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Rewarding Learning

Centre Number

71

Candidate Number

General Certificate of Secondary Education
2010

Construction and the Built Environment

Unit 1: The Construction Industry for the 21st Century

GCB11

[GCB11]

MONDAY 17 MAY, AFTERNOON

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.
Write your answers in the spaces provided in this question paper.
Answer **all nine** questions.
Questions 1, 2, 3, 4, 6, 7 and 9 should be answered in relation to the enclosed house plans and specifications previously issued as pre-release materials.
You should not bring any of the material previously issued into this examination.

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 7 and 9.

A scale ruler is required.

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

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Section A
Answer all questions

Examiner Only	
Marks	Remark

1 (a) Label the roof in **Fig. 1** below, using some of the following terms:

Ridge	Rafter
Fascia board	Soffit
Barge board	Roofing felt
Purlin	Roof tiles
Tiling battens	Eaves detail

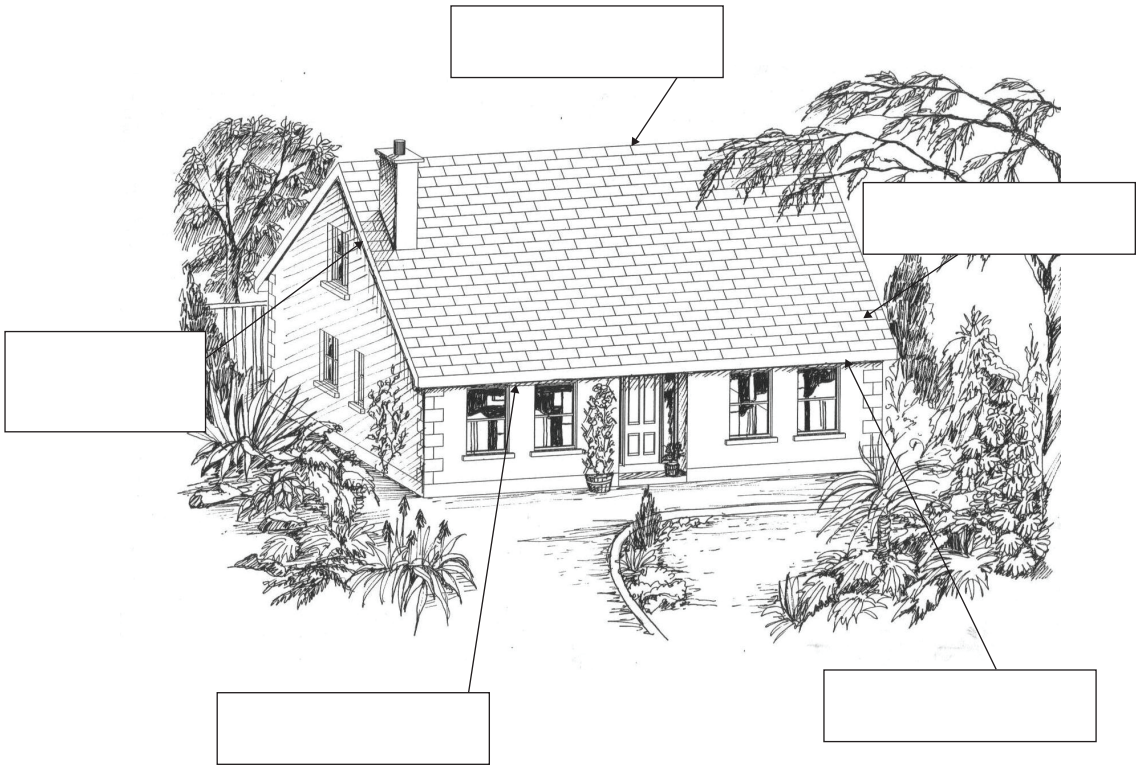

Fig. 1

[5]

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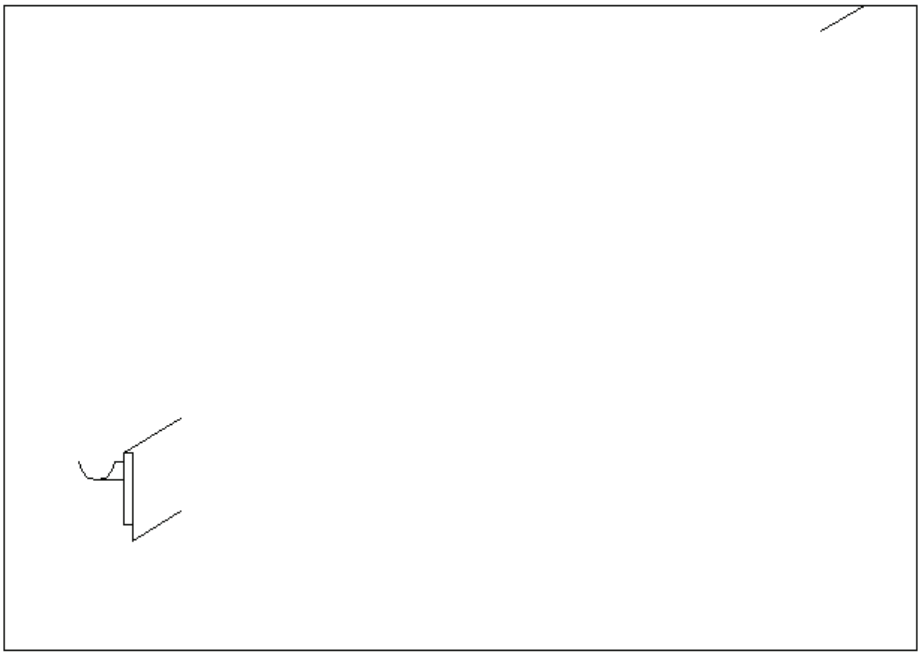
(b) In the space below, complete the sketch of the junction between a ceiling joist, rafter and the wall plate for the pitched roof used in the house shown in the pre-release materials.



[9]

Examiner Only	
Marks	Remark

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Use the pre-release materials (house plans and specifications) to assist with answering questions 2 and 3.

Examiner Only	
Marks	Remark

2 **(a)** Explain five of the main roles which a site manager (foreman) would have in relation to the housing development shown in the pre-release materials.

Site manager

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____ [5]

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(b) Identify five of the main roles which the following members of the design team would carry out prior to work commencing on site for the project shown in the pre-release materials.

Examiner Only

Marks	Remark

Architect

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____ [5]

Quantity surveyor

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____ [5]

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3 Using the attached pre-release materials, give the following internal room dimensions in millimetres/areas in square metres. Some dimensions may need to be scaled.

Examiner Only	
Marks	Remark

(a) The length and width of the kitchen.

Length _____ Width _____ [4]

(b) The length and width of the dining room.

Length _____ Width _____ [4]

(c) The overall width of the house from the outside of the walls.

Width _____ [2]

(d) The width and height of the lounge window at the rear of the house.

Width _____ Height _____ [4]

(e) The total floor area of the hall.

Floor area _____ [2]

(f) The total floor area of the utility room.

Floor area _____ [2]

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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

4 The following drawing shows a door lining which is to be used in the house shown in the attached pre-release materials.

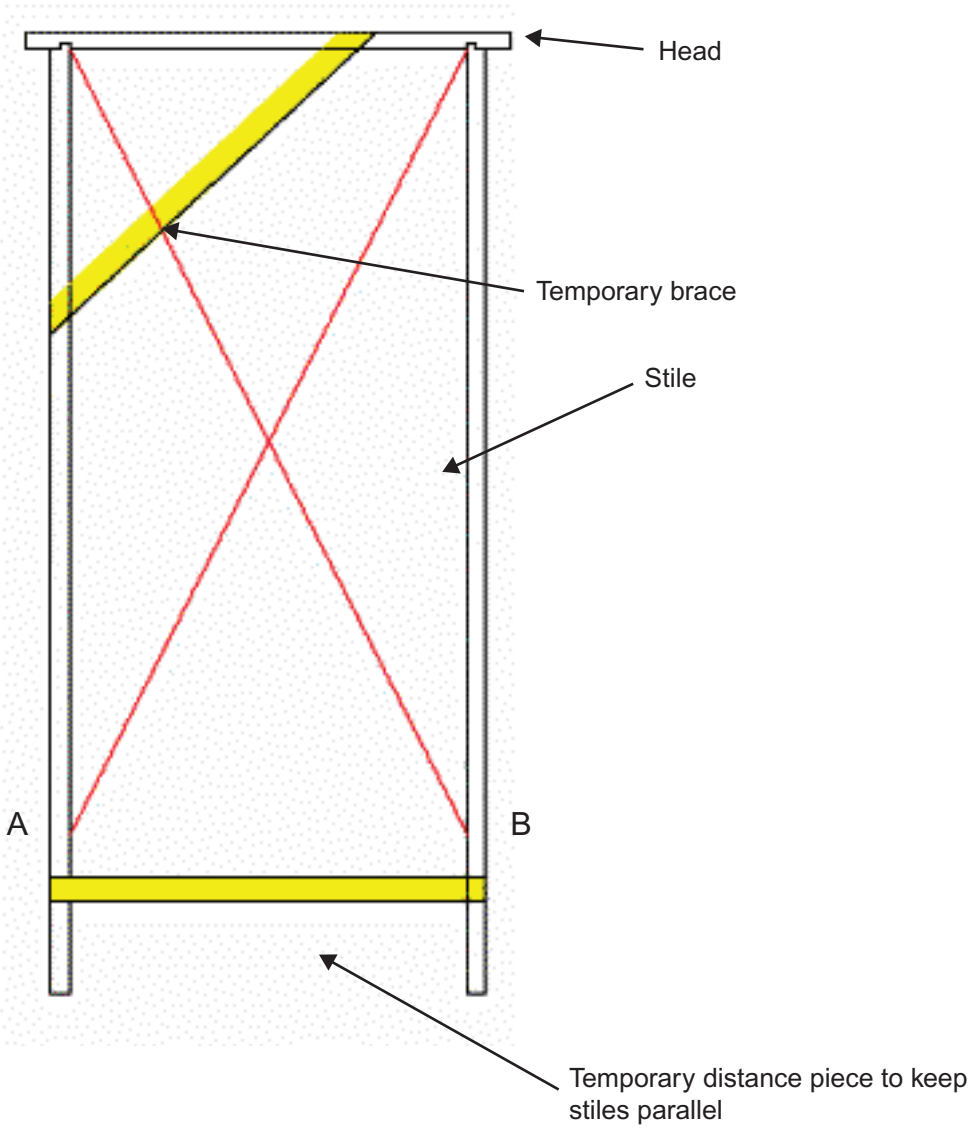

Fig. 2

(a) What is the name of the joint used to join the head and stile of the door lining shown in **Fig. 2**?

_____ [2]

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(b) Sketch the joint used to join the head and stile of the door lining shown in **Fig. 2**. Add the labels for **head** and **stile** to your drawing.

[6]

(c) Describe how a joiner would check to see if this door lining was square before fitting on site.

_____

_____

_____

_____

_____ [2]

(d) Describe the use of the following in relation to door construction.

Architrave

_____

_____ [2]

Hinges

_____

_____ [2]

Examiner Only	
Marks	Remark

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5 List three examples of buildings which would be identified under the following headings.

Examiner Only	
Marks	Remark

(a) Residential

1. _____

2. _____

3. _____ [3]

(b) Community

1. _____

2. _____

3. _____ [3]

(c) Commercial

1. _____

2. _____

3. _____ [3]

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Section B
Answer all questions

Examiner Only

Marks	Remark

6 **(a)** List four different types of renewable energy that could be used to reduce the carbon footprint of a domestic house.

1. _____

2. _____

3. _____

4. _____ [4]

(b) Demonstrate a knowledge and understanding of one of the types of renewable energy listed above, describing how it could be utilised to reduce energy costs in the house shown in the pre-release materials.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

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7 Sourcing of building materials can be very demanding on the earth's natural resources in terms of aggregates, timber, etc. The construction industry also deposits large amounts of excavated earth and waste building materials to land fill.

Analyse the drawings and specifications provided in the pre-release materials and evaluate how a site manager could reduce waste for this development.

You should highlight traditional and improved methods of waste management as part of your answer.

[10]

Examiner Only	
Marks	Remark

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8 **Fig. 3** shows an incomplete detail for the window head for a domestic house. Complete the drawing and include annotations from the list provided.

140 mm reinforced concrete lintel
Cavity
100 mm blockwork outer leaf
Reinforcing bar in concrete lintel
Stepped DPC
Wet dash
60 mm of insulation tight to inner leaf
Window frame
Gypsum plaster bonding
Double glazed PVC or timber windows

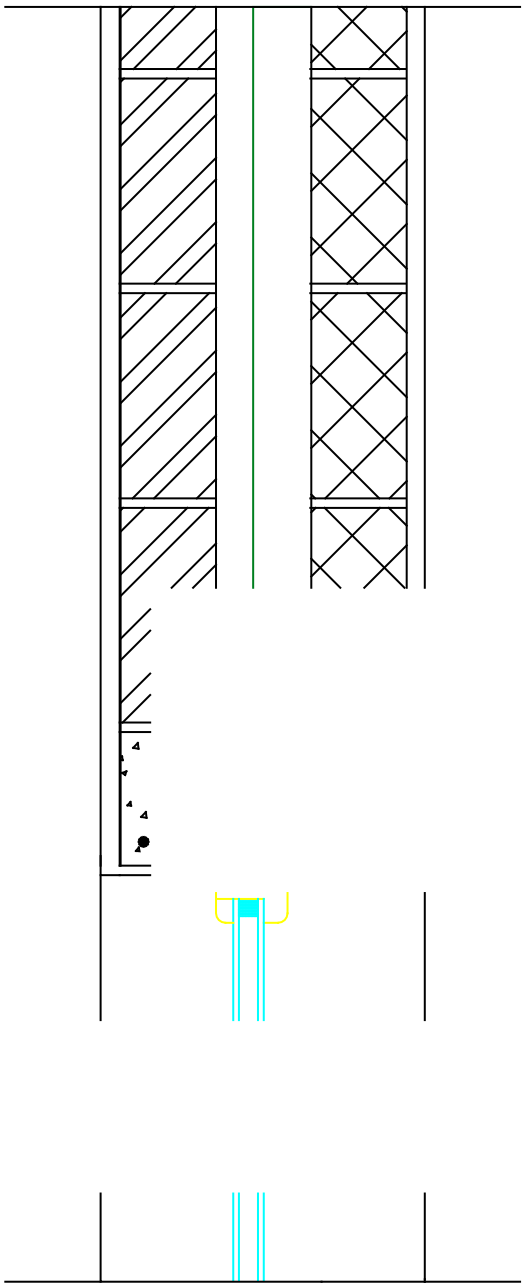

Fig. 3

[10]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

9 **(a)** The house shown in the pre-release materials is constructed using cellular construction and not portal framed construction. List the characteristics of each type of construction.
You should structure your answer under the following headings.

Characteristics of cellular construction.

[5]

Characteristics of portal framed construction.

[5]

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(b) Evaluation why cellular construction is more suitable for domestic construction not exceeding two storeys high than portal framed would be.

Examiner Only	
Marks	Remark

[10]

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New Specification

Construction Single Award
[GCB11]
Pre-Release Materials

For use with questions 1, 2, 3, 4, 6, 7 and 9.

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

The materials contain drawings and specifications relating to a house.

The drawings and specifications pertain to a house which has been constructed in a select residential development of fifty-five houses. The site is fairly flat.

The client is a speculative property developer who has employed the following people to oversee the design of his development:

architect
quantity surveyor
landscape architect

The contractor will be appointed on the basis of selective tendering. The contractor will employ the following team:

site manager
bricklayers
plasterers

All other trades will be sub-contractors appointed by the main contractor.

Your client has asked the design team to look at the practicalities of using renewable energies where possible.

The client has asked the contractor for documentation covering how he will approach site waste management.

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Partial specification for house shown in pre-release drawings.

Foundations

The foundations have been designed to be adequate if the bearing is on subsoil Type III or better as defined in Section 5 Table 5:1 of Technical Booklet D of Building Regulations. Foundations shall be situated centrally under walls. Where foundations require to be stepped they shall overlap by twice the height of the step or the thickness of the foundation or 300 mm whichever is greater. Steps shall not be of greater height than the thickness of the foundation. 600 × 250 mm conc. strip foundations shall be used for 300 mm cavity walls.

450 × 200 mm conc. strip foundations shall be used for 100, 150 and 215 mm solid walls.

Foundations should be a minimum of 750 mm deep taken down to a firm bearing strata. If a suitable bearing cannot be achieved, then an amended design will be submitted to the local authority as necessary.

Brick/Block Cavity Walls

Cavity walls shall be 300 mm thick overall with a 100 mm cavity. Wall ties shall be stainless steel suitable for 100 mm cavity with PVC retainer disc for insulation. Ties shall be positioned at 750 mm centres horizontally and 450 mm centres vertically and staggered. Additional ties should be provided at reveal at 215 mm centres vertically.

Butterfly wire stainless steel wall ties should be used in separating walls at centres as before. Cavities and wall ties should be kept clean of mortar droppings. Provide patented expansion joints vertically every 6 m in facing brick and 8 m in blockwork. DPCs should overlap and be bonded to dpm and be a minimum of 150 mm above finished ground levels.

Lintels

Prestressed or RC lintels should be used in openings up to 2.500 m in accordance with concrete manufacturer's specifications. Keystone SK/90 lintels should be used over openings greater than 2.500 m to the max. span and loadings recommended by the manufacturer's and have 225 minimum end bearing. Where PC floor slabs are used the lintels should be in accordance with the structural engineer's calcs./recommendations.

Pitched Roof Construction

Roof covering as indicated on elevations on 38 × 25 mm sw pressure impregnated battens on Tyvec or similar breathable underlay.

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Smoke and Heat Alarms for Dwelling House more than 200 sq m on each floor and not more than three storey.

Provide an automatic detection system complying with BS5839.6:2004-Grade B Cat. LD2.

- wiring should be fire resistant
- cables should give sufficient resistance to the effects of fire.
- fire resistant cables should be clipped to face of joists/ceiling members with fire resistant clips.

On completion of the installation and commissioning, a certificate confirming compliance is required.
Fire stopping at roof level and separating walls – see details.

Space Heating and Hot Water System

Oil Boiler

Oil fired condensing boiler to be a Grant Vortex or similar having a minimum efficiency of 97% or minimum energy efficiency as detailed on the energy performance calculations. (SAP cals.) Condensing boiler to be as located on plan and have a flue to the size as recommended by the boiler manufacturer. The flue to be impervious to condensates and resistant to corrosion. The appliance should be fitted with a condensate trap and be piped to the external gully as indicated on plan. Where a boiler is fitted internally, a fire valve to BS5410.1:1997 shall be fitted externally on the fuel supply.

Space Heating

Boiler should be fitted with boiler control interlock and space heating divided into two heating zones using room thermostats or programmable room thermostats in all zones, one of which should be the living room. Time control of space and water heating should be provided using a full programmer and separate timing to each circuit.

Dwelling over 150 m^2 will require a multiple heating zone programmer. Hot water cylinder shall be (145 litres) thermally insulated tank with factory applied coating of polyurethane foam 50 mm thick. Hot water cylinder to be fitted with thermostat connected to the programmer. All hot water service pipes including those connecting the HWC shall be insulated throughout their length with Armaflex or similar insulation equal to the diameter of the pipe.

Cold water storage tank to be fitted with a suitable cover and having a 100 mm thick glass fibre filled insulating wrapping.

[Turn over

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Space heating and hot water systems shall be designed, installed and commissioned in accordance with the manufacturer's instructions and handed over in efficient working manner. The installer shall give a full explanation of the systems and its associated equipment and its operation to the user, including manufacturer's User Manuals.

The installer shall also provide a Notice confirming that all the fixed building services have been commissioned and provide a copy to the building owner and the District Council. The Notice shall be signed by a suitably qualified person.

Insulation

Insulation of walls, floor and roof to be as indicated on Plan, Section and SAP calculations. SAP calculations to be taken in preference to any variances on drawings.

NOTE: Students will require the use of a scale ruler during the examination and a calculator would be an advantage for calculations.

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FRONT ELEVATION

scale 1:50

GCSE Construction

Pre-relase materials
2010 New Release
Scale 1:50 or as shown

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REAR ELEVATION

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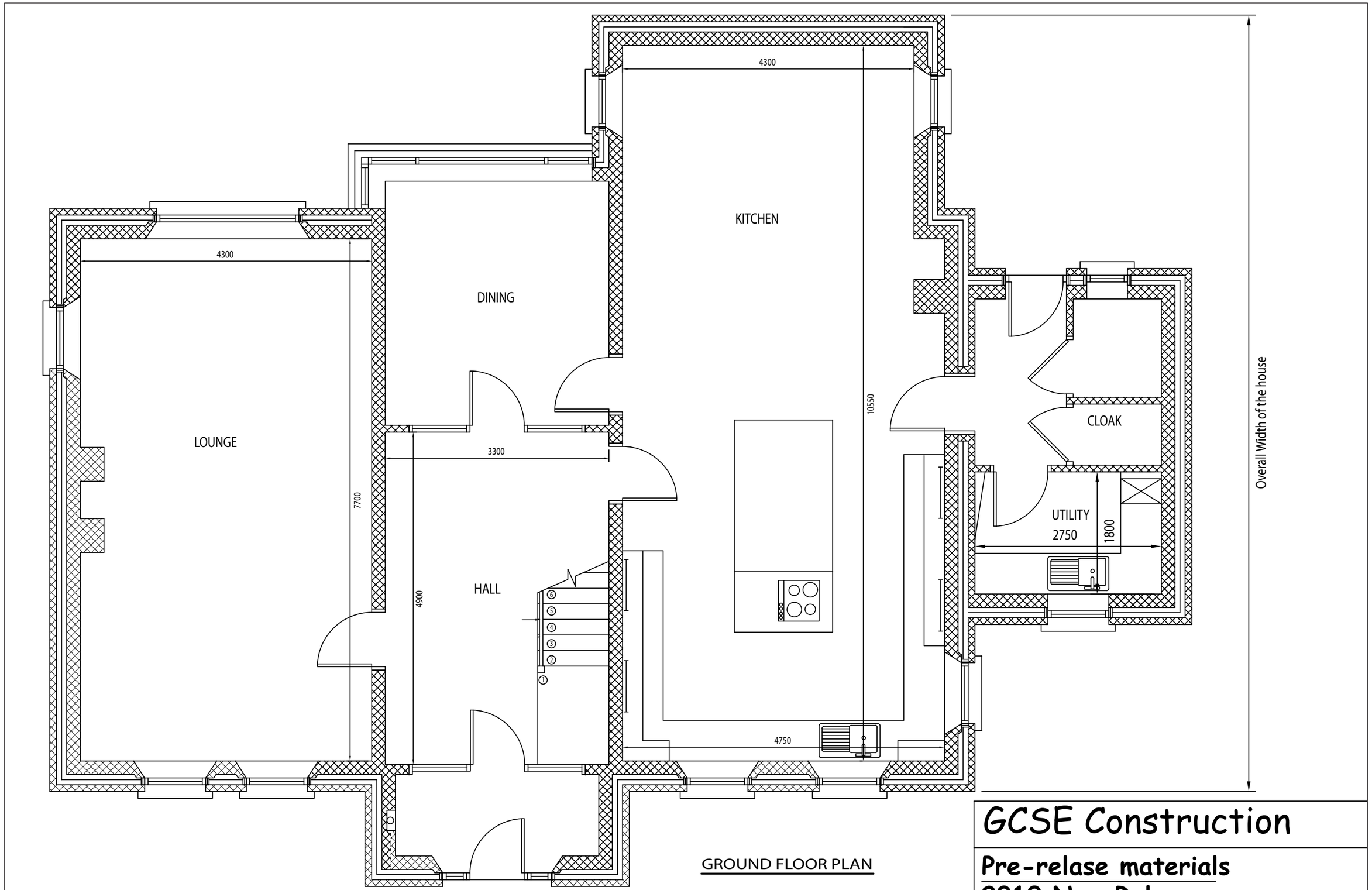

GROUND FLOOR PLAN

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Pre-relase materials
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