AXIOM
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Property: **266 – 278 Yeading Lane**
London
UB4 9AX

Client: **Offer Group Limited**

Report: # Structural Engineering Loading Assessment

Date: **3rd of September 2024**
Revision: **P1**

Axiom Structures Limited
Registered in England and
Wales No. 9447111

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1.0 Introduction

We were asked by Mr. Stephen McGrane of Create Architects to prepare a structural engineers report on the potential of demolishing the existing single storey residential building to the front of the existing building and adding a new two storey lightweight residential development. This assessment is to be based on the residential usage for the upper floors and the aim is for the retail units to remain in occupation during the works.

The purpose of the report was to undertake a preliminary assessment to confirm the structural viability of adding these additional floors to the building, primarily would strengthening be required to the foundations.

Axiom Structures undertook a site visit on the 15th of August 2024. A visual inspection of the building was undertaken at the time of our visit. No intrusive investigations were undertaken or required for this stage of assessment.

This report is confidential for use by Offer Group Limited and is limited to use for the purposes noted. The report is not to be relied upon by third parties.

2.0 Description

The building is situated at the junction of Yeading Lane and Willow Tree Lane. The building appears to be constructed at some point between the 1970's to 1980's and it consists of a concrete frame structure supporting reinforced concrete down stand beams which in turn support a reinforced concrete flat slab. The ground floor are currently used as retail space which contains a number of retail units. These vary in size with some units taking one bay, while others four bays. At the first floor there is a single level of purpose built residential apartments which are accessed by a separate staircase to the left hand side of the building.

The external walls appear to be traditional cavity wall construction, which measured as being approximately 270mm thick. This would indicate a 50mm cavity when the taking into account the thickness of the blockwork, brickwork and plaster finish. The dividing walls between the retail units are measured as being 200mm solid blockwork walls.

The existing RC slabs span continuously over the downstand beams. Based on the distance that slabs span we would assume that the slabs are approximately 200mm in depth. The reinforced concretes slabs have a screed covering within the residential apartments, while the external first floor slab will consist of a screed and 50mm thick paving slabs. The reinforced concrete columns measure approximately 300x 300mm on plan.

The British Geological map indicates that the founding soil is London Clay formation. Given that this is the founding soil and the size of the building, then it is likely that the structure will consist of shallow pad foundations. These will either consist of a raft foundation or reinforced concrete pad footings along with a ground bearing slab.

3.0 Findings

Calculations were undertaken on a typically internal column, a front perimeter column and a rear perimeter column to see if the proposals indicated in Create Architecture plans are feasible without needing to undertake strengthening works to the existing foundations.

Based on information gathered from our visual survey and desktop estimates, we have calculated that the existing foundations can potentially be able to carry the additional floors of residential dwellings. It would appear that the lightweight floors can be added while keeping the foundation loading within a 10 - 20% increase in the overall loading. This increase is typically allowed for as it maintains settlement of the existing foundations within acceptable levels to managing surface cracking within the building.

The load take down calculations have indicated that a number of items need to occur to enable the existing foundations to be adequate:

- The existing front residential development at first floor level needs to be demolished and replaced with a new lightweight structure;
- The existing finishes on the first floor slab need to be removed in their entirety, this includes any screed that is currently present on top of the slab;
- There needs to be a column present within the rear of MediVets retail space. The current survey plans show this as being column free, but it is assumed that the grid spacing of columns would be consistent across the building and access has not been granted to this space.
- The cladding system will consist of metsec internal studs and a lightweight brick slip system. If possible, this should be changed to a lightweight render panel, which would be especially beneficial on the rear elevation.

Based on the above, load run down cases were calculated to find out the demands on the existing footings. A summary table of the load run down cases has been included as Appendix ii.

The total distributed imposed floor loads on the existing foundations were reduced with the number of storeys to Table 2 of BS6399-1:1996. For the residential development, we have lowered the internal partition loading of the current building to 0.5kPa for proposed residential that is typical for such a building use. When looking at partition loadings for commercial buildings, then we have taken the minimum requirement of 1.0kPa. This is applicable in the codes of practice for at the time of construction.

It has been assumed at this stage that the vertical extension will consist of a lightweight Metsec structural framing system that will be constructed off a new steel transfer deck at the first floor level. The steel transfer deck could be removed if the Architect can confirm a lightweight solution to replace the screed that has been removed. This can be reviewed during the detailed design stage.

4.0 Conclusions & Recommendations

A summary table of the load run down and loading assumptions have been included as Appendix ii, this indicates that we could look to install an additional two storeys of residential. This requires the following elements to be undertaken to assist in reducing the load on the existing foundations:

- Demolish front residential apartments;
- Remove all existing finishes to first floor slab;
- Confirm column within rear of MediVets retail space;
- Lightweight cladding system with brick slip/render panel
- Lightweight metsec floor joist system.

By using the imposed floor loadings stated in BS6399-1:1996 in the load take down calculations that reflect the existing building usage, and using the live load reduction factor that is stated in this code to assist us in assessing the loading on the existing foundations. We have been able to show with our load take down calculations that no structural works would be required to strengthen the existing foundations when undertaking a vertical extension of two floors of residential on top of the existing concrete frame.

As standard practise, Structural Engineers typically allow an additional 10 – 20% increase in loadings on foundation elements. This is based on limiting any potential settlement to acceptable levels. Due to one of the rear columns being at the upper end of this 20% limit, then it may be as the detailed design develops, a more in-depth settlement analysis will need to be undertaken by a specialist Geotechnical Engineer. This can be assessed as we progress the detailed design. Our calculations for a typical internal column and front perimeter column show that we are confident we can remain within these limits with the additional floors as noted above.

Given the increase in building height, this means that the increase in wind loading will need to be considered but further detailed analysis will be required. The Architect will need to allow for the provision for some new cross bracing within the proposals and we would recommend that this is allowed for within the new lift core that is being proposed. This will consists of steel cross bracing within the lift shaft build up.

It is assumed that this new floor and roof structure will be formed in a new steel frame with metsec floor joists structure that is built directly off the existing roof structure with a steel grillage deck. This structural form is lightweight and allows for columns to be arranged within the new layouts of the flats, which is desirable for the proposed development.

Further investigation and opening up works would be required to calculate the current imposed load capacity of the existing structure. Typically a material specialist such as Sandberg would be employed by yourself to undertake material testing and opening up works of the existing structure. This would consists of them undertaking opening up works and taking samples from site to confirm the material strength of structural elements such as columns to assist with confirming that they can support the additional proposed vertical loading.

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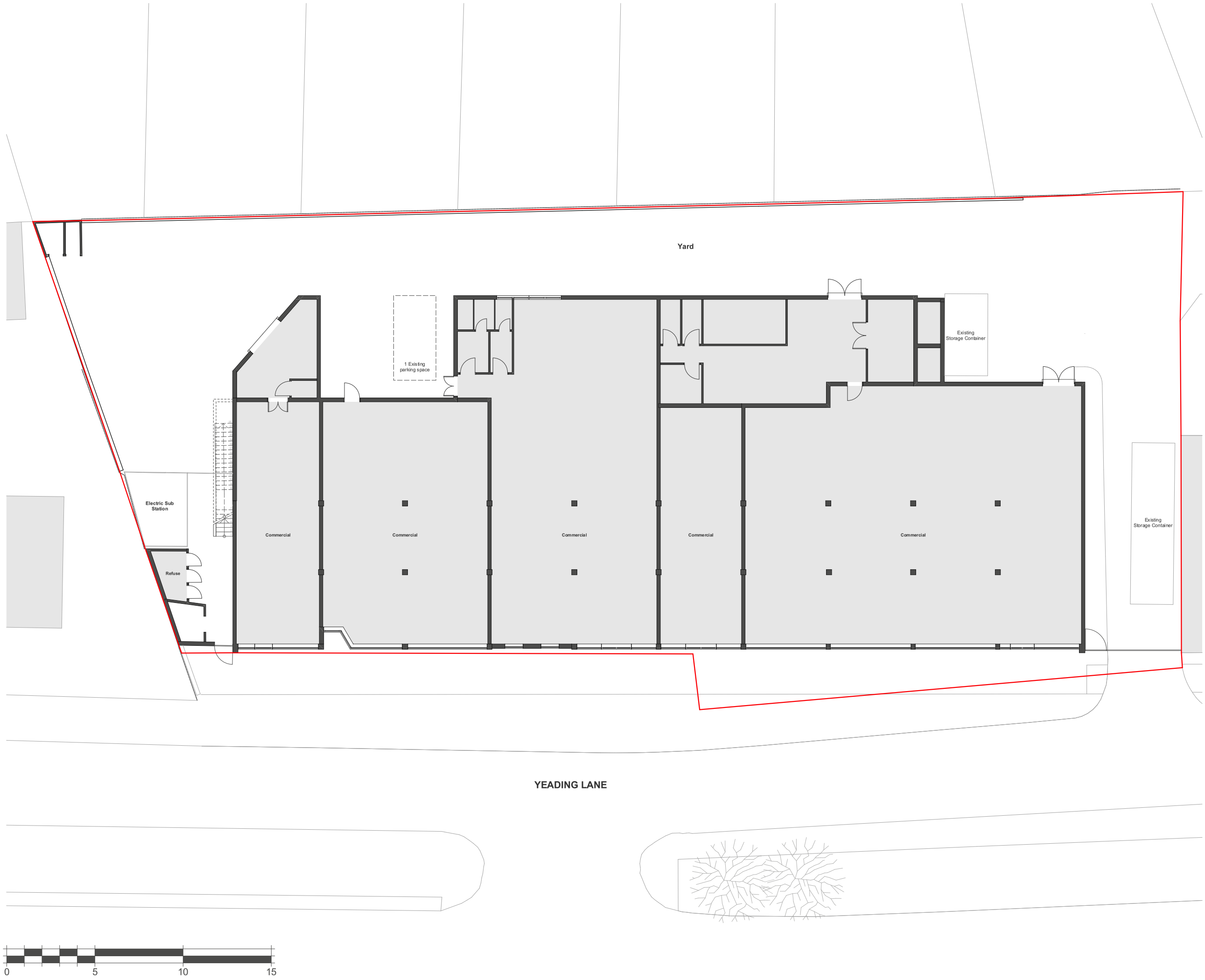
We hope the above is clear, but if you have any questions please feel free to contact me directly. This would be an interesting project, which we have plenty of experience in and would be happy to assist further if required.

Yours sincerely

Alan Bowling – Project Director
BEng (Hons) C Eng MIStructE
Axiom Structures Limited

5.0 Appendix

(i) Existing Measured Survey of the Building
(ii) Proposed Architectural Scheme
(iii) Load Run Down Summary Table & Load Area Comparison



Rev	Description	Drawn	Checked	Date
01		VG	SM	Work in Progress

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266-278 YEADING LANE

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STAGE 3

SURVEY / EXISTING

EXISTING GROUND FLOOR PLAN

CDA Ref	Scale(s)	Original Paper Size
718	1:200	A3

Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
718	CDA	ZZ	00	DR	A	01	0100

Revision	Revision Description
01 - WIP	For Planning

Rev	Description	Drawn	Checked	Date
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STAGE 3

SURVEY / EXISTING

EXISTING FIRST FLOOR PLAN

CDA Ref	Scale(s)	Original Paper Size
718	1:200	A3

Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
718	CDA	ZZ	01	DR	A	01	0101

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STAGE 3

SURVEY / EXISTING

EXISTING ROOF PLAN

CDA Ref	Scale(s)	Original Paper Size
718	1:200	A3

Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
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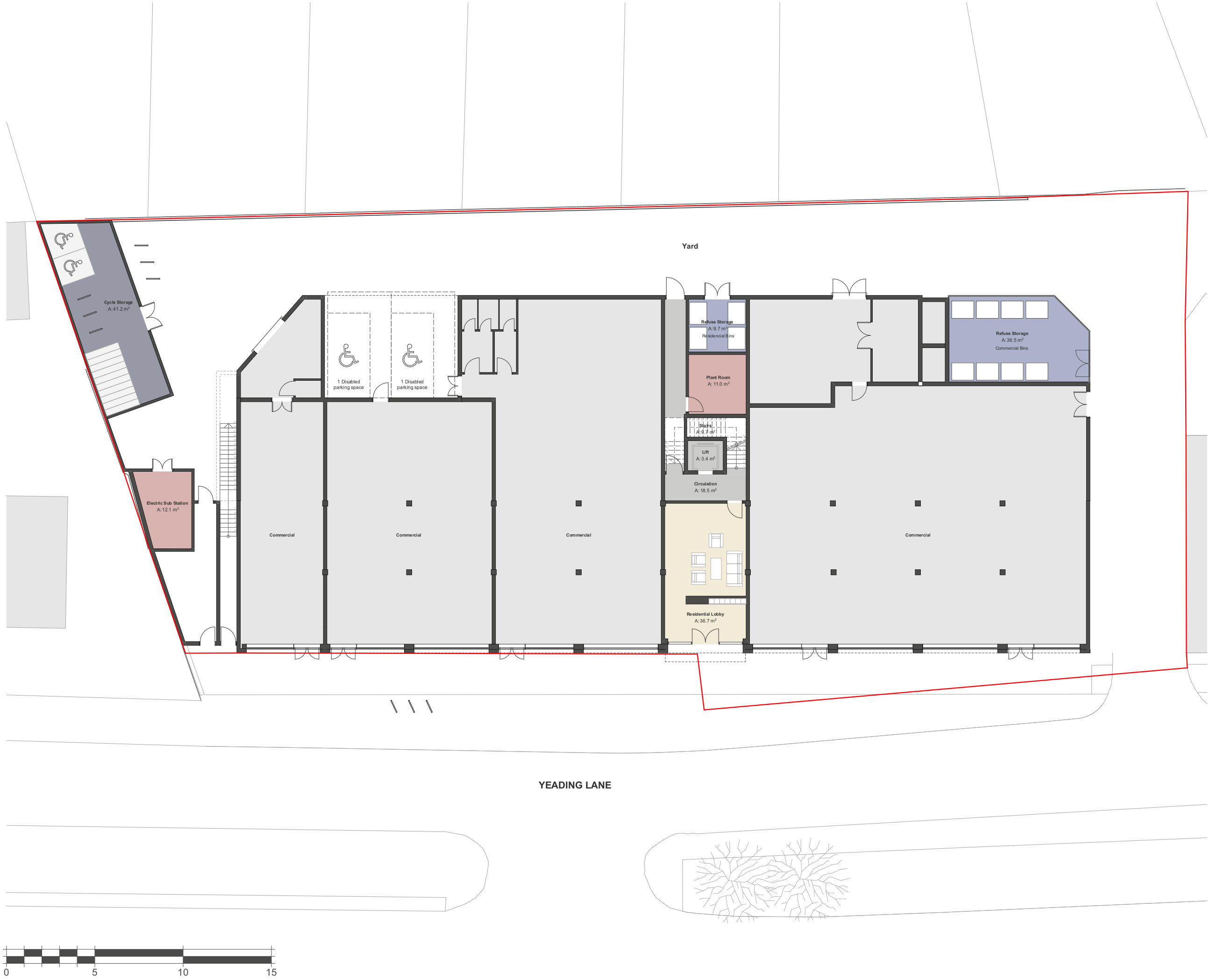
Revision	Revision Description
01 - WIP	For Planning



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STAGE 3

PROPOSED PLANNING

PROPOSED GROUND FLOOR PLAN

CDA Ref	Scale(s)	Original Paper Size
718	1:200	A3

Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
718	CDA	ZZ	00	DR	A	05	0100

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PROPOSED PLANNING

PROPOSED FIRST FLOOR PLAN

CDA Ref	Scale(s)	Original Paper Size
718	1:200	A3

Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
718	CDA	ZZ	01	DR	A	05	0101

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STAGE 3

PROPOSED PLANNING

PROPOSED SECOND FLOOR PLAN

CDA Ref	Scale(s)	Original Paper Size
718	1:200	A3

Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
718	CDA	ZZ	02	DR	A	05	0102

Revision	Revision Description
01 - WIP	For Planning

Rev	Description	Drawn	Checked	Date
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STAGE 3

PROPOSED PLANNING

PROPOSED ROOF PLAN

CDA Ref	Scale(s)	Original Paper Size
718	1:200	A3

Drawing Number

Project	Originator	Volume	Level	Type	Role	Class	Number
718	CDA	ZZ	03	DR	A	05	0103

Revision	Revision Description
01 - WIP	For Planning

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Existing Loading Assumptions

Existing Flat Roof Loads			
	Dead: kN/m2	Imposed: kN/m2	Total
200mm RC Slab	5.00		
75mm Screed	1.35		
Services	0.15		
Waterproofing	0.30		
Insulation	0.04		
Live Load		0.75	
SLS=	6.84	0.75	6.84

Existing First Floor Internal Slab			
	Dead: kN/m2	Imposed: kN/m2	Total
200mm RC Slab	3.37		
Services	0.50		
75mm Screed	1.35		
Partition Allowance		1.00	
Finishes	0.25		
Residential		1.50	
SLS=	5.47	2.50	5.47

Existing First Floor External Slab			
	Dead: kN/m2	Imposed: kN/m2	Total
200mm RC Slab	3.37		
Services	0.50		
75mm Screed	1.35		
Paving Slabs	1.25		
Residential Communal Space		3.00	
SLS=	6.47	3.00	6.47

Existing Ground Floor			
	Dead: kN/m2	Imposed: kN/m2	Total
Insitu Ground Slab (assumed 200m)	7.20		
65mm Screed	1.20		
Partition Allowance		1.00	
Finishes	0.25		
Retail Usage		4.00	
SLS=	8.65	5.00	8.65

Existing External Wall Loads			
	Dead: kN/m2	Imposed: kN/m2	Total
102mm Face brickwork (20kN/m3)	2.00		
100mm Blockwork (18N/m3)	1.80		
Internal S/C/L Finish Plaste	0.50		
SLS=	4.30	0.00	4.30

Internal Blockwork Wall Loads			
	Dead: kN/m2	Imposed: kN/m2	Total
215mm THK Blockwork Walls (18kN/m3)	3.90		
Internal S/C/L Finish Plaste	0.50		
SLS=	4.40	0.00	4.40

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Proposed Residential Loadings

Proposed Roof Loads			
	Dead: kN/m2	Imposed: kN/m2	Total
Metal Deck Roof	0.10		
Steelwork	0.15		
Services	0.15		
Finishes	0.30		
Insulation	0.04		
Live Load - Communal/Plant		3.00	
SLS=	0.74	3.00	0.74

Proposed Metsec Floor Loads - Residential			
	Dead: kN/m2	Imposed: kN/m2	Total
Metsec Joists & 18mm Chipboard	0.25		
Services	0.15		
Partition	0.50		
Gypsum Boards	0.13		
Finishes	0.12		
Residential Space		1.50	
SLS =	1.15	1.50	1.15

Proposed Concrete First Floor			
	Dead: kN/m2	Imposed: kN/m2	Total
200mm RC Slab	3.37		
Services	0.50		
75mm Screed	0.00		
Partition Allowance	0.50		
Finishes	0.20		
Residential Usage		1.50	
SLS=	4.57	1.50	6.07

Proposed Ground Floor			
	Dead: kN/m2	Imposed: kN/m2	Total
Insitu Ground Slab (assumed 200m)	5.00		
75mm Screed	1.35		
Partition Allowance		1.00	
Finishes	0.25		
Retail Usage		4.00	
SLS=	6.60	5.00	6.60

Proposed External Wall Loads			
	Dead: kN/m2	Imposed: kN/m2	Total
Brick Slip System	0.60		
150mm Celotex Insulation (4.88kg/m2)	0.05		
12mm Versaliner Board	0.06		
100mm Rockwool	0.04		
Metsec Allowance	0.15		
2no. 15mm Soundbloc	0.12		
SLS=	1.02	0.00	1.02

Proposed External Wall Loads			
	Dead: kN/m2	Imposed: kN/m2	Total
102mm Face brickwork (20kN/m3)	2.00		
100mm Blockwork (18N/m3)	1.80		
Internal S/C/L Finish Plaster	0.50		
SLS=	4.30	0.00	4.30

Internal Blockwork Wall Loads			
	Dead: kN/m2	Imposed: kN/m2	Total
215mm THK Blockwork Walls (18kN/m3)	3.90		
Internal S/C/L Finish Plaster	0.50		
SLS=	4.40	0.00	4.40

Typical Internal Column

Existing Loading										
	Area	Dead Load	Live Load	Live Load Reduction	Total Slab Loading	Wall Area	Wall Load	Total Wall Loading	Total Floor Load	Cum. Total
Roof	9.8	6.84	0.75	0.00	67.0				67.0	67.0
1st Floor Residential	9.8	5.47	2.50	0.00	53.6	20.0	4.3	86.0	139.6	206.6
1st Floor Communal	11.6	6.47	3.50	0.00	75.1	0.0	4.3	0.0	75.1	281.7
Ground	21.4	8.65	5.00	0.00	185.1	0.0	4.4	0.0	185.1	466.8

Proposed Residential Loading											
	Area	Dead Load	Live Load	Live Load Reduction (20%)	Total Slab Loading	Wall Length	Wall Load	Total Wall Loading	Total Floor Load	Cum. Total	% Increase
Roof	21.4	0.74	3.00	2.4	67.2	0.0	0.0	0.0	67.2	67.2	
2nd Floor	21.4	1.15	1.50	1.2	50.3	0.0	0.0	0.0	50.29	117.5	
1st Floor	21.4	4.57	1.50	1.2	123.5	0.0	0.0	0.0	123.48	241.0	
Ground Floor	21.4	6.60	5.00	4	226.8	0.0	0.0	0.0	226.84	467.8	0.22

Typical Front Perimeter Column

Existing Loading										
	Area	Dead Load	Live Load	Live Load Reduction	Total Slab Loading	Wall Area	Wall Load	Total Wall Loading	Total Floor Load	Cum. Total
Roof	9.8	6.84	0.75	0.00	67.0	0.0	0.0	0.0	67.0	67.0
1st Floor	9.8	5.47	2.50	0.00	53.6	20.0	4.3	86.0	139.6	206.6
Ground	9.8	8.65	5.00	0.00	84.8	20.0	1.0	20.0	104.8	311.4

Proposed Office Loading											
	Area	Dead Load	Live Load	Live Load Reduction (20%)	Total Slab Loading	Wall Area	Wall Load	Total Wall Loading	Total Floor Load	Cum. Total	% Increase
Roof	9.8	0.74	3.00	2.40	30.8	7.0	1.0	2.7	33.5	33.5	
2nd Floor	9.8	1.15	1.50	1.20	23.0	15.3	1.0	15.6	38.64	72.1	
1st Floor	9.8	4.57	1.50	1.20	56.5	15.3	1.0	15.6	72.15	144.3	
Ground Floor	9.8	6.60	5.00	4.00	103.9	20.0	1.0	20.0	123.88	268.1	-13.89

Typical Rear Internal Column

Existing Loading										
	Area	Dead Load	Live Load	Live Load Reduction	Total Slab Loading	Wall Area	Wall Load	Total Wall Loading	Total Floor Load	Cum. Total
1st Floor	14.2	6.47	1.50	0.00	91.9	7.0	4.3	30.1	122.0	122.0
Ground	14.2	8.65	5.00	0.00	122.8	20.0	4.3	86.0	208.8	330.8

Proposed Office Loading											
	Area	Dead Load	Live Load	Live Load Reduction (20%)	Total Slab Loading	Wall Area	Wall Load	Total Wall Loading	Total Floor Load	Cum. Total	% Increase
Roof	6.5	0.74	3.00	2.40	20.4	7.0	1.0	2.7	23.1	23.1	
2nd Floor	6.5	1.15	1.50	1.20	15.3	15.3	1.0	15.6	30.88	54.0	
1st Floor	14.2	4.57	1.50	1.20	81.9	15.3	1.0	15.6	97.54	151.5	
Ground Floor	14.2	6.60	5.00	4.00	150.5	20.0	4.4	88.0	238.52	390.1	17.91