Construction and the Built Environment
Unit 2: Construction Design

You must have: Black ink or ball point pen, HB or B pencil, ruler, eraser, a non-programmable calculator and access to computer-aided design (CAD) facilities and printing facilities.

Instructions
• Use black ink or ball-point pen.
• Fill in the boxes at the top of this page with your name, centre number and learner registration number.
• Answer all activities.
• Answer the activities in the spaces provided – there may be more space than you need.
• Part A will need to have been used in preparation for completion of Part B.
• Part B booklet must be issued to learners as defined by Pearson and should be kept securely.
• Part B materials must be issued to learners during the 2 week period and under the conditions specified by Pearson.
• Part B is specific to each series and this material must be issued only to learners who have been entered to undertake the task in the relevant series.
• Part B should be kept securely until the start of the 12-hour supervised assessment period.

Information
• The total mark for this paper is 63.
• The marks for each activity are shown in brackets – use this as a guide as to how much time to spend on each activity.

Advice
• Read each activity carefully before you start to answer it.
• Try to answer every activity.
• Check your answers if you have time at the end.

Turn over
**Instructions to Teachers/Tutors and/or Invigilators**

**Part B** must be taken under supervision in a number of scheduled sessions over a supervised assessment period of two weeks. All learners can be given access to computer resources. Centres should schedule all learners in the same sessions if possible and should release **Part B** to individual learners only for their scheduled sessions.

**Part B** set task requires learners to apply understanding gained through familiarisation with the case study. Learners should bring in notes as defined in **Part A**. The teacher/invigilator needs to ensure that notes comply with the requirements.

Learners must complete the set task using this task and answer booklet. Activity 5 must be completed using a computer which has appropriate CAD software. Learners must save their work regularly and ensure that all materials can be identified as their work.

Materials allowed in the supervised assessment:
- a pen, a ruler, eraser and HB or 2B pencil to sketch
- a non-programmable calculator.

The set task is a formal external assessment and must be conducted with reference to the instructions in this task booklet and the Instructions for Conducting External Assessments (ICEA) document to ensure that the supervised assessment is conducted correctly and that learners submit evidence that is their own work.

Learners must not bring anything into the supervised environment or take anything out without your approval.

Centres are responsible for putting in place appropriate checks to ensure that only permitted material is introduced into the supervised environment.

**Maintaining security**

- During supervised assessment sessions, the assessment areas must only be accessible to the individual learner and to named members of staff.
- Learners can only access their work under supervision.
- Any work learners produce under supervision must be kept secure.
- Only permitted materials for the set task can be brought into the supervised environment.
- During any permitted break and at the end of the session materials must be kept securely and no items removed from the supervised environment.
- Learners are not permitted to have access to the internet or other resources during the supervised assessment period.
- Learner notes related to Part A must be checked to ensure length and/or contents meet limitations.
- Learner notes will be retained securely by the centre after Part B and may be requested by Pearson if there is suspected malpractice.
- Learners’ work produced using computer-aided design (CAD) is regularly backed up.

After the session the teacher/tutor or invigilator will confirm that all learner work had been completed independently as part of the authentication submitted to Pearson.
**Outcomes for submission**

Each learner must submit the task and answer booklet, and the following:

- One A4, scaled-to-fit, colour printout of the external envelope as specified in the scenario.
- One A4, scaled-to-fit, colour printout of the internal space as specified in the scenario.

The A4 printouts must be secured to task and answer booklet using a treasury tag.

Each learner must complete an authentication sheet.
Instructions for Learners

Read the set task information carefully.

You have a number of sessions to complete the set task provided by your centre. Plan your time carefully and allow time to produce your outcomes for submission.

You have prepared for the set task given in this Part B booklet. Use your notes prepared during Part A if relevant. Attempt all of Part B.

Your notes must be your own work and will be retained by your centre until results are issued.

You will complete this set task under supervision and your work will be kept securely during any breaks taken.

You must work independently throughout the supervised assessment period and must not share your work with other learners.

In this task booklet, you will be given information that must be used to complete your activities.

You are advised to spend 15 minutes reading the task information about the activities you need to complete. You may make notes and/or highlight information to use in the completion of your activities.

You are allowed the following materials in the supervised assessment:

- a pen, a ruler, eraser and HB or 2B pencil to sketch
- a non-programmable calculator.

You will have access to CAD and printing facilities for completion of Activity 5.

Outcomes for submission

You should submit the task and answer booklet, and the following:

- One A4, scaled-to-fit, colour printout of the external envelope as specified in the scenario.
- One A4, scaled-to-fit, colour printout of the internal space as specified in the scenario.

The A4 printouts must be secured to task and answer booklet using a treasury tag.

You must complete a declaration that the work you submit is your own.
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PART B SET TASK INFORMATION BEGINS ON THE NEXT PAGE.
Part B set task information

Scenario
You are working as an assistant to the Design Manager for a medium-sized, regional construction company that has been awarded a contract to design and build a drive-through coffee shop.

The client’s vision
The client is a large national chain that wishes to provide a drive-through coffee shop in an expanding residential and light retail area. It wants to create a friendly, safe environment with ample car parking spaces for those who wish to eat and drink inside. It is keen to create a modern, environmentally friendly and sustainable site once completed which is bright, light and finished to a high specification.

Site details
- Site is approximately 75 m by 40 m at its widest point.
- There is a one-metre difference in the ground level - rising from east (36.600m) to west (37.600m) on the site.
- Site plan as shown in Figure 1.
- Sub-soil ground conditions as shown in Figure 2.
- New prestigious car dealership to the east housed in a modern glazed building.
- Need to retain vehicle access to, and operation of, the car dealership at all times.
- Site delivery access restricted to a small roundabout on the junction off the main road.

General project information
- The total budget for the project is £2.5 million.
- Six-month programme to ensure that the building is complete before winter.
- Outskirts of the town centre in a growing modern retail park.
- Site ready for excavation, see Figure 4.

Aesthetic requirements
- The external envelope should improve and enhance the visual appearance of the local area.
- The completed development should enhance and improve the character of the site.

Spatial requirements
- The design is restricted to a single storey.
- The design requires seating capacity for 150 people inside and 30 outside.
- There needs to be a range of seating options including lounge style and bar seating.
- The design requires a food storage and preparation area.
- The design requires space for 50 cars and must include electric charging points for hybrid and electric vehicles.
- A condition of outline planning permission states that the building footprint must not occupy more than 40% of the total site area.
Service requirements

- The building design should allow for as much natural light as is reasonably practicable.
- The building must be air conditioned.
- The building must include toilet facilities for people with disabilities, and parent and baby changing rooms.
Figure 1: Site plan (not to scale)

<table>
<thead>
<tr>
<th>Height (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>36.600</td>
<td>Ground level</td>
</tr>
<tr>
<td>35.900</td>
<td>Ground water table</td>
</tr>
<tr>
<td>35.350</td>
<td>Made ground – compact ash and clay</td>
</tr>
<tr>
<td>33.700</td>
<td>Stiff brown silty clay</td>
</tr>
<tr>
<td>31.300</td>
<td>Stiff brown boulder clay</td>
</tr>
</tbody>
</table>

Figure 2: Extract from project borehole report
Figure 3: View of the site from the south

Figure 4: Site ready for excavation – view of the site from the south
Set Task

You will need to refer to the task information and your notes completed in Part A.

You must complete ALL activities.

You need to produce documentation for the client to support the design and approvals process.

Activity 1 – Design factors and constraints

Communicate the following to the client.

• The design factors and constraints of the project and site.
• The likely impact and influence of the design factors and constraints on the design and specification of this project.

You are advised to spend 1 hour and 15 minutes on this activity.

(Total for Activity 1 = 9 marks)

Activity 2 – Initial project brief

Your manager has asked you to produce an initial project brief, to include:

• spatial requirements
• desired project outcomes
• site information
• budget requirements.

You are advised to spend 1 hour and 15 minutes on this activity.

(Total for Activity 2 = 9 marks)

Activity 3 – Building size, form and type of construction

You have been asked to recommend and justify an outline solution to the client that meets their vision and requirements, considering the:

• possible size of the building
• form and type of construction.

You are advised to spend 1 hour and 15 minutes on this activity.

(Total for Activity 3 = 9 marks)
Activity 4 - Sketches

The Design Manager has asked you to produce annotated sketches of your initial idea, to include:

- a 3D external view of the whole building
- a plan view of the internal customer seating area
- an internal view showing a 3D pictorial representation of the internal customer seating area.

Your annotations must include dimensions, key features of the design, the operation of the building and how the design meets the needs of the client.

You are advised to spend 2 hours and 30 minutes on this activity.

(Total for Activity 4 = 12 marks)

Activity 5 – Virtual modelling of the design

You have been asked to use CAD software to develop a 3D virtual model of your design for the:

- external envelope
- interior of the customer seating area.

Print out your rendered 3D image, scaled to fit one A4 sheet, for each of the following:

1. external envelope
2. interior of the customer seating area.

Attach these to your task booklet using a treasury tag. Write your name, learner registration number and centre number on both sheets.

You are advised to spend 5 hours and 30 minutes on this activity.

(Total for Activity 5 = 24 marks)

TOTAL FOR PAPER = 63 MARKS
For use with Activity 1: Design factors and constraints

Communicate the following to the client.

- The design factors and constraints of the project and site.
- The likely impact and influence of the design factors and constraints on the design and specification of this project.

You are advised to spend 1 hour and 15 minutes on this activity.
For use with Activity 2: Initial project brief

Your manager has asked you to produce an initial project brief, to include:

- spatial requirements
- desired project outcomes
- site information
- budget requirements.

You are advised to spend 1 hour and 15 minutes on this activity.

INITIAL PROJECT BRIEF

Spatial requirements
INITIAL PROJECT BRIEF

Desired project outcomes

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INITIAL PROJECT BRIEF

Budget requirements

(Total for Activity 2 = 9 marks)
Activity 3: Building size, form and type of construction

You have been asked to recommend and justify an outline solution to the client that meets their vision and requirements, considering the:

- possible size of the building
- form and type of construction.

You are advised to spend 1 hour and 15 minutes on this activity.
Activity 4: Sketches of the initial idea

The Design Manager has asked you to produce annotated sketches of your initial idea, to include:

- a 3D external view of the whole building
- a plan view of the internal customer seating area
- an internal view showing a 3D pictorial representation of the internal customer seating area.

Your annotations must include dimensions, key features of the design, the operation of the building and how the design meets the needs of the client.

You are advised to spend 2 hours and 30 minutes on this activity.

3D external view of the whole building
Plan view of the internal customer seating area
Internal view showing a 3D pictorial representation of the internal customer seating area

(Total for Activity 4 = 12 marks)
Activity 5: Virtual modelling of the design

You have been asked to use CAD software to develop a 3D virtual model of your design for the:

- external envelope
- interior of the customer seating area.

Print out your rendered 3D image, scaled to fit one A4 sheet, for each of the following:

1. external envelope
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Attach these to your task booklet using a treasury tag. Write your name, learner registration number and centre number on both sheets.

You are advised to spend 5 hours and 30 minutes on this activity.

(Total for Activity 5 = 24 marks)

TOTAL FOR PAPER = 63 MARKS