higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

CIVIL AND STRUCTURAL STEELWORK DETAILING

(Second paper)

NQF LEVEL 3

(12050663)

10 December 2020 (Y-paper)
13:00–15:00

REQUIREMENTS: **Yellow cover folder BOE 8/15 and A4 drawing paper.**

Standard hot-rolled structural steel section table (BOE 8/1)

Calculators may be used.

This question paper consists of 5 pages and 2 diagram sheets.

475Q2N2010

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TIME: 2 HOURS
MARKS: 75

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Start each question on a new page.
5. Use standard hot-rolled structural steel section table (BOE 8/1)
6. Use a suitable scale if not indicated.
7. Drawings and sketches must be clear enough to show detail.
8. All drawings must be fully dimensioned and labelled.
9. Write neatly and legibly.

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QUESTION 1: CONCRETE RETAINING WALL

1.1 Draw a concrete retaining wall using CAD. The wall extends 250 mm above the ground. The larger mass of soil has a natural slope of 20°, the bottom soil is level. The toe is situated on the right-hand side of the wall. Use the following information:

Total height	:	2 750 mm
Height of the wall above the ground	:	1 900 mm
Wall thickness	:	0,5 m
Ground level (bottom)	:	250 mm above foundation
Ground level (top)	:	250 mm from the top of the wall
Length of toe	:	1 500 mm
Base length	:	2,6 m
Thickness of the base	:	0,6 m
Concrete cover	:	50 mm
Longitudinal wall reinforcement	:	Y16 01 @ 150 c/c and transversely with Y12's @ 200 c/c
Longitudinal base reinforcement	:	Y16 02 @ 150 c/c and transversely with Y12's @ 200 c/c
Bend bar(n)	:	150 mm (15)

1.2 Draw, to scale 1:10, a reinforced column of 400 mm × 400 mm^2 with 8Y16 longitudinal main bars, R8 stirrups at a minimum of 200 centre to centre. The beam consists of concrete, stirrups, eight main bars. The drawing must include the stirrups, main rods and the concrete cover.

Reinforced column	:	400 mm × 400 mm
Main bar rods	:	Ø16 mm
Main bars	:	8Y16 – 01
Length	:	1 200 mm
Stirrups	:	Ø 12 mm diameter Y12 – 02 @ 200 c/c
Concrete cover	:	50 mm (15)

[30]

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QUESTION 2: STRUCTURAL STEELWORK DETAILING AND SPECIFICATIONS

2.1 Draw to scale 1:1, a full section through the following steel profile: angle steel profile, 120 × 75 × 10 mm. Neatly print the size and scale of the profile centrally beneath the drawing.

Use standard hot-rolled structural steel section table (BOE 8/1). (10)

2.2 Refer to FIGURE 1, DIAGRAM SHEET 1, and redraw an erection plan of the steel structure as shown.

Use scale 1:50.

1 - $UC\ 305\ \times 305\ \times\ 95\ Kg\ /m$
2 - $UB\ 203\ \times 305\ \times\ 95\ kg\ /m\ (4\ \times\ M20\ BOLTS\ PER\ END)$
3 - $UB\ 203\ \times 133 \times 30\ kg\ /m\ (4 \times M20\ BOLTS\ PER\ END)$
4 - $IPE\ 200(4\ \times\ M16\ BOLTS\ PER\ END)$
5 - $IPE\ 160\ (2\ \times\ M16\ BOLTS\ PER\ END)$
6 - $RSA\ 70\ \times 70\ \times\ 8\ (2\ \times\ M16\ BOLTS\ PER\ END)$

- ALL BASE PLATE 200 mm
- ALL END PLATE 10 mm

Use standard hot-rolled structural steel section table (BOE 8/1) (10)

2.3 Draw to a scale of 1:10, a column base detail using the following specification:

- Column UC 305 × 305 × 97 kg/m
- Base plate (welded) 20 mm × 500 mm × 500 mm
- Four holes with diameter 20 mm
- Holes edge distance is 75 mm

Draw a plan and vertical section (approximately 500 mm) and annotate fully
Use standard hot-rolled structural steel section table (BOE 8/1) (10)
[30]

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QUESTION 3: STRUCTURAL STEELWORK DETAILING (ROOF TRUSSES)

FIGURE 2, DIAGRAM SHEET 2, shows a line diagram of a typical welded latticed girder.

Draw, to scale 1: 5, typical details of the following:

3.1 Detail A – Apex connections (7)

3.2 Detail B – Main tie node connections

SPECIFICATIONS: 

- Top and bottom booms: rolled steel angle profiles, 120 × 120 × 10
- All internal members: rolled steel angle profiles, 100 × 100 × 8
- All gusset plates are 10 mm thick.
- Do not insert any dimensions.
- Use own discretion for gusset plate sizes, and information not provided. (8)

[15]

TOTAL: 75

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DIAGRAM SHEET 1

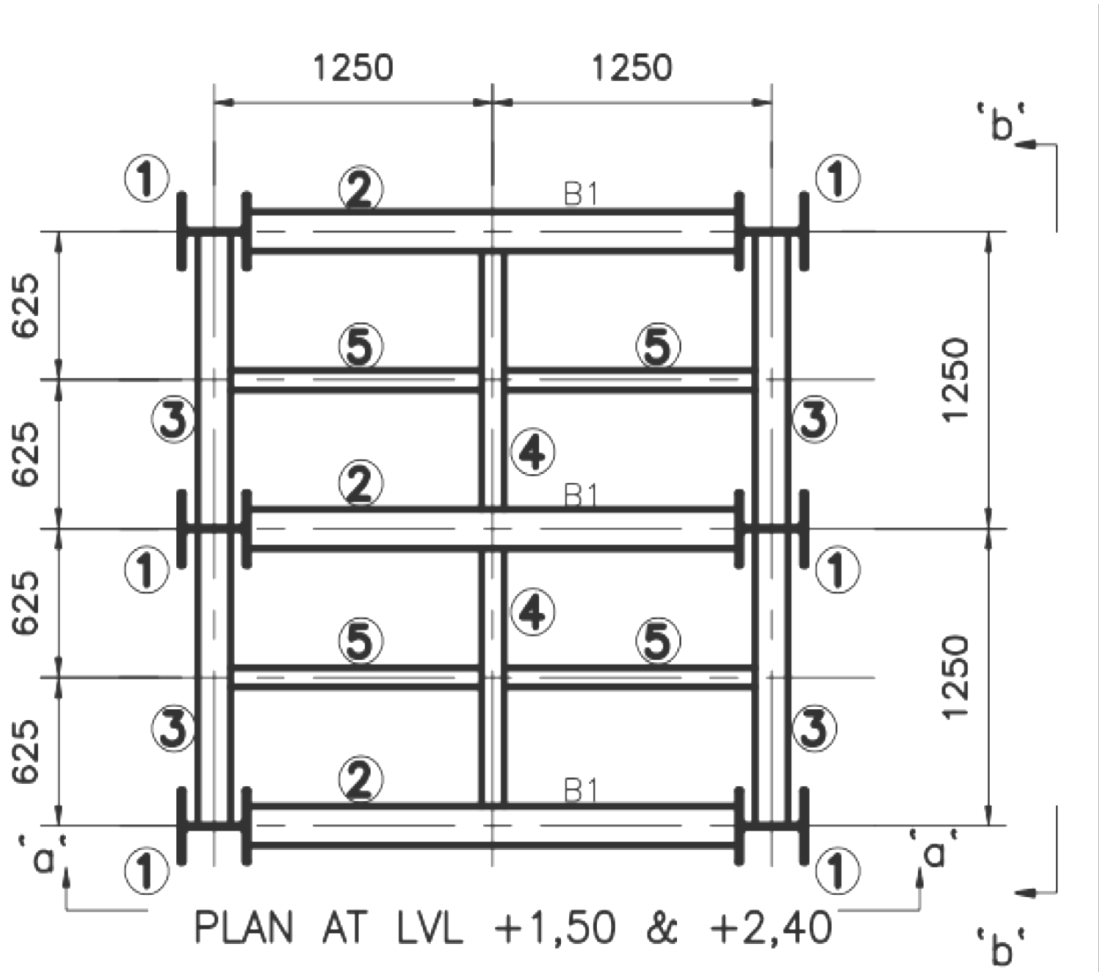

FIGURE 1

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DIAGRAM SHEET 2

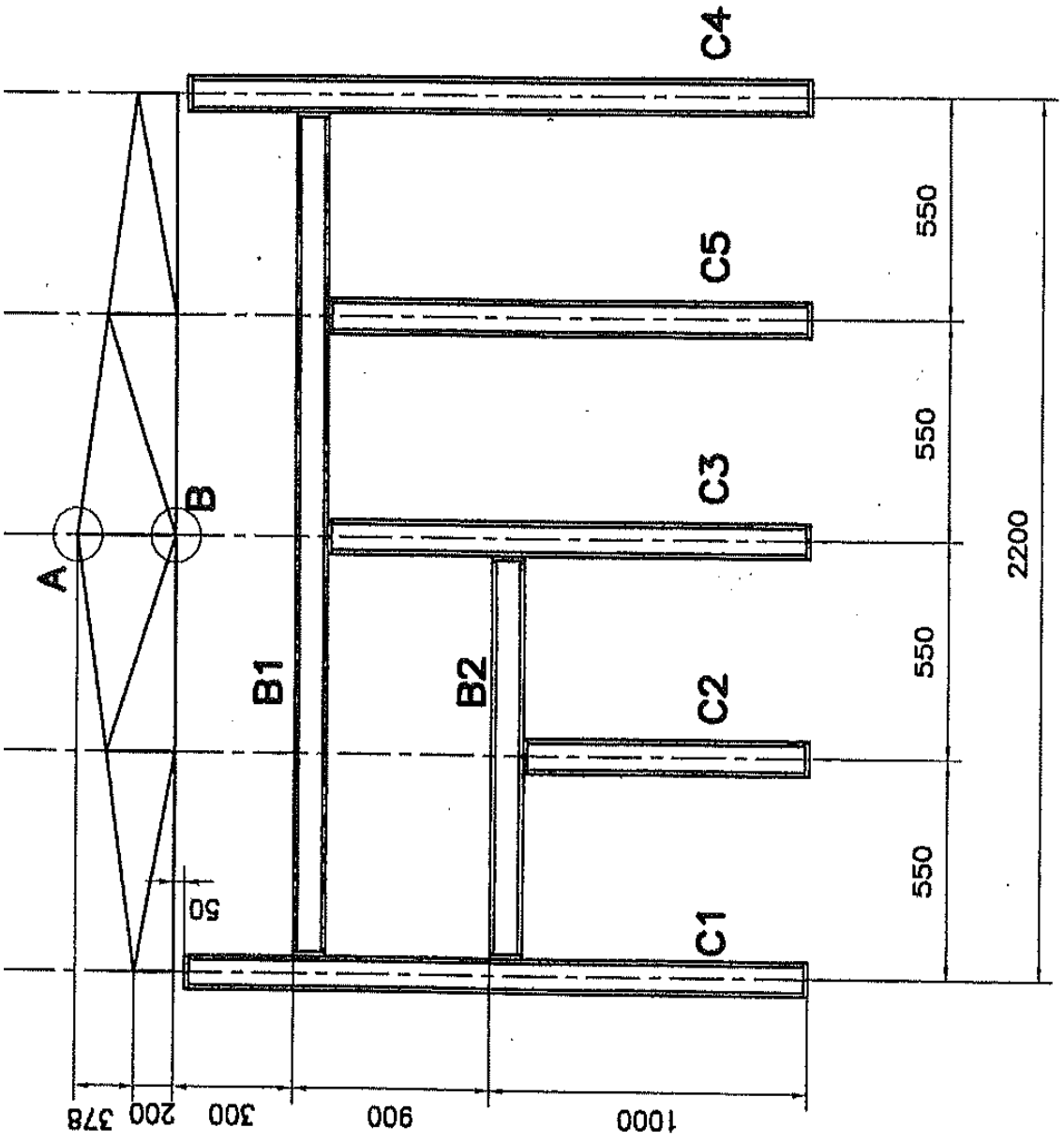

FIGURE 2

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