higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE: MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE

BUILDING DRAUGHTING

(2050035)

8 April 2021 (X-paper)
09:00–13:00

REQUIREMENTS: ONE A2 drawing sheet

Candidates may use drawing instruments, CAD software and calculators.

This question paper consists of 7 pages, 3 diagram sheets and 2 information sheets.

076Q1A2108

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
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NATIONAL CERTIFICATE: MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE
BUILDING DRAUGHTING
TIME: 4 HOURS
MARKS: 100

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. Use both sides of the drawing paper.
5. A balanced layout is important and candidates will be penalised for bad planning.
6. A 15 mm border must be drawn around both sides of the drawing sheet.
7. All drawing work, including candidate information, must be done in pencil.
8. Drawing work must comply with the SABS Recommended Code of Practice for Building Drawing as well as the SANS 10111-1990.
9. Building regulations must comply with the National Building Regulations SANS 10400-1990.
10. Abbreviations and symbols must comply with the latest National Building Regulations and all relevant SANS (SABS) codes.
11. For the purpose of the examination brick sizes should be taken as 230 mm × 115 mm × 75 mm.
12. Work neatly.

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QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) on the DRAWING SHEET.

1.1.1 The clerk of works …

A prepares bills of quantities.
B is in charge of a trade gang.
C orders materials and obtains quotations for the supply of materials and services.
D is the architect's on-site representative on large contracts.

1.1.2 The contractor …

A orders materials and obtains quotations for the supply of materials and services.
B is employed by the building owner on the architect's advice to carry out the construction work.
C prepares unit rates for the pricing of tenders and carries out pre-tender investigations on the cost aspects of the proposed contract.
D prepares and submits accounts to clients and makes payments to suppliers and subcontractors.

1.1.3 The engineer …

A commissions the work and directly or indirectly employs everybody.
B can be a specialist such as a structural engineer employed to work with the architect on that aspect of the design.
C checks each operation to see whether it conforms with the Health and Safety Act.
D informs the architect on the payment progress.

1.1.4 A queen closer may be placed …

A in header course.
B in stretcher course.
C in header course next to the first brick.
D in stretcher course next to the first brick.

1.1.5 The foundations are placed below ground level to increase …

A strength.
B workability.
C stability of structure.
D all the above.

1.1.6 The 115 mm × 75 mm side of a brick as seen in the wall face is generally known as the …

A stretcher.
B face.
C front.
D header.

1.1.7 The undersurface of an arch is called the …

A soffit.
B intrados.
C haunch.
D back.

1.1.8 The member which is placed horizontally to support common rafters of a sloping roof, is called a …

A purlin.
B cleat.
C batten.
D strut.

1.1.9 The angular steps used for changing the direction of stairs, are called …

A round steps.
B angular steps.
C winders.
D circular steps.

1.1.10 Which one of the following factors is considered for the orientation of buildings?

A Direction of prevailing winds in the area
B Exposure of walls and roof of buildings to sunrays
C Extent up to which sunrays penetrate with the verandah
D All the above

(10 × 1) (10)

1.2 Explain, with the aid of a drawing, the 3:4:5 method used in the construction of houses. Also indicate where this method is used. (5)

[15]

QUESTION 2

FIGURE 1, DIAGRAM SHEET 1 (attached) shows a sketch of an octagon house plan found on the internet. Some notes were made on the sketch.

BRIEF SPECIFICATIONS	
Roof pitch	45°
Roof type	Gable roof
Roof truss	Special made trusses
Roof cover	IBR roof sheets
Roof overhang	500 mm
Ceiling height	29 brick courses
Exterior walls	1 brick wall, face-brick wall with15 mm plaster on the interior side
Interior walls	½ brick wall, 15 mm plaster both sides
Barge boards	250 mm × 10 mm Nutec fascia
MATERIAL AVAILIBLE ON SITE	
1×	1 830 mm aluminium sliding door
1×	steel frame with hardwood exterior door
4×	steel frame, with hollow-core interior door
1×	sliding-door rail with hollow-core interior door
2×	1 800 × 900 aluminium window frame (18DT9)
2×	900 × 600 aluminium window frame (9T6)

Design a cottage looking more or less like the sketch and use what is already available on site.

Draw, to scale 1:100, a fully detailed working drawing of the floor plan layout of the dwelling. The following must be included and indicated on the plan:

- 3 bedrooms, kitchen/living-room, full bathroom, and en-suite and other rooms as indicated on sketch plan (attached INFORMATION SHEET 1) (12)
- Room names and floor finishes (2)
- All external, internal and wall dimensions (7)
- Window and door symbols (2)
- Sanitary installation symbols must be in accordance with the SABS Code of Practice for Building Drawing (2)
- Window codes (attached DIAGRAM 2) (1)
- Section arrows (2)
- Title and scale (2)
- True North (2)

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[32]

QUESTION 3

Draw, to scale 1:75, a section A-A through the middle of the dwelling and indicate the following:

- Pitch, roof cover, truss and ceiling (attached DIAGRAM 1) (3)
- Gutter on fascia (2)
- Roof covering (eaves projection): 500 mm (2)
- Strip foundation (to include sizes) (2)
- Concrete slab (2)
- Damp-proof course (to include minimum height above FGL) (2)
- Damp-proof membrane (2)
- Compacted fill (2)
- Screed (2)
- External and internal walls (2)
- Finished ground level and finished floor level (2)
- Dimensions of ceiling height, roof overhang, total height and minimum damp-proof course distance from ground level (3)
- Title and scale (2)

[28]

QUESTION 4

Draw, to scale 1:100, all the views (north, east, south and west) from the design of the complete dwelling. Indicate the following on each elevation:

- Wall finish (face brick, with brick on edge window sill) (4)
- Window and door codes (attached DIAGRAM 2) (4)
- Title and scale (2)

[10]

QUESTION 5

Refer to FIGURE 3, DIAGRAM SHEET 3 (attached). Do not copy the given view, but drawn the site plan to scale 1:200. Indicate the following on the site plan:

- Boundary lines and pegs (2)
- Position of driveway (carriage-way crossing) (2)
- Building lines (2)
- Complete dwelling in correct position (show roof as seen from the top) (2)
- Drainage system (2)
- Direction of True North (2)
- Title and scale (2)
- Name of street (1)

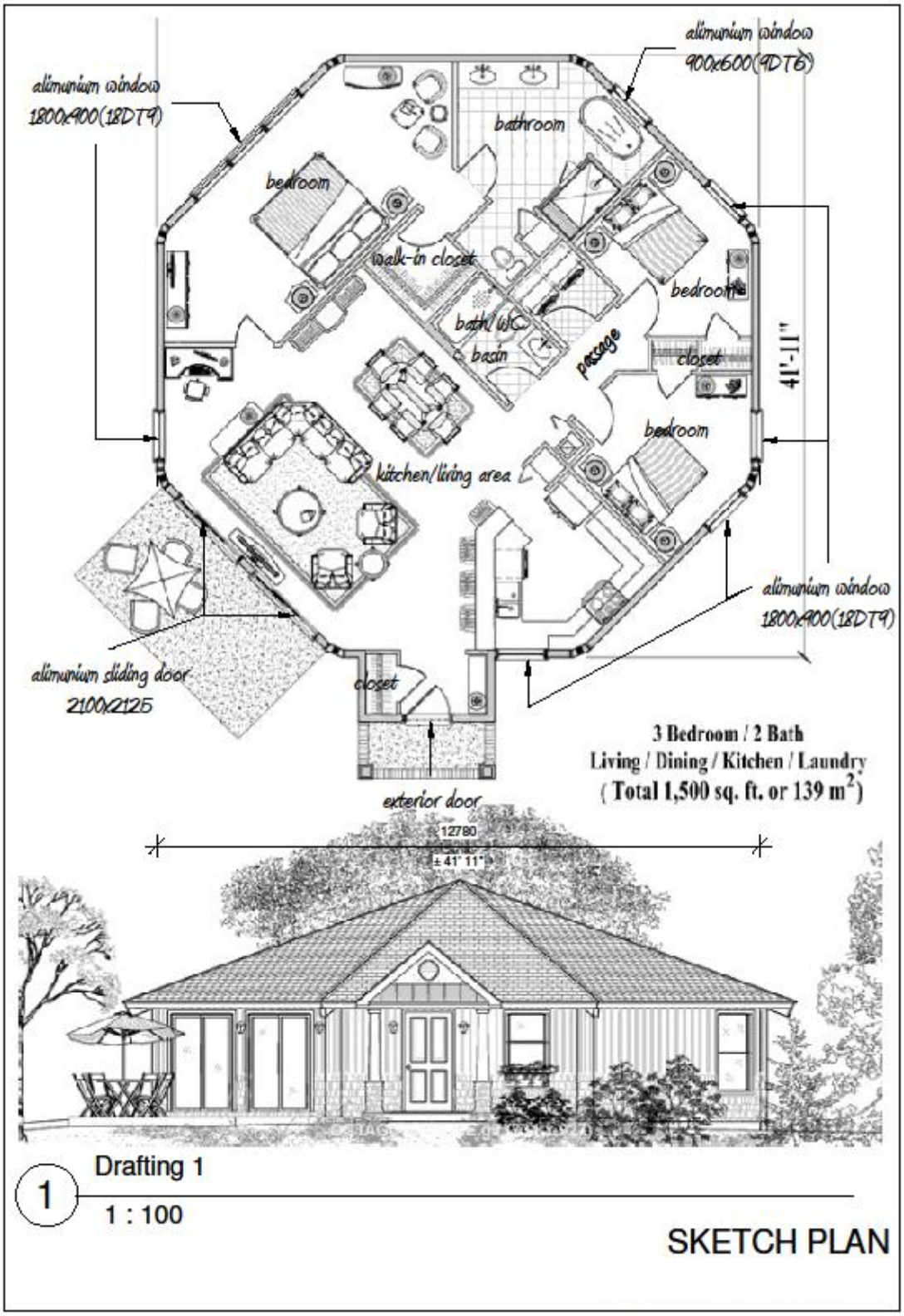
[15]

TOTAL: 100

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BUILDING DRAUGTING

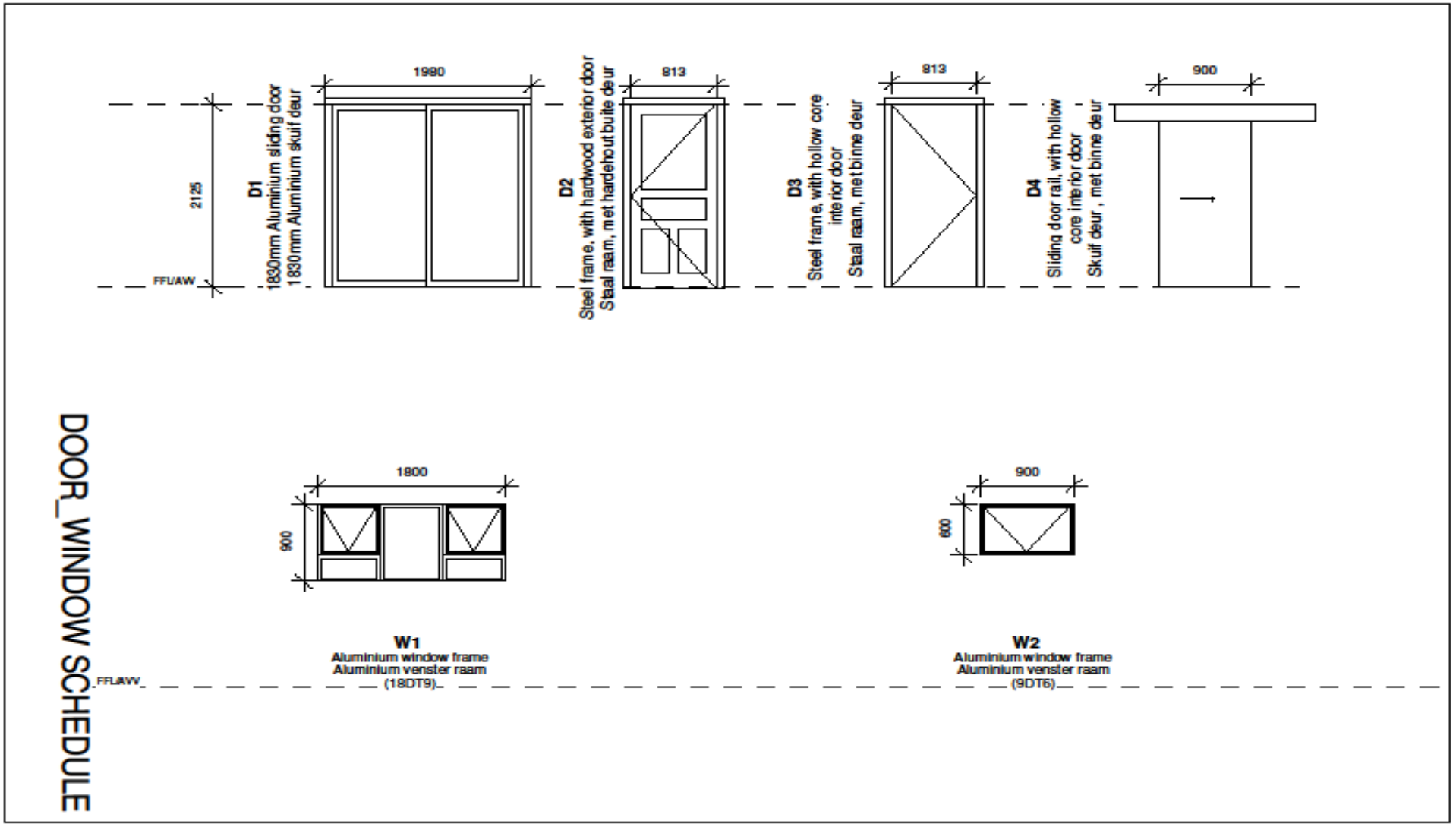
DIAGRAM SHEET 1



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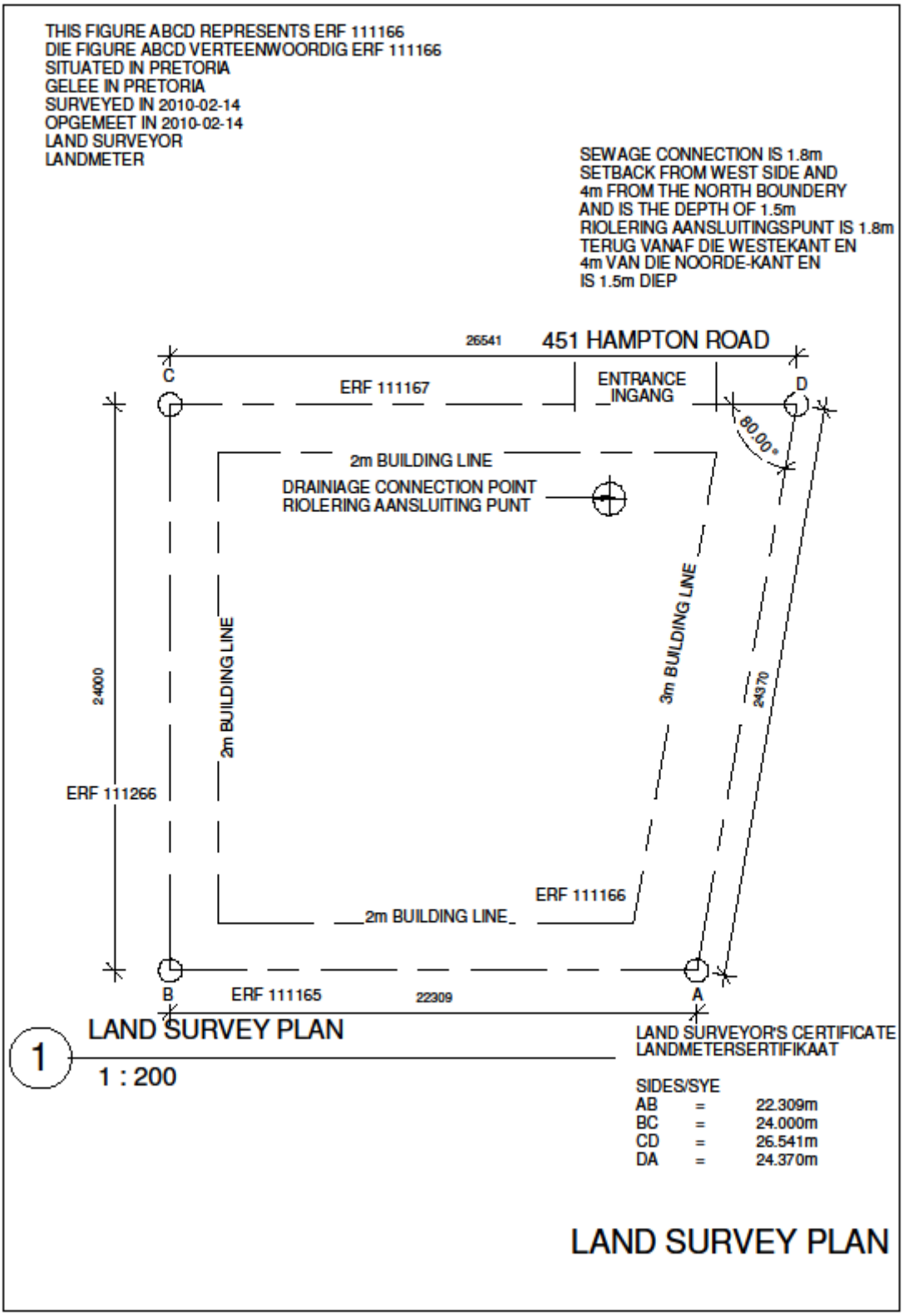
DIAGRAM SHEET 2



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DIAGRAM SHEET 3



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BUILDING DRAUGTING: INFORMATION SHEET 1

Table 4 — Howe-type roof trusses

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Roof covering	**Pitch degrees**			**Maximum clear span m**	**Maximum centre-to-centre truss spacing mm**	**Bolts at heel and splice joints (number × type)[a]**	**Member sizes and grade of timber in accordance with SANS 1783-2[b, c]**						**Number of bays**
	Minimum	**Maximum**	**Recommended**				**TC[d]**		**BC**		**Web**		
							Size mm	**Grade**	**Size mm**	**Grade**	**Size mm**	**Grade**	
Tiles and slates with 38 mm × 38 mm battens spaced at centres that do not exceed 345 mm maximum, and in accordance with the manufacturer's instructions	17,5	35	26	3,0 4,0 5,0 6,0 6,5 7,0 7,5 8,0	760 (650 where slates or tiles have a self-mass in excess of 55 kg/m^2)	2 × M12	114	5	114 114 114 114 114 152 152 152	5	114	5	2 4 4 4 6 6 6 6
Metal or fibre-cement sheets with 50 mm × 76 mm purlins on edge spaced at centres that do not exceed 1 200 mm	15	30	17,5	3,0 4,0 5,0 6,0 6,5 7,0 7,5 8,0	1 200	2 × M12	114	5	114 114 114 114 114 152 152 152	5	114	5	2 4 4 4 6 6 6 6
Metal tiles with 38 mm × 38 mm battens spaced in accordance with the manufacturer's instructions	15	30	20	3,0 4,0 5,0 6,0 6,5 7,0 7,5 8,0	1 000	2 × M12	114	5	114 114 114 114 114 152 152 152	5	114	5	2 4 4 4 6 6 6 6

TC = top chord or rafter
BC = bottom chord or tie beam

[a] Heel joints shall have 2 × M12 bolts per joint with 40 mm washers at each end.
[b] All timber members shall have a thickness of 38 mm (36 mm if planed).
[c] 38 mm × 114 mm grade 7 members may be substituted for 38 mm × 152 mm grade 5 material, if required.
[d] The maximum overhang of a 114 mm TC is 600 mm. The TC needs to be increased to 152 mm if the overhang is greater than 600 mm but less than or equal to 900 mm.

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BUILDING DRAUGTING

INFORMATION SHEET 2

Table 1 – Room area		
Type of occupancy	**Room**	**Minimum plan area**
All occupancies	Any habitable room other than kitchen, scullery and laundry	6m² with no linear dimension of less than 2m
B, D or J	Change rooms and dining rooms	Population 1–15: 0,8 m² per person but not less than 6 m² Population 16–100: 0,6 m² per person but not less than 12 m² Population more than 100: 0,5 m² per person but not less than 60 m²

Table 2 – Rooms and dimensions	
Room or space	**Minimum height**
Bedroom	2,4 m above floor area of at least 6 m² with clear height of at least 1,8 m at any point more than 0,75 m from edge of floor space
Any other habitable room in dwelling house or dwelling unit	2,4 m above minimum of 70% of floor area, and not less than 2,1 m above remaining floor area
All habitable rooms other than those listed above	2,4 m
Passage or entrance hall	2,1 m
Bathroom, shower-room, laundry or room containing toilet pan	2,1 m above any area where person would normally be in standing position
Open mezzanine floor with an area not exceeding 25% of area of floor immediately below it	2,1 m above and below mezzanine floor

SANS 10400-C: 2010

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