



General Certificate of Secondary Education  
2025

Centre Number

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Candidate Number

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# Construction and the Built Environment

Unit 2

Sustainable Construction

**MV18**

[GCN21]

**THURSDAY 12 JUNE, MORNING**

## **Time**

1 hour 30 minutes, plus your additional time allowance.

## **Instructions to Candidates**

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write on blank pages.**

Complete in black ink only. **Do not write with a gel pen.**

Answer **all nine** questions.

Questions **1**, **2** and **3** should be answered in relation to the previously issued pre-release material.

You should **not** bring any of the material previously issued into this examination.

You will be provided with a clean copy of the pre-release material.

## **Information for Candidates**

The total mark for this paper is 120.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in questions **6** and **9**.

**A scale ruler is required.**

**A calculator is required.**

Answer **all** questions.

**Questions 1, 2 and 3 relate to the pre-release material.**

**1 (a)** List below a material used to make each of the following elements of the house shown in the pre-release material. [1 mark for each]

**(i)** Window frames \_\_\_\_\_

**(ii)** Roof tiles \_\_\_\_\_

**(iii)** Ground floor construction \_\_\_\_\_

**(iv)** External render \_\_\_\_\_

**(b)** List below six performance requirements of windows used in the house shown in the pre-release material. [6 marks]

**(i)** \_\_\_\_\_

**(ii)** \_\_\_\_\_

**(iii)** \_\_\_\_\_

**(iv)** \_\_\_\_\_

**(v)** \_\_\_\_\_

**(vi)** \_\_\_\_\_

- 2** Using the attached pre-release material, give the following internal room dimensions in **millimetres**.

Some dimensions may need to be scaled.

- (a) (i)** The length and width of bedroom 1. [2 marks]

Length \_\_\_\_\_ mm Width \_\_\_\_\_ mm

- (ii)** The overall length of the dwelling at first floor level.  
[2 marks]

Length \_\_\_\_\_ mm

- (iii)** The length and width of bedroom 3. [4 marks]

Length \_\_\_\_\_ mm Width \_\_\_\_\_ mm

**(b)** Calculate the total floor area of the kitchen/dining room.  
Show your calculations below. [2 marks]

\_\_\_\_\_ square metres

**(c)** How many internal doors are required for the complete dwelling? [2 marks]

\_\_\_\_\_

**3 List four different materials/components** used for external wall construction of the house shown in the pre-release material and **describe** how each material/component would be used. [3 marks for each]

**(a)** \_\_\_\_\_

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**(b)** \_\_\_\_\_

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**(c)** \_\_\_\_\_

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**(d)** \_\_\_\_\_

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**(Questions continue overleaf)**

**4** Describe what you understand by each of the following types of renewable energy. [4 marks for each]

**(a)** Wind energy

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**(b)** Solar energy

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**(c) Biomass**

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- 5 Complete a cutting list for the bookcase shown in **Fig. 1** and **Fig. 2**.

**Fig. 1**

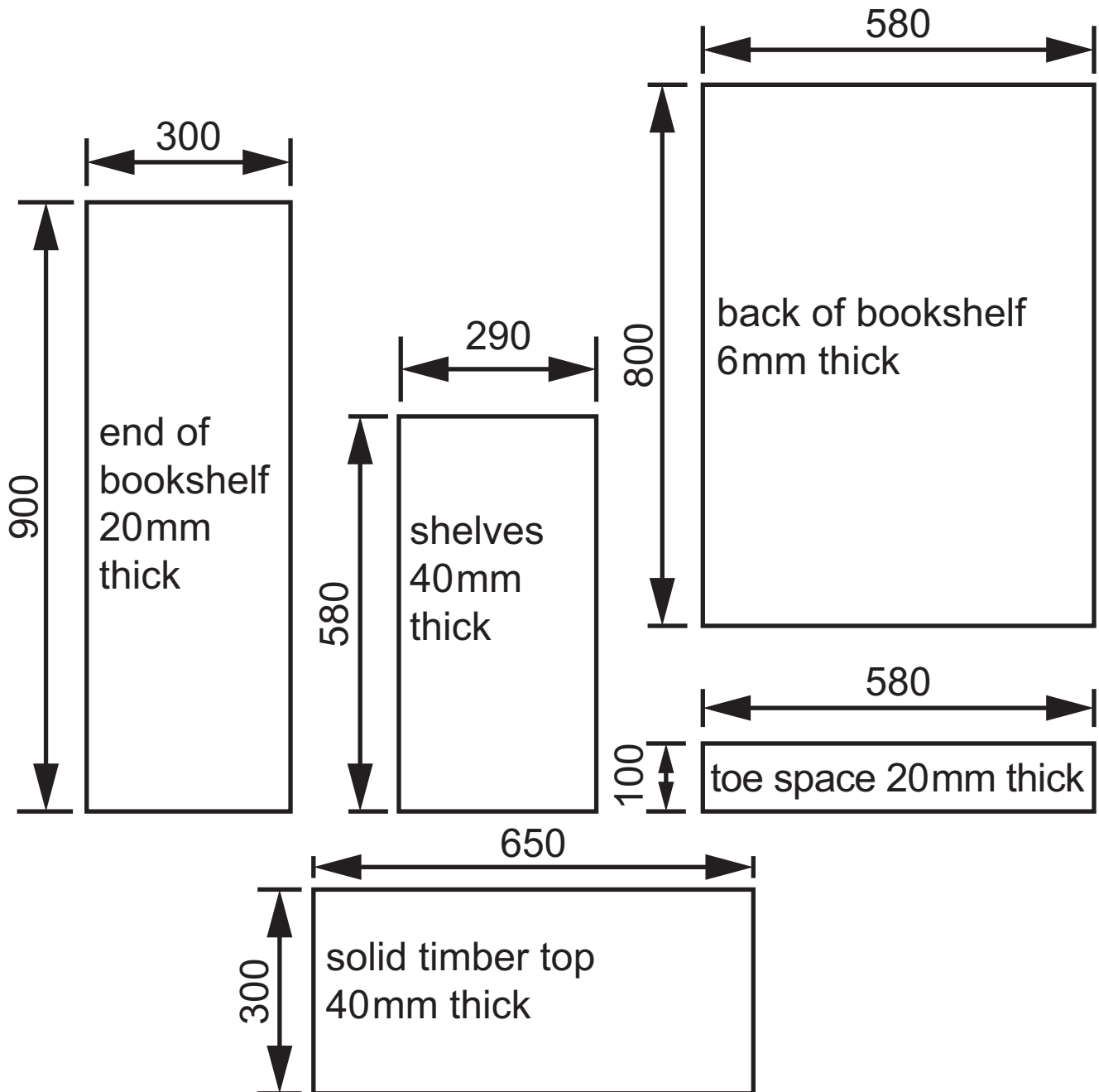
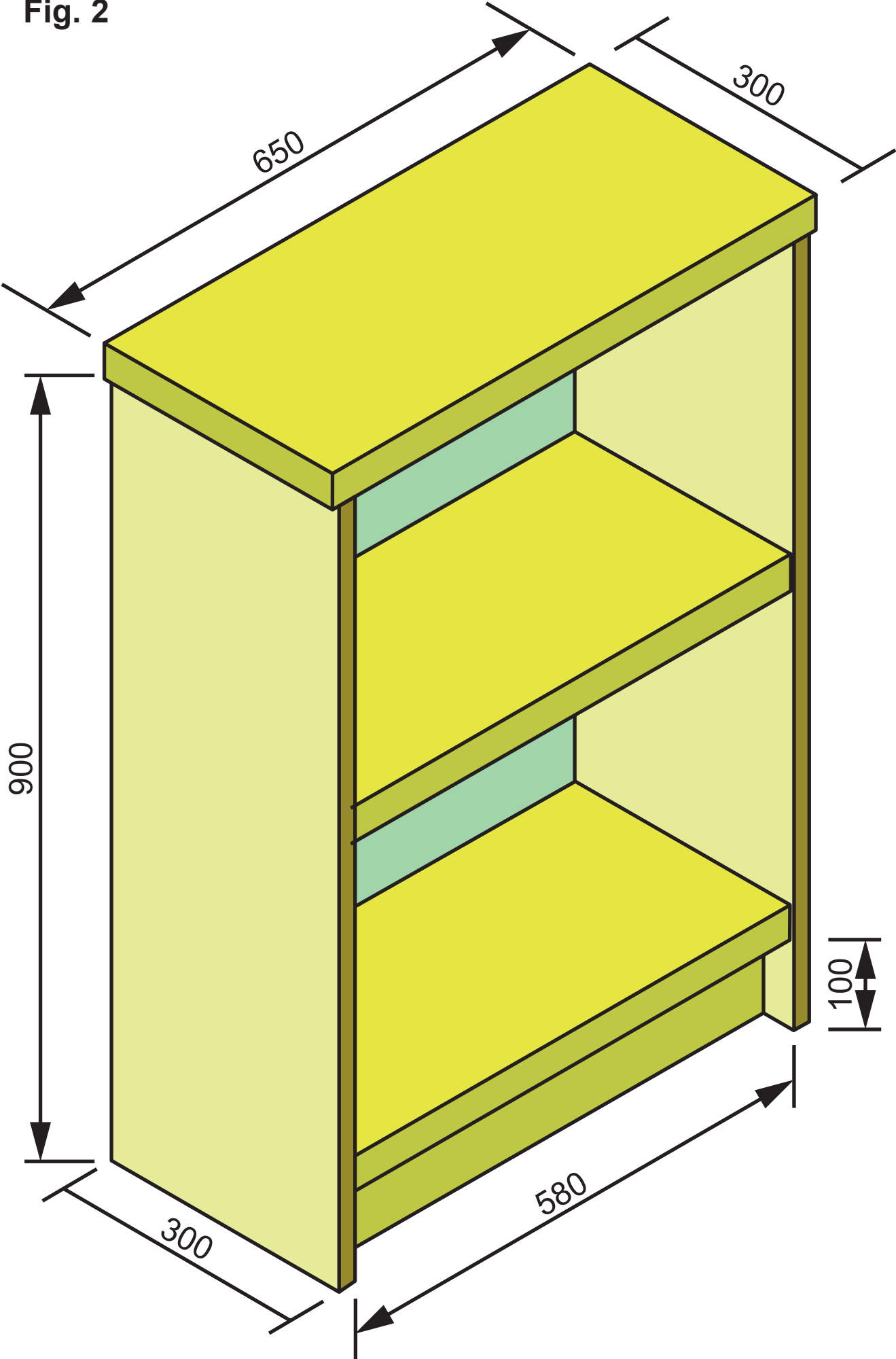


Fig. 2



**The costs of the materials excluding the shelves to be used in the bookcase are shown below.**

- 300 mm wide solid pine sheeting which is 20 mm thick.  
Cost **£7.46** per linear metre.
- 300 mm wide solid pine sheeting which is 40 mm thick.  
Cost **£11.96** per linear metre.
- 100 mm wide solid pine sheeting which is 20 mm thick.  
Cost **£2.51** per linear metre.

Pine faced 6 mm thick MDF costs **£42** for a sheet measuring 2440 mm × 1220 mm. You will be able to cut 6 backs for your bookshelf from one sheet of MDF.

**Please complete the emboldened boxes in the cutting list opposite (space for your calculations is on page 14). [26 marks]**

Item	Part	Quantity	Description of material required	Length in mm	Width in mm	Thickness in mm	Total length required	Cost per linear metre	Total cost
1	Top of bookshelf	1	40 mm thick solid pine sheeting	650	300	40	0.65	£	
2	End of bookshelf	2						£	
3	Toe space							£	
4	Back of bookshelf						6 backs from one sheet	Cost per sheet £	
<b>Total cost of glue, connection blocks, varnish and shelves</b>									<b>£20.00</b>
<b>Total cost</b>									<b>£</b>

**Use this page for calculations where necessary.**

**Blank Page**  
**(Questions continue overleaf)**

**6 Evaluate** how construction methods for roofs have changed over time. As part of your evaluation, consider the advantages of modern construction methods over those that were previously used. [10 marks]

**Quality of written communication will be assessed in your answer.**

The following terms should be evaluated as part of your answer;

- Pitched or flat roof
- Roof coverings, natural slate, concrete tiles, thatch and composite sheeting
- Traditional cut roof structure, trussed rafter structure
- Support, wall plate, purlin
- Ventilation
- Insulation

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**7 Fig. 3** shows an incomplete concrete sill detail.

**(a)** Complete the drawing in **Fig. 3** adding the following details: [8 marks]

1. Outer skin of blockwork
2. External wet dash plaster
3. Concrete sill
4. DPC
5. Inner skin of blockwork
6. Window frame
7. Double glazing
8. Gypsum plaster

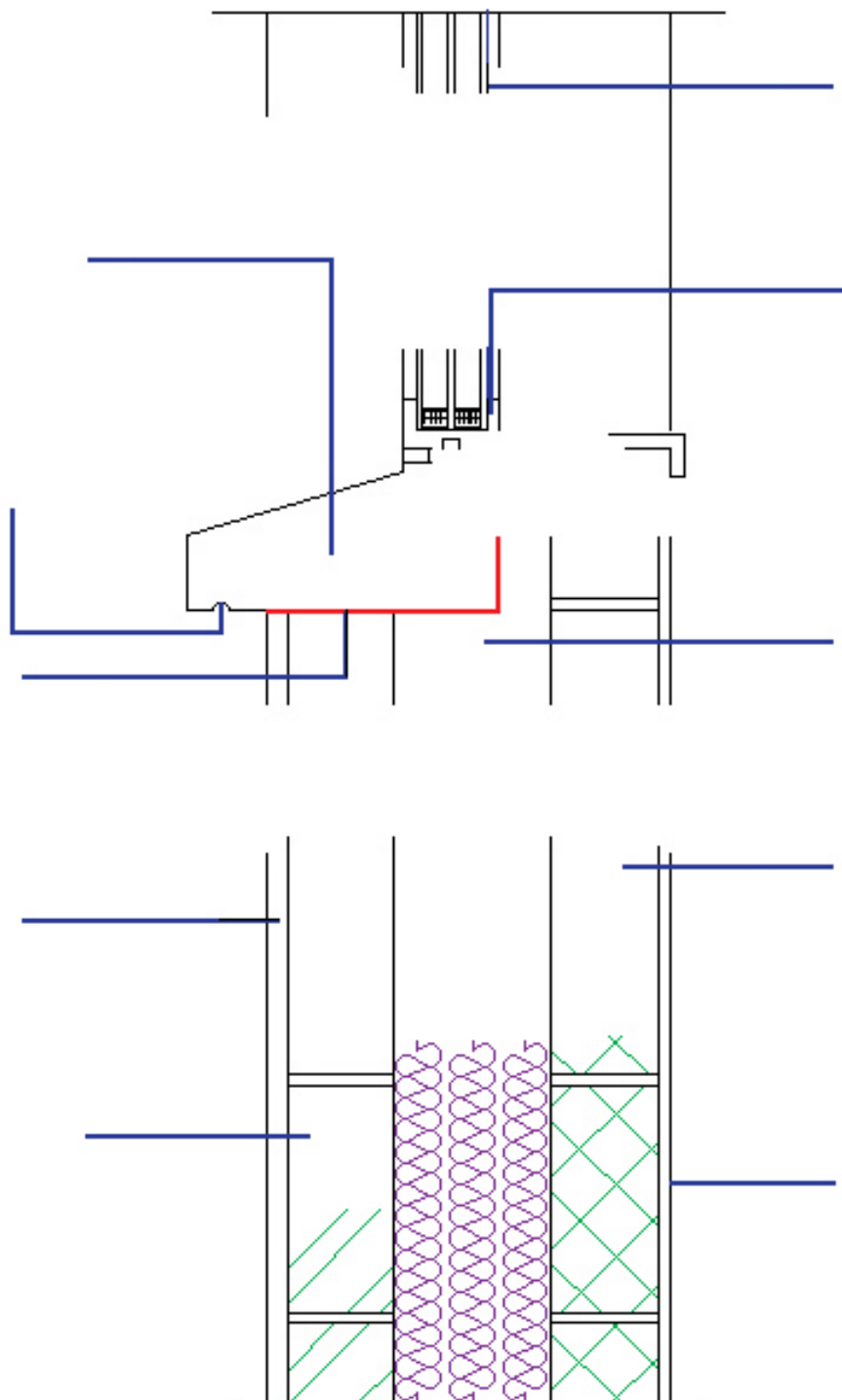
**(b)** You should also draw in hatch patterns to represent the following: [4 marks]

1. Insulation behind the concrete sill
2. Inner skin of blockwork
3. Outer skin of blockwork
4. Cavity insulation

**(c)** Add the labels from the list below once you have completed your drawing: [10 marks]

1. 100mm blockwork outer leaf
2. Wet dash on a sand/cement render
3. Concrete sill
4. D.P.C.
5. 100 mm inner skin of blockwork
6. Cavity insulation
7. Window frame
8. Double glazed window
9. Gypsum plaster
10. Anti-capillary groove

**Fig. 3**







- 9 Using notes and/or annotated sketches, **evaluate** the way in which the design and structure of domestic wall construction has changed over the last century. The following terms should be evaluated as part of your answer. [10 marks]

**Fig. 4**



Stone walls  
One brick thick wall  
Timber frame  
Walls of the future  
Insulation  
Cavity wall construction  
DPC

**Quality of written communication will be assessed in your answer.**

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**This is the end of the question paper**

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
<b>Total Marks</b>	

Examiner Number

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to floor joist. Floor joist spanning more than 4.5 m to be strutted by two rows of solid or herringbone strutting at one third span. Solid strutting to be at least 38 mm thick and at least  $\frac{3}{4}$  times the depth of the joist. Herringbone strutting shall be at least 38 mm × 38 mm but should not be used when the distance between the joist is 3 times the depth of the joist. Mineral wool to be in between joists on 1st floor

- **Windows and doors:** Grey painted oak window frames. Glazing to be double glazed with soft coat Low-E Argon Filled units with 16 mm glass spacing (min. to U Value of 1.4) including safety glazing. Composite front and rear door (colour to client's choice)

**Note Students will require the use of a scale ruler during the examination.**



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## Construction and the Built Environment

Unit 2

Sustainable Construction

[GCN21]

THURSDAY 12 JUNE, MORNING

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**MV18**

### Information for Candidates

A copy of the pre-release information for this examination is included in the following pages.

You must use this clean copy of the Pre-release Material in the examination and not your own annotated copy.

**Pre-Release  
Material**

## Scenario

A client has purchased a green field site in a semi-urban area. An Architect has been appointed to lead the design team. The client will develop the site with a mixture of single storey and two storey house types. The following working drawings for a detached house type have been completed, receiving full planning and building control approval.

The architectural style complements the surrounding area, matching existing adjacent developments.

### Specification notes for construction:

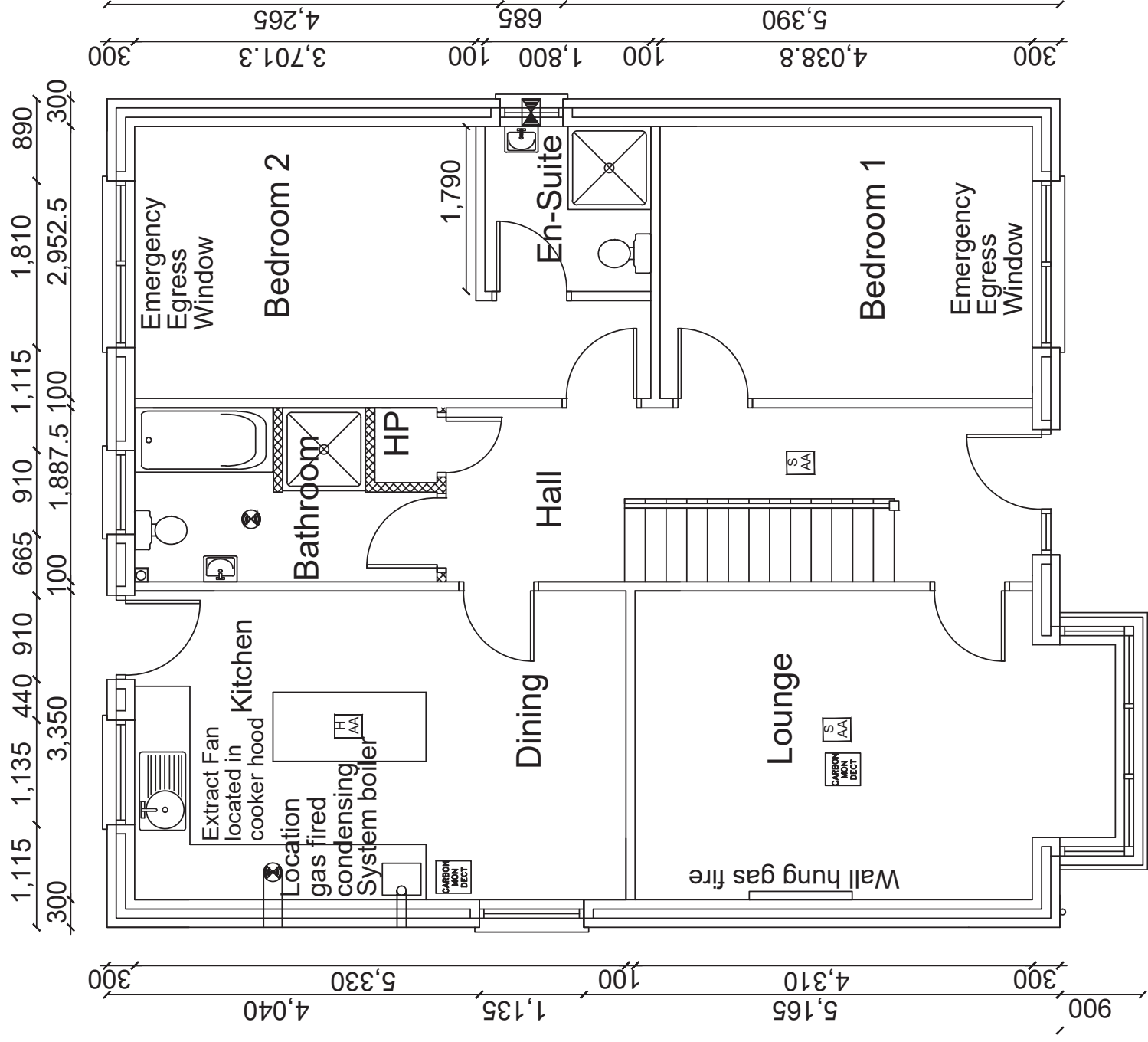
- **Foundations:** Foundation depth and size to be determined by Structural Engineer where employed. Provide C20 mix with min. crushing strength for foundations to be 25N/mm<sup>2</sup> after 28 days. Depth of foundation subject to local ground conditions but in all cases should be taken down to a firm bearing min. 750mm below finished ground level to protect from frost damage.  
Foundation sizes:  
100mm wall – 450mm x 225mm deep  
215mm wall – 600mm x 225mm deep  
300mm wall – 600mm x 225mm deep

- **Walls:** External walls in 300mm cavity construction with 100mm blockwork inner and outer leaf. Grey / blue mixed engineering brick base constructed in stretcher bond.  
Provide 100mm cavity with 100mm full fill insulation to inner leaf. Wall ties to be placed every 750mm centres horizontally, 450mm centres vertically, 225mm vertically at all openings and within 150mm of opening. Provide horizontal and vertical damp proof course to all openings

with min 25mm high density polystyrene insulation where cavities close to prevent cold bridging. Blockwork inner leaf and internal walls to be 100mm unless stated otherwise with min crushing strength of 7N/mm<sup>2</sup>. Inside of wall to be finished with 12.5mm carlite browning and 3mm hardwall plaster finish. External finish: painted wet dash, rendered finish.

Provide DPC min 150mm above finished ground level, lapped and bonded to floor damp proof membrane.

- **Ground Floor Construction:** Ground floor construction of 100mm sand/cement screed on precast concrete insulated floors to comply with current building regulations. DPM to be of sufficient size to allow for upstand to be lapped and bonded to wall damp proof course (DPC)
- **Roof:** Provide grey concrete interlocking roof tiles, with universal ridge tiles to match on 25mm x 38mm treated softwood battens on Kooltherm sarking felt (or equal and approved) to BS 747 on C16 kiln dried trussed rafters as indicated on structural roof plan/sections. Trussed rafters to be designed and manufactured by specialist with calculations to be forwarded to Building Control for approval prior to manufacture. Trusses fixed to 100mm x 50mm wall plate secured to wall at 900mm centres with 30mm x 6mm galvanised straps. Cavity to be closed with 12.5mm fibreboard.  
Provide 225mm x 19mm treated softwood fascia.  
Provide 200mm x 12mm external grade plywood soffit.  
100mm Aluminium seamless gutter system.
- **Timber First floor:** Timber first floor construction of 22mm tongue and groove flooring grade chipboard on timber floor joists as stated on drawing. Double joist to be provided below first floor stud walls which run parallel to joist and below first floor baths/showers. Solid strutting to be provided below first floor stud walls which run perpendicular



**Ground Floor Plan**



Notes

Project Name  
Pre-Release Materials

Drawing Title  
Ground Floor Plan

Unit

Unit 2: Sustainable Construction

Scale  
Not to Scale

Date  
Summer 2025

Dwg. No

01

Drawn by

CCEA

**GCSE Construction  
&  
The Built Environment**

Notes

Project Name  
Pre-Release Materials

Drawing Title  
First Floor Plan

Unit  
Unit 2: Sustainable Construction

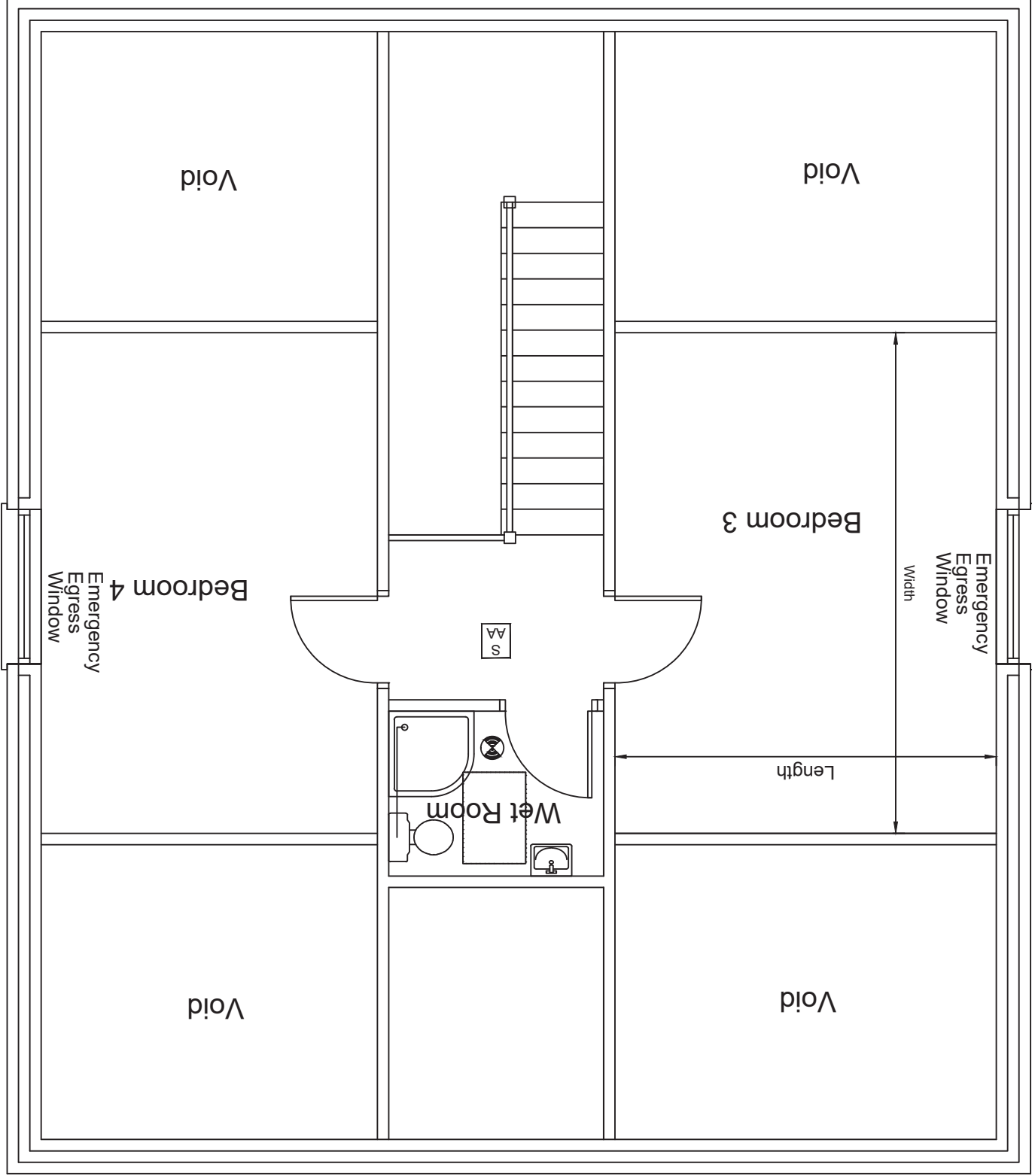
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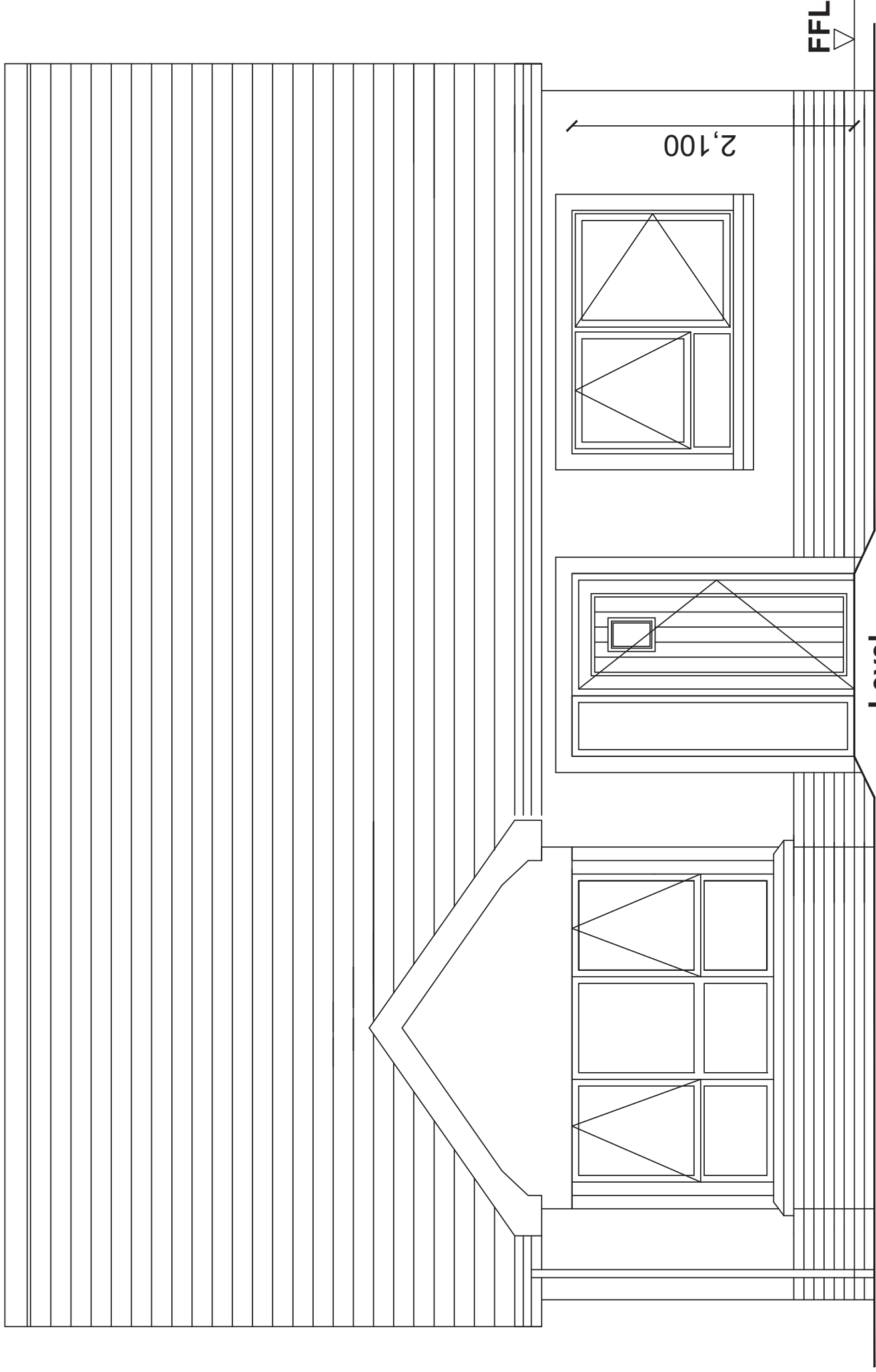
Date  
Summer 2025

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### First Floor Plan





**Front Elevation**

**Level Access**

Notes

Project Name

**Pre-Release Materials**

Drawing Title

**Front Elevation**

Unit

**Unit 2: Sustainable Construction**

Date

**Summer 2025**

Scale

**Not to Scale**

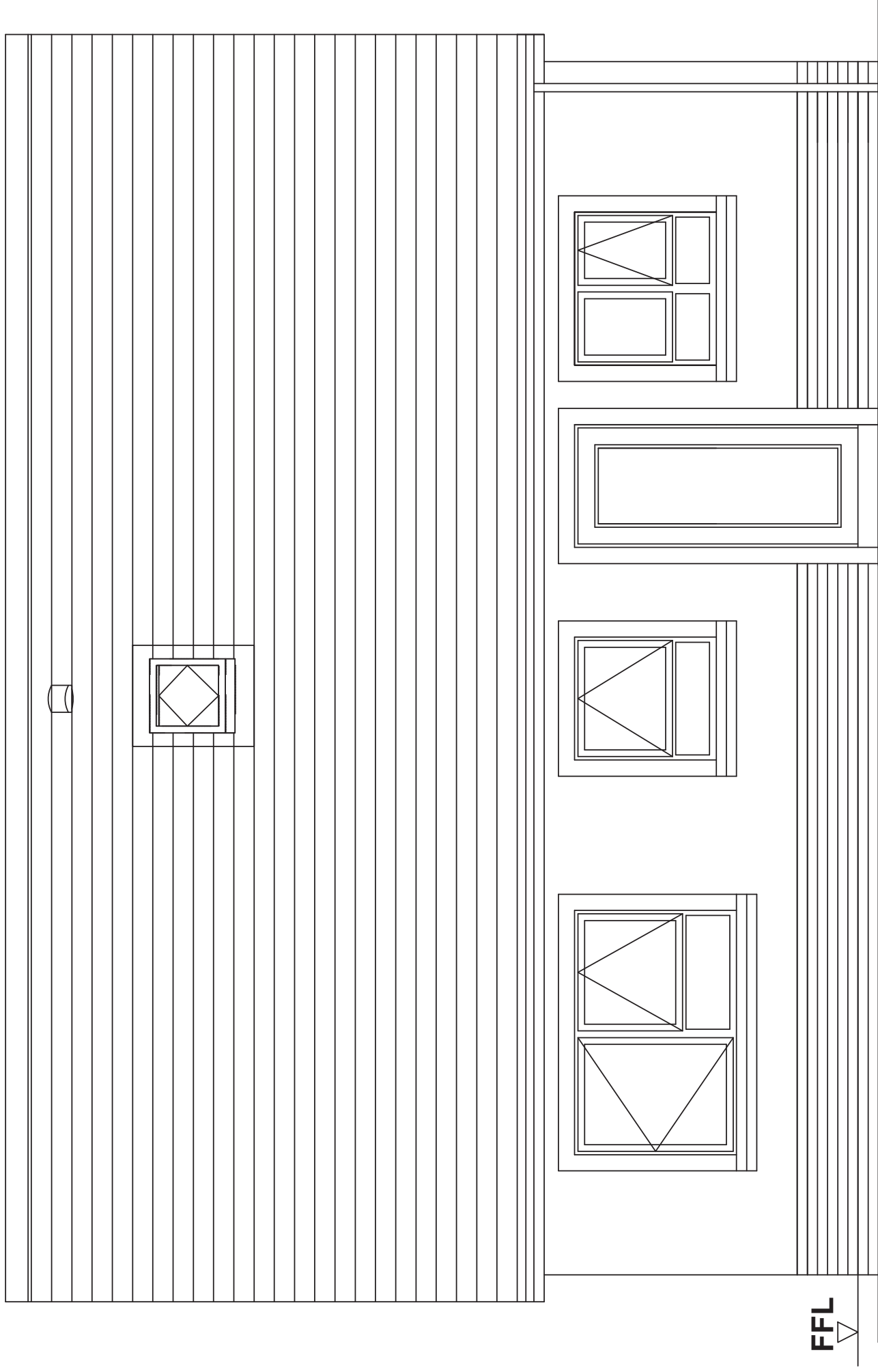
Dwg. No

**03**

Drawn by

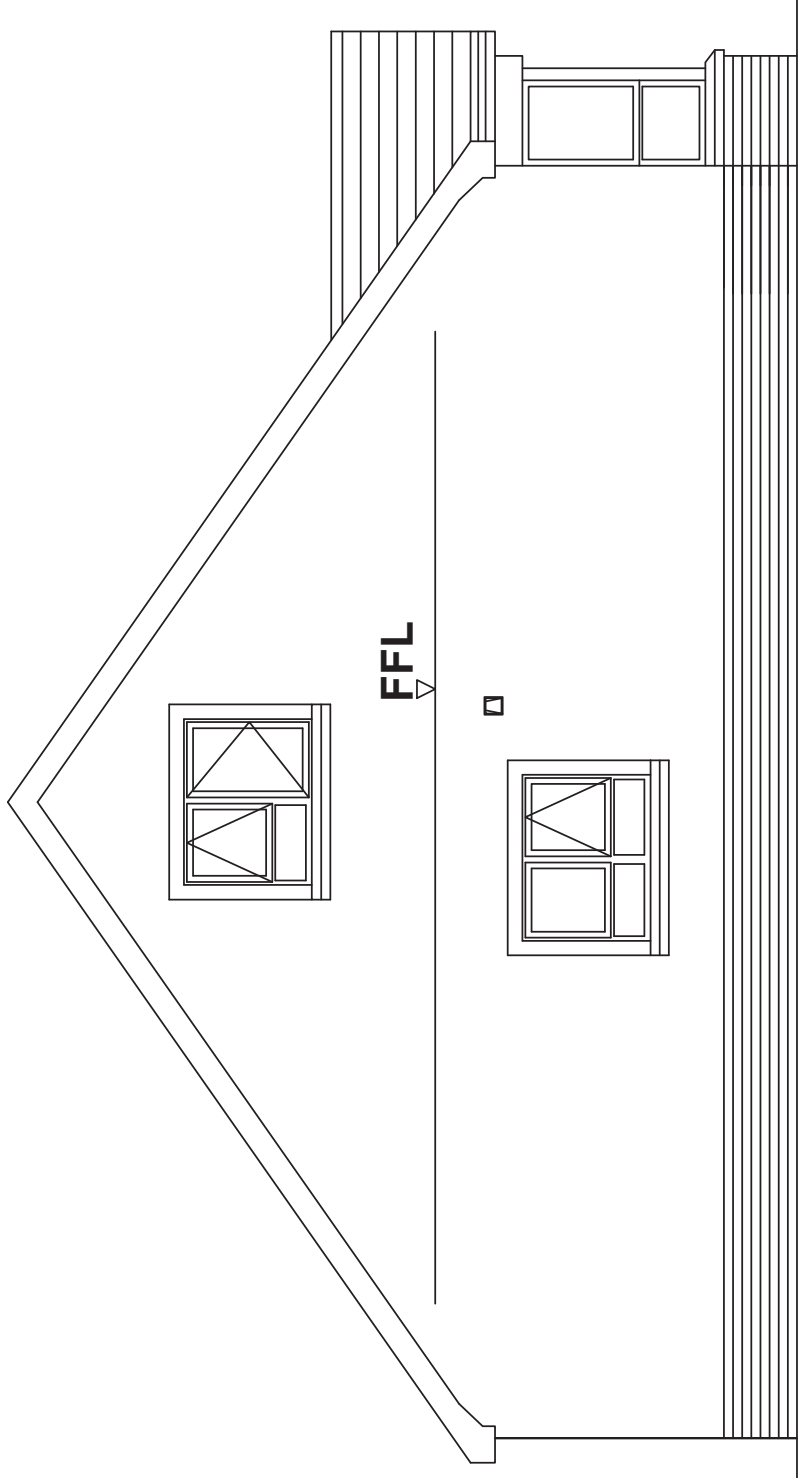
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The Built Environment**

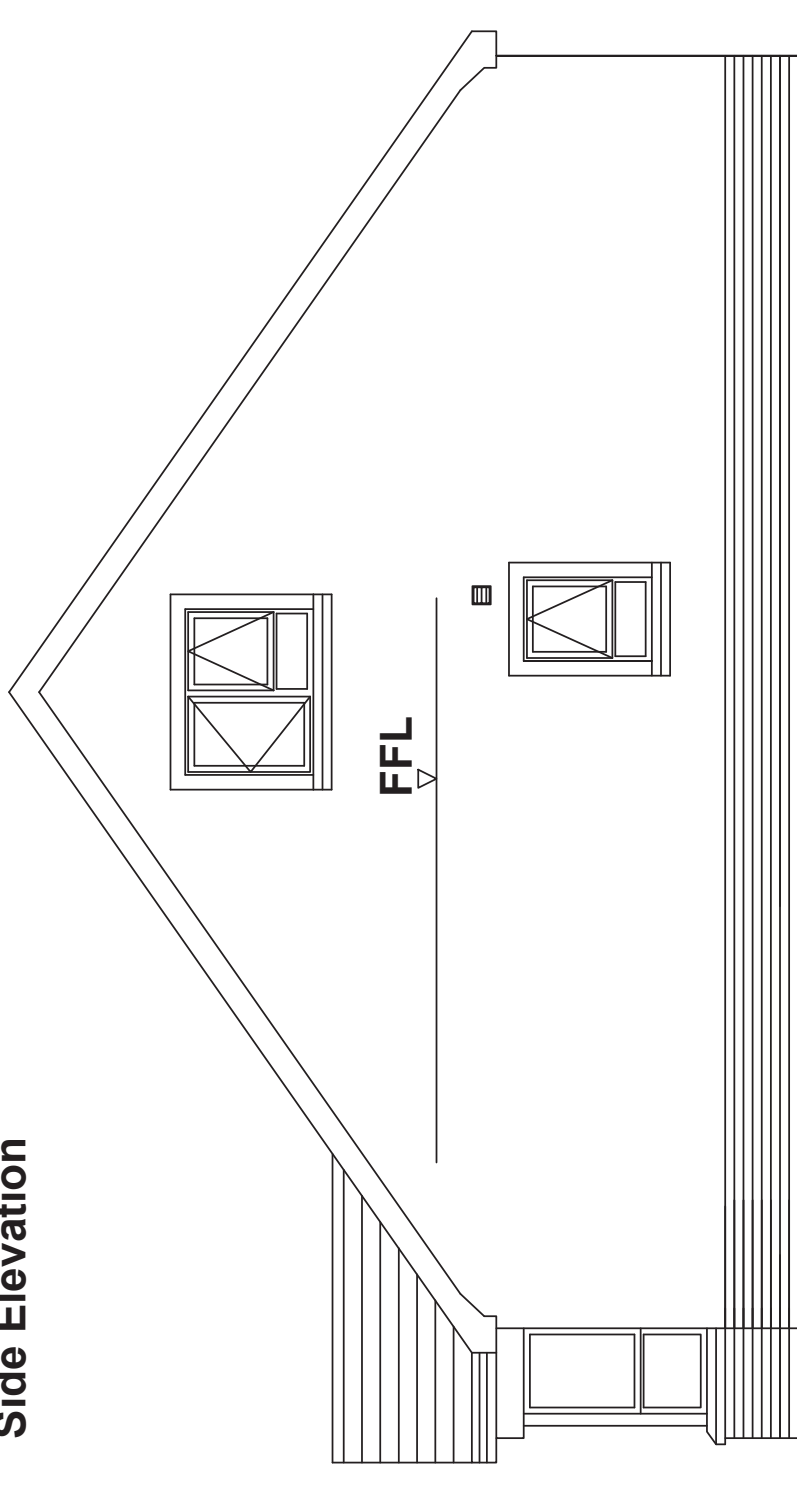


**Rear Elevation**

Notes	Project Name Pre-Release Materials	Unit	Unit 2: Sustainable Construction		GCSE Construction & The Built Environment
	Drawing Title Rear Elevation	Scale Not to Scale	Date Summer 2025	Drawn by CCEA	
		Dwg. No 04			



**Side Elevation**



**Side Elevation**

Notes

Project Name  
Pre-Release Materials

Drawing Title  
Side Elevations

Unit

Unit 2: Sustainable Construction

Scale

Not to Scale

Date

Summer 2025

Dwg. No

05

Drawn by

CCEA

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