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TWO STOREY ROOF EXTENSION, 95 AVENUE ROAD, LONDON NW8 6HY

Structural Engineer's Feasibility Report, Structural Alterations and Extensions

May 2022

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Preliminary	Issue 1	Issued for Comment	09.05.2022	AZ
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CONTENTS

1.0 INTRODUCTION

This report presents Michael Barclay Partnership LLP's proposals, as Structural Engineer, for the extension of the top floors of 95 Avenue Road, London NW8 6HY and:

- records the design criteria and performance parameters to which the new structure will be designed;
- reports on investigations and studies that have been carried-out;
- details our proposals and specification for the structural works;
- forms the Structural Statement, required by the London Borough of Camden at planning stage.

1.1 THE BRIEF

Our proposal is based on the planning drawings prepared by the HUB Architects, dated January 2022, the Client's brief, and design discussions with the project team. It is proposed for the existing plant/services enclosure on top if the roof to be removed and replaced with the doble storey roof extension to create 2 separate apartments with access to each floor by stairs and extended lift shaft.

2.0 THE SITE

2.1 LOCATION

95 Avenue Road is part of the Royal Borough of Camden at the postcode NW8 6HY, it is located on the west side of Avenue Road, at the junction with Adelaide Road and St. John's Wood Park. The property is a 7 storey above the ground floor, apartment block with one storey basement, built in late 1980s with a primary RC structural frame, but clad in traditional brickwork. The block is built above two tunnels, Jubilee Underground line tunnel at lower level, and Network Rail tunnel at higher level (approximately 4m below the ground), please refer to Figure 3. There is a London Overground line 150m up North with a vent shaft raising around 10m above the ground. There is a Swiss Cottage underground station 350m up North and South Hampstead tube station 650m West. Swiss Cottage School Development and Research Centre is just opposite on the easter side of the Avenue Road.

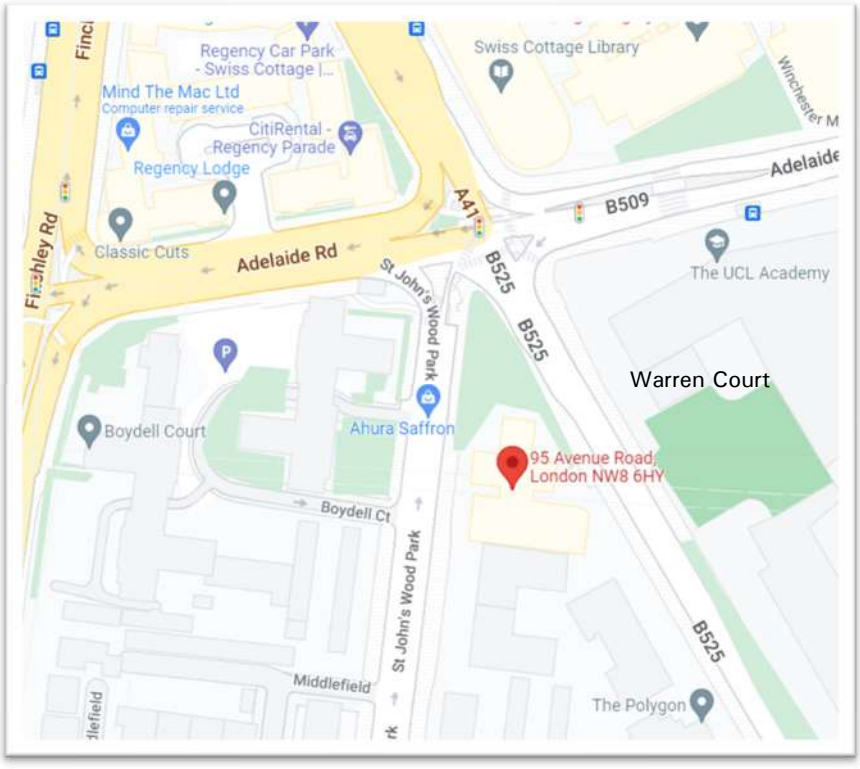

Figure 1: Site Location

2.2 SITE GEOLOGY

Although the proposed roof extension does not include any works to the foundations of the property, it should be confirmed there will be no more than 10% increase on the existing foundation loads of the apartment block. We have carried out a basic search on the geology of this area of London. The Geological Survey map of the area, Figure 2, indicates an area of London Clay Formation local to Avenue Road. London Clay Formation is taken as the top of the Claygate Member, which is distinguished from the overlying Bagshot Formation by containing finer sand without cross-bedding and in the relative abundance of clay and silt in the Claygate Member. Site Investigation will be carried out to confirm the existing ground condition, however there will be no change to the existing foundation.

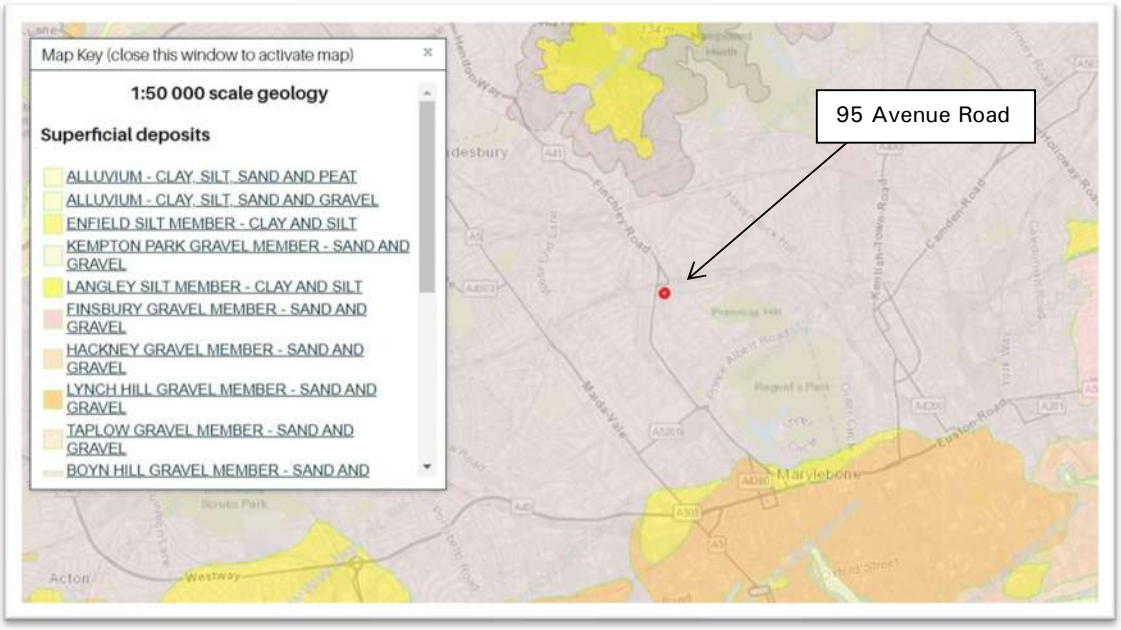

Figure 2: Extract from BGS maps

2.3 BOUNDARIES AND ADJOINING STRUCTURES

The apartment building with 7 floors above the ground floor and one level of basement, sits alone on its site with the single story extension on the southern edge of the building with enclosed garages. Block of flats is surrounded by similar hight buildings. The apartment block is built over the crossing of London Underground (Jubilee Line) which run at lower level from north to south and Network Railway which run from west to east proximity 4m below the building. Please refer to Figure 3. The closest building to the 95 Avenue Road is a 3 story above the Ground Floor, residential building Park Lodge on St John's Wood Park which is built close to the south face of the single story garage.

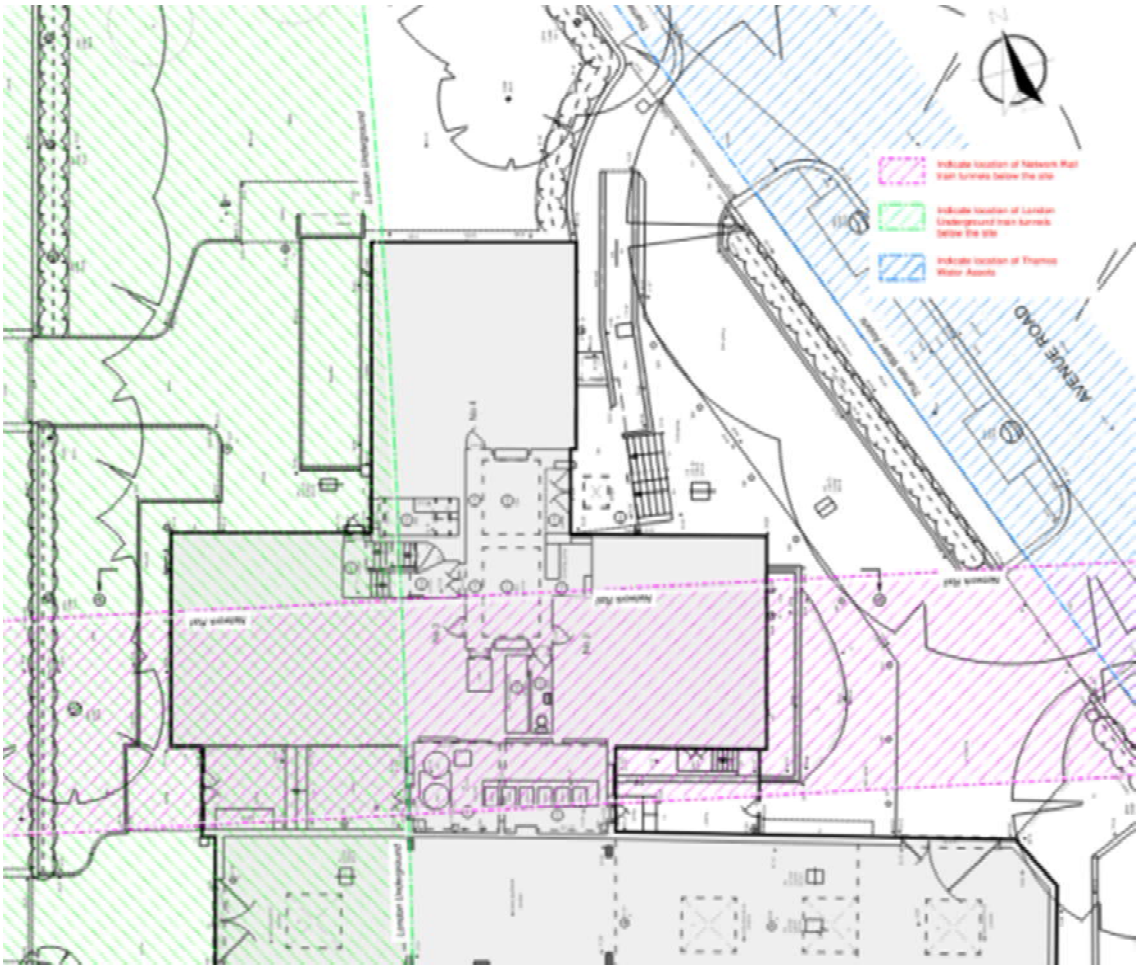

Figure 3: Network Rail and London Underground crossing

3.0 OVERVIEW OF THE PROPOSED SCHEME

The proposed scheme comprises double story roof extension with a separate apartment on each floor, wrapping around the north/east/southern portion of roof. The existing lift and common staircase will be extended to allow access to the new 8th and 9th floor. The new 3 bedroom apartments will be constructed on top of the transfer deck built over the existing roof level. A new brick elevation will match the existing façade. The existing plant/services enclosure structure will be carefully dismantled and new lightweight plant enclosure to be constructed on the east side of the new roof transfer deck.

3.1 EXTENSION CONSTRUCTION GENERALLY

The proposed 8th floor to be extended over a similar footprint as the existing 7th floor below, leaving the west side area of the roof for the new plant/services enclosure. The 9th floor perimeter walls to be set back from the north and south face to create space for terraces. Overall hight of the new extension will not exceed 6.5m.

As we are aiming to have a minimal impact on the building below, the parameters considered in selecting a structural solution have included:

- ability to transfer all vertical loads from the new construction into the fabric of the existing building
- ability to transfer all horizontal loads from the new construction into the fabric of the existing building

The favoured method of constructing for the extension is to construct a transfer deck using hot-rolled steel beams and light-gauge steel (LGS) cold formed joists, fixed down to the existing RC frame structure. The walls and roof construction of the new 8th and 9th floor will be predominately lightweight LGS metsec SFS framing (or similar approved) with hot rolled steel columns to create robust frame.

Photo 1: Example of hot rolled frame structure with light weight metsec wall infill and floors.

Michael Barclay Partnership has considerable experience of the design and construction monitoring for roof extensions of the type suggested above. Recent projects have included the construction of a single level of penthouse accommodation on the top of similar blocks on the west side of Lowndes Square, Photo 2 and 5, and duplex penthouses on the east side of the same square. Both of these examples were carried out with neighbours in occupation below, the 5th floor having been vacated.

Photo 2: New penthouses above Lowndes Square

3.2 CO-ORDINATION OF EXTENSION AND EXISTING BUILDING

The new lightweight roof extension will be supported on the new transfer deck structure, constructed of the steel beams positioned above the existing 7th floor level. The transfer deck will be picked up on the existing load bearing RC frame and loads transfer down through the existing structure to the foundation level. There will be less than 10% of loading increase on the existing foundation however more detail calculation to be provided in the later stage of the design to confirm the estimated figure.

As a part of the first stage of the site investigation, an exploratory hole was made in the wall at the Lower Ground Floor level. It was confirmed that the existing wall structure is a RC columns with 9'' solid brick wall between. A further site investigation by the structural engineer is required to confirm the condition and capacity of the existing structure at the 7th Floor Level. Any defects in the existing framing to be rectified before the new extension is installed. A study will be made of the existing original wall and flues before the main works commence, to ensure that there is no disruption to the service of the apartments below.

3.3 MANAGEMENT OF THE WORKS

Our experience suggests that a degree of prefabrication is often advantageous in these situations. By using prefabricated, light weight wall and floor system the amount of time to assembly the construction and to transport the elements from the street up to the roof level could be reduced. Using the large crane with special foundation may not be permitted due to the existing tunnels below the site, therefore a temporary external goods lift, for lifting the building material up to the roof to be consider. Splicing the long members could be necessary.

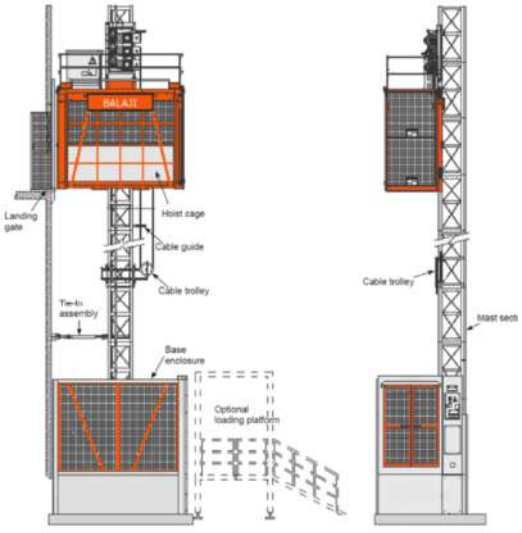

Photo 3 and 4: Example of external lift tower.

4.0 DESIGN AND PERFORMANCE PARAMETERS

4.1 OCCUPANCY LOADS

The new structure elements have been designed in accordance with current British Standards, Codes of Practice and Building Regulations. The general design imposed loads for the buildings are as follows:

Category	Use	Uniformly distributed load* (kN/m²)	Concentrated load* (kN)
A	All usages within self-contained single Family dwelling	1.5	1.4

* defined by BS6399: PT 1

4.2 ENVIRONMENTAL LOADS

The buildings new walls and framing will be designed to support loads from the wind in combination with the occupancy loads scheduled above.

The wind net lateral load onto the structure was assumed as 1.0 kN/m^2 based on a worst case south-westerly wind direction.

4.3 PERMISSIBLE DEFLECTIONS

The design of new constructional steel elements will limit deflection and displacement in accordance to the following criteria:

Steel Elements	Limit – under full load
Simple Beams	Span / 360
Cantilever Beams	Span / 360

The above criteria must be read in conjunction with any performance specifications produced by MBP for individual works packages. Where brittle finishes are required, the allowable deformations will be reduced.

4.4 FIRE RATING

The new structure is to be designed and detailed to achieve the minimum period of fire resistance required by Approved Document B, Table A2, i.e. 60 minutes for load-bearing, structural elements (beams columns framing). A separate Fire Safety Strategy will be prepared by Specialist.

4.5 DISPROPORTIONATE COLLAPSE

The new extension shall be constructed so that in the event of an accident the existing building below will not suffer any damage and the performance of the main apartment block will not be affected by the larger extension. In line with good practice the new transfer deck installed above 7th floor will be capable of supporting the collapse load of the 8th and 9th floor walls and roof.

4.6 SITE CONSTRAINTS

Avenue Road is a wide street, with restricted parking on both sides of the road. It is a two way street. There is a small residential parking area available on site. Large vehicular access for site deliveries is limited. This means that there is limited space on the site to locate site accommodation and materials storage. In order to overcome the above constraints, a strategy will be developed in conjunction with the contractor and local authority to minimise the disruption to both vehicular and pedestrian traffic during the duration of the works.

4.7 DESIGN CODES AND STANDARDS

The following documents are used:

- BS648 - Schedule Of Weights Of Building Materials
- BS6399 Pt 1 - Code of Practice for Dead and Imposed Loads
- BS6399 Pt 2 - Code of Practice for Wind Loads
- BS6399 Pt 3 - Code of Practice for Imposed Roof Loads
- BS5268:Pt 2 - Code of Practice for Structural use of Timber
- BS5628:Pt 1 - Code of Practice for Structural use of Masonry
- BS5950: Pt 1 - Design of Steel Structures
- The Building Regulations 1991 - Approved Documents A, B, C, E, H, K & N

5.0 STRUCTURAL PROPOSAL

5.1 EXISTING STRUCTURE

5.1.1 DEMOLITION

The existing roof plant/services enclosure with cavity brick walls and beam and ceramic pot roof, supported on RC frame (Photo 5), will be carefully dismantled, taking for consideration the waterproofing of the exposed, higher roof section of the 7th floor. High 7th floor level windows on the east elevation to be retained and protected. The exploratory works to be carried out to expose the existing structure of the parapet walls, and to confirm the support for the new steel transfer deck structure. Parapet wall to be protected at all times during the construction till the new waterproofing system is installed. Existing lift overrun and staircase to be retained and extended, and new hatch access to be provided.

Photo 5 and 6: Existing roof structure and parapet wall

5.1.2 TRANSFER FRAMING

The existing 7th floor roof structure will be retained entirely and protected. The new steel transfer structure to be supported on the existing load bearing walls just above the existing roof construction. Deflection limits to be determent to avoid any contact of the transfer deck with non loadbearing elements of the existing roof. The existing structure will be exposed in the location of transfer deck's support and inspected as part of an enabling works package.

5.1.3 BEARINGS OF THE TRANSFER FRAMING

The junctions between transfer deck steelwork and the perimeter masonry structure, the bearings, will also be inspected at this early stage. Any required repairs will be carried out prior to the construction of the new extension and new padstone to be installed to spread the load onto the existing wall. Parapet wall to be extended in some location and new waterproofing and ventilation to be considered to protect the void between existing and new structure.

5.2 NEW SUPERSTRUCTURE

5.2.1 FLOORS AND WALLING, NON-VOLUMETRIC OPTION

The floors and walls of the new proposed 8th and 9th floor will be formed in modern lightweight construction, clad with brick to match the existing elevation. The walls around the exterior perimeter will be clad in non-flammable cladding with a structural liner panel formed using cold formed steelwork to keep weight to a minimum but still achieving the required stiffness. A similar approach will be used for the roof and floor panels of the new 9th floor.

The new plant area with louvre enclosure will be installed on the east side of the existing plant leaving the clear space to allow for natural light to travel down to the flat below.

5.2.2 STABILITY

Lateral stability for the extension is to be provided by the new structural framing above 7th floor level fixed down to the existing loadbearing structure mentioned in item section 5.1. All of this will be done above the 7th floor level. Once complete the new stability frame will transfer all of the lateral forces safely back into the bearings of the original structure.

Photo 5: Primary structure erected above transfer deck on MBP's Lowndes Square penthouse.

5.2.2 STRUCTURAL PROPOSAL

A simplified structural model was built in Robot Structural Analysis (RSA) to better understand the expected deflections of the proposed transfer deck beams and loads from these beams onto the masonry walls of the existing building. The Figures 3 and 4 below is an extract from the RSA model. Also refer to RSA Model extract drawing 30 and 31 in the Appendix to this report.

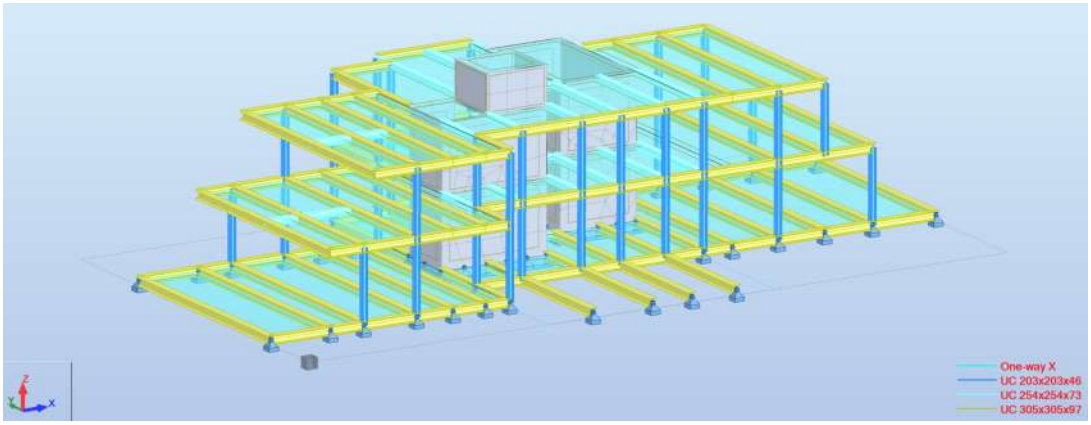

Figure 3: Extract from RSA model

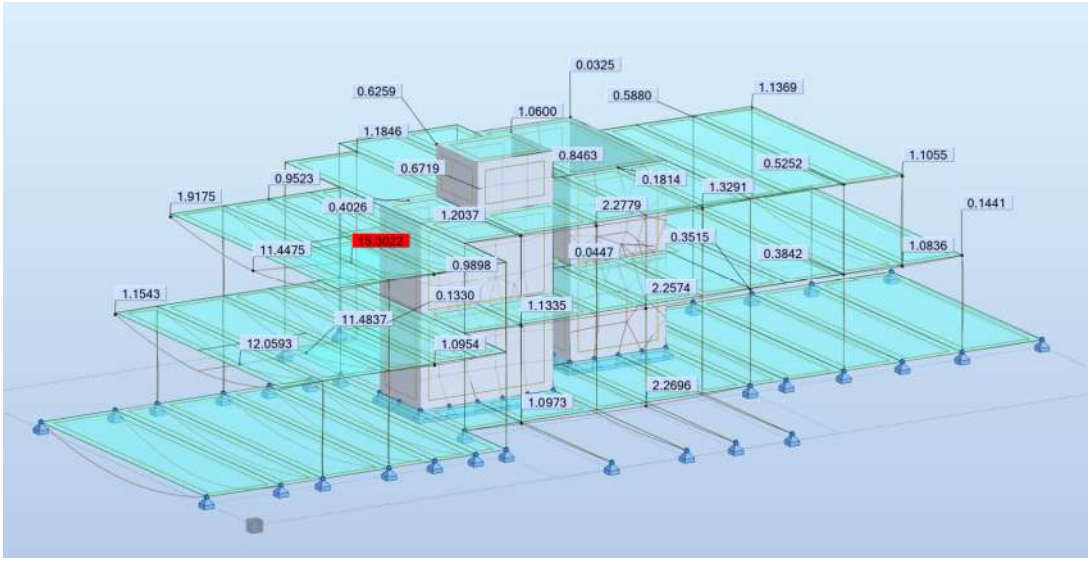

Figure 4: Extract from RSA model

6.0 CONSTRUCTION HAZARDS

The proposed construction has standard materials and components and is of common form within the construction industry. Nevertheless MBP will produce a separate document that will be developed as the detailed design proceeds.

7.0 SPECIFICATION

The proposed construction materials, components, workmanship etc. will be specified using the National Building Specification documents and a separate performance specification. Those sections that MBP will schedule are:

Demolition	C20
Structural steel framing	G10
Carpentry/timber framing/first fixing	G20
Holes/chases/covers/supports for services	P31

It is Michael Barclay Partnership's practice to specify materials and construction-practices that do not cause undue harm to the environment. For example, timber used in temporary and permanent works must be obtained from a certified sustainable source, and be identified as such. The paint specification will avoid red lead, zinc chromate or coal-tar content and have a low solvent (VOC) content and offer manufacturers with an Environmental Policy in operation. The Contractor will be encouraged to use Portland cement replacement materials for the reinforced concrete elements.

8.0 DRAWINGS

A set of schematic plans have been produced for the scheme that indicate the principals of the proposed development. These are appended to this report in Appendix A.

9.0 SUMMARY

The new rooftop extension to 95 Avenue Road will be formed using modern lightweight methods of construction, successfully carried out by MBP on other projects in Central London and Camden. The weight of the increased volume of the rooftop extension will be reduced by removal of the existing roof plant/services enclosure with cavity brick walls and ceramic pot roof, supported on RC frame. The ventilation shafts, staircase and lift shafts will be extended to serve additional floors. The existing primary load paths will be used to support the new structure and all necessary repairs of the existing walls will be carried out to ensure the long term security of the building fabric. As the loading on the existing structure will not exceed allowable 10% and the top levels will represent a small portion of the building as a whole, the proposed development will not have an adverse impact on the apartments below or infrastructure at ground floor level and below.

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Date: 9th May 2022

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Structural Engineer's Feasibility Report, Structural Alterations and Extensions

April 2022

Issue 1 - Planning Issue

Appendix A - Michael Barclay Partnership's schematic drawings

MBP - 8538 – 01
MBP - 8538 – 02
MBP - 8538 – 03
MBP - 8538 – 04
MBP - 8538 – 05
MBP - 8538 – 20