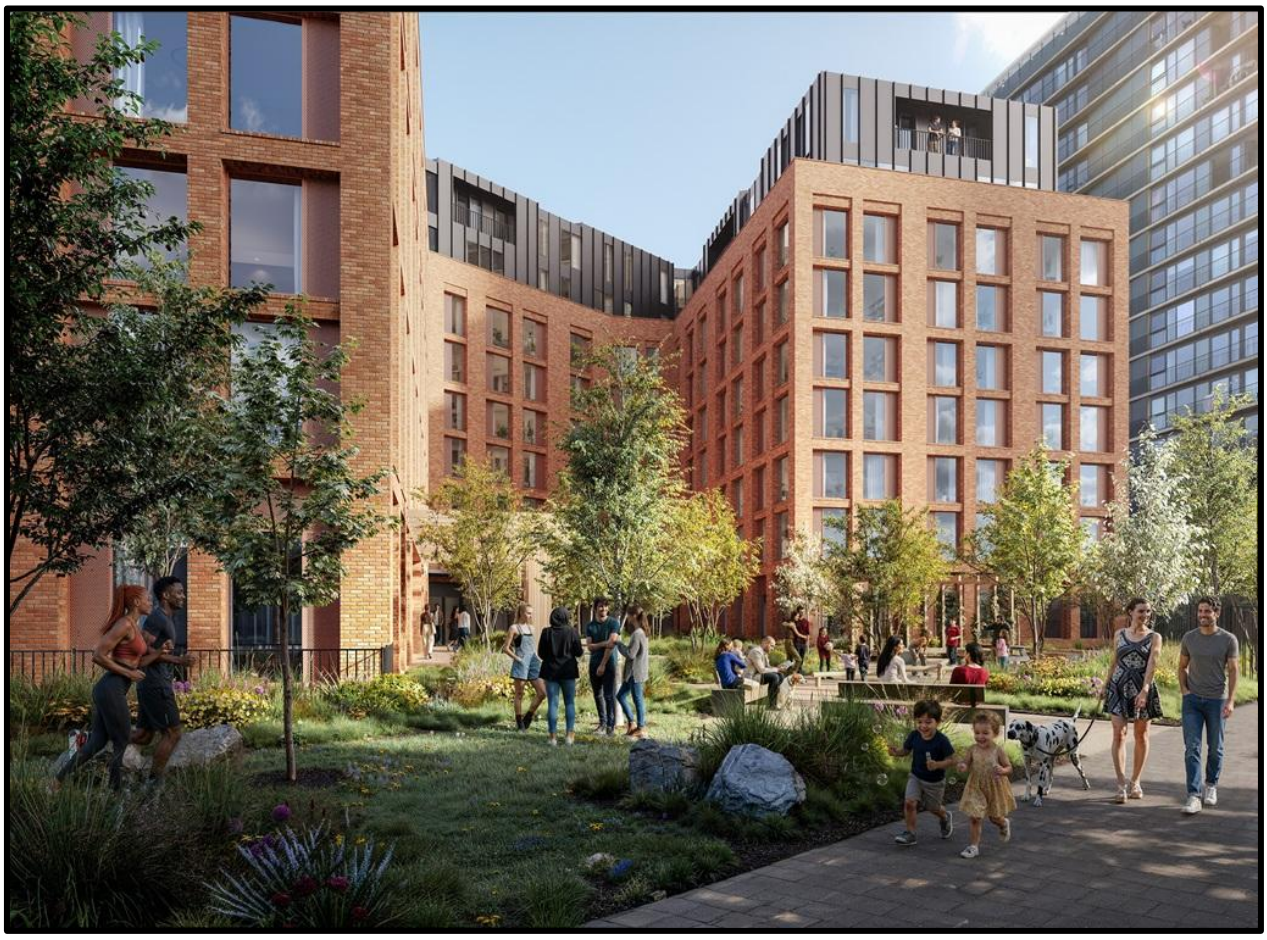
Upfront and Life Cycle Embodied Carbon Report
One Castlefield
Manchester

Site: 44153 – No. 1 Castlefield
Contact: Matthew Holland
Date: 28/08/2026

Second Issue



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Section 1.0 – Executive Summary & Introduction

This report presents the upfront and life cycle embodied carbon (A1-C4) for the proposed residential development at One Castlefield, Manchester. This report contains reporting on models for both Block A (The Tower) and Block B (The Street) buildings, for the same development.

The assessment has been undertaken using One Click LCA, in accordance with the RICS Whole Life Carbon Assessment for the Built Environment methodology and prepared in support of the carbon reduction objectives set out within the GMCA policies.

The proposed scheme comprises a 46-storey residential development delivering 436 apartments (Block A, The Tower) and a 9-storey residential development delivering 157 apartments (Block B, The Street Block).

The structural strategy for both blocks comprises piled foundations and reinforced concrete substructures. Block A comprises a reinforced concrete frame and core with an aluminium-framed glazed curtain wall façade, whilst Block B comprises a reinforced concrete flat slab frame with a brick-faced precast cladding façade system. This report focuses on both upfront embodied carbon (Modules A1-A5) as well as the Whole Life Carbon/Life Cycle Carbon (A1-C4) as is appropriate to the size of the development (see section 2.3)

- A1-A3: Product stage (material manufacture)
- A4: Transport to site
- A5: Construction/installation processes
- B1-B5: In-use stage
- C1-C4: End of life stage

Upfront and Life Cycle Embodied Carbon Results:

including 15% top-up factor, see section 7.0 for full breakdown

Upfront & Life Cycle Embodied Carbon (A1-C4)			
Block	**GIFA (m2)**	**Total kgco2e - (A1-C4)**	**Kgco2/m2 - (A1-C4)**
Block A (The Tower)	36,846	20,195,168.22	548.10
Block B (The Street Block)	16,825	9,130,11.16	542.65

Upfront Embodied Carbon (A1-A5)			
Block	**GIFA (m2)**	**Total kgco2e - (A1-A5)**	**Kgco2/m2 - (A1-A5)**
Block A (The Tower)	36,846	14,079,576.25	382.12
Block B (The Street Block)	16,825	6,597,344.44	392.12

- The embodied carbon intensity of Block A is 548.10 $kgCO_2e/m^2$, which is below the GMCA target of 600 $kgCO_2e/m^2$.
- The embodied carbon intensity of Block B is 542.65 $kgCO_2e/m^2$, which is below the GMCA target of 600 $kgCO_2e/m^2$.

Top Contributing Materials (highest upfront & life cycle embodied carbon emissions)

see section 4.1 for full breakdown

BLOCK A (The Tower)

Material 1: Ready-Mix Concrete (C50/60 50% GGBS)

Material 2: Reinforcement Steel (Rebar)

Material 3: Aluminium Framed Curtain Wall System

Block B (The Street Block)

Material 1: Ready-Mix Concrete (C50/60 50% GGBS)

Material 2: Reinforcement Steel (Rebar)

Material 3: Brick-faced precast cladding

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Section 2.0 - Scope & Methodology

2.1 Methodological Framework

This assessment applies the RICS Whole Life Carbon Assessment for the Built Environment (2023). The assessment has been undertaken using One Click LCA software and covers the following life-cycle modules:

Scope Included:

- A1 – Raw material supply
- A2 – Transport of materials
- A3 – Manufacturing
- A4 – Transport to site
- A5 – Construction/installation stage
- B-stage emissions (use, maintenance, repair, replacement)
- C-stage emissions (end of life)

GMCA guidance requires Large Major Developments to report both upfront and life-cycle embodied carbon (A1-C4).

2.2 Data Sources

- Environmental Product Declarations (EPDs) where available
- OneClick LCA Generic Data Inputs
- Typical construction assemblies for high-rise & mid-rise apartments, respectively.
- Structural drawings (see appendix)
- Architectural drawings (see appendix)

2.3 National Planning Policy Framework (August 2026)

The National Planning Policy Framework published in August 2026 has been reviewed in the context of this assessment. The revised Framework does not result in any material change to the methodology, findings or conclusions of this report. The assessment remains consistent with national policy objectives relating to sustainable development, climate change mitigation and the transition to net zero, and continues to demonstrate compliance with the applicable GMCA carbon reporting requirements.

2.4 – GMCA Reporting

For the purposes of assessing energy and carbon performance under the GMCA Submission Guidance (2025), this scheme is classified as a Large Major Development. The residential thresholds set out in the guidance define:

- Major Development: *10–149 homes*
- Large Major Development: *150+ homes*

Block A (The Tower) comprises of **436 residential dwellings** and Block B (The Street Blocks) comprises of **157 residential dwellings.** Both projects are placed within the Large Major Development category. Hence, upfront AND life cycle embodied carbon model has been reported. The results will also be reported against the ≤600kgco2e/m2 limit for flats.

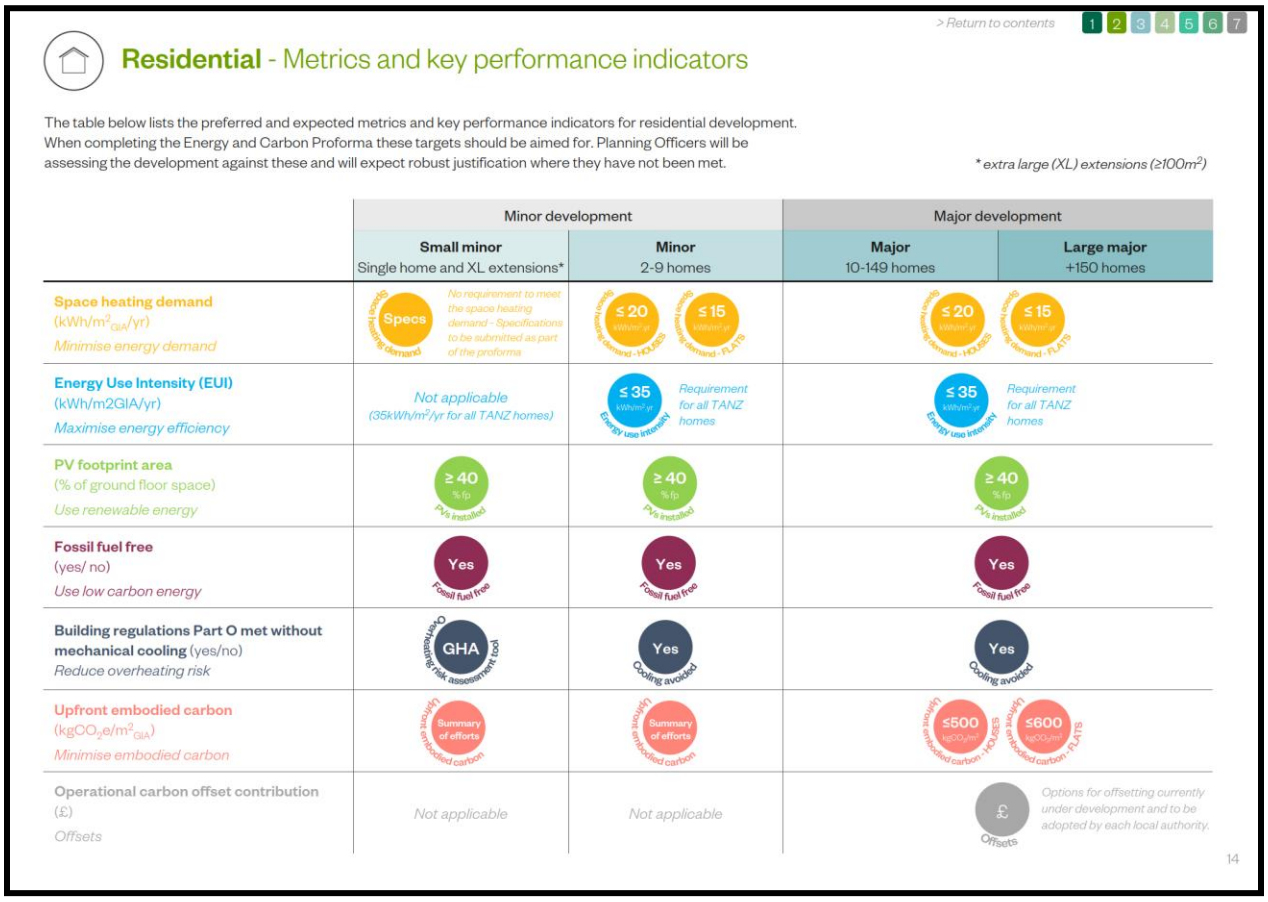


Figure 1 – Submission Guidance for Places for Everyone policies JP-S2 and JP-S3, GMCA, March 2025 (pg. 14)

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Section 3.0 – Block A (The Tower) Project Description

The development comprises 436 apartments, of which the entire development has been included in the modelling carried out within the OneClick LCA Software

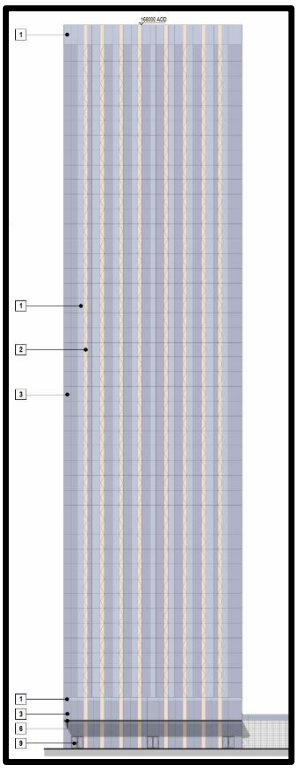


Figure 2 – Proposed south elevation

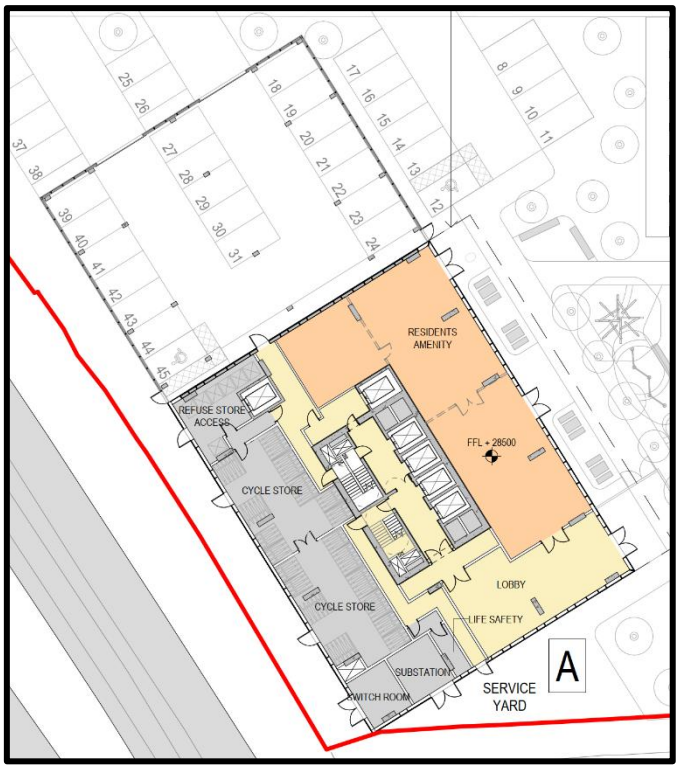


Figure 3 – Proposed ground floor plan

Section 4.0 - Embodied Carbon Results (Cradle to Grave A1-C4) & Top Contributing Materials

4.1 – Upfront & Life Cycle Embodied Carbon Results

Upfront & Life Cycle Embodied Carbon (A1-C4)		
GIFA (m2)	**Total kgco2e - (A1-C4)**	**Kgco2/m2 - (A1-C4)**
36,846	20,195,168.22	548.10

Upfront Embodied Carbon (A1-A5)		
GIFA (m2)	**Total kgco2e - (A1-A5)**	**Kgco2/m2 - (A1-A5)**
36,846	14,079,576.25	382.12

The above calculations both include the 15% top up & 2% data uncertainty factor (see section 7.0)

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4.2 – Top Contributing Materials – Block A (The Tower), One Castlefield, 436 apartments

Material 1: Ready-Mix Concrete (C50/60 50% GGBS)

- **165.06 kgco2e/m2** *(53.1% of total upfront embodied carbon A1-A3)*

Ready-mix concrete arises primarily from the reinforced concrete frame and substructure, including the piled foundations, raft foundation, core walls, columns, transfer elements and floor slabs. Concrete forms the principal structural material within the development and represents the largest contributor to embodied carbon due to the extensive use of reinforced concrete throughout the tower

Material 2: Reinforcement Steel (Rebar)

- **33.19 kgCO_2e/m²** *(10.7% of total upfront embodied carbon A1-A3)*

Reinforcement steel emissions arise from the reinforced concrete structural frame, including foundations, core walls, columns, beams and floor slabs. Reinforcement is required throughout the structure to provide tensile capacity and structural resilience, making it the second largest contributor to the upfront embodied carbon impact

Material 3: Aluminium Framed Curtain Wall System

- **17.26 kgCO_2e/m²** *(5.6% of total upfront embodied carbon A1-A3)*

Curtain wall emissions arise primarily from the aluminium framed glazed façade system, including double-glazed vision panels and associated framing components. The embodied carbon impact is driven by the use of aluminium framing and high-performance insulated glazing units, which form a significant proportion of the external envelope.

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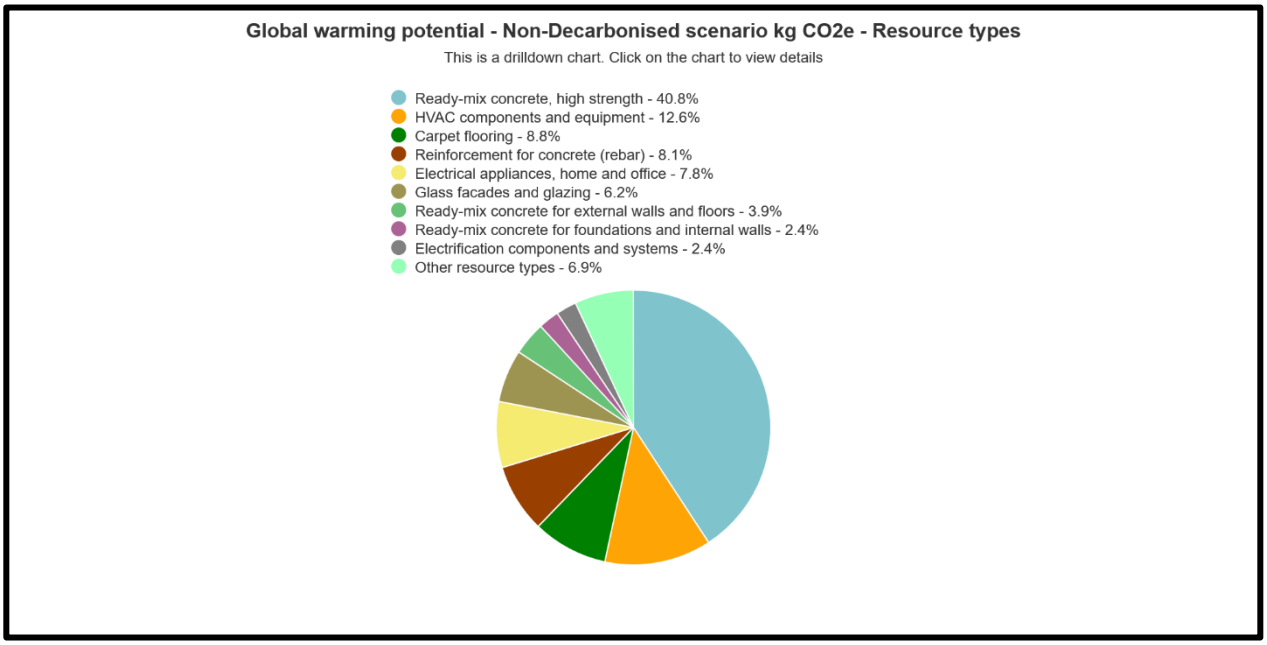


Figure 4 – Pie chart showing global warming potential per resource type (OneClick LCA)

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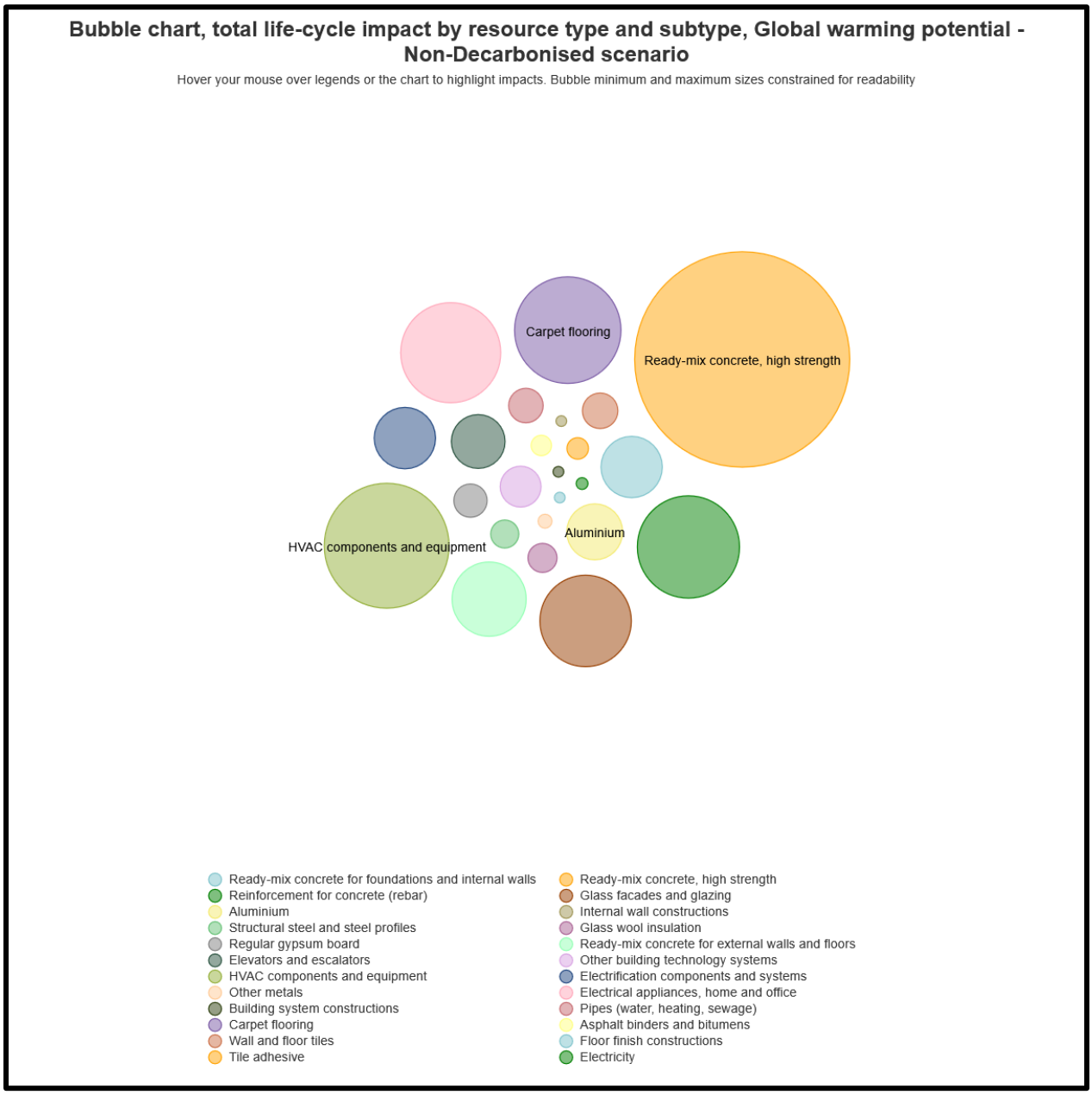


Figure 5 – Bubble Chart showing the top-contributing materials to the One Castlefield – Block A (The Tower) development

Section 5.0 – Block B (The Street Block) Project Description

The development comprises 157 apartments, of which the entire development has been included in the modelling carried out within the OneClick LCA Software

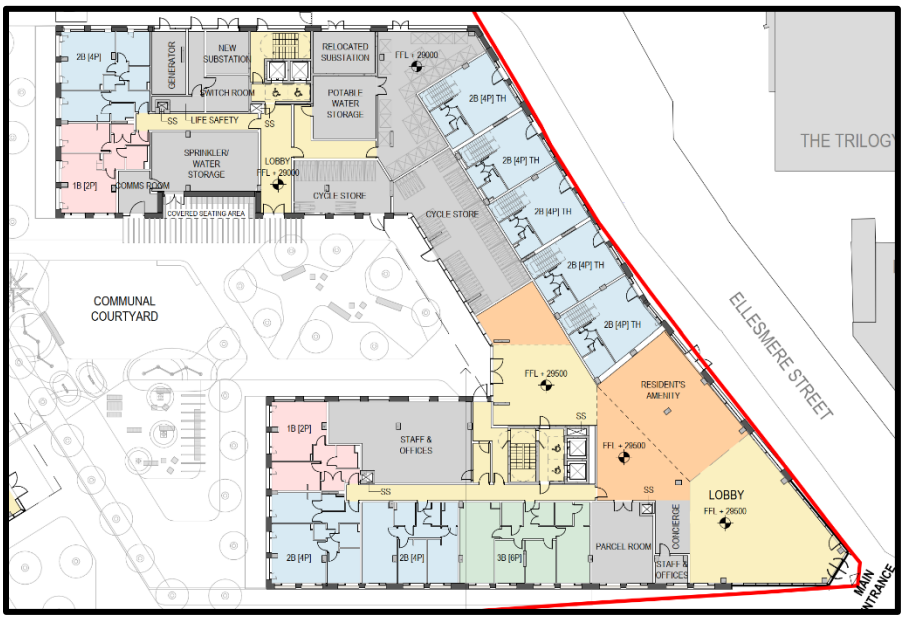


Figure 6 – Proposed ground floor plan



Figure 7 – Proposed west elevation

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Section 6.0 - Embodied Carbon Results (Cradle to Grave A1-C4) & Top Contributing Materials

6.1 – Upfront & Life Cycle Embodied Carbon Results

Upfront & Life Cycle Embodied Carbon (A1-C4)		
GIFA (m2)	**Total kgco2e - (A1-C4)**	**Kgco2/m2 - (A1-C4)**
16,825	9,130,111.16	542.65

Upfront Embodied Carbon (A1-A5)		
GIFA (m2)	**Total kgco2e - (A1-A5)**	**Kgco2/m2 - (A1-A5)**
16,825	6,597,344.44	392.12

The above calculations both include the 15% top up & 2% data uncertainty factor (see section 7.0)

6.2 - Top Contributing Materials – Block B (The Street Block) One Castlefield- 157 Apartments

Material 1: Ready-Mix Concrete (C50/60 50% GGBS)

- **169.57 kgco2e/m2** *(52.7% of upfront embodied carbon)*

Reinforced concrete is the primary embodied carbon contributor within the street block, driven by the piled foundations, structural frame, floor slabs and core walls. Despite the lower building height, the structural system remains material-intensive and accounts for the majority of upfront embodied carbon.

Material 2: Reinforcement Steel (Rebar)

- **34.18 kgCO_2e/m²** *(10.6% of upfront embodied carbon)*

Reinforcement steel is a key contributor due to its widespread use throughout the concrete frame. Steel reinforcement is required within the foundations, columns, slabs and cores to provide structural capacity and durability.

Material 3: Brick-faced precast cladding

- **31.03 kgCO_2e/m²** *(9.7% of total upfront embodied carbon)*

Brick-faced precast cladding is a significant contributor to embodied carbon due to the combination of concrete backing panels, brick finishes and associated manufacturing processes. As the predominant façade material, it represents a substantial proportion of the building envelope impact.

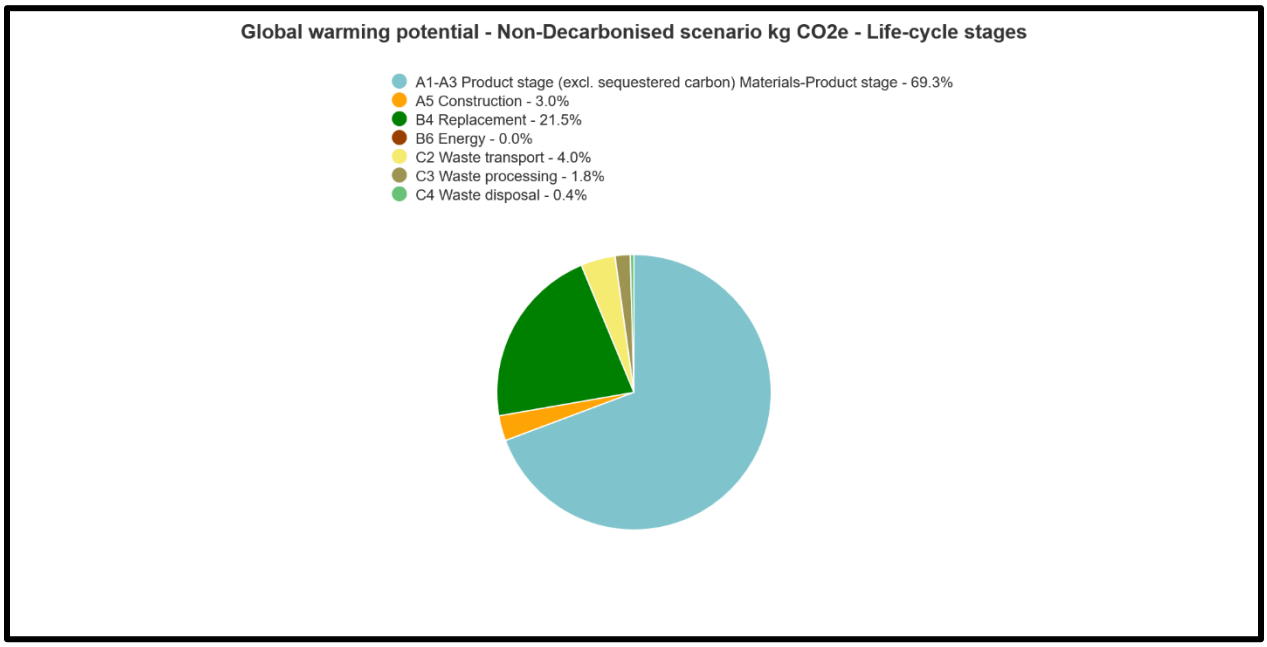


Figure 8 – Pie Chart showing the global warming potential per stage to the One Castlefield – Block B (The Street Block) development (OneClick LCA)

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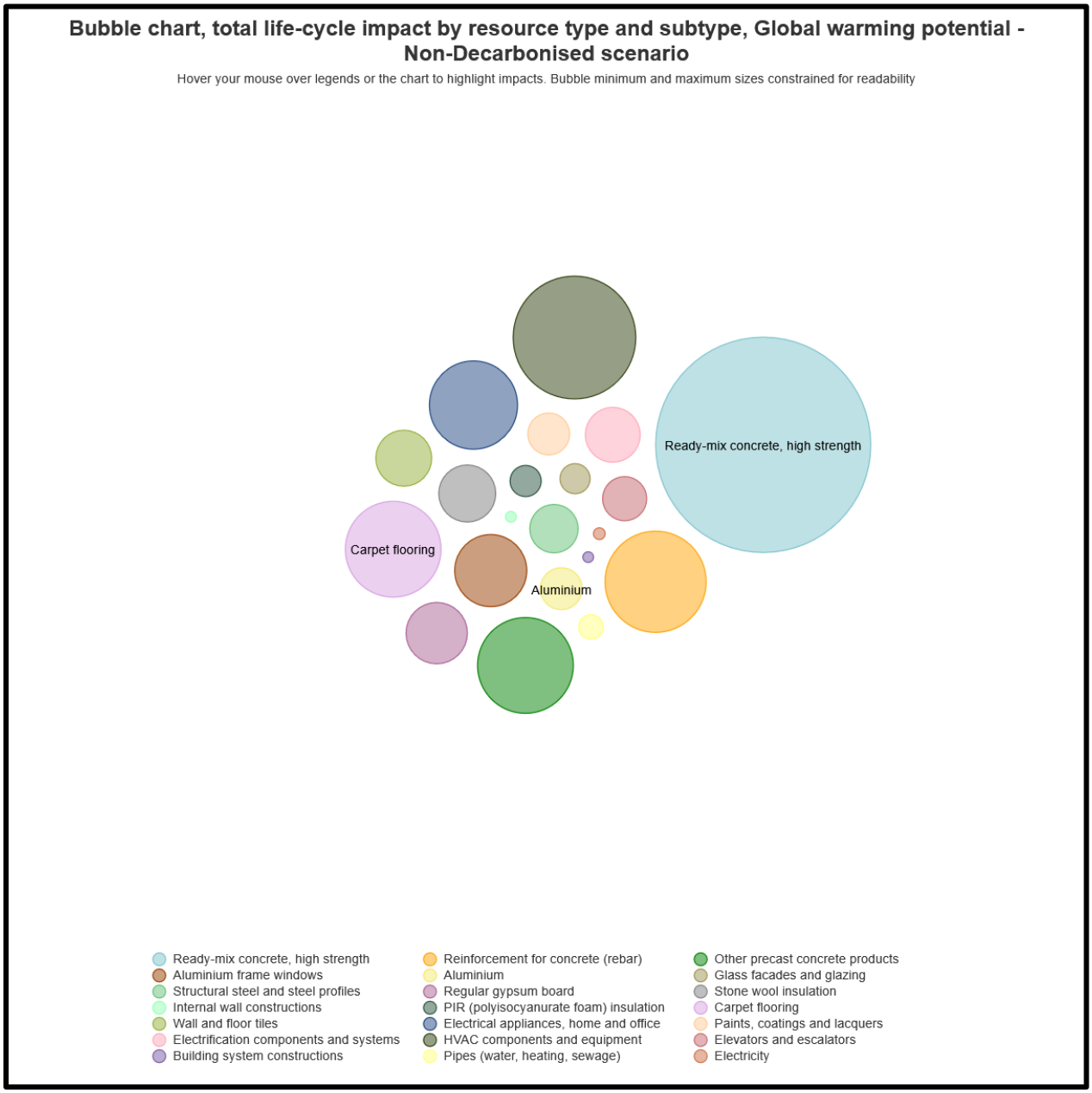


Figure 9 – Bubble Chart showing the top-contributing materials to the One Castlefield – Block B (The Street Block) development (OneClick LCA)

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Section 7.0 – Data assumptions, uncertainty & top-up factor

At the time of undertaking these assessments, detailed construction information and fully quantified schedules were not available. Material quantities and specifications have therefore been estimated based on concept design information, typical high-rise residential construction practices and mid-rise residential construction practices (respectively) as well as industry benchmark data within One Click LCA.

To reflect this level of early-stage uncertainty, the RICS-compliant uncertainty top-up factor of 15% for early design stage assumptions has been applied within the software. This ensures that the reported upfront and life cycle embodied carbon figure remains appropriately conservative and proportionate for a planning-stage submission.

As well as the top-up factor a 2% data uncertainty factor has been applied to the life cycle and upfront embodied carbon assessment to account for the conceptual stage of design development, assumptions regarding material specifications, and the use of generic datasets where project-specific information was unavailable.

Material quantities have been derived from the latest available architectural and structural drawings, with floor areas, façade extents, structural depths and internal layouts measured directly from drawings where detailed schedules were not available.

It is recommended that the assessment is updated at later design stages (RIBA Stage 4 and post-construction) once detailed structural calculations, coordinated services information and confirmed product specifications are available, to provide improved accuracy.

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Section 8.0 - Conclusion & GMCA Compliance Statement

This report provides a complete assessment of upfront and life cycle embodied carbon (A1–C4) for the proposed developments at One Castlefield for both Block A (The Tower) and Block B (The Street Block) The report identifies the three materials with the highest embodied carbon contributions in full compliance with the **GMCA Submission Guidance (2025)** for both assessments.

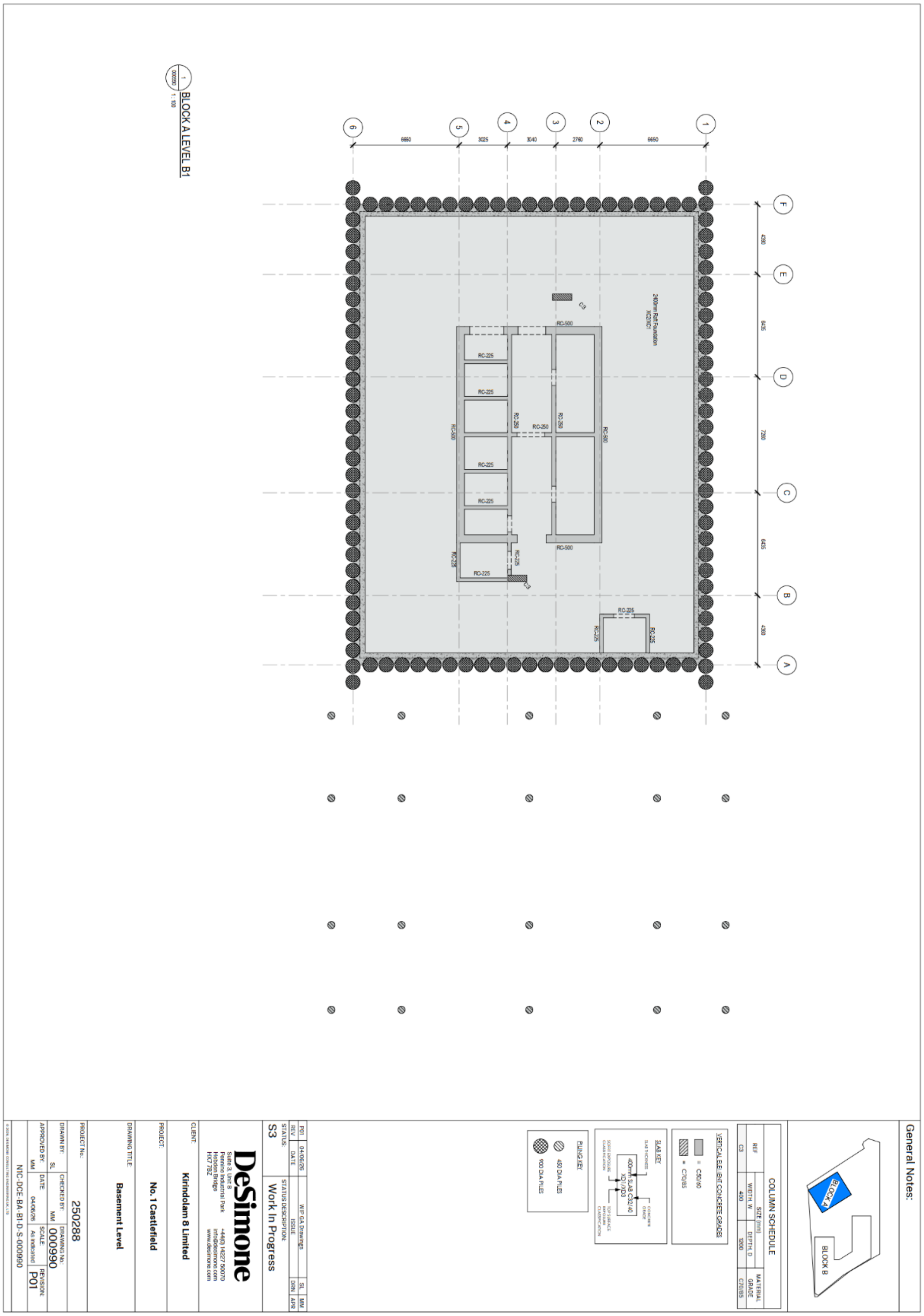
The project is fully compliant with GMCA requirements for embodied carbon reporting, having:

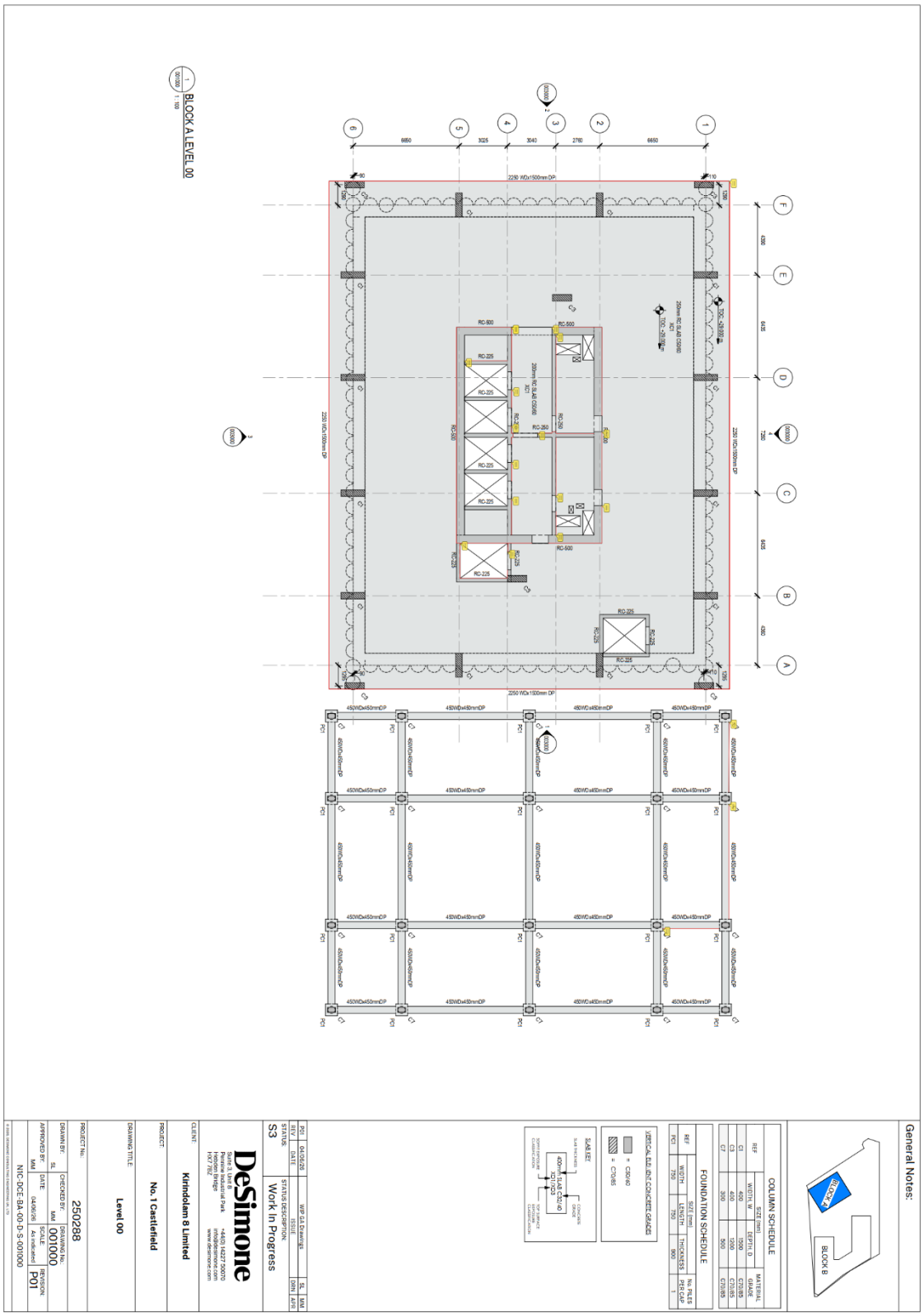
- Reported A1–C4 (cradle to grave) embodied carbon using RICS 2023 methodology *(section 4.1 & 6.1)*
- Both Block A and Block B achieve embodied carbon intensities below the GMCA target of 600 $kgCO_2e/m^2$ GIFA for residential developments.
- Identified the top three contributing materials per development *(section 4.2 & 6.2)*

These assessments establish a clear baseline for embodied carbon performance at design stage and provide a solid foundation for future refinement as the projects progress.

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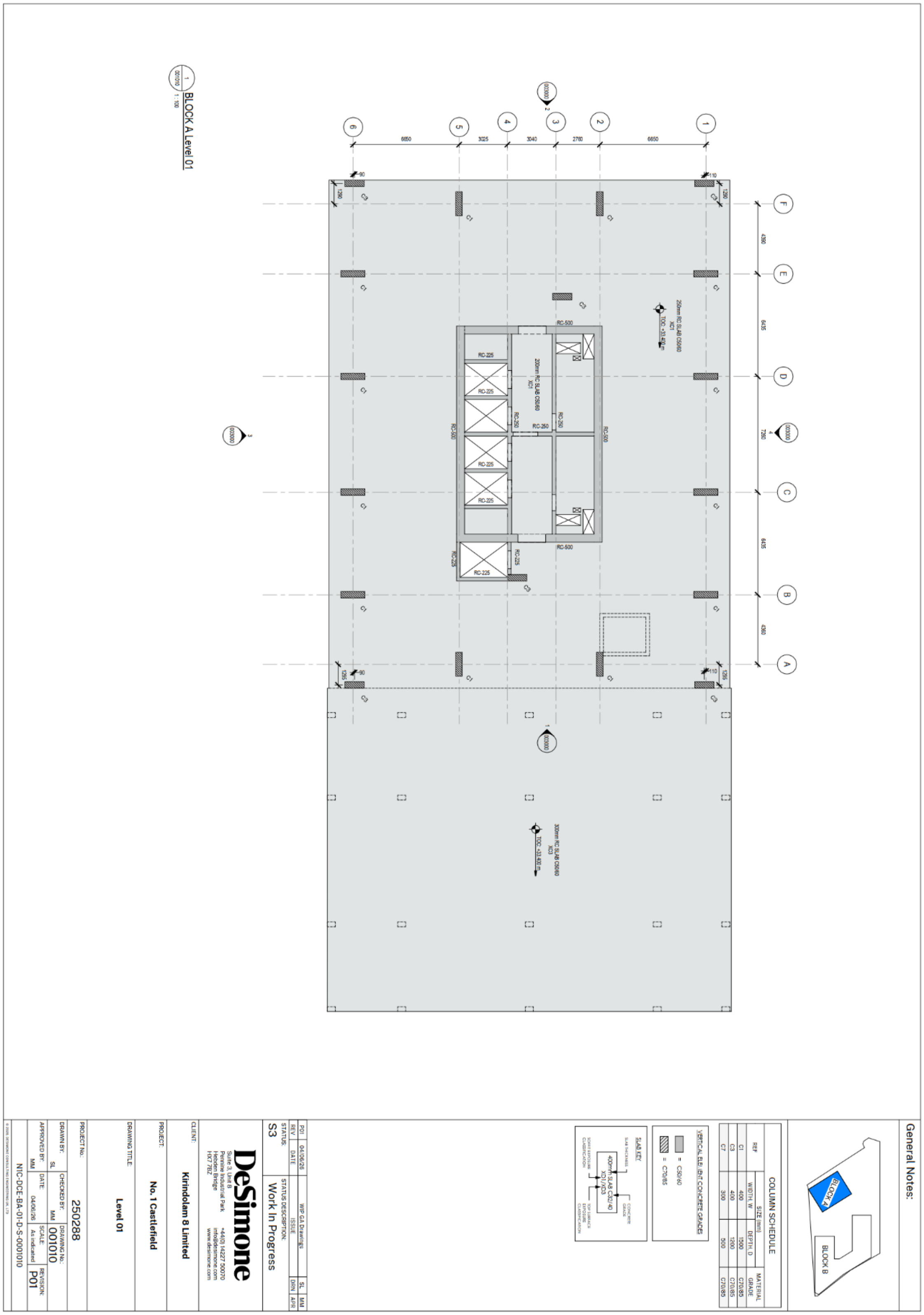
Appendix 1 – The Tower (Block A) Plans, Sections & Elevations, Structural Design



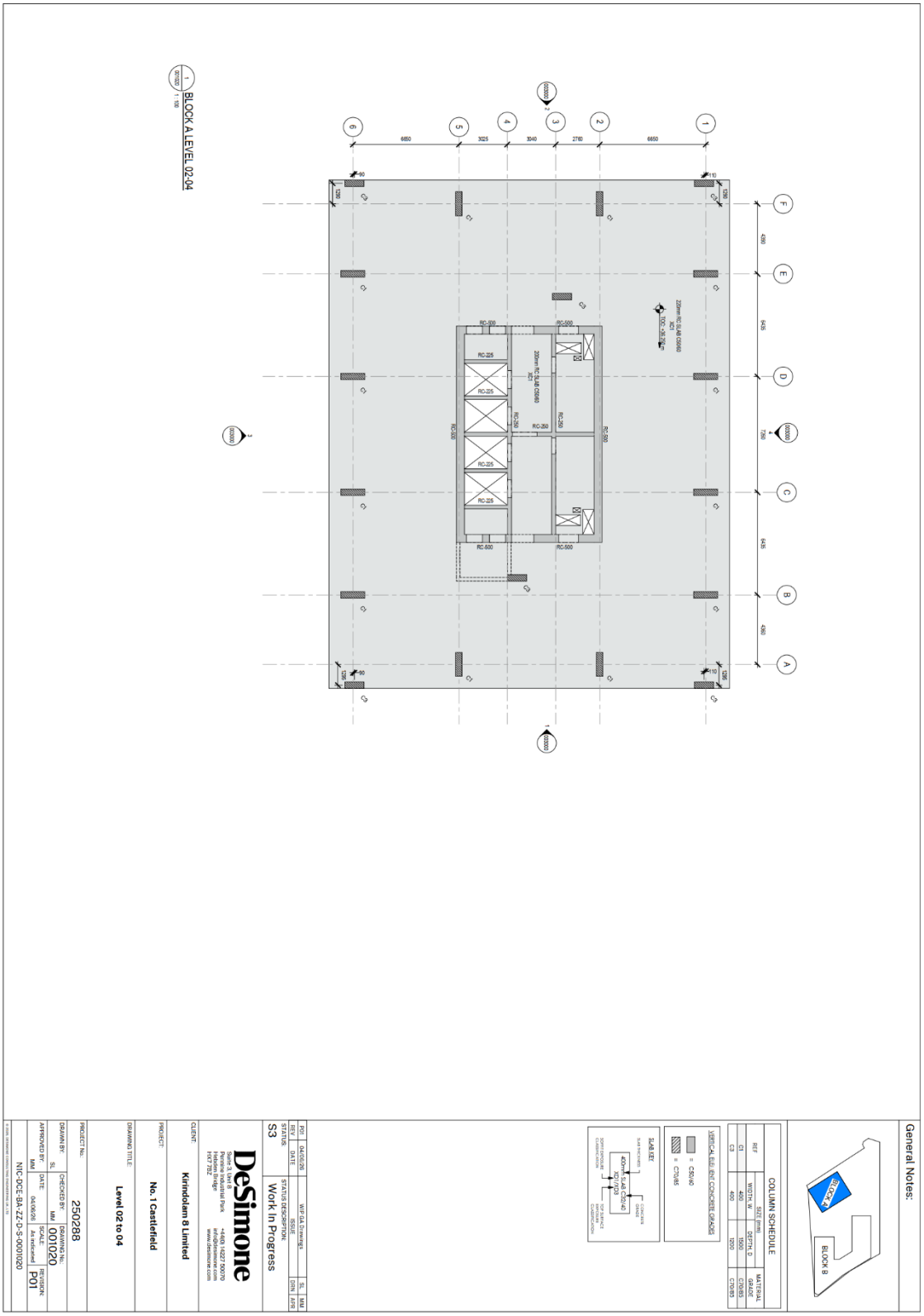


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Work In Progress
DESCRIPTION
ISSUE
WIP S3-3 Drawings
DATE
04/09/2020
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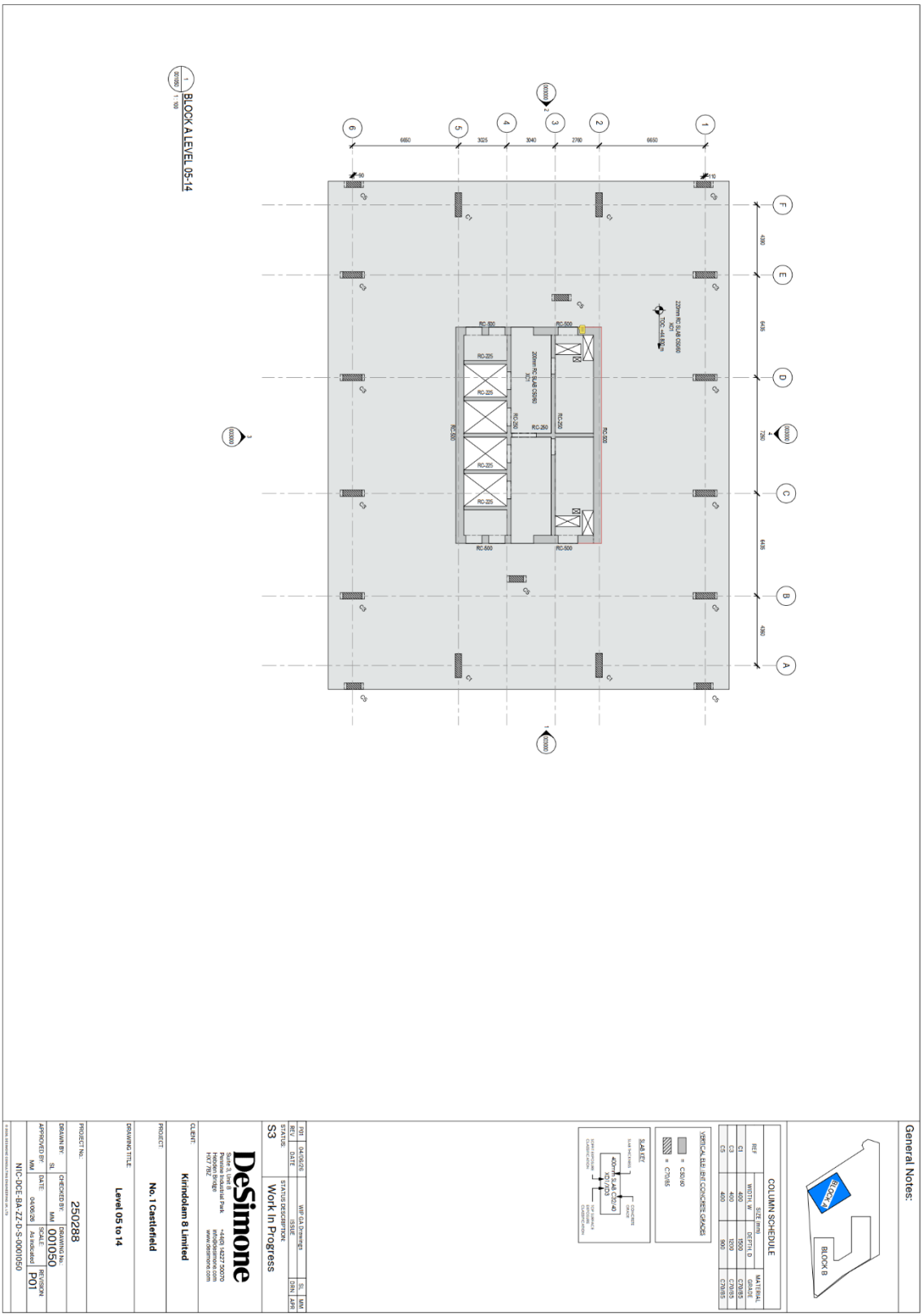
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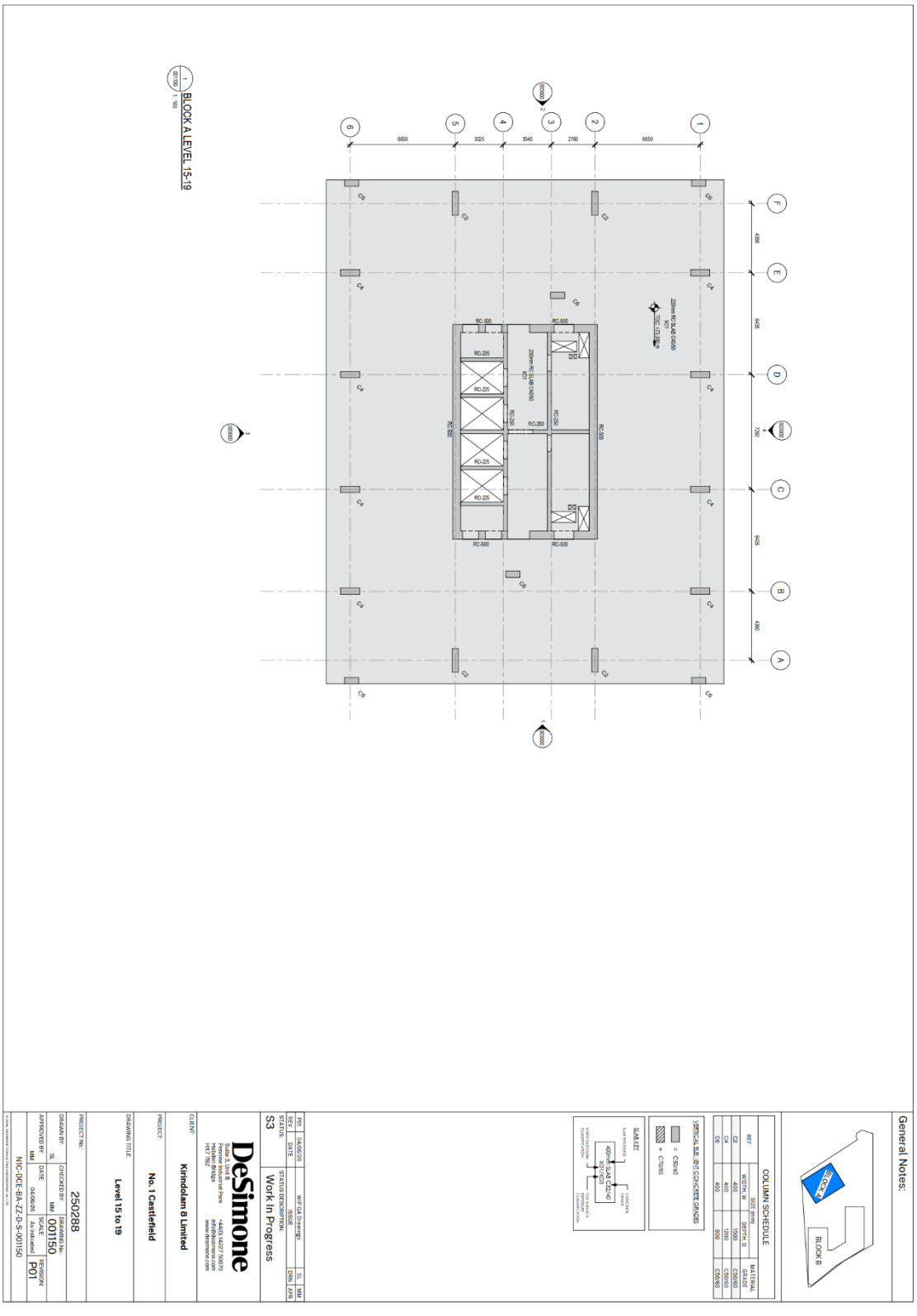
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APPROVED BY: MM
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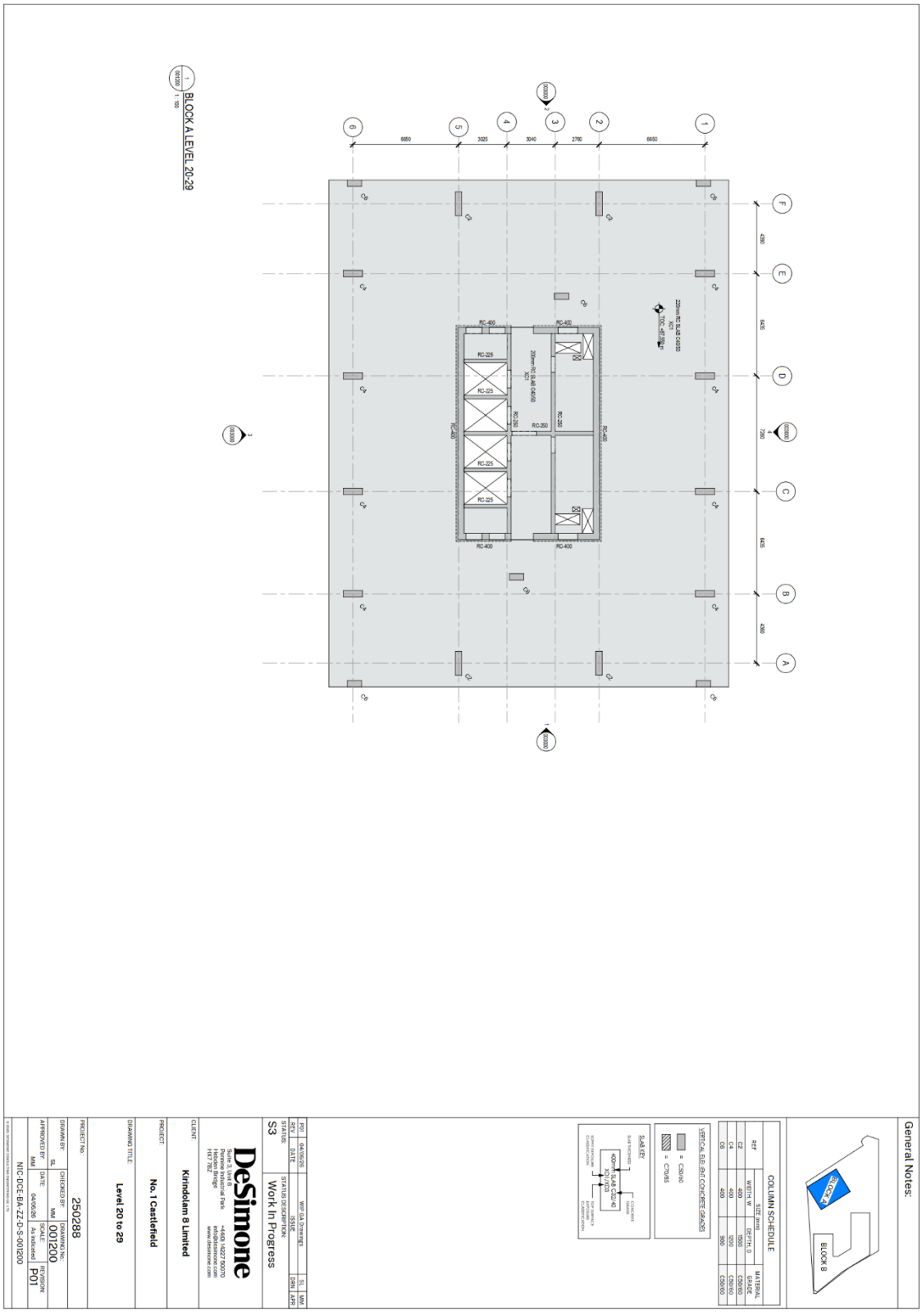
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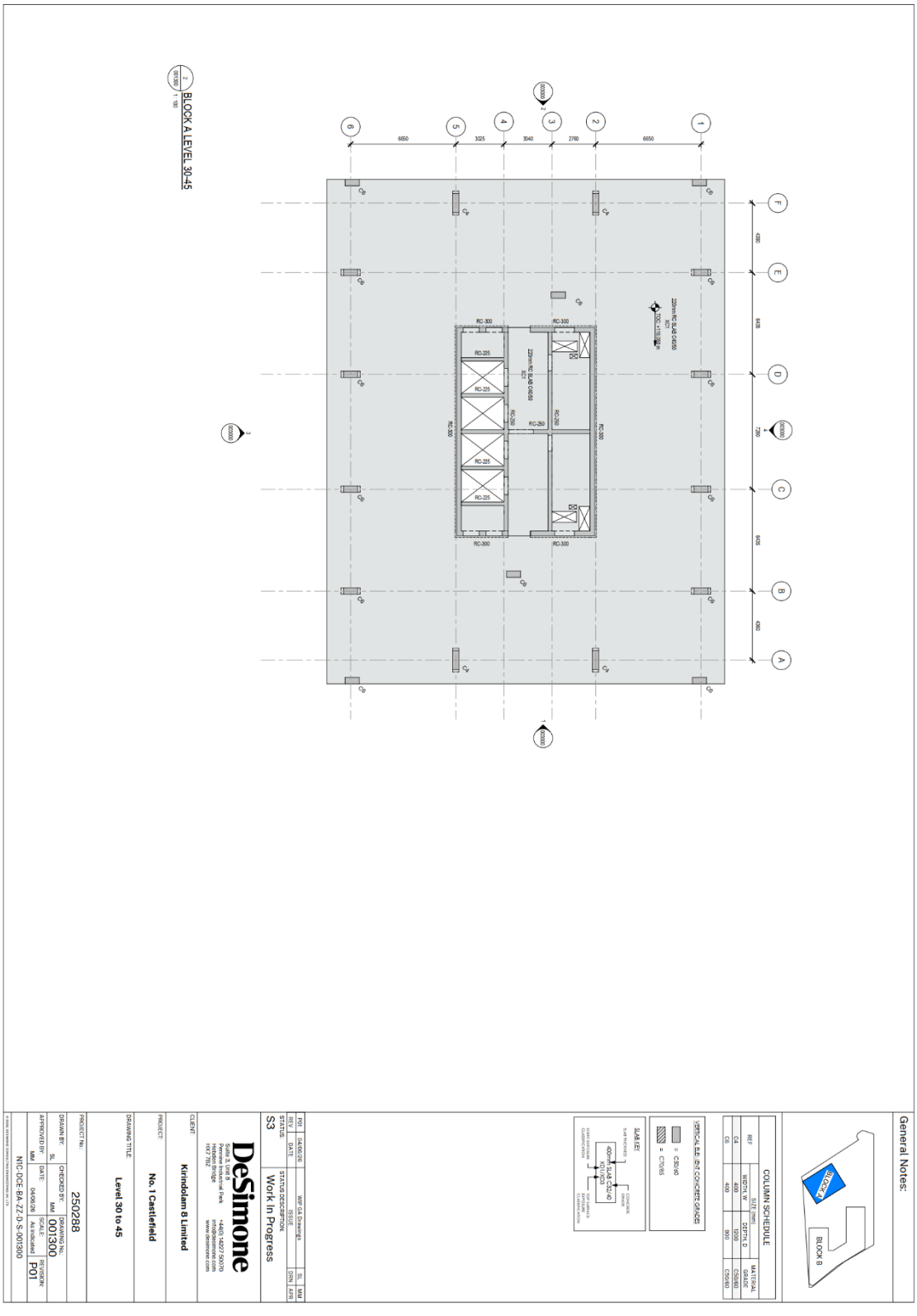
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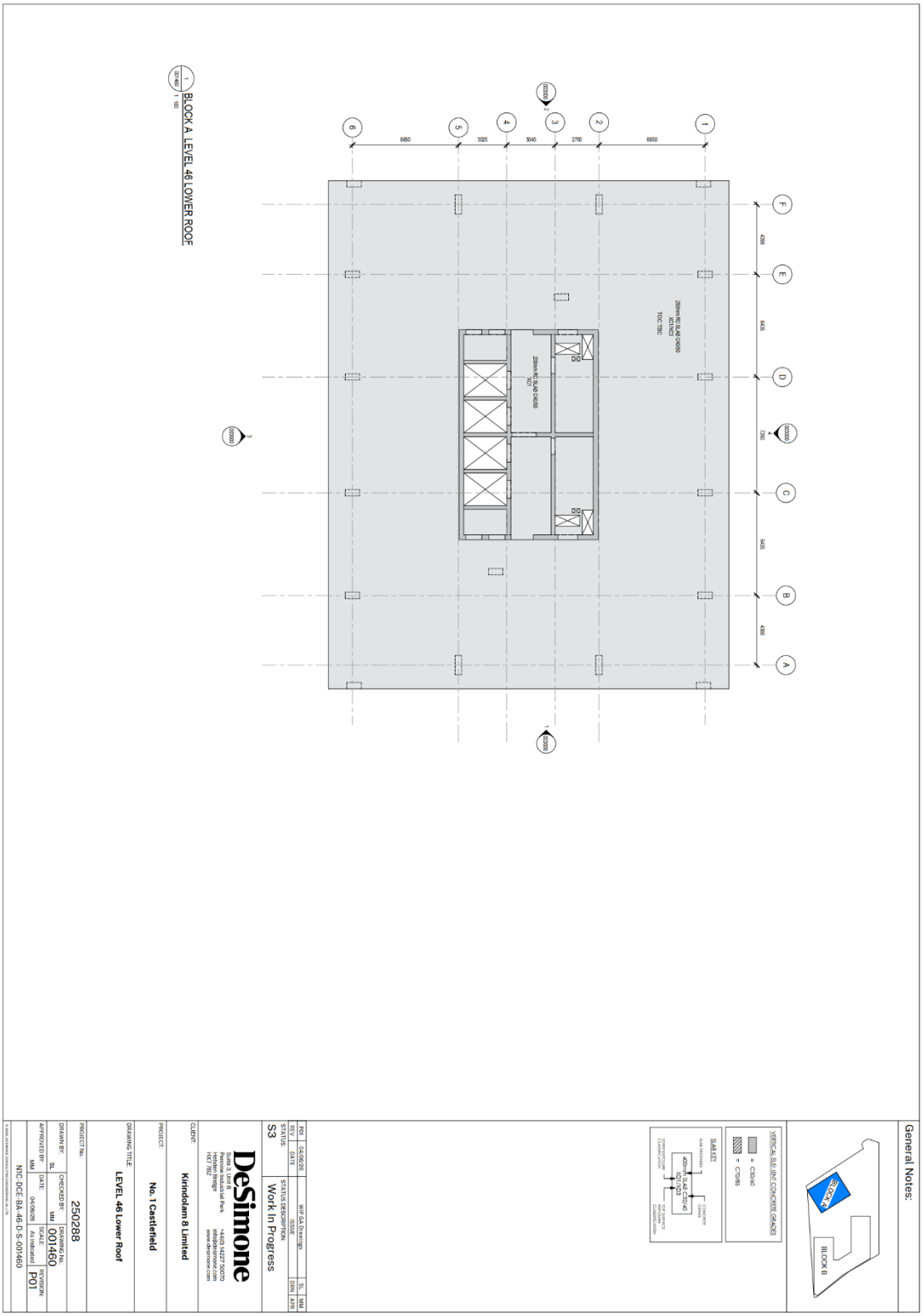
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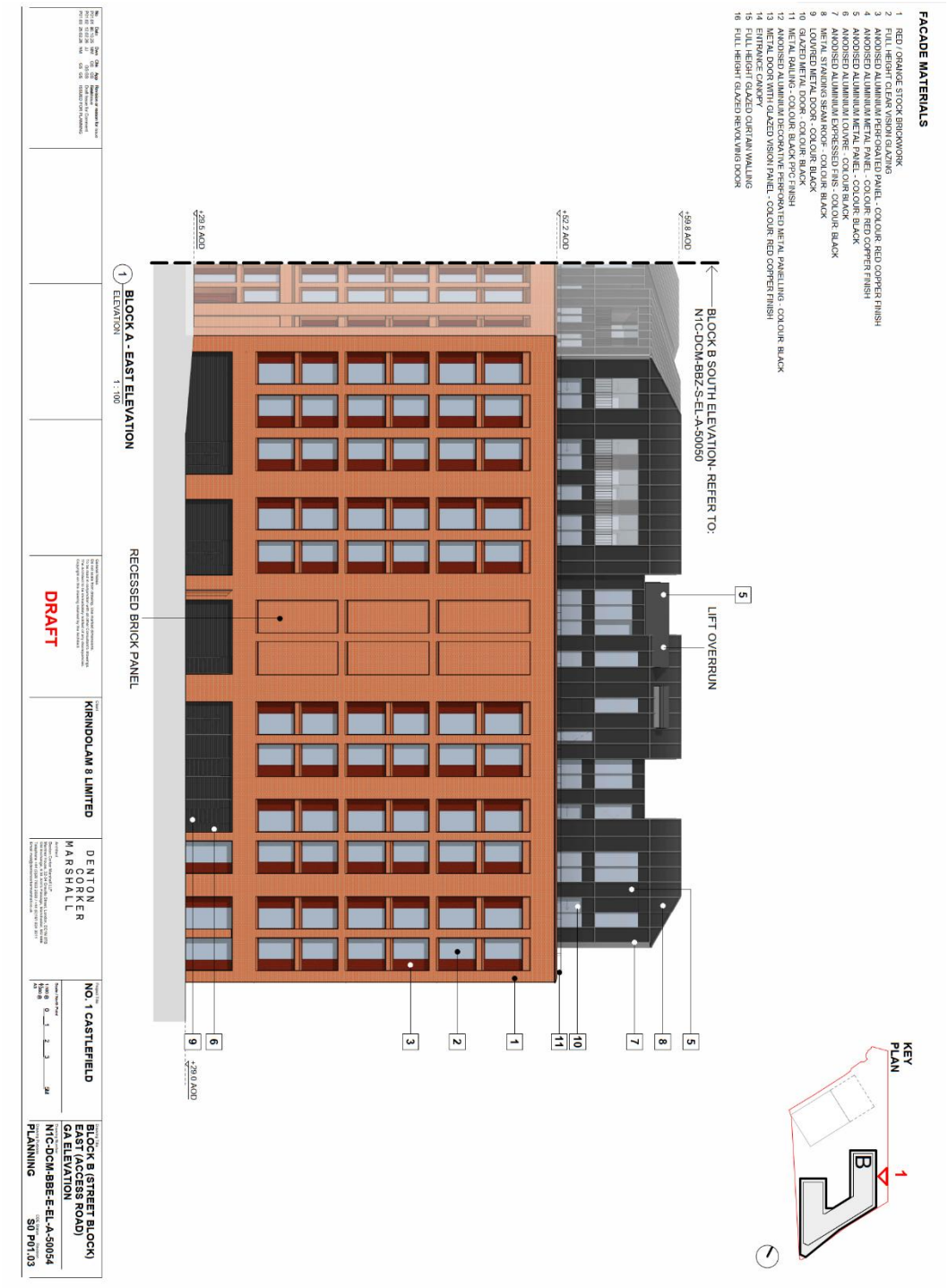


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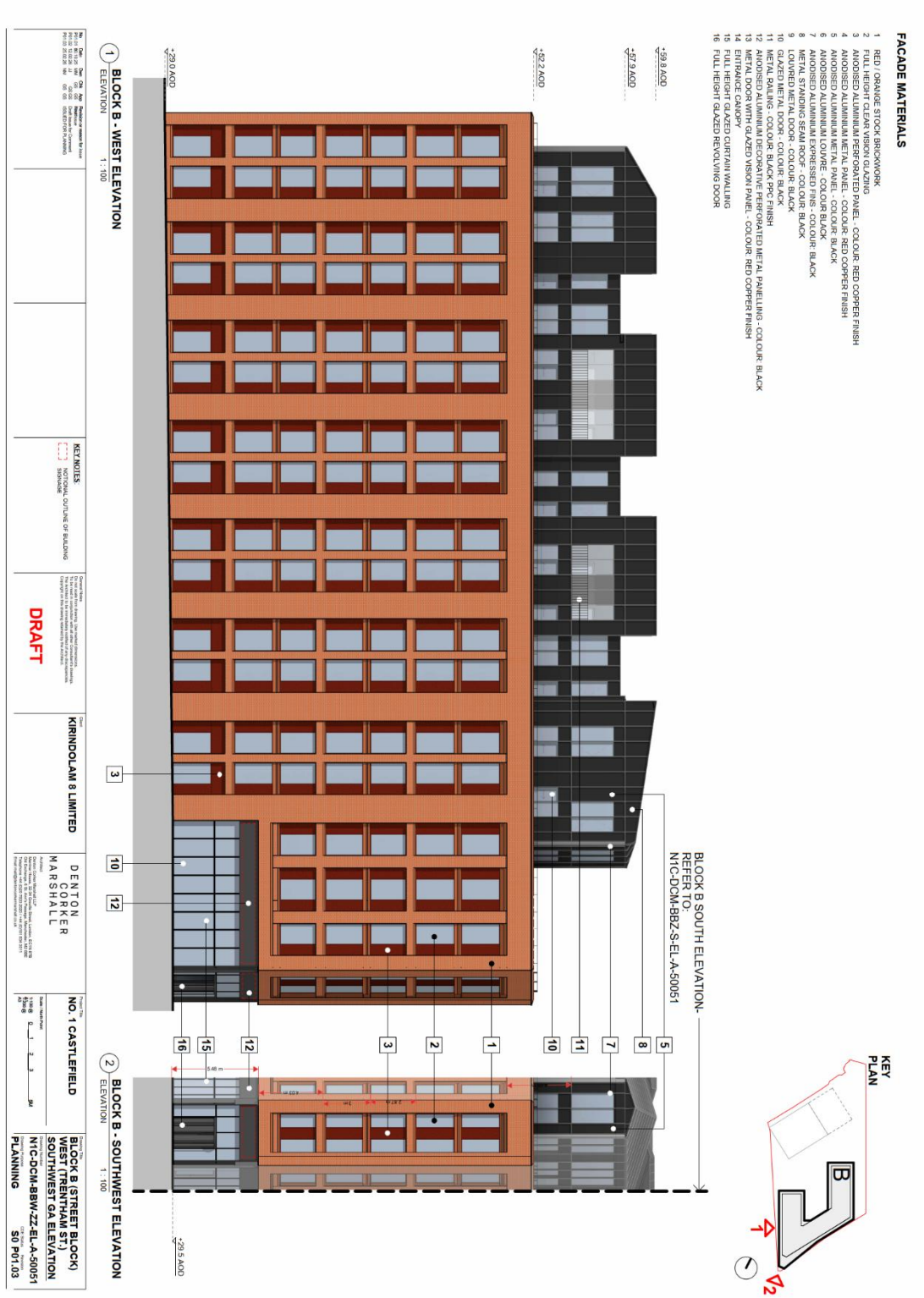
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Appendix 2 – Block B (The Street Block) Plans, Sections & Elevations, Structural Design



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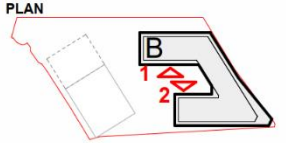
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FACADE MATERIALS

1 RED / ORANGE STOCK BRICKWORK
2 FULL HEIGHT CLEAR VISION GLAZING
3 ANODISED ALUMINIUM PERFORATED PANEL - COLOUR: RED COPPER FINISH
4 ANODISED ALUMINIUM METAL PANEL - COLOUR: RED COPPER FINISH
5 ANODISED ALUMINIUM METAL PANEL - COLOUR: BLACK
6 ANODISED ALUMINIUM LOUVRE - COLOUR BLACK
7 ANODISED ALUMINIUM EXPRESSED FINS - COLOUR: BLACK
8 METAL STANDING SEAM ROOF - COLOUR: BLACK
9 LOUVRED METAL DOOR - COLOUR: BLACK
10 GLAZED METAL DOOR - COLOUR: BLACK
11 METAL RAILING - COLOUR: BLACK PPC FINISH
12 ANODISED ALUMINIUM DECORATIVE PERFORATED METAL PANELLING - COLOUR: BLACK
13 METAL DOOR WITH GLAZED VISION PANEL - COLOUR: RED COPPER FINISH
14 ENTRANCE CANOPY
15 FULL HEIGHT GLAZED CURTAIN WALLING
16 FULL HEIGHT GLAZED REVOLVING DOOR

KEY PLAN



BLOCK B NORTH ELEVATION- REFER TO:
N1C-DCM-BBE-E-EL-A-50054



1 BLOCK B - COURTYARD - WEST ELEVATION
ELEVATION 1 : 100

2 BLOCK B - COURTYARD - EAST ELEVATION
ELEVATION 1 : 100

No	Date	Dwn	Chk	App	Revision or reason for issue
P01.01	30.10.25	MM	GS	GS	Rev1Issue
P01.02	12.02.26	AF	GS	GS	Draft Issue for Comment
P01.03	25.02.26	NM	GS	GS	ISSUED FOR PLANNING

General Notes
Do not scale from drawing. Use marked dimensions.
To be read in conjunction with all other Consultant's drawings.
The Architect to be immediately notified of any discrepancies.
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DRAFT

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Project Title: NO. 1 CASTLEFIELD

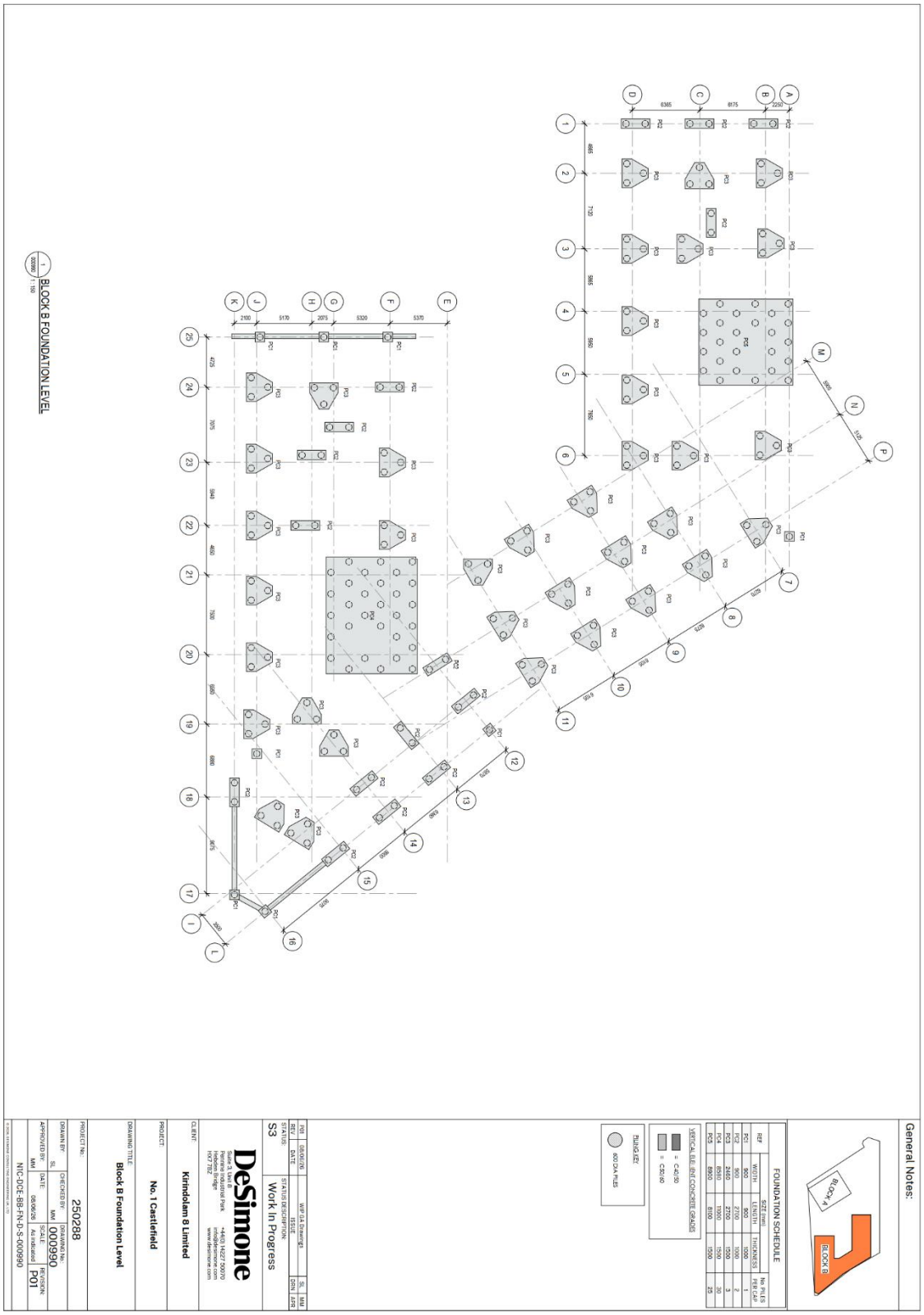
Scale / North Point
1:100 @ A1
1:200 @ A3
0 1 2 3 5M

Drawing Title: BLOCK B (STREET BLOCK) EAST & WEST (COURTYARD) GA ELEVATION

Drawing Number: N1C-DCM-BBZ-ZZ-EL-A-50053

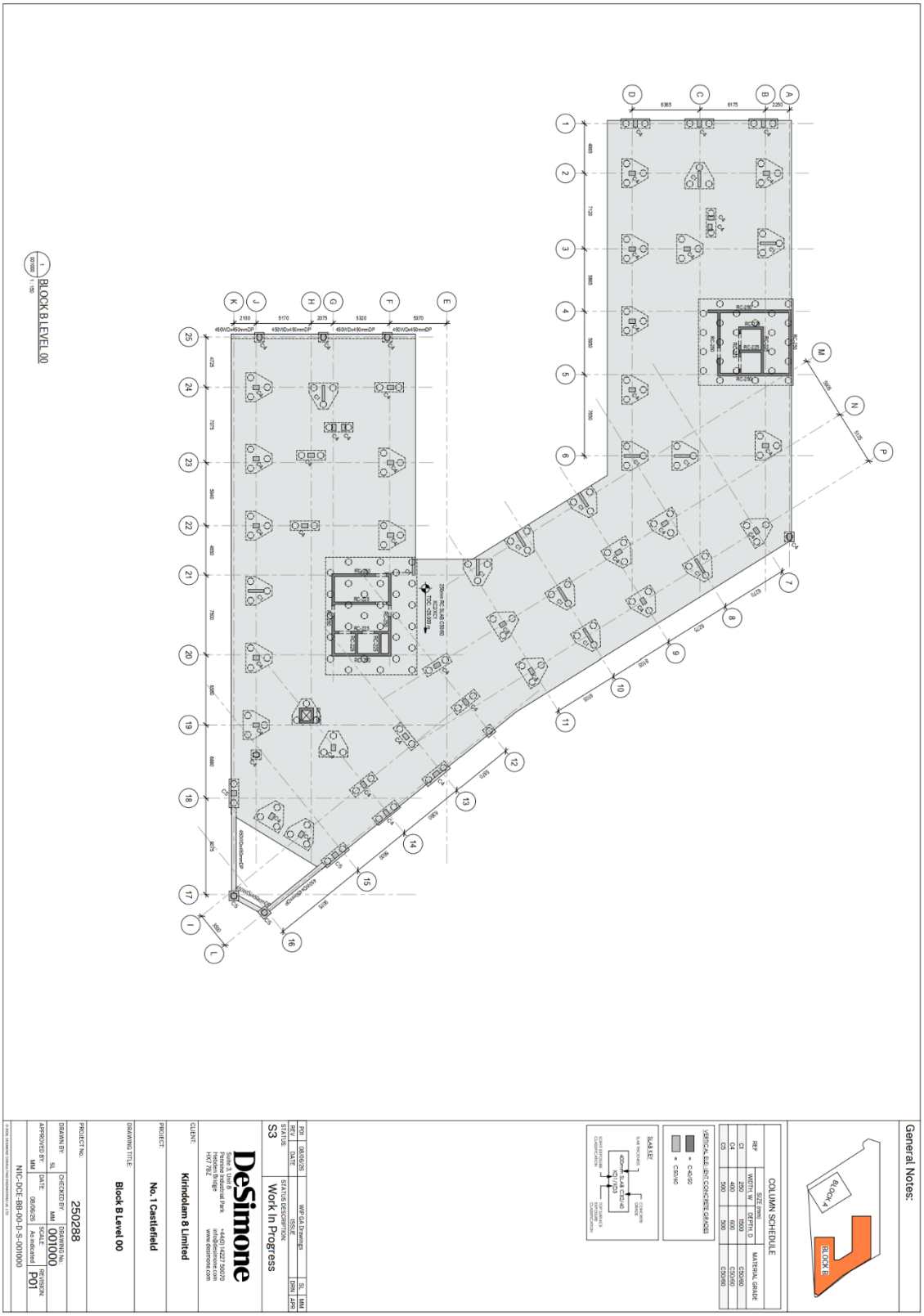
Drawing Purpose: PLANNING
CDE Status / Revision: S0 P01.03

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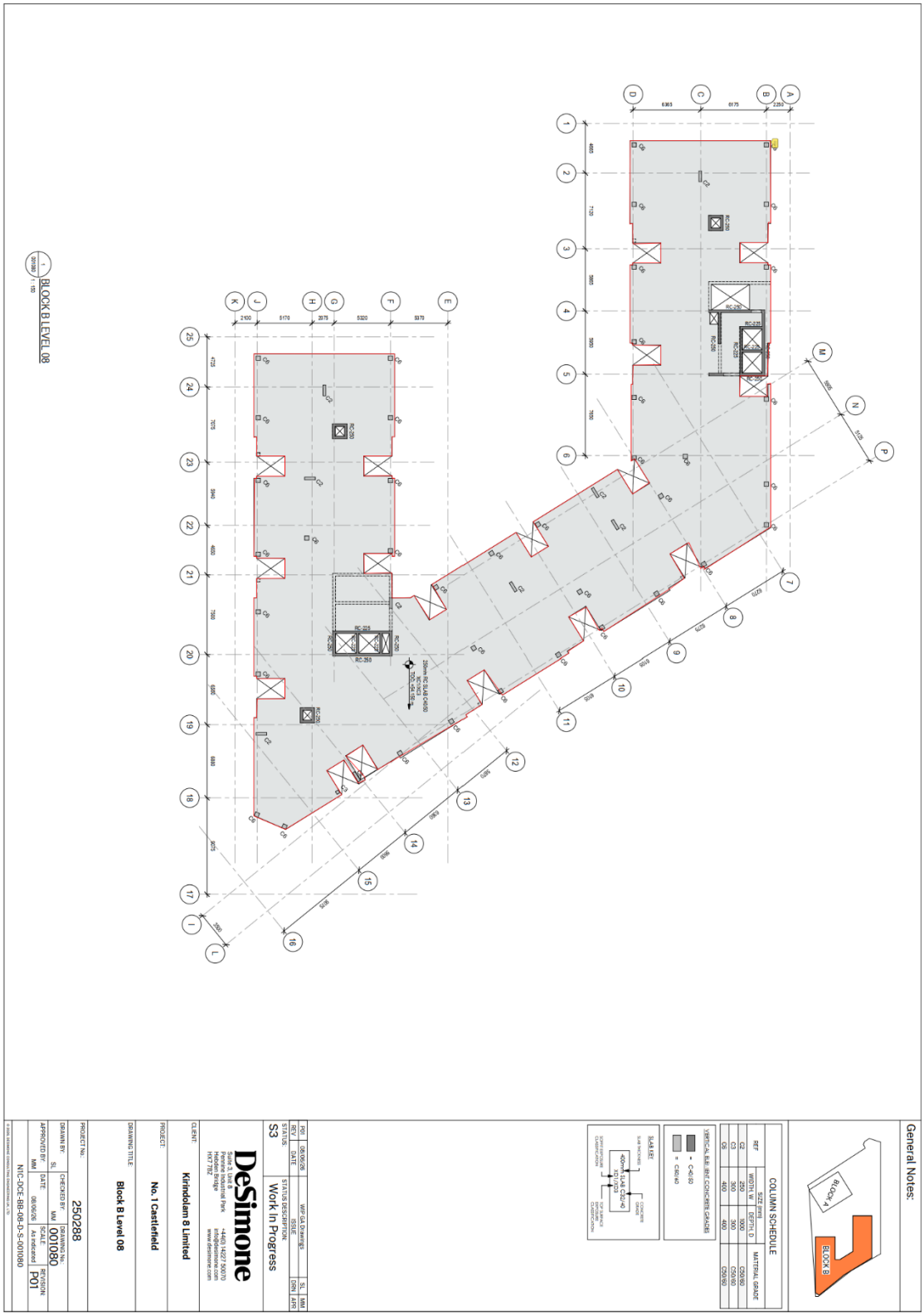
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BLOCK B LEVEL 01
1 : 100
General Notes:
COLUMN SCHEDULE
REF
SIZE (mm)
WIDTH W
DEPTH D
MATERIAL GRADE
C1
C4
C5
400
500
250
600
1000
500
C50/60
C50/60
C50/60
VERTICAL B.E.B. (RC) CONCRETE GRADE
= C40/50
= C50/60
BLOCK B
BLOCK A
DeSimone
Work in Progress
S3
WIP-04 Drawings
Kirkbolam B Limited
No. 1 Castlefield
Block B Level 01
250288
001010
P01
NTC-DCE-BB-01-D-S-001010
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