflow (L/s)
0	0.000	0.0	0.0
5	0.000	13.4	13.4
10	0.000	31.2	31.2
15	0.000	24.2	24.2
20	0.000	6.2	6.2
25	0.000	5.9	5.9
30	0.000	5.9	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

INT

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Outlet(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	13.4	13.4	13.4	0.107	0.121	0.000	13.0
10	31.2	31.2	31.2	0.330	0.374	0.000	29.8
15	24.2	24.2	24.2	0.259	0.293	0.000	25.6
20	6.2	6.2	6.2	0.068	0.077	0.000	6.6
25	5.9	5.9	5.9	0.064	0.073	0.000	5.9
30	5.9	5.9	5.9	0.064	0.073	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	13.0
10	29.8
15	25.6
20	6.6
25	5.9
30	5.9

IC1

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Outlet(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	5.9	5.9	5.9	0.092	0.015	0.000	5.9
10	5.9	5.9	5.9	0.669	0.106	0.000	1.6
15	5.9	5.9	5.9	0.504	0.080	0.000	10.4
20	5.9	5.9	5.9	0.092	0.015	0.000	5.9
25	5.9	5.9	5.9	0.092	0.015	0.000	5.9
30	5.9	5.9	5.9	0.092	0.015	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	5.9
10	1.6
15	10.4
20	5.9
25	5.9
30	5.9

TW

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Free Discharge(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	13.0	13.0	13.0	0.095	0.000	0.000	13.0
10	29.8	29.8	29.8	0.150	0.000	0.000	30.0
15	25.6	25.6	25.6	0.150	0.000	0.000	25.5
20	6.6	6.6	6.6	0.063	0.000	0.000	6.6
25	5.9	5.9	5.9	0.059	0.000	0.000	5.9
30	5.9	5.9	5.9	0.059	0.000	0.000	5.9

Time (mins)	Total Outflow (L/s)
0	0.0
5	13.0
10	30.0
15	25.5
20	6.6
25	5.9
30	5.9

Pipe
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.085	5.9
10	0.100	1.6
15	0.100	10.4
20	0.085	5.9
25	0.085	5.9
30	0.085	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Connection Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Pipe (1)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.106	13.4
10	0.150	31.2
15	0.150	24.2
20	0.065	6.2
25	0.063	5.9
30	0.063	5.9

Pipe (2)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.101	13.0
10	0.150	29.8
15	0.150	25.6
20	0.066	6.6
25	0.062	5.9
30	0.062	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflow Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Roof Area
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	37.5
Total Inflow Volume (m³)	16.991

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	8.6
10	37.5
15	10.2
20	0.1
25	0.0
30	0.0

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflow Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Car Park Area
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Catchment Area

Inflow

Max. Inflow (L/s)	9.9
Total Inflow Volume (m³)	4.471

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	2.3
10	9.9
15	2.7
20	0.0
25	0.0
30	0.0

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Inflow Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Foul Base Flow
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Base Flow

Inflow

Max. Inflow (L/s)	5.9
Total Inflow Volume (m³)	10.584

Tables

Time (mins)	Total Inflow (L/s)
0	0.0
5	5.9
10	5.9
15	5.9
20	5.9
25	5.9
30	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

IC2
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Inlet (1)(L/s)	Inlet (2)(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)
0	0.0	0.0	0.0	0.0	0.0	0.000	0.000
5	16.8	2.3	5.9	8.6	16.8	0.125	0.020
10	47.4	9.9	0.0	37.5	47.4	0.844	0.780
15	13.7	2.7	0.8	10.2	13.7	0.843	0.480
20	9.8	0.0	9.7	0.1	9.8	0.099	0.016
25	5.9	0.0	5.9	0.0	5.9	0.061	0.010
30	5.9	0.0	5.9	0.0	5.9	0.061	0.010

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Flooded Volume (m³)	Outlet(L/s)	Total Outflow (L/s)
0	0.000	0.0	0.0
5	0.000	16.4	16.4
10	0.646	32.6	32.6
15	0.346	32.6	32.6
20	0.000	13.8	13.8
25	0.000	5.9	5.9
30	0.000	5.9	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

INT

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Outlet(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	16.4	16.4	16.4	0.125	0.142	0.000	15.7
10	32.6	32.6	32.6	0.377	0.427	0.000	32.6
15	32.6	32.6	32.6	0.378	0.427	0.000	32.6
20	13.8	13.8	13.8	0.151	0.171	0.000	18.2
25	5.9	5.9	5.9	0.064	0.073	0.000	5.9
30	5.9	5.9	5.9	0.064	0.073	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	15.7
10	32.6
15	32.6
20	18.2
25	5.9
30	5.9

IC1

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Outlet(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	5.9	5.9	5.9	0.092	0.015	0.000	5.9
10	5.9	5.9	5.9	0.750	0.448	0.329	0.0
15	5.9	5.9	5.9	0.752	2.300	2.181	0.8
20	5.9	5.9	5.9	0.191	0.030	0.000	9.7
25	5.9	5.9	5.9	0.092	0.015	0.000	5.9
30	5.9	5.9	5.9	0.092	0.015	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	5.9
10	0.0
15	0.8
20	9.7
25	5.9
30	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

TW

Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Manhole

Tables

Time (mins)	Total Approach Flow (L/s)	Inlet(L/s)	Total Inflow (L/s)	Depth (m)	Volume (m³)	Flooded Volume (m³)	Free Discharge(L/s)
0	0.0	0.0	0.0	0.000	0.000	0.000	0.0
5	15.7	15.7	15.7	0.109	0.000	0.000	15.8
10	32.6	32.6	32.6	0.150	0.000	0.000	32.6
15	32.6	32.6	32.6	0.150	0.000	0.000	32.6
20	18.2	18.2	18.2	0.150	0.000	0.000	17.1
25	5.9	5.9	5.9	0.059	0.000	0.000	5.9
30	5.9	5.9	5.9	0.059	0.000	0.000	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Junction Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Time (mins)	Total Outflow (L/s)
0	0.0
5	15.8
10	32.6
15	32.6
20	17.1
25	5.9
30	5.9

Pipe
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 30 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.085	5.9
10	0.085	5.9
15	0.100	2.3
20	0.100	0.8
25	0.100	14.9
30	0.087	6.0
35	0.085	5.9
40	0.085	5.9
45	0.085	5.9
50	0.085	5.9
55	0.085	5.9
60	0.085	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Connection Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Pipe (1)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.137	17.6
10	0.150	32.6
15	0.150	30.5
20	0.134	14.8
25	0.063	5.9
30	0.063	5.9

Project:	Date:		
10428560 227 Shepherds Bush Road	12/01/2026		
	Designed by: SA	Checked by: IM	Approved By: JL
Report Details: Type: Connection Results Storm Phase: Proposed	Company Address: 240 Blackfriars Road London SE1 8NW		

Pipe (2)
Critical by Return Period: FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Summer

Type : Pipe

Tables

Time (mins)	Depth (m)	Flow (L/s)
0	0.000	0.0
5	0.117	15.7
10	0.150	32.6
15	0.150	32.6
20	0.150	18.2
25	0.062	5.9
30	0.062	5.9

Appendix C. Existing Structure Intrusive Investigation Findings

Ain

Specification for Structural Steelwork

227 Shepherds Bush Road

Date:	16/01/2025	**Issue:**	P01
Reference:	10428560	**Status:**	Issued
Prepared by:	R. Bowden	**Date:**	09/01/2026
Edited by:	-	**Date:**	-
Authorised by:	D. Staddon	**Date:**	16/01/2026
Issuing office:	Blackfriars		

DOCUMENT CONTROL

Issue	Date	Status	HDR Author	HDR Approval	Notes
P01	16/01/26	Issued	R. Bowden	S. Staddon	Issued for Stage 3 Delivery

The findings and opinions provided in this document are given in good faith and are subject to the limitations and constraints imposed by the methods and information sources described in this report. Factual information, including, where stated, a visual inspection of the site, has been obtained from a variety of sources. HDR Consulting assumes the third-party data to be reliable, but has not independently confirmed this; therefore, HDR Consulting cannot and does not guarantee the authenticity or reliability of third-party information it has relied upon.

The findings and opinions presented in this report are relevant to the dates when the assessment was undertaken but should not necessarily be relied upon to represent conditions at a substantially later date. Further information, ground investigation, construction activities, change of site use, or the passage of time may reveal conditions that were not indicated in the data presented and therefore could not have been considered in the preparation of the report. Where such information might impact upon stated opinions, HDR Consulting reserves the right to modify the opinions expressed in this report. Where opinions expressed in this report are based on current available guidelines and legislation, no liability can be accepted by HDR Consulting for the effects of any future changes to such guidelines and legislation.

The limitations of liability of HDR Consulting for the contents of this document have been agreed with the Client, as set out in the terms and conditions of offer and related contract documentation.

CONTENTS:

INTRODUCTION

General

a. This specification should be read in conjunction with all accompanying tender documentation and the contract documents. This specification is to be read in conjunction with the National Structural Steelwork Specification for Building Construction, 7th Edition including such relevant specifications and codes referred to within, except as modified by the following clauses.

b. All clauses in the National Structural Steel Specification not noted below shall apply in their entirety. Should there be a conflict in the specified requirements these shall be brought to the attention of the Engineer for resolution prior to proceeding.

DEFINITIONS

Refer to Page 13 of the National Structural Steelwork Specification for building construction, 7th Edition.

a. The term Employer in this specification shall mean: 227 SBR Ltd

b. The term Project Manager shall mean: 227 SBR Ltd

c. The term Contract Administrator shall mean: N/A

d. The term Engineer shall mean: HDR

e. The term Architect shall mean: Space Agent

f. The term Quantity Surveyor/ Cost Consultant shall mean: TBC

g. The term CDM Principal Designer shall mean: TBC

h. The Services Consultant shall mean: Oakley M&E Design

i. The Local Authority shall mean: London Borough of Hammersmith & Fulham Council

j. The term Main Contractor shall mean: the Contractor responsible for completion of the works

k. The term Demolition Contractor shall mean: TBC

l. The term Asbestos Consultant shall mean: TBC

1 SECTION 1.0 - INFORMATION REQUIRED BY STEELWORK CONTRACTOR

Project Specification for Structural Steelwork

1.1.1 The checklists given in Tables 1.1 to 1.7 set out information which is shown on the design drawings and contained within the project specification.

1.1.2 The structural steelwork is to be provided strictly in accordance with the current edition of BS EN 1993-1-1:2005+A1:2014 Design of steel structures. General rules and rules for buildings (incorporating corrigenda February 2006 and April 2009) and BS EN 1090-2-2018 Execution of steel structures and Aluminium structures, together with the National Structural Steelwork Specification 7th Edition (NSSS), including such relevant specifications and codes referred to within, except as modified by the following clauses.

1.1.3 Should there be a conflict in specified requirements, the project specification takes precedence over other documents.

1.1.4 All current amendments shall be complied with and the National Building Regulations/Local Authority Bye-Laws notwithstanding any omission of such requirements in this specification, and as indicated or implied on the drawings prepared by the Engineer.

1.1.5 The specification should be read in conjunction with all accompanying tender documentation and Conditions of Contract.

Table 1.1 Proposed Works – Checklist

i. The development comprises the following:
   - Construction of an additional 2 storey vertical steel frame extension, creating residential units with step back balconies
   - The proposed extension is to also create a new flat roof level with plant space and photovoltaics proposed at roof level.

ii. The building is proposed for residential use.

iii. Details of the site and the constraints that need to be considered are to be provided in the contract documents.

iv. The building class in accordance with the building regulations is provided in the contract documents.

v. External parts of the structure include balconies, walkways and steel staircases, refer to the contract documents for further details.

vi. No parts of the structure are Execution Class 1

vii. No parts of the structure are Execution Class 3 or 4.

1.2 Design

Only 1 Clause 1.2A is included. Clauses 1.2B and 1.2C are 'Not Used'.

Table 1.2A Design – Checklist

When the Steelwork Contractor carries out detailing of the steelwork based on the member design prepared by the Engineer.

Information Required by the Steelwork Contractor

1.2.1 Connections are to be designed to develop the forces indicated on the design drawings and must be carefully detailed to provide a clean functional appearance. The steelworker is required to discuss and submit conceptual designs of the connections to the Engineer prior to detailing.

Generally connections are simple and only splices or cantilevers are required to develop moments unless noted otherwise on the drawings. The detailing is to avoid stress concentrations particularly in welded sections. The design of all connections and other items associated with fabrication and erection shall be the sole responsibility of the steelworker. The connections should be carefully considered to ensure that they make adequate provision for adjustment to achieve the tolerances laid down in this Specification and elsewhere in the contract documents.

1.2.2 For a list of the contract design drawings refer to the contract documentation available from the Contract Administrator. The steelwork is to be provided in accordance with the Engineer's design as indicated or implied on the Engineer's drawings unless instructed otherwise on further drawings or equivalent electronic data and documents that may be issued as the work proceeds.

1.2.3 Refer to Contract Documentation for specifics of document management systems to be used.

1.2.4 BS EN 1993-1-8:2005 is to be used in design of all connections.

1.2.5 Member forces and end reactions are shown on the drawings. Unless otherwise noted, the loads are expressed as factored ultimate loads in accordance with BS EN 1993-1-1:2005.

1.2.6 There are no adverse environmental conditions to affect detailing. If any exist, they should be stated by the Steelwork Contractor.

1.2.7 Details and locations of any temporary works assumed by the Engineer in the design will be indicated on the contract drawings. However, any temporary bracing required for stability during erection will be the responsibility of the Steelwork Contractor.

1.2.8 The Steelwork Contractor must submit for approval by the Engineer the following information:

i) Calculations covering connection design.
ii) General arrangement drawings.
iii) Steelwork detail drawings.
iv) Q.A. plan.
v) Method statement for erection, including risk assessments.
vi) Material test certificates.
vii) Weld test certificates.

1.2.9 Welding across tension flanges of key elements such as transfer beams.

1.2.10 The steel grade is to be S355 to BS EN 100245 and designation of the steel to be used is shown on the contract drawings.

1.2.11 The Steelwork Contractor shall allow for all cleats, brackets, end plates, stiffeners, gussets, shear plates etc. as and where deemed necessary for fabrication, connection and site erection purposes. The Engineer may indicate some specific stiffeners etc. where the structural design is improved by their inclusion.

1.2.12 Bolts for all shear connections to be Grade 8.8. Preloaded bolts in category C connections (see EN 1993 1-8 cl 3.4.1) should be used in all bracing connections and for splices in beams and trusses.

The use of grade 4.6 bolts is strictly restricted to minor connections as defined by the Engineer, e.g. purlin and sheeting rail connections, and is subject to written agreement.

Holding down bolts may be Grade 4.6 unless in direct tension where Grade 8.8 shall be used.

1.2.13 A foundation plan is provided showing the locations and details of the holding down bolts required to be supplied to the concrete contractor by the steelwork contractor.

The steelwork contractor will issue a dimensioned drawing to enable the sub-structure works contractor to cast these bolts into the structure.

1.2.14 See clause 8.1.6 for type of grout to be used and the contract drawings for the thicknesses.

1.2.15 Refer to the drawings for typical steelwork details.

1.2.16 For details of cut-outs, holes or fittings refer to drawings and also agree the procedure for the integration of interfaces requirements of other trade-contractors. Refer to the contract documentation for details.

1.2.17 For camber requirements refer to the contract drawings as listed in the package documents.

1.2.18 Punched holes may not be used in connections without written approval of the Engineer.

1.2.19 Design and detail connections so as not to encroach upon architectural clearance lines, finishes or other secondary members required for the support of cladding or other 'secondary' structural elements.

1.2.20 Where connections between beams and columns and the like result in a loss of bearing to the metal deck, design and provide support for the metal deck.

1.2.21 Design and provide end bearing connections of inclined members such that the bearing plane between the inclined members and their supporting members is horizontal.

Table 1.3 Building Information Modelling (BIM)- Checklist

1.3.1 For additional requirements regarding BIM refer to the contract documents.

Table 1.4 Workmanship - Checklist

Information required by the Steelwork Contractor.

1.4.1 Hardstamping on exposed Architectural elements shall be as follows:

i) Beams - mark top flange

ii) Columns - mark underside of baseplate or tab plate/cleat for incoming beam connections on the connecting face.

iii) Lifting/Craneage beams to be stamped on web with safe working load capacity.

1.4.2 Weld procedures for all or any site welding will be prepared and submitted to the Engineer in reasonable time for review prior to commencing the work on site. The information shall be presented in a schedule form similar to **TABLE B EXTENT OF ROUTINE SUPPLEMENTARY NDT** identifying material types and procedures in Annex B of NSSS.

The fabricator's job specific Quality Plan shall be made available to the Engineer for inspection.

Procedures for any special welding for plate girders or "made-up" sections must be presented in reasonable time allowing 10 working days for review by the Engineer prior to commencing work in the shops.

Plates behind all major welds shall be free from laminations. The cost of tests to demonstrate this shall be borne by the Steelwork Contractor as part of the fabrication inspection and quality control process.

1.4.3 Temporary holes and attachments are required to be blanked or removed on all Architecturally visible elements of the structure. See drawings for locations.

1.4.4 Test Plates

1.4.4.1 The Steelwork Contractor, when required, shall send test pieces to an approved laboratory with sample pieces as selected and marked by the Engineer being provided free of charge. The costs of all tests shall be borne by the Steelwork Contractor.

1.4.4.2 All important compression flanges as noted on the drawings shall be tested as necessary for laminar defects by ultrasonic methods and shall be replaced if not in accordance with BS EN 10160 to be free from laminar defects . Plates behind all major welds shall be free of laminations.

The cost of these tests shall be borne by the Steelwork Contractor as part of the fabrication inspection and quality control process.

1.4.5 Weld inspection shall be carried out by the fabricator or by an independent specialist consultant. The inspection method shall be as defined in Table B of the National Steelwork Specification. Where weld-sizes are less than tabulated a minimum of 10% of welds shall be inspected using the M.P.I. method.

1.4.6 Special requirements regarding welding acceptance criteria.

1.4.6.1 The Steelwork Contractor shall be solely responsible for ensuring that all work is in accordance with the specification and to good standards of workmanship; no exceptions can be made on the grounds that the Engineers or their representatives may have inspected some part of parts of the work at some stage during production.

1.4.6.2 The costs of any welder's tests, which may be required, shall be at the expense of the Steelwork Contractor, including any specialist fee for witnessing and/or testing the coupon plates.

1.4.6.3 The cost of any remedial measures taken on defective welds shall be borne by the Steelwork Contractor, including the cost of any specialists' fees incurred by the Inspection Authority in additional work on defective welds.

1.4.6.4 All webs forming castellated beams, including those for infill plates shall be full strength butt welds with edge preparation as necessary to ensure the parent web thickness is fully developed along joints.

1.4.6.5 Site welding should be avoided if possible but in the event of special circumstances necessitating the adoption of such connections a method statement, detailing the proposed procedures, should be submitted for comment and written permission must be obtained prior to the commencement of any relevant operations. All site welds are to be subject to non-destructive testing.

Untested site welds will only be permitted for minor connections, with the express permission of the Engineer. These welds shall be designed to a reduced stress of 50% of the normal design stress.

1.4.6.6 The proportion of Magnetic Particle Inspection of fillet welds set out of Annex B: Table B of NSSS shall also apply to welds of less than 10mm leg length

- All welded connections supporting hangers from trusses and transfer girders shall be subjected to 100% NDT.
- All butt welds for splicing the elements of trusses or plates in transfer girders, whether in the shop or on site, shall be subjected to 100% ultrasonic inspection.
- All special or unusual welds, as indicated on the structural drawings, shall be subject to 100% NDT.

Non-destructive testing shall be either MPI for fillet welds or Ultrasonic for butt welds

Table 1.5 Erection - Checklist

Information required by the Steelwork Contractor.

1.5.1 Refer to Contract Documents for all site plan details, logistics and access requirements or restrictions and details of adjacent services and obstructions Erection procedures and erection bracing are the sole responsibility of the Steelwork Contractor.

1.5.2 Refer to 1.4.1.

1.5.3 to 9 Refer to Contract Documentation.

1.5.10 A safe site handling procedure is required in order to comply with clause 8.3.1 of the National Steelwork Specification. The format of this certificate is to be included in the Steelwork Contractor's erection method statement which must be approved by the Engineer prior to erection commencing.

Table 1.6 Protective Treatment - Checklist

Information required by the Steelwork Contractor.

1.6.1 Environmental Protection Act

All paint systems must comply with the Environmental Protection Act (EPA) - 1990 EPA-PG6/23 and any amendments thereof.

As of April 1998, the permitted limits for volatile organic compounds (VOC) emissions into the atmosphere were as follows:

Blast/weldable primer	780g/l
Protective Finishes	420g/l
Primers/Intermediates	250g/l
Finishes	420g/l

A protective finish is defined as a single coat application at works that will receive no further coatings either at works or on site.

Primers or Intermediate coats are defined as individual components applied at works that will be overcoated with a finish coat to provide a complete system.

1.6.2 Handling

Painted steelwork shall not be handled until an adequate drying/curing period has been allowed in accordance with the recommendations of the particular paint supplier.

The methods and equipment used to handle the coated steelwork shall be selected to minimise any damage to the painted components. The steelwork may include such design features as lifting holes and lugs to assist in minimising the potential damage due to handling.

1.6.3 Transportation

Separators shall be provided to prevent steel to steel contact and shall be adequate for intended use. It is essential that coatings are protected from the possible effects of ponded water.

1.6.4 Storage

Coated components shall be stored clear of the ground, separated by timber packers and so that ponding does not occur.

1.6.5 Finished Appearance (Intumescent Paint)

For finished appearance, refer to the Intumescent Paint Specification.

1.6.6 Inspection

The nominated steelwork contractor and site applicator will alert the Engineer and the Paint Supplier 10 working days prior to start of the application programme, both at the works and on site. They will permit them to inspect the work in progress, and prepare inspection reports in accordance with their requirements. The Paint Supplier will forward a copy of any inspection report direct to the Engineer and make his comments known to the applicator and steelwork contractor.

1.6.7 Surface Preparation Prior to Paint Application

1.6.7.1 Blast cleaning shall be by an airless system using ball shot to BS EN ISO 8501 P3. (The use of grit in blast cleaning operations may require variations in type and thickness of prefabrication primer and the steelwork contractor must obtain written agreement to any such Specification variation prior to the commencement of any surface treatment).

1.6.7.2 The blast cleaning and application of the prefabrication primer, if required, is to be carried out as a continuous operation so that the prefabrication primer is applied to a thoroughly clean and dry surface within four hours of the surface being ball blasted and before any deterioration of the surface has taken place.

Note: A pre-fabrication primer is to be used in the preparation of all steelwork unless agreed otherwise in writing by the Engineer. Such agreement will only be provided on production of suitable evidence from the fabricator that a pre-fabrication primer is not required.

1.6.7.3 Particular care must be taken when selecting the correct prefabrication primer and its suitability for any subsequent welding operations. Welds to be blast cleaned to accord with the Specification requirements.

1.6.8 Preparation and Painting

1.6.8.1 The materials used for the various coats shall be manufactured by the same suppliers, and the Steelwork Contractor shall confirm compatibility of all subsequent coats in his method statement see Clause 10.1.2.

1.6.8.2 Sections of the structure noted on the drawings as being encased in concrete are not be painted except for the usual contact and concealed surfaces.

1.6.8.3 Paint should not be applied to the top flange of those beams to which through deck stud welding is to be applied.

1.6.8.4 Where necessary, remove weld spatter and smooth weld seams or sharp edges. The welds and adjacent areas should be thoroughly degreased and cleaned by thorough mechanical hand abrasion to remove contamination and provide a profile. The steel should be 'bright' but not polished.

1.6.8.5 Stripe coating of welds and any other areas of difficult access is to be carried out by brush prior to the spray application of the specified primer.

1.6.8.6 Nominal dry film thickness (dft) is defined as the average of the readings obtained using a dft gauge in a particular scheduled area. These readings should equal or exceed the specified nominal dry film thickness and in no case should any reading be less than 75% of the specified nominal dry film thickness.

Readings should be taken at 2 readings per metre on the web and two per metre on the various flange faces for ordinary paints.

For intumescent paints, refer to the requirements in the Intumescent Paint Specification.

1.6.8.7 Remedial Work

Early degradation of coatings by blistering, peeling, flaking, cracking, or lack of adhesion must be made good by complete removal, preparation, and re-application of all coats as instructed.

Inadequate dry film thickness or surface defects due to inclement weather must be rubbed down and further coats applied as instructed.

Any areas mechanically damaged in transit to be touched up with a surface tolerant epoxy to meet the original works DFT.

1.6.9 Paint System Specifications

For schedule of locations requiring treatment see attached table and refer to the contract drawings. For details of Architectural finishes and intumescent paint locations refer to Appendix attached.

1.6.9.1 Internal Non-Exposed Dry Environment

Life to first maintenance - 20 years.

After abrasive blast cleaning (in works) -

Apply Overall by Airless Spray:

1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide protective finish coating (Grey) @ 75 microns nominal dft

1.6.9.2a Cavity Areas (Atmospheric corrosivity category C2 BSEN ISO 12944)

Design life of building (not exceeding 20 years)
After abrasive blast cleaning (in Works)
Apply Overall by Airless Spray
1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide primer-intermediate compliant coating (Grey) @ 175 microns nominal dft

1.6.9.2b Inaccessible Cavity Areas (Atmospheric Corrosivity Categories C2 or C3 BS EN ISO 12944)

Design life of building (20-60 years without maintenance)
After abrasive blast cleaning SA 2½ (in Works) –
Coats as required of Epoxy Glass Flake Primer-Intermediate coat works applied (White) @ TDFT to achieve performance required but not less than 400microns
The contractor may propose alternative paint systems that meet the performance requirements.
(The paint manufacturer in conjunction with the steelwork contractor shall provide a warranty for the continual durability performance of the product for the stated design life of the building without maintenance)

1.6.9.3 Internal Exposed Steelwork (Option A) – for high architectural finish

Life to first maintenance - 20 years.

After abrasive blast cleaning (in Works) -

Apply Overall by Airless Spray:

1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide primer-intermediate compliant coating (Grey) @ 75 microns nominal dft

On Site (architectural finish coats):

To clean and dry surfaces, after repairs to mechanical damage of the shop applied coating apply to all required areas (colours to Architect's approval):

2 coats Recoatable Polyurethane (to shade) @ 50 microns nominal dft per coat

NB: Dependent on colour requirement and obliteration properties of coating one site coat may be omitted.

Internal Exposed Steelwork (Option B) – for non-architectural finish

Life to first maintenance - 20 years.

After abrasive blast cleaning (in Works) -
Apply Overall by Airless Spray:

1 coat **Two pack epoxy zinc phosphate Protective Finish (**Colour to suit) @ 75 microns nominal dft

1.6.9.4 External Exposed Steelwork (Option A)

Life to first maintenance - 10-15 years Inland.
8-10 years Coastal.

After abrasive blast cleaning (in Works) -

Apply Overall by Airless Spray:

1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide primer-intermediate compliant coating (Grey) @ 175 microns nominal dft

On Site (architectural finish coats):

To clean and dry surfaces, after repairs to mechanical damage of the shop applied coating apply to all required areas (colours to Architect's approval):

2 coats Recoatable Polyurethane (to shade) @ 50 microns nominal dft per coat

NB: Dependent on colour requirement and obliteration properties of coating one site coat may be omitted.

External Exposed Steelwork (Option B – for severe conditions / marine environment)

Life to first maintenance - 20 years Inland
10-15 years Coastal

After abrasive blast cleaning (in Works) -
Apply Overall by Airless Spray:

1 coat Two Pack Epoxy zinc rich coating (Grey) @ 75 microns nominal dft
1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide intermediate compliant coating (Grey) @ 125 microns nominal dft

On Site (architectural finish coats):

To clean and dry surfaces, after repairs to mechanical damage of the shop applied coating apply to all required areas (colours to Architect's approval):

2 coats Recoatable Polyurethane (to shade) @ 50 microns nominal dft per coat
NB: Dependent on colour requirement and obliteration properties of coating one site coat may be omitted.

1.6.9.5 Steelwork to be Treated with Intumescent Fire Protection (Dry Internal Conditions)

Refer to the Intumescent Paint Specification.

1.6.9.6 Steelwork Partially or Fully Immersed in Water or in Damp/Wet Environments

Life to first maintenance - 20 years.

After abrasive blast cleaning (in Works) -

Apply Overall by Airless Spray:

1 coat Hydrocarbon epoxy primer-intermediate compliant coating (Black) @ 500 microns nominal dft or 1 coat epoxy glass flake primer-intermediate compliant coating 400 microns.

1.6.9.7 Galvanising of Steelwork

After abrasive blast cleaning (in works), galvanise in accordance with BS EN ISO 1461 "Hot Dipped Galvanised Coatings on Iron and Steel Articles" with a minimum coating of 85 microns (610 g/m^2).

1.6.9.8 All areas of galvanised steelwork within a masonry cavity in contact with outer leaf are to be additionally protected with 2 coats of bitumastic paint. Min. DFT 200 microns which is compatible with the galvanising.

1.6.9.9 Galvanised Steelwork

To first maintenance - 20 years.

On site painting:

Clean down and degrease using an aqueous detergent solution.
Apply acid etch (T-wash) solution

1 coat surface tolerant epoxy micaceous iron oxide primer @ 75 microns nominal dft

2 coats Recoatable Polyurethane (to shade) @ 50 microns nominal dft per coat

NB: Dependent on colour requirement and obliteration properties of coating one site coat may be omitted.

1.6.9.10 Unpainted Steelwork

Blast clean BS EN ISO 8501 P2

1.6.10 Care and Attention

1.6.10.1 When erection has been completed all steel shall be further inspected and areas marked to indicate where remedial work is required. Areas concerned will be hand or power tool cleaned to BS EN ISO 8501 P2 and treated with the appropriate touch up system.

Areas of damaged paintwork shall be made good and the repair overlap sound paintwork by at least 50mm.

1.6.11 Bolts, nuts and washers shall be class II sherardized for internal use and spun galvanised to give 43 microns minimum coating for external use and only for internal use where specifically stated thus on the drawing. Only bolts up to grade 10.9 shall be galvanised unless agreed otherwise in writing by the Engineer.

Paint Schedule

Paint systems are to be applied in accordance with the schedule below. In addition, reference is to be made to the details of architectural finishes in Appendix C, attached, for the decorative requirements.

		Surface Type (ref. Clause 1.6.9)	Clause
1.	Add description of area with clause reference for appropriate paint system:		
	Steelwork for the external exposed staircase, walkways, balconies		1.6.9.7-9

Table 1.7 Inspections and Tests - Checklist

Information required by the Steelwork Contractor.

1.7.1 Facilities shall be made available at all times to enable inspections and quality monitoring by the Construction Manager or their representative of materials, fabricated items, Quality Plan and Procedures.

Table 1.8 Programme – Checklist

Information required by the Steelwork Contractor.

1.8.1 See Contract documentation for programme.

1.8.2 See Contract documentation for the review periods of any documents and drawings issued by the trade contractor.

1.8.3-4 See construction programme in the contract documentation for all dates.

SECTION 2.0 - MATERIALS

2.1 Material Qualities

Additional Requirement

All the structural steelwork shall be of European manufacture throughout, unless specifically approved, in writing, otherwise, and only from accredited manufacturers. Refer to contract drawings for grade of material.

2.2.3 Dimensions And Tolerances

2.2.3.1 In addition to the standard material and dimensional standards, certain architectural elements as listed in the attached schedule are to be produced to stricter deviations as follows:

Straightness ± 1mm over 2m straight edge on rolled or fabricated section

For clarity, when considering the plumb of the columns, with respect to feature columns, the height of the columns is to be defined as ground floor level to roof.

The section shall be corrected for overall deviation from its nominal centre line on its total length by processing through specialists to achieve an overall straightness of ±1mm end to end.

Hollow sections are to be produced as seamless, where possible. If they are produced with a seam than these are to be concealed in any fabricated section.

Schedule of Architectural Steelwork for Clause 2.2.3.1

Refer to schedule of Architectural finishes in Appendix attached.

SECTION 3.0 – INFORMATION PROVIDED BY THE STEELWORK CONTRACTOR

Add the following to clause 3.5.1.

A drawing register shall be made and used for the control and issue of drawings. It shall incorporate a system so that the erection marks of the components can be readily identified with each drawing.

Add the following to clause 3.8.

"As Erected" Drawings

Add the following:-

The Steelwork contractor shall supply free of charge copies of the finally agreed shop drawings in accordance with the requirements of the Trade Contract Annex.

Where the drawings for fabrication purposes are produced using Strucad or similar, the cost of any alterations to the details due to changes on the Engineer's drawings will be based on the lesser of amending standard individual drawings, or amending the full Strucad model.

SECTION 4 - WORKMANSHIP - GENERAL

Before clause 4.1, add the following

Where any item of this specification is subject to the Engineer's comment the Steelwork Contractor may proceed with this item only after all matters arising from such comment have been fully taken into account by the Steelwork Contractor.

The Engineer's approval of a sample of materials and/or workmanship does not constitute approval of the actual materials and/or workmanship employed in the works but only approval of the particular sample.

Holes are not to be drilled unless otherwise, specifically, agreed in writing by the Engineer and care must be taken to remove burrs to ensure members fit together correctly.

SECTION 5 - WORKMANSHIP – WELDING

Add to the end of clause 5.1

Welding shall be in accordance with the best modern practice and shall be made in such a manner as to minimise distortion and 'locked-in' stresses.

Add clause 5.3.4

5.3.4 Preheating

The steelworker's attention is drawn to the need to pre-heat Grade S355 steel complying with BS EN 10025 and BS EN 10113 as specified in BS EN 1011. Thick grade S275 steel may also require pre-heat.

SECTION 6 - WORKMANSHIP – BOLTING

Add to the end of clause 6.3.2

The preloaded fasteners in friction grip applications shall be used with a 'Coronet' load indicator washer.

Replace clause 6.4.1 with the following

6.4.1 Fit-up

6.4.1.1 Where necessary erection or service bolts are to be provided to secure the mating surfaces prior to inserting the preloaded fasteners and the commencement of torquing operations. Surface areas forming the connection are to be free of oil, paint, loose rust and scale. Manufacturer's markings on rolled sections are to be ground flush where they form part of the contact area of the connection.

6.4.1.2 Provision is to be made in detailing the preloaded fasteners connections for any shims or liners as and when considered necessary to accommodate any lack of fit at site, as excessive straining of members in endeavouring to mate surfaces is not allowed. Connections are to be arranged so as to enable all preloaded fasteners to be correctly fixed and torqued.

6.4.1.3 Connecting surfaces forming preloaded bolted joints shall be in close contact to effectively transfer loads by the induced friction forces generates by the preloaded fasteners. In the event of any joint being considered as unsatisfactory, the Engineer's assessment of the structural adequacy of the joint shall prevail.

Add clause 6.5:

6.5 The Flowdrill Process

The Flowdrill process, as recommended by Corus Plc, Tubes and Pipes, will be considered for joints in simple non-fatigue conditions in rectangular hollow sections up to 12.5mm thick. However, the Steelworker must obtain the prior agreement of the Engineer before adopting this type of connection in the preparation of the fabrication drawings.

SECTION 7 - WORKMANSHIP – ACCURACY OF FABRICATION

Amend clauses 7.2.6, 7.4.9 and 7.5.8.

Delete $\Delta = \frac{L}{500}$ *or* $6mm$
Whichever is greater

Add Deviation = ± 6mm

SECTION 8 - WORKMANSHIP - ERECTION

Add the following paragraph to clause 8.1.6

8.1.6 Column Bases and Slabs

The bases of the steel columns shall be temporarily set to the correct level and positioned using narrow steel packs, steel wedges and the holding down bolts prior to grouting up using SBD Five Star Grout, or a similar non-shrink cementitious grout approved by the Engineers, which shall be used strictly in accordance with the manufacturer's instructions.

SECTION 9 - WORKMANSHIP - ACCURACY OF ERECTED STEELWORK

Amend clause 9.1.3

Delete $\Delta_y or\ \Delta_z = \pm 10mm$
Add $\Delta_y or\ \Delta_z = \pm 5mm$

Also add

The position of the end of the bolt in the concrete shall be set so that any resulting slope of the bolt is not such as to cause difficulties in making the connection to the structural frame. It shall be possible to move the bolt to the full extent of the sleeve provided.

Additional clause

9.3.1 Prior to hand over of steel areas, the steelwork Contractor shall survey all beam ends and beam mid spans to check for level tolerance. Surveys shall be issued to the Design Team in drawing format showing the levels at its' + or – position from true level.

9.5 – Information for Other Contractors

Delete the wording given in the National Steelwork Specification.

Add

The dimensional deviations indicated in clause 9.6 mean only that the Engineer will not reject steelwork as being unstable if the site dimensions of the steelwork are within these noted

deviations. It must be clearly understood that these deviations may not be permitted where and when a higher degree of accuracy could be required as follows:-

(a) As required by the Architect.

(b) As necessary to suit the installation of lifts, escalators or other mechanical plant.

(c) As necessary to suit windows and cladding.

(d) As necessary to suit finishes.

The Trade Contractor shall satisfy himself during the detail drawing period that such items as noted above can be catered for during fabrication and erection. In the event of disagreement over dimensional deviations the Engineers decision will be final, and any costs arising out of such decisions shall be borne by the Trade Contractor.

9.6 – Permitted Deviations of Erected Components

Erected Steelwork Dimensional Deviations; these deviations are to be considered as the maximum normally acceptable for structural stability purposes in accordance with BS EN 1993 or as modified by the specification and are in particular strictly subject to the stipulations of clause 9.5 of the steelwork specification. Rolling tolerances and fabrication tolerances shall be in accordance with the "National Structural Steelwork Specification for Building Construction". Where more than one tolerance may be applied, the most onerous case shall take precedence. **The rolling tolerances, fabrication tolerances and all erected tolerances indicated shall not be considered cumulative.**

Amend clause 9.6.1

Delete $\Delta = \pm 10mm$
Add $\Delta = \pm 5mm$

Amend clause 9.6.3.1

Add maximum = ± 15mm

Amend clause 9.6.4

Add $\Delta = \pm 15mm\ maximum$

Also add

Allowable deviations for buildings greater than 10 stories to be agreed.

Amend clause 9.6.5

Add

Bearing surfaces shall comply with those specified in BS EN 1090 part 2.

Amend clause 9.6.11

This shall include self-weight deflection of steelwork and metal deck. Pre-cambers where indicated shall be out with this tolerance.

Amend clause 9.6.13

Delete maximum = ± 25mm
Add maximum = ± 15mm

SECTION 10 – PROTECTIVE TREATMENT

No amendments.

SECTION 11 – QUALITY ASSURANCE

No amendments.

Add **SECTION 12 DESIGN CALCULATIONS**

12.1 The Steelwork Contractor will be required to submit proof to the Engineer that the connections as shown on his fabrication drawings are capable of resisting the forces and moments shown on the Engineer's drawings and/or other Engineer's data sheets.

Design calculations shall be submitted in accordance with the contract documentation.

12.2 Connections shall not only be structurally adequate but must also be carefully detailed to provide a clean functional appearance and also avoid stress concentrations particularly in welded sections.

Add **SECTION 13 - SITE DIMENSIONS**

13.1 The Steelwork Contractor shall take all necessary dimensions and levels from site to execute and complete his work to suit the Engineer's requirements and other trades in such order and sequence as may be directed in accordance with the Construction Manager's programme charts from commencement to completion of his work.

13.2 In this regard the Steelwork Contractor shall take particular care to ensure sufficient site dimensions, including the plumbing of any existing internal and external walls, have been taken to ensure the steelwork fits the site throughout the full height of the steelwork structure.

13.3 The Steelwork Contractor shall be responsible for the positioning and levelling of all the steelwork, the plumbing of columns and the placing of each section with accuracy in accordance with the relevant drawings and shall amend or make good as necessary any fabrication or erection defects resulting from dimensional errors at his own expense.

13.4 The Steelwork Contractor is responsible for taking site dimensions where steelwork is fixed to an existing concrete face.

Add **SECTION 14 - STEEL CASTINGS**

14.1 The steel quality in the castings should be equivalent to a weldable grade S355 JR steel, in accordance with BS EN 10025. The cast equivalent is to be in accordance with EN 10088 (2005) corrosion resistant supplied in the normalised condition.

14.2 TESTING AND INSPECTION PLAN

14.2.1 SURFACE FINISH

Surface Cleanliness	Shot blast to SA2.5 standards
Surface Texture	By comparison to ASTM A802
	APPENDIX A**ACCEPTANCE**
Surface Texture	Level A3 (max)
Gas	Level C3

Sand	Level B2
Surface Laps	Level D1
Mechanical Dressing	Level H3

14.2.2 CASTING INTEGRITY

SURFACE REQUIREMENT

Crack Detection	To BS EN 1369 – 2012, Level 4

VOLUMETRIC INTERNAL REQUIREMENTS

X-ray	To ASTM E446 Level 3

14.2.3 FREQUENCY AND AREAS FOR TEST

Surface Finish	100% visual examination all castings	
Crack Detection	Samples: Bulk:	100% coverage Methods features, fillets and all changes of section
Radiography	Samples only:	100% coverage

14.2.4 MECHANICAL TEST

Tensile and charpy test on a one per heat basis, indicating yield, elongation, BHN, chemical analysis - all from separately cast test bars.

Tensile test pieces would be machined in accordance with BS.EN 10.002-1-1990 and impact test pieces BS 10.045-1-1990.

Chemical analysis tests would be carried out in accordance with BS EN 10293:2015 in conjunction with BS EN ISO 9002, 1994 approval using certified reference materials traceable to British Standards.

14.2.5 WELD REPAIRS

Cosmetic Welding

To be carried out without prior sanction, a cosmetic weld is not greater than 10% of thickness. Weld repairs would be carried out in accordance with BS 4570. Weld maps to be produced for structural welds only, structural repairs to be approved by client.

14.2.6 INSPECTION OF WELD REPAIRS

Cosmetic Welds	To be inspected by crack detection after suitable heat treatment.
Structural Welds	To be inspected by ultrasonic examination and crack detection on completion of suitable heat treatment.

14.2.7 OUTSIDE INSPECTION

Facilities are to be provided for independent testing visits to be carried out by nominated inspection authority of client.

NB All inspection functions, i.e. crack detection, radiography and visual would be carried out by approved internal inspection personnel.

Mechanical testing is to be carried out by approved test house.

14.2.8 DIMENSIONAL TOLERANCE (CAST)

In accordance with BS 6615, 1996 grade CT 10.

14.2.9 CERTIFICATES OF CONFORMITY

Certificates of conformity to be provided on a one per order basis.

14.2.10 DIMENSIONAL VERIFICATION

Initial samples are to be fully marked out for approval prior to bulk production.

14.2.11 CERTIFICATION PACKAGE

To be supplied at end of contract.

APPENDIX A

SPECIFICATION FOR PROFILED METAL DECKING

A.1 The metal decking should be of such form, gauge and material that full composite action can develop with the concrete topping to the depths as shown on the drawings, all in accordance with BS EN 1994 part 4 .

A.2 The composite section must be capable of sustaining the loads as specified on the drawings (partition load to be taken as dead) together with its own weight

A.3 The Engineer's design has been based on the use of a *re-entrant* profile decking of height *60*mm and not the use of a *trapezoidal deck**.

A.4 The metal decking must be capable of supporting the wet weight of *lightweight** concrete to the overall depths shown on the drawings, together with a construction super-load of 1.5 kN/m² without propping. If the spans vary the gauge of the decking may need to change to enable unpropped construction. Refer to BS EN 1994-1.1 CLAUSE 9.6 AND NA BS EN 1994 for deflection criteria

(The tenderer is required to submit with his tender details of the thicknesses of the decks and types of edge trims included within his tender price).

If any propping is required in exceptional circumstances, the decking contractor is to identify these at time of tender.

A5 The metal decking should be zinc coated to a total weight, including both sides, of 275g/m² in accordance with BS EN10346.

A.6 The metal deck should provide a fixing system to the soffit for the suspension of services and false ceiling. The fixing points should be at a maximum spacing of 600mm in each direction and capable of supporting a uniform load of 1.0 kN/m². (If this item is extra to the normal deck price, the additional cost should be itemised separately by the Tenderer).

A.7 The decking contractor must submit for approval by the Engineer the following information:

i) Calculations covering connection design.
ii) General arrangement drawings.
iii) Decking detail drawings.
iv) Q.A. plan.
v) Method statement for erection, including risk assessments.
vi) Material test certificates.

A.8 The decking shall include all edge trims and void fillers etc. in connection with edge trims, in locations as indicated on the drawings, to facilitate the placing of the concrete topping. (Concrete topping is by other trades).

A.9 The decking shall be taped at all joints, perimeters and columns to prevent grout leakage.

* Engineer to amend as required.

APPENDIX B

SPECIFICATION FOR STUD WELDING AND THE LAYING OF METAL DECKING

B.1 (a) All tools and equipment used in stud welding procedures must be used strictly in accordance with the manufacturer's instructions and/or recommendations.

(b) All stud welding operatives employed on the site must have attended a recognised course on the operation of the particular welding equipment to be used and must be certified by the equipment manufacturer as competent in its use.

B.2 (a) Before starting stud welding operations, or after equipment has been moved or left unused for any period of time, test welds should be done. The initial test welds shall be undertaken in the presence of the Engineer and or Local Authority's representative.

(b) Two studs shall be welded and then bent to an angle of 30 degrees from the original axis. This can be done by placing a pipe over the stud and levering to the required test angle. If failure occurs in the weld zone of either stud, correct or adjust the equipment set-up and repeat the test until two consecutive studs are welded and found to be satisfactory. Production welding can then commence.

(c) If studs, on visual inspection, do not show a 360 degree weld fillet, these studs should be bent 15 degrees from the vertical positions towards the nearest end of the beam. If the weld shows no fracture, these studs should be considered acceptable, and left in the bent condition. Studs failing this test should be replaced.

(d) The first and last stud on every beam shall be tested as a minimum requirement by bending to an angle of 15^{o} towards the nearest end. If one or more of the studs fails, a further 5% with a minimum of 2 shall be tested and if no further studs fail, the remainder of the studs shall be accepted. If further studs fail, the studs over the entire beam length shall be replaced and tested again, and studs failing during testing shall be replaced. Also allow for 100% ring tests.

B.3 (a) The decking shall be laid butt fitted longitudinally and have the shear connectors welded in a suitable pattern, i.e. one per valley on each sheet or staggered, as specified on the Engineer's drawings. The decking shall have sufficient temporary fixings to ensure the correct operation of the stud welding equipment.

(b) The spacing of the shear connectors across the metal decking will generally be governed to a maximum of one shear connector per valley. The minimum centre to centre spacing of stud connections in the above transverse axis, along the composite beam, should be not less than 6 stud diameters. The connectors shall further be welded, wherever possible, directly over the web of the composite beam. If studs are to be welded to the flange, the diameter shall be no greater than 2½ times the flange thickness. The spacing of these studs from the edge of the beam towards the web should also be approximately 2½ times the stud diameter.

(c) All spacing of the shear connectors shall comply with the shear stud manufacturer's requirements.

B.4 (a) The flange of the beam to be welded shall be unpainted and free of rust and mill scale, dirt, sand and/or other materials detrimental to welding. The top flange shall be cleaned as necessary prior to laying the metal decking, to ensure that the shear connector can be welded satisfactorily.

(b) Decking materials shall also be free of materials - listed above - which are detrimental to welding. Any water on the deck or beams must be removed before welding.

(c) Decking shall be laid in dry weather just ahead of the stud welding team. In wet weather, cover must be provided and the conditions for water, above, rigidly observed.

(N.B. It may be possible to lay additional decking overhead to provide weather protection).

(d) The decking must fit tightly to the beam where a shear connector is to be welded - no air gaps must be permitted.

Appendix D. Outline Specification for steelwork

Ain

Specification for Structural Steelwork

227 Shepherds Bush Road

Date:	16/01/2025	**Issue:**	P01
Reference:	10428560	**Status:**	Issued
Prepared by:	R. Bowden	**Date:**	09/01/2026
Edited by:	-	**Date:**	-
Authorised by:	D. Staddon	**Date:**	16/01/2026
Issuing office:	Blackfriars		

DOCUMENT CONTROL

Issue	Date	Status	HDR Author	HDR Approval	Notes
P01	16/01/26	Issued	R. Bowden	S. Staddon	Issued for Stage 3 Delivery

The findings and opinions provided in this document are given in good faith and are subject to the limitations and constraints imposed by the methods and information sources described in this report. Factual information, including, where stated, a visual inspection of the site, has been obtained from a variety of sources. HDR Consulting assumes the third-party data to be reliable, but has not independently confirmed this; therefore, HDR Consulting cannot and does not guarantee the authenticity or reliability of third-party information it has relied upon.

The findings and opinions presented in this report are relevant to the dates when the assessment was undertaken but should not necessarily be relied upon to represent conditions at a substantially later date. Further information, ground investigation, construction activities, change of site use, or the passage of time may reveal conditions that were not indicated in the data presented and therefore could not have been considered in the preparation of the report. Where such information might impact upon stated opinions, HDR Consulting reserves the right to modify the opinions expressed in this report. Where opinions expressed in this report are based on current available guidelines and legislation, no liability can be accepted by HDR Consulting for the effects of any future changes to such guidelines and legislation.

The limitations of liability of HDR Consulting for the contents of this document have been agreed with the Client, as set out in the terms and conditions of offer and related contract documentation.

CONTENTS:

INTRODUCTION

General

a. This specification should be read in conjunction with all accompanying tender documentation and the contract documents. This specification is to be read in conjunction with the National Structural Steelwork Specification for Building Construction, 7th Edition including such relevant specifications and codes referred to within, except as modified by the following clauses.

b. All clauses in the National Structural Steel Specification not noted below shall apply in their entirety. Should there be a conflict in the specified requirements these shall be brought to the attention of the Engineer for resolution prior to proceeding.

DEFINITIONS

Refer to Page 13 of the National Structural Steelwork Specification for building construction, 7th Edition.

a. The term Employer in this specification shall mean: 227 SBR Ltd

b. The term Project Manager shall mean: 227 SBR Ltd

c. The term Contract Administrator shall mean: N/A

d. The term Engineer shall mean: HDR

e. The term Architect shall mean: Space Agent

f. The term Quantity Surveyor/ Cost Consultant shall mean: TBC

g. The term CDM Principal Designer shall mean: TBC

h. The Services Consultant shall mean: Oakley M&E Design

i. The Local Authority shall mean: London Borough of Hammersmith & Fulham Council

j. The term Main Contractor shall mean: the Contractor responsible for completion of the works

k. The term Demolition Contractor shall mean: TBC

l. The term Asbestos Consultant shall mean: TBC

1 SECTION 1.0 - INFORMATION REQUIRED BY STEELWORK CONTRACTOR

Project Specification for Structural Steelwork

1.1.1 The checklists given in Tables 1.1 to 1.7 set out information which is shown on the design drawings and contained within the project specification.

1.1.2 The structural steelwork is to be provided strictly in accordance with the current edition of BS EN 1993-1-1:2005+A1:2014 Design of steel structures. General rules and rules for buildings (incorporating corrigenda February 2006 and April 2009) and BS EN 1090-2-2018 Execution of steel structures and Aluminium structures, together with the National Structural Steelwork Specification 7th Edition (NSSS), including such relevant specifications and codes referred to within, except as modified by the following clauses.

1.1.3 Should there be a conflict in specified requirements, the project specification takes precedence over other documents.

1.1.4 All current amendments shall be complied with and the National Building Regulations/Local Authority Bye-Laws notwithstanding any omission of such requirements in this specification, and as indicated or implied on the drawings prepared by the Engineer.

1.1.5 The specification should be read in conjunction with all accompanying tender documentation and Conditions of Contract.

Table 1.1 Proposed Works – Checklist

i. The development comprises the following:
   - Construction of an additional 2 storey vertical steel frame extension, creating residential units with step back balconies
   - The proposed extension is to also create a new flat roof level with plant space and photovoltaics proposed at roof level.

ii. The building is proposed for residential use.

iii. Details of the site and the constraints that need to be considered are to be provided in the contract documents.

iv. The building class in accordance with the building regulations is provided in the contract documents.

v. External parts of the structure include balconies, walkways and steel staircases, refer to the contract documents for further details.

vi. No parts of the structure are Execution Class 1

vii. No parts of the structure are Execution Class 3 or 4.

1.2 Design

Only 1 Clause 1.2A is included. Clauses 1.2B and 1.2C are 'Not Used'.

Table 1.2A Design – Checklist

When the Steelwork Contractor carries out detailing of the steelwork based on the member design prepared by the Engineer.

Information Required by the Steelwork Contractor

1.2.1 Connections are to be designed to develop the forces indicated on the design drawings and must be carefully detailed to provide a clean functional appearance. The steelworker is required to discuss and submit conceptual designs of the connections to the Engineer prior to detailing.

Generally connections are simple and only splices or cantilevers are required to develop moments unless noted otherwise on the drawings. The detailing is to avoid stress concentrations particularly in welded sections. The design of all connections and other items associated with fabrication and erection shall be the sole responsibility of the steelworker. The connections should be carefully considered to ensure that they make adequate provision for adjustment to achieve the tolerances laid down in this Specification and elsewhere in the contract documents.

1.2.2 For a list of the contract design drawings refer to the contract documentation available from the Contract Administrator. The steelwork is to be provided in accordance with the Engineer's design as indicated or implied on the Engineer's drawings unless instructed otherwise on further drawings or equivalent electronic data and documents that may be issued as the work proceeds.

1.2.3 Refer to Contract Documentation for specifics of document management systems to be used.

1.2.4 BS EN 1993-1-8:2005 is to be used in design of all connections.

1.2.5 Member forces and end reactions are shown on the drawings. Unless otherwise noted, the loads are expressed as factored ultimate loads in accordance with BS EN 1993-1-1:2005.

1.2.6 There are no adverse environmental conditions to affect detailing. If any exist, they should be stated by the Steelwork Contractor.

1.2.7 Details and locations of any temporary works assumed by the Engineer in the design will be indicated on the contract drawings. However, any temporary bracing required for stability during erection will be the responsibility of the Steelwork Contractor.

1.2.8 The Steelwork Contractor must submit for approval by the Engineer the following information:

i) Calculations covering connection design.
ii) General arrangement drawings.
iii) Steelwork detail drawings.
iv) Q.A. plan.
v) Method statement for erection, including risk assessments.
vi) Material test certificates.
vii) Weld test certificates.

1.2.9 Welding across tension flanges of key elements such as transfer beams.

1.2.10 The steel grade is to be S355 to BS EN 100245 and designation of the steel to be used is shown on the contract drawings.

1.2.11 The Steelwork Contractor shall allow for all cleats, brackets, end plates, stiffeners, gussets, shear plates etc. as and where deemed necessary for fabrication, connection and site erection purposes. The Engineer may indicate some specific stiffeners etc. where the structural design is improved by their inclusion.

1.2.12 Bolts for all shear connections to be Grade 8.8. Preloaded bolts in category C connections (see EN 1993 1-8 cl 3.4.1) should be used in all bracing connections and for splices in beams and trusses.

The use of grade 4.6 bolts is strictly restricted to minor connections as defined by the Engineer, e.g. purlin and sheeting rail connections, and is subject to written agreement.

Holding down bolts may be Grade 4.6 unless in direct tension where Grade 8.8 shall be used.

1.2.13 A foundation plan is provided showing the locations and details of the holding down bolts required to be supplied to the concrete contractor by the steelwork contractor.

The steelwork contractor will issue a dimensioned drawing to enable the sub-structure works contractor to cast these bolts into the structure.

1.2.14 See clause 8.1.6 for type of grout to be used and the contract drawings for the thicknesses.

1.2.15 Refer to the drawings for typical steelwork details.

1.2.16 For details of cut-outs, holes or fittings refer to drawings and also agree the procedure for the integration of interfaces requirements of other trade-contractors. Refer to the contract documentation for details.

1.2.17 For camber requirements refer to the contract drawings as listed in the package documents.

1.2.18 Punched holes may not be used in connections without written approval of the Engineer.

1.2.19 Design and detail connections so as not to encroach upon architectural clearance lines, finishes or other secondary members required for the support of cladding or other 'secondary' structural elements.

1.2.20 Where connections between beams and columns and the like result in a loss of bearing to the metal deck, design and provide support for the metal deck.

1.2.21 Design and provide end bearing connections of inclined members such that the bearing plane between the inclined members and their supporting members is horizontal.

Table 1.3 Building Information Modelling (BIM)- Checklist

1.3.1 For additional requirements regarding BIM refer to the contract documents.

Table 1.4 Workmanship - Checklist

Information required by the Steelwork Contractor.

1.4.1 Hardstamping on exposed Architectural elements shall be as follows:

i) Beams - mark top flange

ii) Columns - mark underside of baseplate or tab plate/cleat for incoming beam connections on the connecting face.

iii) Lifting/Craneage beams to be stamped on web with safe working load capacity.

1.4.2 Weld procedures for all or any site welding will be prepared and submitted to the Engineer in reasonable time for review prior to commencing the work on site. The information shall be presented in a schedule form similar to **TABLE B EXTENT OF ROUTINE SUPPLEMENTARY NDT** identifying material types and procedures in Annex B of NSSS.

The fabricator's job specific Quality Plan shall be made available to the Engineer for inspection.

Procedures for any special welding for plate girders or "made-up" sections must be presented in reasonable time allowing 10 working days for review by the Engineer prior to commencing work in the shops.

Plates behind all major welds shall be free from laminations. The cost of tests to demonstrate this shall be borne by the Steelwork Contractor as part of the fabrication inspection and quality control process.

1.4.3 Temporary holes and attachments are required to be blanked or removed on all Architecturally visible elements of the structure. See drawings for locations.

1.4.4 Test Plates

1.4.4.1 The Steelwork Contractor, when required, shall send test pieces to an approved laboratory with sample pieces as selected and marked by the Engineer being provided free of charge. The costs of all tests shall be borne by the Steelwork Contractor.

1.4.4.2 All important compression flanges as noted on the drawings shall be tested as necessary for laminar defects by ultrasonic methods and shall be replaced if not in accordance with BS EN 10160 to be free from laminar defects . Plates behind all major welds shall be free of laminations.

The cost of these tests shall be borne by the Steelwork Contractor as part of the fabrication inspection and quality control process.

1.4.5 Weld inspection shall be carried out by the fabricator or by an independent specialist consultant. The inspection method shall be as defined in Table B of the National Steelwork Specification. Where weld-sizes are less than tabulated a minimum of 10% of welds shall be inspected using the M.P.I. method.

1.4.6 Special requirements regarding welding acceptance criteria.

1.4.6.1 The Steelwork Contractor shall be solely responsible for ensuring that all work is in accordance with the specification and to good standards of workmanship; no exceptions can be made on the grounds that the Engineers or their representatives may have inspected some part of parts of the work at some stage during production.

1.4.6.2 The costs of any welder's tests, which may be required, shall be at the expense of the Steelwork Contractor, including any specialist fee for witnessing and/or testing the coupon plates.

1.4.6.3 The cost of any remedial measures taken on defective welds shall be borne by the Steelwork Contractor, including the cost of any specialists' fees incurred by the Inspection Authority in additional work on defective welds.

1.4.6.4 All webs forming castellated beams, including those for infill plates shall be full strength butt welds with edge preparation as necessary to ensure the parent web thickness is fully developed along joints.

1.4.6.5 Site welding should be avoided if possible but in the event of special circumstances necessitating the adoption of such connections a method statement, detailing the proposed procedures, should be submitted for comment and written permission must be obtained prior to the commencement of any relevant operations. All site welds are to be subject to non-destructive testing.

Untested site welds will only be permitted for minor connections, with the express permission of the Engineer. These welds shall be designed to a reduced stress of 50% of the normal design stress.

1.4.6.6 The proportion of Magnetic Particle Inspection of fillet welds set out of Annex B: Table B of NSSS shall also apply to welds of less than 10mm leg length

- All welded connections supporting hangers from trusses and transfer girders shall be subjected to 100% NDT.
- All butt welds for splicing the elements of trusses or plates in transfer girders, whether in the shop or on site, shall be subjected to 100% ultrasonic inspection.
- All special or unusual welds, as indicated on the structural drawings, shall be subject to 100% NDT.

Non-destructive testing shall be either MPI for fillet welds or Ultrasonic for butt welds

Table 1.5 Erection - Checklist

Information required by the Steelwork Contractor.

1.5.1 Refer to Contract Documents for all site plan details, logistics and access requirements or restrictions and details of adjacent services and obstructions Erection procedures and erection bracing are the sole responsibility of the Steelwork Contractor.

1.5.2 Refer to 1.4.1.

1.5.3 to 9 Refer to Contract Documentation.

1.5.10 A safe site handling procedure is required in order to comply with clause 8.3.1 of the National Steelwork Specification. The format of this certificate is to be included in the Steelwork Contractor's erection method statement which must be approved by the Engineer prior to erection commencing.

Table 1.6 Protective Treatment - Checklist

Information required by the Steelwork Contractor.

1.6.1 Environmental Protection Act

All paint systems must comply with the Environmental Protection Act (EPA) - 1990 EPA-PG6/23 and any amendments thereof.

As of April 1998, the permitted limits for volatile organic compounds (VOC) emissions into the atmosphere were as follows:

Blast/weldable primer	780g/l
Protective Finishes	420g/l
Primers/Intermediates	250g/l
Finishes	420g/l

A protective finish is defined as a single coat application at works that will receive no further coatings either at works or on site.

Primers or Intermediate coats are defined as individual components applied at works that will be overcoated with a finish coat to provide a complete system.

1.6.2 Handling

Painted steelwork shall not be handled until an adequate drying/curing period has been allowed in accordance with the recommendations of the particular paint supplier.

The methods and equipment used to handle the coated steelwork shall be selected to minimise any damage to the painted components. The steelwork may include such design features as lifting holes and lugs to assist in minimising the potential damage due to handling.

1.6.3 Transportation

Separators shall be provided to prevent steel to steel contact and shall be adequate for intended use. It is essential that coatings are protected from the possible effects of ponded water.

1.6.4 Storage

Coated components shall be stored clear of the ground, separated by timber packers and so that ponding does not occur.

1.6.5 Finished Appearance (Intumescent Paint)

For finished appearance, refer to the Intumescent Paint Specification.

1.6.6 Inspection

The nominated steelwork contractor and site applicator will alert the Engineer and the Paint Supplier 10 working days prior to start of the application programme, both at the works and on site. They will permit them to inspect the work in progress, and prepare inspection reports in accordance with their requirements. The Paint Supplier will forward a copy of any inspection report direct to the Engineer and make his comments known to the applicator and steelwork contractor.

1.6.7 Surface Preparation Prior to Paint Application

1.6.7.1 Blast cleaning shall be by an airless system using ball shot to BS EN ISO 8501 P3. (The use of grit in blast cleaning operations may require variations in type and thickness of prefabrication primer and the steelwork contractor must obtain written agreement to any such Specification variation prior to the commencement of any surface treatment).

1.6.7.2 The blast cleaning and application of the prefabrication primer, if required, is to be carried out as a continuous operation so that the prefabrication primer is applied to a thoroughly clean and dry surface within four hours of the surface being ball blasted and before any deterioration of the surface has taken place.

Note: A pre-fabrication primer is to be used in the preparation of all steelwork unless agreed otherwise in writing by the Engineer. Such agreement will only be provided on production of suitable evidence from the fabricator that a pre-fabrication primer is not required.

1.6.7.3 Particular care must be taken when selecting the correct prefabrication primer and its suitability for any subsequent welding operations. Welds to be blast cleaned to accord with the Specification requirements.

1.6.8 Preparation and Painting

1.6.8.1 The materials used for the various coats shall be manufactured by the same suppliers, and the Steelwork Contractor shall confirm compatibility of all subsequent coats in his method statement see Clause 10.1.2.

1.6.8.2 Sections of the structure noted on the drawings as being encased in concrete are not be painted except for the usual contact and concealed surfaces.

1.6.8.3 Paint should not be applied to the top flange of those beams to which through deck stud welding is to be applied.

1.6.8.4 Where necessary, remove weld spatter and smooth weld seams or sharp edges. The welds and adjacent areas should be thoroughly degreased and cleaned by thorough mechanical hand abrasion to remove contamination and provide a profile. The steel should be 'bright' but not polished.

1.6.8.5 Stripe coating of welds and any other areas of difficult access is to be carried out by brush prior to the spray application of the specified primer.

1.6.8.6 Nominal dry film thickness (dft) is defined as the average of the readings obtained using a dft gauge in a particular scheduled area. These readings should equal or exceed the specified nominal dry film thickness and in no case should any reading be less than 75% of the specified nominal dry film thickness.

Readings should be taken at 2 readings per metre on the web and two per metre on the various flange faces for ordinary paints.

For intumescent paints, refer to the requirements in the Intumescent Paint Specification.

1.6.8.7 Remedial Work

Early degradation of coatings by blistering, peeling, flaking, cracking, or lack of adhesion must be made good by complete removal, preparation, and re-application of all coats as instructed.

Inadequate dry film thickness or surface defects due to inclement weather must be rubbed down and further coats applied as instructed.

Any areas mechanically damaged in transit to be touched up with a surface tolerant epoxy to meet the original works DFT.

1.6.9 Paint System Specifications

For schedule of locations requiring treatment see attached table and refer to the contract drawings. For details of Architectural finishes and intumescent paint locations refer to Appendix attached.

1.6.9.1 Internal Non-Exposed Dry Environment

Life to first maintenance - 20 years.

After abrasive blast cleaning (in works) -

Apply Overall by Airless Spray:

1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide protective finish coating (Grey) @ 75 microns nominal dft

1.6.9.2a Cavity Areas (Atmospheric corrosivity category C2 BSEN ISO 12944)

Design life of building (not exceeding 20 years)
After abrasive blast cleaning (in Works)
Apply Overall by Airless Spray
1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide primer-intermediate compliant coating (Grey) @ 175 microns nominal dft

1.6.9.2b Inaccessible Cavity Areas (Atmospheric Corrosivity Categories C2 or C3 BS EN ISO 12944)

Design life of building (20-60 years without maintenance)
After abrasive blast cleaning SA 2½ (in Works) –
Coats as required of Epoxy Glass Flake Primer-Intermediate coat works applied (White) @ TDFT to achieve performance required but not less than 400microns
The contractor may propose alternative paint systems that meet the performance requirements.
(The paint manufacturer in conjunction with the steelwork contractor shall provide a warranty for the continual durability performance of the product for the stated design life of the building without maintenance)

1.6.9.3 Internal Exposed Steelwork (Option A) – for high architectural finish

Life to first maintenance - 20 years.

After abrasive blast cleaning (in Works) -

Apply Overall by Airless Spray:

1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide primer-intermediate compliant coating (Grey) @ 75 microns nominal dft

On Site (architectural finish coats):

To clean and dry surfaces, after repairs to mechanical damage of the shop applied coating apply to all required areas (colours to Architect's approval):

2 coats Recoatable Polyurethane (to shade) @ 50 microns nominal dft per coat

NB: Dependent on colour requirement and obliteration properties of coating one site coat may be omitted.

Internal Exposed Steelwork (Option B) – for non-architectural finish

Life to first maintenance - 20 years.

After abrasive blast cleaning (in Works) -
Apply Overall by Airless Spray:

1 coat **Two pack epoxy zinc phosphate Protective Finish (**Colour to suit) @ 75 microns nominal dft

1.6.9.4 External Exposed Steelwork (Option A)

Life to first maintenance - 10-15 years Inland.
8-10 years Coastal.

After abrasive blast cleaning (in Works) -

Apply Overall by Airless Spray:

1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide primer-intermediate compliant coating (Grey) @ 175 microns nominal dft

On Site (architectural finish coats):

To clean and dry surfaces, after repairs to mechanical damage of the shop applied coating apply to all required areas (colours to Architect's approval):

2 coats Recoatable Polyurethane (to shade) @ 50 microns nominal dft per coat

NB: Dependent on colour requirement and obliteration properties of coating one site coat may be omitted.

External Exposed Steelwork (Option B – for severe conditions / marine environment)

Life to first maintenance - 20 years Inland
10-15 years Coastal

After abrasive blast cleaning (in Works) -
Apply Overall by Airless Spray:

1 coat Two Pack Epoxy zinc rich coating (Grey) @ 75 microns nominal dft
1 coat Two Pack epoxy zinc phosphate/micaceous iron oxide intermediate compliant coating (Grey) @ 125 microns nominal dft

On Site (architectural finish coats):

To clean and dry surfaces, after repairs to mechanical damage of the shop applied coating apply to all required areas (colours to Architect's approval):

2 coats Recoatable Polyurethane (to shade) @ 50 microns nominal dft per coat
NB: Dependent on colour requirement and obliteration properties of coating one site coat may be omitted.

1.6.9.5 Steelwork to be Treated with Intumescent Fire Protection (Dry Internal Conditions)

Refer to the Intumescent Paint Specification.

1.6.9.6 Steelwork Partially or Fully Immersed in Water or in Damp/Wet Environments

Life to first maintenance - 20 years.

After abrasive blast cleaning (in Works) -

Apply Overall by Airless Spray:

1 coat Hydrocarbon epoxy primer-intermediate compliant coating (Black) @ 500 microns nominal dft or 1 coat epoxy glass flake primer-intermediate compliant coating 400 microns.

1.6.9.7 Galvanising of Steelwork

After abrasive blast cleaning (in works), galvanise in accordance with BS EN ISO 1461 "Hot Dipped Galvanised Coatings on Iron and Steel Articles" with a minimum coating of 85 microns (610 g/m^2).

1.6.9.8 All areas of galvanised steelwork within a masonry cavity in contact with outer leaf are to be additionally protected with 2 coats of bitumastic paint. Min. DFT 200 microns which is compatible with the galvanising.

1.6.9.9 Galvanised Steelwork

To first maintenance - 20 years.

On site painting:

Clean down and degrease using an aqueous detergent solution.
Apply acid etch (T-wash) solution

1 coat surface tolerant epoxy micaceous iron oxide primer @ 75 microns nominal dft

2 coats Recoatable Polyurethane (to shade) @ 50 microns nominal dft per coat

NB: Dependent on colour requirement and obliteration properties of coating one site coat may be omitted.

1.6.9.10 Unpainted Steelwork

Blast clean BS EN ISO 8501 P2

1.6.10 Care and Attention

1.6.10.1 When erection has been completed all steel shall be further inspected and areas marked to indicate where remedial work is required. Areas concerned will be hand or power tool cleaned to BS EN ISO 8501 P2 and treated with the appropriate touch up system.

Areas of damaged paintwork shall be made good and the repair overlap sound paintwork by at least 50mm.

1.6.11 Bolts, nuts and washers shall be class II sherardized for internal use and spun galvanised to give 43 microns minimum coating for external use and only for internal use where specifically stated thus on the drawing. Only bolts up to grade 10.9 shall be galvanised unless agreed otherwise in writing by the Engineer.

Paint Schedule

Paint systems are to be applied in accordance with the schedule below. In addition, reference is to be made to the details of architectural finishes in Appendix C, attached, for the decorative requirements.

		Surface Type (ref. Clause 1.6.9)	Clause
1.	Add description of area with clause reference for appropriate paint system:		
	Steelwork for the external exposed staircase, walkways, balconies		1.6.9.7-9

Table 1.7 Inspections and Tests - Checklist

Information required by the Steelwork Contractor.

1.7.1 Facilities shall be made available at all times to enable inspections and quality monitoring by the Construction Manager or their representative of materials, fabricated items, Quality Plan and Procedures.

Table 1.8 Programme – Checklist

Information required by the Steelwork Contractor.

1.8.1 See Contract documentation for programme.

1.8.2 See Contract documentation for the review periods of any documents and drawings issued by the trade contractor.

1.8.3-4 See construction programme in the contract documentation for all dates.

SECTION 2.0 - MATERIALS

2.1 Material Qualities

Additional Requirement

All the structural steelwork shall be of European manufacture throughout, unless specifically approved, in writing, otherwise, and only from accredited manufacturers. Refer to contract drawings for grade of material.

2.2.3 Dimensions And Tolerances

2.2.3.1 In addition to the standard material and dimensional standards, certain architectural elements as listed in the attached schedule are to be produced to stricter deviations as follows:

Straightness ± 1mm over 2m straight edge on rolled or fabricated section

For clarity, when considering the plumb of the columns, with respect to feature columns, the height of the columns is to be defined as ground floor level to roof.

The section shall be corrected for overall deviation from its nominal centre line on its total length by processing through specialists to achieve an overall straightness of ±1mm end to end.

Hollow sections are to be produced as seamless, where possible. If they are produced with a seam than these are to be concealed in any fabricated section.

Schedule of Architectural Steelwork for Clause 2.2.3.1

Refer to schedule of Architectural finishes in Appendix attached.

SECTION 3.0 – INFORMATION PROVIDED BY THE STEELWORK CONTRACTOR

Add the following to clause 3.5.1.

A drawing register shall be made and used for the control and issue of drawings. It shall incorporate a system so that the erection marks of the components can be readily identified with each drawing.

Add the following to clause 3.8.

"As Erected" Drawings

Add the following:-

The Steelwork contractor shall supply free of charge copies of the finally agreed shop drawings in accordance with the requirements of the Trade Contract Annex.

Where the drawings for fabrication purposes are produced using Strucad or similar, the cost of any alterations to the details due to changes on the Engineer's drawings will be based on the lesser of amending standard individual drawings, or amending the full Strucad model.

SECTION 4 - WORKMANSHIP - GENERAL

Before clause 4.1, add the following

Where any item of this specification is subject to the Engineer's comment the Steelwork Contractor may proceed with this item only after all matters arising from such comment have been fully taken into account by the Steelwork Contractor.

The Engineer's approval of a sample of materials and/or workmanship does not constitute approval of the actual materials and/or workmanship employed in the works but only approval of the particular sample.

Holes are not to be drilled unless otherwise, specifically, agreed in writing by the Engineer and care must be taken to remove burrs to ensure members fit together correctly.

SECTION 5 - WORKMANSHIP – WELDING

Add to the end of clause 5.1

Welding shall be in accordance with the best modern practice and shall be made in such a manner as to minimise distortion and 'locked-in' stresses.

Add clause 5.3.4

5.3.4 Preheating

The steelworker's attention is drawn to the need to pre-heat Grade S355 steel complying with BS EN 10025 and BS EN 10113 as specified in BS EN 1011. Thick grade S275 steel may also require pre-heat.

SECTION 6 - WORKMANSHIP – BOLTING

Add to the end of clause 6.3.2

The preloaded fasteners in friction grip applications shall be used with a 'Coronet' load indicator washer.

Replace clause 6.4.1 with the following

6.4.1 Fit-up

6.4.1.1 Where necessary erection or service bolts are to be provided to secure the mating surfaces prior to inserting the preloaded fasteners and the commencement of torquing operations. Surface areas forming the connection are to be free of oil, paint, loose rust and scale. Manufacturer's markings on rolled sections are to be ground flush where they form part of the contact area of the connection.

6.4.1.2 Provision is to be made in detailing the preloaded fasteners connections for any shims or liners as and when considered necessary to accommodate any lack of fit at site, as excessive straining of members in endeavouring to mate surfaces is not allowed. Connections are to be arranged so as to enable all preloaded fasteners to be correctly fixed and torqued.

6.4.1.3 Connecting surfaces forming preloaded bolted joints shall be in close contact to effectively transfer loads by the induced friction forces generates by the preloaded fasteners. In the event of any joint being considered as unsatisfactory, the Engineer's assessment of the structural adequacy of the joint shall prevail.

Add clause 6.5:

6.5 The Flowdrill Process

The Flowdrill process, as recommended by Corus Plc, Tubes and Pipes, will be considered for joints in simple non-fatigue conditions in rectangular hollow sections up to 12.5mm thick. However, the Steelworker must obtain the prior agreement of the Engineer before adopting this type of connection in the preparation of the fabrication drawings.

SECTION 7 - WORKMANSHIP – ACCURACY OF FABRICATION

Amend clauses 7.2.6, 7.4.9 and 7.5.8.

Delete $\Delta = \frac{L}{500}$ *or* $6mm$
Whichever is greater

Add Deviation = ± 6mm

SECTION 8 - WORKMANSHIP - ERECTION

Add the following paragraph to clause 8.1.6

8.1.6 Column Bases and Slabs

The bases of the steel columns shall be temporarily set to the correct level and positioned using narrow steel packs, steel wedges and the holding down bolts prior to grouting up using SBD Five Star Grout, or a similar non-shrink cementitious grout approved by the Engineers, which shall be used strictly in accordance with the manufacturer's instructions.

SECTION 9 - WORKMANSHIP - ACCURACY OF ERECTED STEELWORK

Amend clause 9.1.3

Delete $\Delta_y or\ \Delta_z = \pm 10mm$
Add $\Delta_y or\ \Delta_z = \pm 5mm$

Also add

The position of the end of the bolt in the concrete shall be set so that any resulting slope of the bolt is not such as to cause difficulties in making the connection to the structural frame. It shall be possible to move the bolt to the full extent of the sleeve provided.

Additional clause

9.3.1 Prior to hand over of steel areas, the steelwork Contractor shall survey all beam ends and beam mid spans to check for level tolerance. Surveys shall be issued to the Design Team in drawing format showing the levels at its' + or – position from true level.

9.5 – Information for Other Contractors

Delete the wording given in the National Steelwork Specification.

Add

The dimensional deviations indicated in clause 9.6 mean only that the Engineer will not reject steelwork as being unstable if the site dimensions of the steelwork are within these noted

deviations. It must be clearly understood that these deviations may not be permitted where and when a higher degree of accuracy could be required as follows:-

(a) As required by the Architect.

(b) As necessary to suit the installation of lifts, escalators or other mechanical plant.

(c) As necessary to suit windows and cladding.

(d) As necessary to suit finishes.

The Trade Contractor shall satisfy himself during the detail drawing period that such items as noted above can be catered for during fabrication and erection. In the event of disagreement over dimensional deviations the Engineers decision will be final, and any costs arising out of such decisions shall be borne by the Trade Contractor.

9.6 – Permitted Deviations of Erected Components

Erected Steelwork Dimensional Deviations; these deviations are to be considered as the maximum normally acceptable for structural stability purposes in accordance with BS EN 1993 or as modified by the specification and are in particular strictly subject to the stipulations of clause 9.5 of the steelwork specification. Rolling tolerances and fabrication tolerances shall be in accordance with the "National Structural Steelwork Specification for Building Construction". Where more than one tolerance may be applied, the most onerous case shall take precedence. **The rolling tolerances, fabrication tolerances and all erected tolerances indicated shall not be considered cumulative.**

Amend clause 9.6.1

Delete $\Delta = \pm 10mm$
Add $\Delta = \pm 5mm$

Amend clause 9.6.3.1

Add maximum = ± 15mm

Amend clause 9.6.4

Add $\Delta = \pm 15mm\ maximum$

Also add

Allowable deviations for buildings greater than 10 stories to be agreed.

Amend clause 9.6.5

Add

Bearing surfaces shall comply with those specified in BS EN 1090 part 2.

Amend clause 9.6.11

This shall include self-weight deflection of steelwork and metal deck. Pre-cambers where indicated shall be out with this tolerance.

Amend clause 9.6.13

Delete maximum = ± 25mm
Add maximum = ± 15mm

SECTION 10 – PROTECTIVE TREATMENT

No amendments.

SECTION 11 – QUALITY ASSURANCE

No amendments.

Add **SECTION 12 DESIGN CALCULATIONS**

12.1 The Steelwork Contractor will be required to submit proof to the Engineer that the connections as shown on his fabrication drawings are capable of resisting the forces and moments shown on the Engineer's drawings and/or other Engineer's data sheets.

Design calculations shall be submitted in accordance with the contract documentation.

12.2 Connections shall not only be structurally adequate but must also be carefully detailed to provide a clean functional appearance and also avoid stress concentrations particularly in welded sections.

Add **SECTION 13 - SITE DIMENSIONS**

13.1 The Steelwork Contractor shall take all necessary dimensions and levels from site to execute and complete his work to suit the Engineer's requirements and other trades in such order and sequence as may be directed in accordance with the Construction Manager's programme charts from commencement to completion of his work.

13.2 In this regard the Steelwork Contractor shall take particular care to ensure sufficient site dimensions, including the plumbing of any existing internal and external walls, have been taken to ensure the steelwork fits the site throughout the full height of the steelwork structure.

13.3 The Steelwork Contractor shall be responsible for the positioning and levelling of all the steelwork, the plumbing of columns and the placing of each section with accuracy in accordance with the relevant drawings and shall amend or make good as necessary any fabrication or erection defects resulting from dimensional errors at his own expense.

13.4 The Steelwork Contractor is responsible for taking site dimensions where steelwork is fixed to an existing concrete face.

Add **SECTION 14 - STEEL CASTINGS**

14.1 The steel quality in the castings should be equivalent to a weldable grade S355 JR steel, in accordance with BS EN 10025. The cast equivalent is to be in accordance with EN 10088 (2005) corrosion resistant supplied in the normalised condition.

14.2 TESTING AND INSPECTION PLAN

14.2.1 SURFACE FINISH

Surface Cleanliness	Shot blast to SA2.5 standards
Surface Texture	By comparison to ASTM A802
	APPENDIX A**ACCEPTANCE**
Surface Texture	Level A3 (max)
Gas	Level C3

Sand	Level B2
Surface Laps	Level D1
Mechanical Dressing	Level H3

14.2.2 CASTING INTEGRITY

SURFACE REQUIREMENT

Crack Detection	To BS EN 1369 – 2012, Level 4

VOLUMETRIC INTERNAL REQUIREMENTS

X-ray	To ASTM E446 Level 3

14.2.3 FREQUENCY AND AREAS FOR TEST

Surface Finish	100% visual examination all castings	
Crack Detection	Samples: Bulk:	100% coverage Methods features, fillets and all changes of section
Radiography	Samples only:	100% coverage

14.2.4 MECHANICAL TEST

Tensile and charpy test on a one per heat basis, indicating yield, elongation, BHN, chemical analysis - all from separately cast test bars.

Tensile test pieces would be machined in accordance with BS.EN 10.002-1-1990 and impact test pieces BS 10.045-1-1990.

Chemical analysis tests would be carried out in accordance with BS EN 10293:2015 in conjunction with BS EN ISO 9002, 1994 approval using certified reference materials traceable to British Standards.

14.2.5 WELD REPAIRS

Cosmetic Welding

To be carried out without prior sanction, a cosmetic weld is not greater than 10% of thickness. Weld repairs would be carried out in accordance with BS 4570. Weld maps to be produced for structural welds only, structural repairs to be approved by client.

14.2.6 INSPECTION OF WELD REPAIRS

Cosmetic Welds	To be inspected by crack detection after suitable heat treatment.
Structural Welds	To be inspected by ultrasonic examination and crack detection on completion of suitable heat treatment.

14.2.7 OUTSIDE INSPECTION

Facilities are to be provided for independent testing visits to be carried out by nominated inspection authority of client.

NB All inspection functions, i.e. crack detection, radiography and visual would be carried out by approved internal inspection personnel.

Mechanical testing is to be carried out by approved test house.

14.2.8 DIMENSIONAL TOLERANCE (CAST)

In accordance with BS 6615, 1996 grade CT 10.

14.2.9 CERTIFICATES OF CONFORMITY

Certificates of conformity to be provided on a one per order basis.

14.2.10 DIMENSIONAL VERIFICATION

Initial samples are to be fully marked out for approval prior to bulk production.

14.2.11 CERTIFICATION PACKAGE

To be supplied at end of contract.

APPENDIX A

SPECIFICATION FOR PROFILED METAL DECKING

A.1 The metal decking should be of such form, gauge and material that full composite action can develop with the concrete topping to the depths as shown on the drawings, all in accordance with BS EN 1994 part 4 .

A.2 The composite section must be capable of sustaining the loads as specified on the drawings (partition load to be taken as dead) together with its own weight

A.3 The Engineer's design has been based on the use of a *re-entrant* profile decking of height *60*mm and not the use of a *trapezoidal deck**.

A.4 The metal decking must be capable of supporting the wet weight of *lightweight** concrete to the overall depths shown on the drawings, together with a construction super-load of 1.5 kN/m² without propping. If the spans vary the gauge of the decking may need to change to enable unpropped construction. Refer to BS EN 1994-1.1 CLAUSE 9.6 AND NA BS EN 1994 for deflection criteria

(The tenderer is required to submit with his tender details of the thicknesses of the decks and types of edge trims included within his tender price).

If any propping is required in exceptional circumstances, the decking contractor is to identify these at time of tender.

A5 The metal decking should be zinc coated to a total weight, including both sides, of 275g/m² in accordance with BS EN10346.

A.6 The metal deck should provide a fixing system to the soffit for the suspension of services and false ceiling. The fixing points should be at a maximum spacing of 600mm in each direction and capable of supporting a uniform load of 1.0 kN/m². (If this item is extra to the normal deck price, the additional cost should be itemised separately by the Tenderer).

A.7 The decking contractor must submit for approval by the Engineer the following information:

i) Calculations covering connection design.
ii) General arrangement drawings.
iii) Decking detail drawings.
iv) Q.A. plan.
v) Method statement for erection, including risk assessments.
vi) Material test certificates.

A.8 The decking shall include all edge trims and void fillers etc. in connection with edge trims, in locations as indicated on the drawings, to facilitate the placing of the concrete topping. (Concrete topping is by other trades).

A.9 The decking shall be taped at all joints, perimeters and columns to prevent grout leakage.

* Engineer to amend as required.

APPENDIX B

SPECIFICATION FOR STUD WELDING AND THE LAYING OF METAL DECKING

B.1 (a) All tools and equipment used in stud welding procedures must be used strictly in accordance with the manufacturer's instructions and/or recommendations.

(b) All stud welding operatives employed on the site must have attended a recognised course on the operation of the particular welding equipment to be used and must be certified by the equipment manufacturer as competent in its use.

B.2 (a) Before starting stud welding operations, or after equipment has been moved or left unused for any period of time, test welds should be done. The initial test welds shall be undertaken in the presence of the Engineer and or Local Authority's representative.

(b) Two studs shall be welded and then bent to an angle of 30 degrees from the original axis. This can be done by placing a pipe over the stud and levering to the required test angle. If failure occurs in the weld zone of either stud, correct or adjust the equipment set-up and repeat the test until two consecutive studs are welded and found to be satisfactory. Production welding can then commence.

(c) If studs, on visual inspection, do not show a 360 degree weld fillet, these studs should be bent 15 degrees from the vertical positions towards the nearest end of the beam. If the weld shows no fracture, these studs should be considered acceptable, and left in the bent condition. Studs failing this test should be replaced.

(d) The first and last stud on every beam shall be tested as a minimum requirement by bending to an angle of 15^{o} towards the nearest end. If one or more of the studs fails, a further 5% with a minimum of 2 shall be tested and if no further studs fail, the remainder of the studs shall be accepted. If further studs fail, the studs over the entire beam length shall be replaced and tested again, and studs failing during testing shall be replaced. Also allow for 100% ring tests.

B.3 (a) The decking shall be laid butt fitted longitudinally and have the shear connectors welded in a suitable pattern, i.e. one per valley on each sheet or staggered, as specified on the Engineer's drawings. The decking shall have sufficient temporary fixings to ensure the correct operation of the stud welding equipment.

(b) The spacing of the shear connectors across the metal decking will generally be governed to a maximum of one shear connector per valley. The minimum centre to centre spacing of stud connections in the above transverse axis, along the composite beam, should be not less than 6 stud diameters. The connectors shall further be welded, wherever possible, directly over the web of the composite beam. If studs are to be welded to the flange, the diameter shall be no greater than 2½ times the flange thickness. The spacing of these studs from the edge of the beam towards the web should also be approximately 2½ times the stud diameter.

(c) All spacing of the shear connectors shall comply with the shear stud manufacturer's requirements.

B.4 (a) The flange of the beam to be welded shall be unpainted and free of rust and mill scale, dirt, sand and/or other materials detrimental to welding. The top flange shall be cleaned as necessary prior to laying the metal decking, to ensure that the shear connector can be welded satisfactorily.

(b) Decking materials shall also be free of materials - listed above - which are detrimental to welding. Any water on the deck or beams must be removed before welding.

(c) Decking shall be laid in dry weather just ahead of the stud welding team. In wet weather, cover must be provided and the conditions for water, above, rigidly observed.

(N.B. It may be possible to lay additional decking overhead to provide weather protection).

(d) The decking must fit tightly to the beam where a shear connector is to be welded - no air gaps must be permitted.