



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

[GCN21]

\*GCN21\*

**THURSDAY 12 JUNE, MORNING**

## TIME

1 hour 30 minutes.

## 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 outside the boxed area on each page or 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 down the right-hand side of pages 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.**

14560.10 R



\*20GCN2101\*

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.
- (i) Window frames \_\_\_\_\_ [1]
- (ii) Roof tiles \_\_\_\_\_ [1]
- (iii) Ground floor construction \_\_\_\_\_ [1]
- (iv) External render \_\_\_\_\_ [1]
- (b)** List below six performance requirements of windows used in the house shown in the pre-release material.
- (i) \_\_\_\_\_
- (ii) \_\_\_\_\_
- (iii) \_\_\_\_\_
- (iv) \_\_\_\_\_
- (v) \_\_\_\_\_
- (vi) \_\_\_\_\_ [6]



**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.

Length \_\_\_\_\_ **mm** Width \_\_\_\_\_ **mm** [2]

**(ii)** The overall length of the dwelling at first floor level.

Length \_\_\_\_\_ **mm** [2]

**(iii)** The length and width of bedroom 3.

Length \_\_\_\_\_ **mm** Width \_\_\_\_\_ **mm** [4]

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

\_\_\_\_\_ **square metres** [2]

**(c)** How many internal doors are required for the complete dwelling?

\_\_\_\_\_ [2]

**[Turn over**

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\*20GCN2103\*

**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.

(a) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

(b) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

(c) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

(d) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]





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**(Questions continue overleaf)**

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**[Turn over**



\*20GCN2105\*



**(c) Biomass**

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**[4]**

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**[Turn over**



\*20GCN2107\*

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

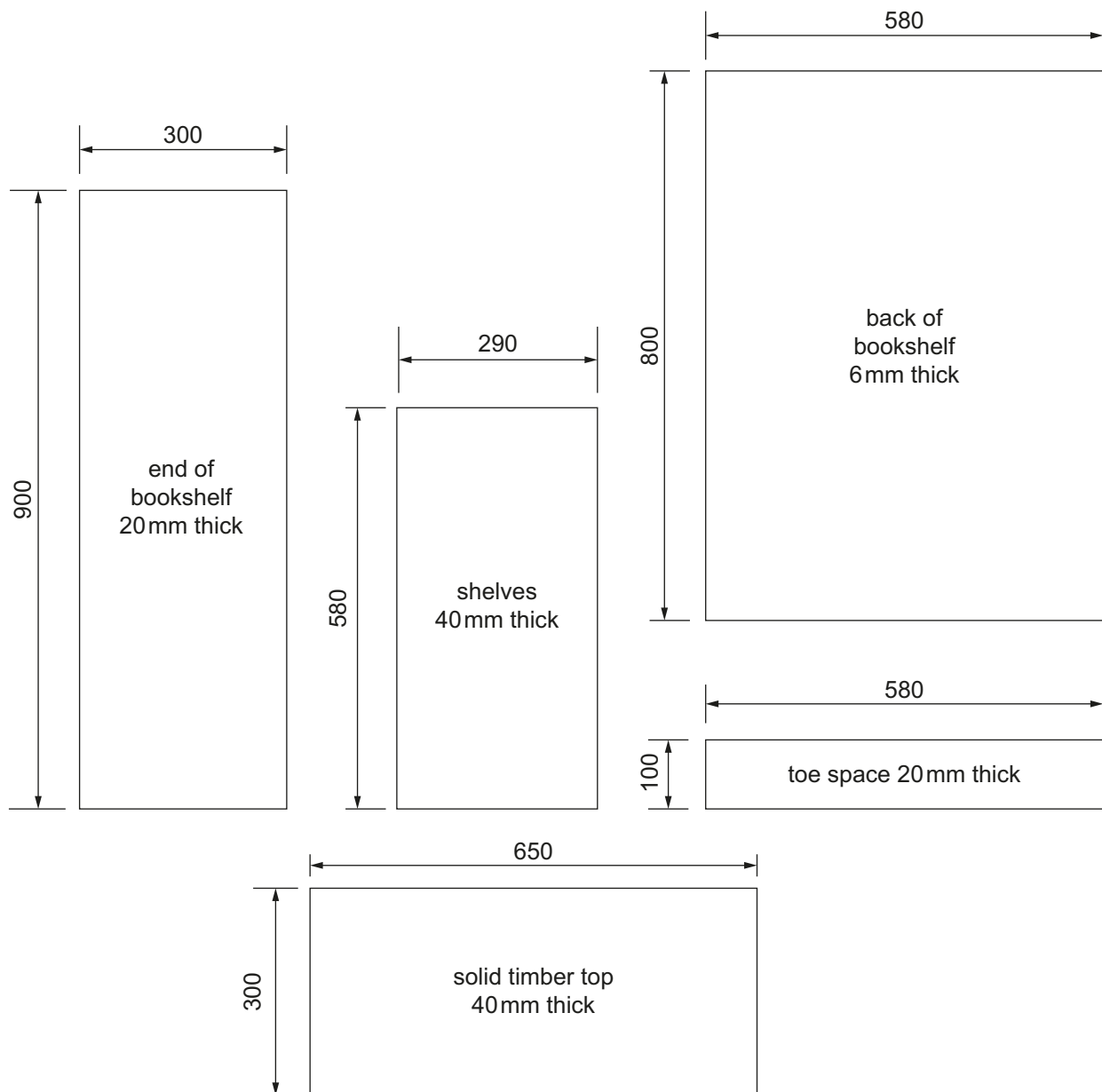


Fig. 1

14560.10 R



\*20GCN2108\*

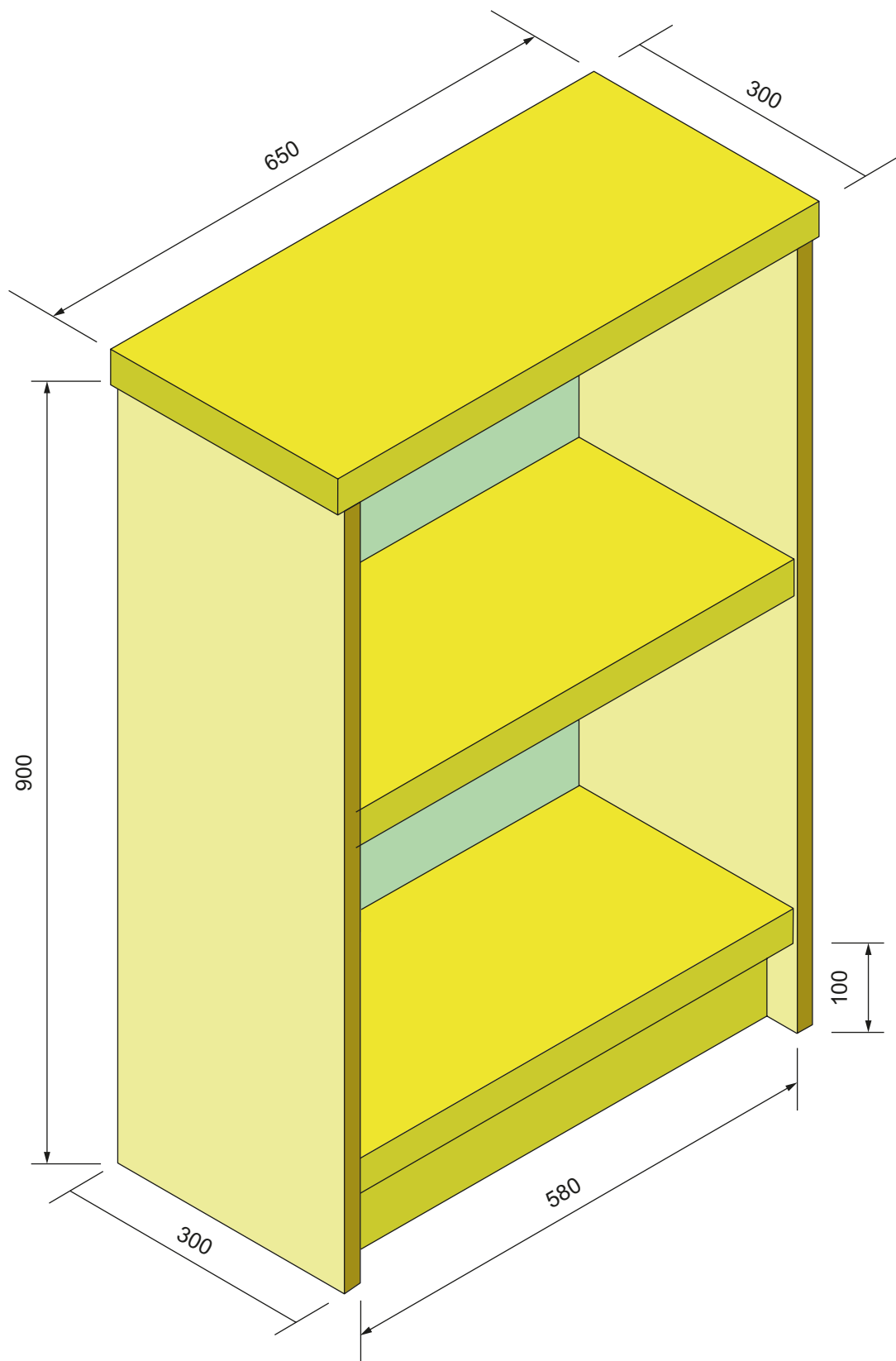


Fig. 2

[Turn over

14560.10 R



\*20GCN2109\*

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.

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>

Please complete the shaded boxes in the cutting list above.

[26]

14560.10 R



\*20GCN2110\*

Use this page for calculations where necessary.

[Turn over

14560.10 R



\*20GCN2111\*





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

**(a)** Complete the drawing in **Fig. 3** adding the following details:

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

[8]

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

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

[4]

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

- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| 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           |

[10]



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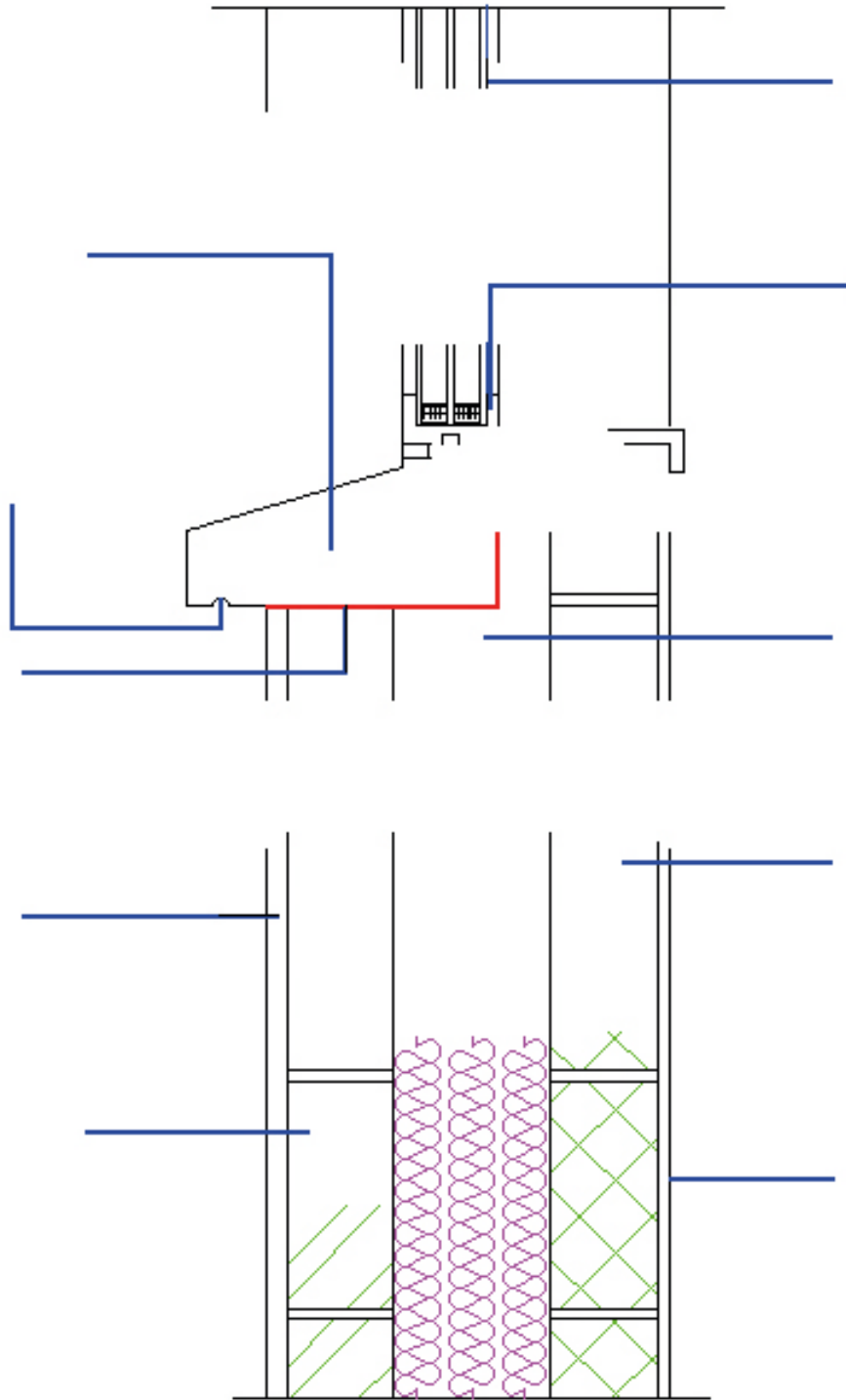


Fig. 3

[Turn over

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\*20GCN2115\*









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[10]

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\*20GCN2119\*

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**THIS IS THE END OF THE QUESTION PAPER**

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**DO NOT WRITE ON THIS PAGE**

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

**Examiner Number**

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\*20GCN2120\*



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2025**

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## **Construction and the Built Environment**

Unit 2

Sustainable Construction

**[GCN21]**

**THURSDAY 12 JUNE, MORNING**

---



GCN21

### **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.

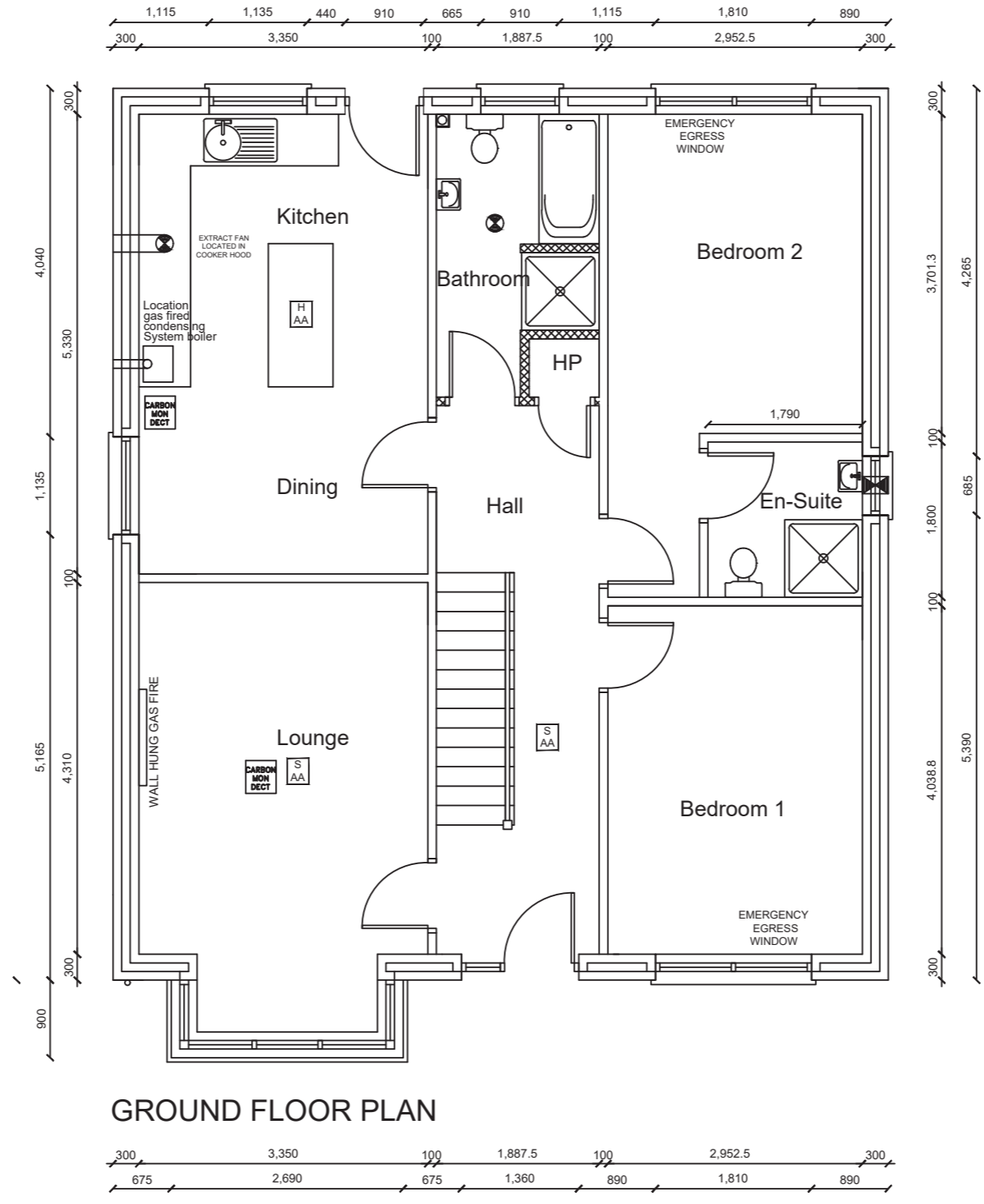
### Specification notes for construction:

- **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. 750 mm below finished ground level to protect from frost damage.  
Foundation sizes:  
100 mm wall – 450 mm × 225 mm deep  
215 mm wall – 600 mm × 225 mm deep  
300 mm wall – 600 mm × 225 mm deep
- **Walls:** External walls in 300 mm cavity construction with 100 mm blockwork inner and outer leaf. Grey / blue mixed engineering brick base constructed in stretcher bond. Provide 100 mm cavity with 100 mm full fill insulation to inner leaf. Wall ties to be placed every 750 mm centres horizontally, 450 mm centres vertically, 225 mm vertically at all openings and within 150 mm of opening. Provide horizontal and vertical damp proof course to all openings with min 25 mm high density polystyrene insulation where cavities close to prevent cold bridging. Blockwork inner leaf and internal walls to be 100 mm unless stated otherwise with min crushing strength of 7N/mm<sup>2</sup>. Inside of wall to be finished with 12.5 mm carlite browning and 3 mm hardwall plaster finish. External finish: painted wet dash, rendered finish.  
Provide DPC min 150 mm above finished ground level, lapped and bonded to floor damp proof membrane.
- **Ground Floor Construction:** Ground floor construction of 100 mm 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 25 mm × 38 mm 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 100 mm × 50 mm wall plate secured to wall at 900 mm centres with 30 mm × 6 mm galvanised straps. Cavity to be closed with 12.5 mm fibreboard.  
Provide 225 mm × 19 mm treated softwood fascia.  
Provide 200 mm × 12 mm external grade plywood soffit.  
100 mm Aluminium seamless gutter system.

- **Timber First floor:** Timber first floor construction of 22 mm 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 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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Notes

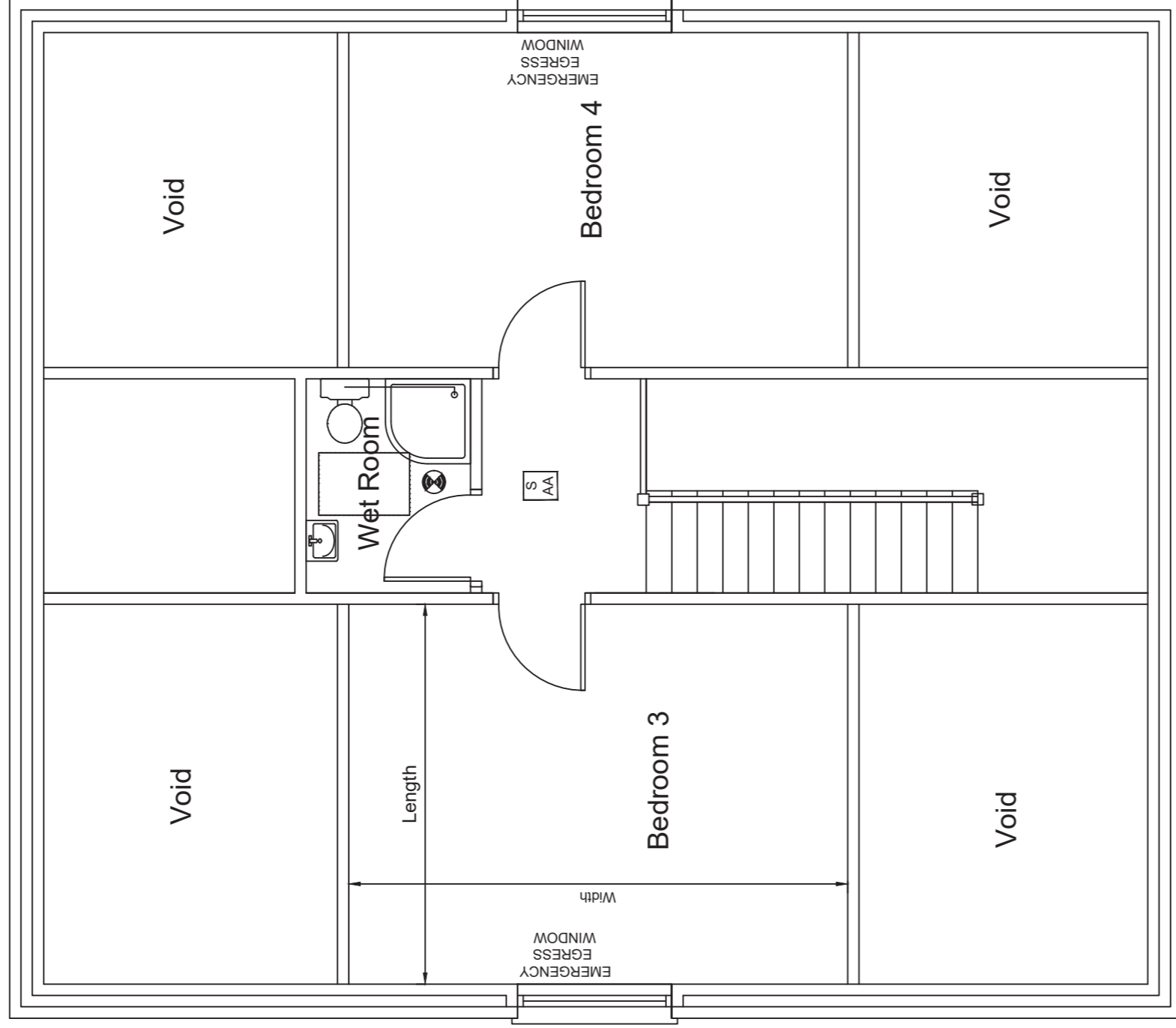
14560.03

Project Name	Pre-Release Materials	
Drawing Title	Ground Floor Plan	

Unit	Unit 2: Sustainable Construction	
Scale	Not to Scale	Date
Dwg. No	01	Summer 2025
		Drawn by
		CCEA

**GCSE Construction  
&  
The Built Environment**





FIRST FLOOR PLAN

Notes

Project Name

Pre-Release Materials

Drawing Title

First Floor Plan

Unit

Unit 2: Sustainable Construction

Scale

1:50

Dwg. No

02

Date

Summer 2025

Drawn by

CCEA





# FRONT ELEVATION

Notes

Project Name

Pre-Release Materials

Unit

Unit 2: Sustainable Construction

Drawing Title

Front Elevation

Scale

Not to Scale

Date

Summer 2025

Dwg. No

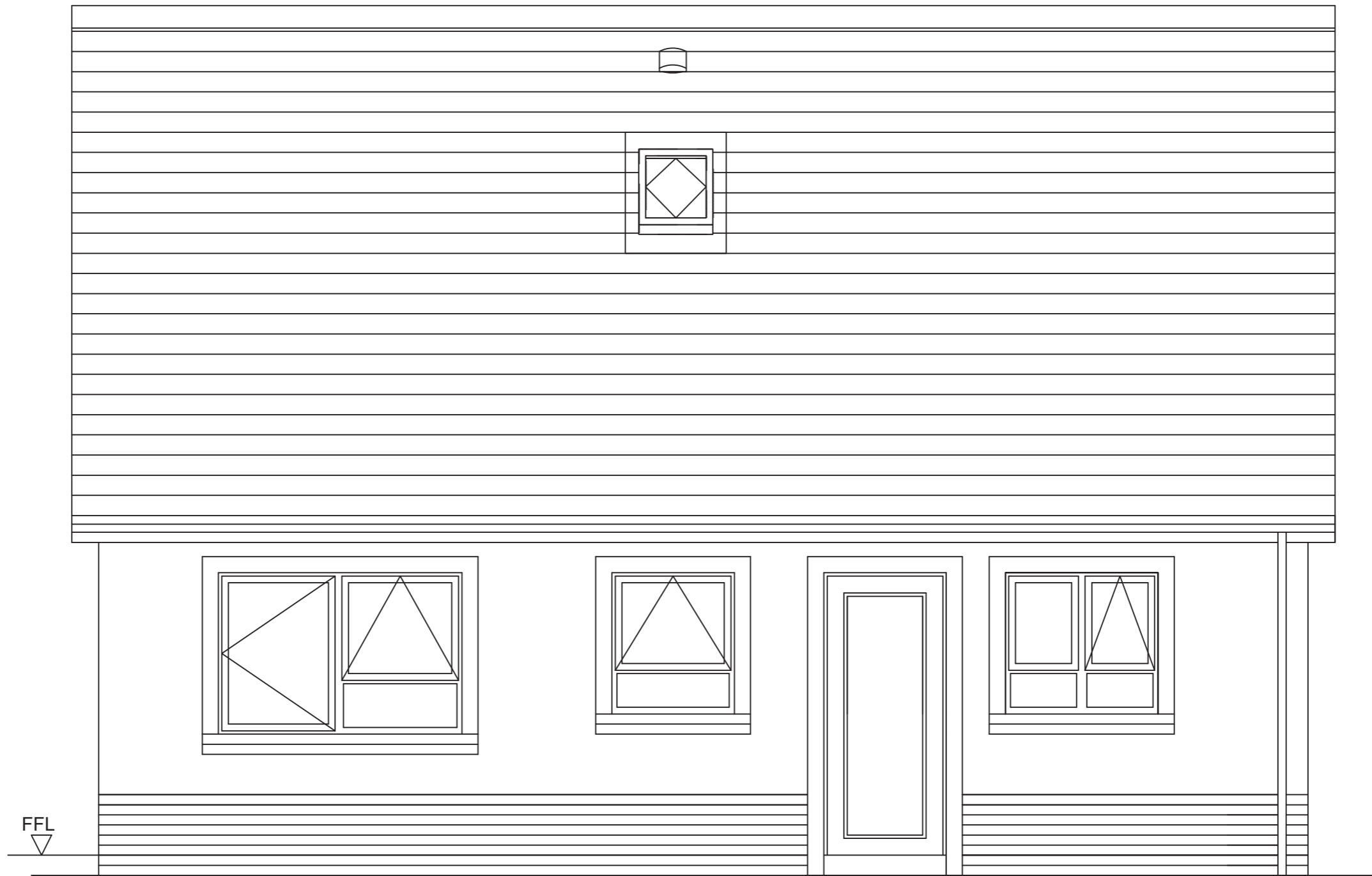
03

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## REAR ELEVATION

Notes

14560.03

Project Name

Pre-Release Materials

Drawing Title

Rear Elevation

Unit

Unit 2: Sustainable Construction

Scale

Not to Scale

Dwg. No

04

Date

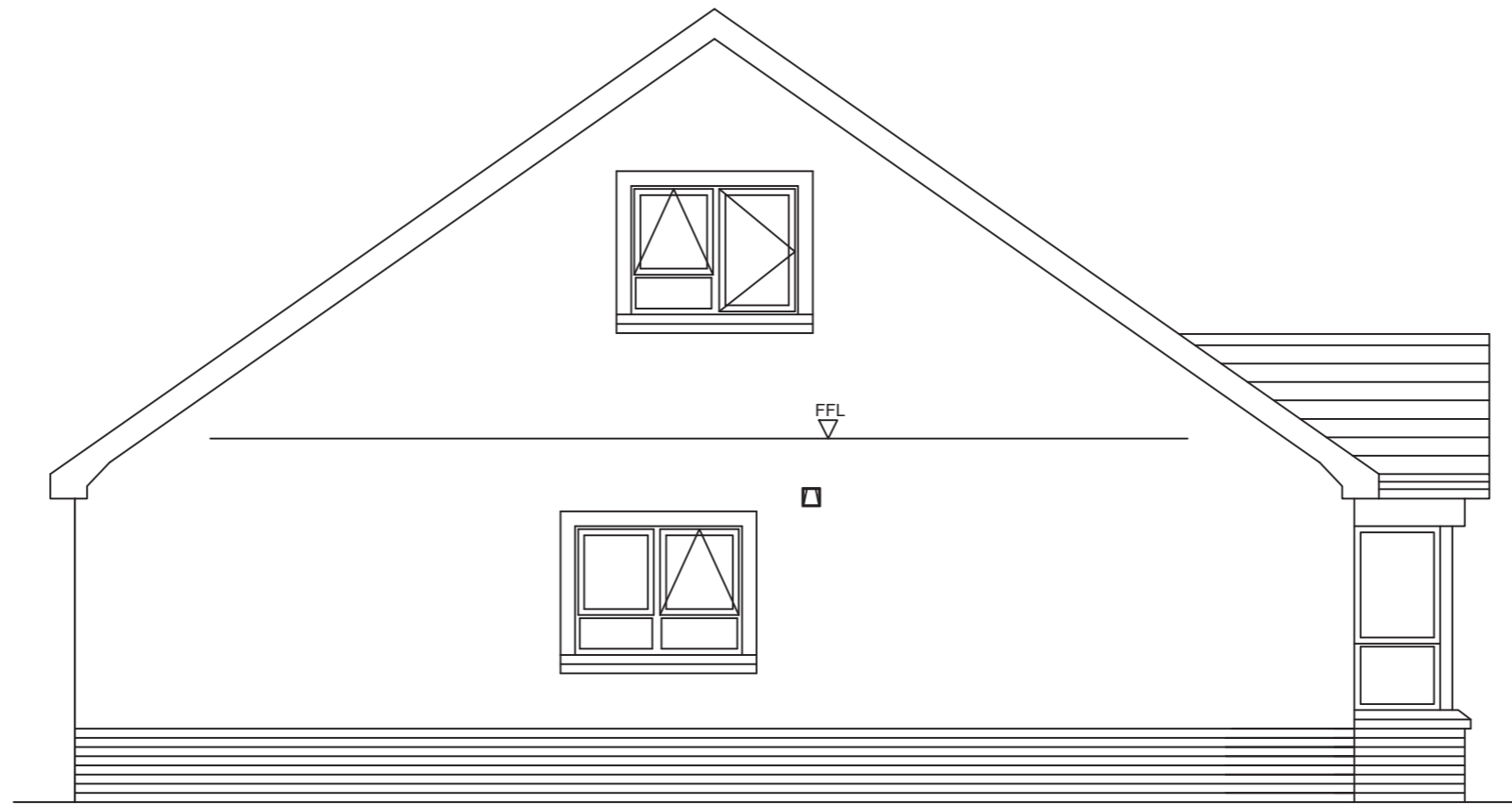
Summer 2025

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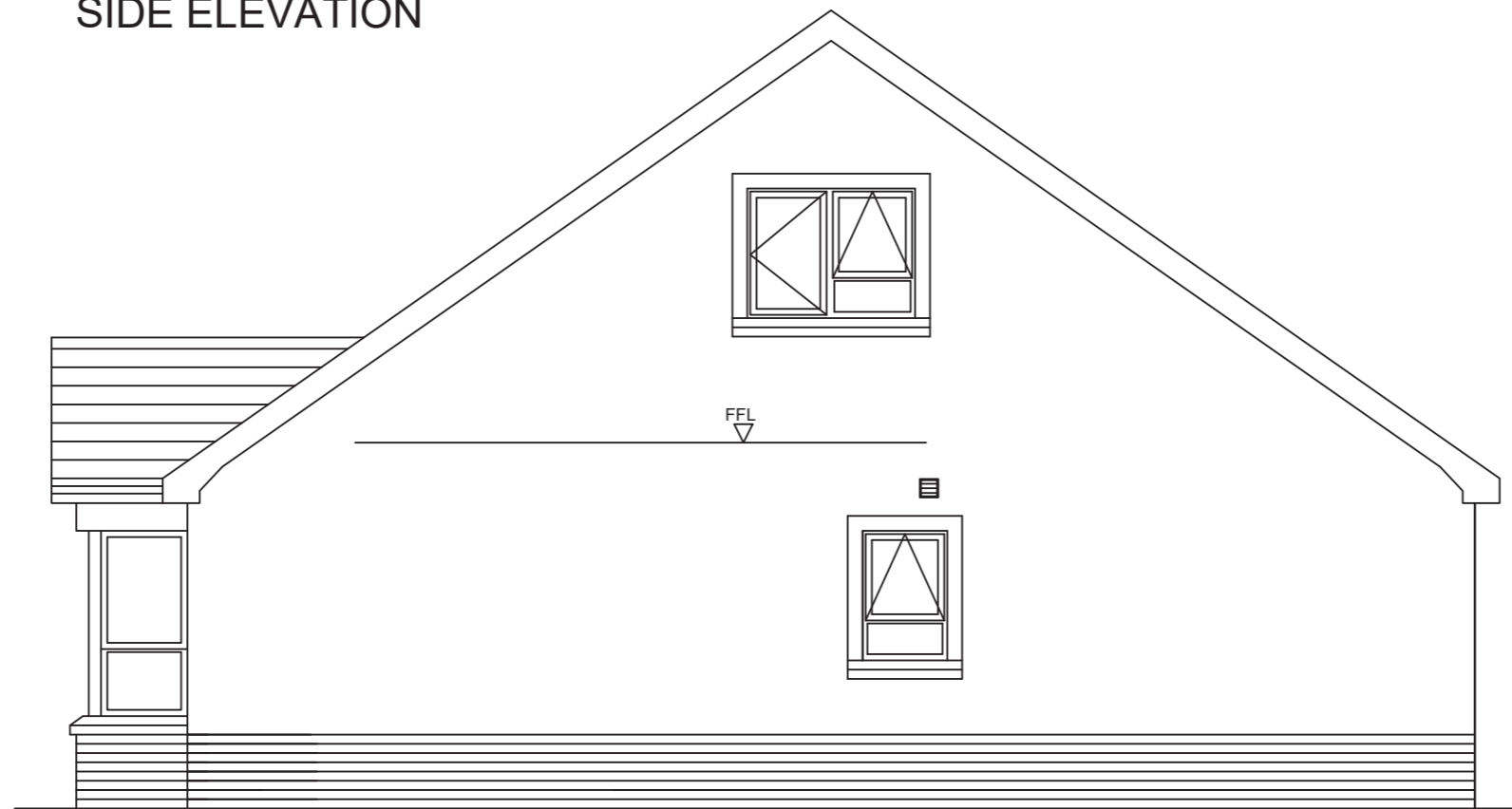
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SIDE ELEVATION



SIDE ELEVATION

Notes

14560.03

Project Name

Pre-Release Materials

Drawing Title

Side Elevations

Unit

Unit 2: Sustainable Construction

Scale

Not to Scale

Dwg. No

05

Date

Summer 2025

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