higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE: MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE

BUILDING DRAUGHTING

(2050035)

29 July 2021 (X-paper)
09:00–13:00

REQUIREMENTS: ONE A2 drawing sheet

Nonprogrammable calculators, drawing instruments and CAD software may be used.

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

082Q1G2129

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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 SHEET.
5. A balanced layout is very important and candidates will be penalised for bad planning.
6. A 15 mm border must be drawn around the drawing sheet (both sides).
7. The question numbers must be clearly indicated.
8. All drawing work, including candidate information, must be done in PENCIL.
9. All the drawing work must comply with the SABS recommended code of practice for building drawing as well as the SANS 10111-1990.
10. All the building regulations must comply with the national building regulations SANS 10400-1990.
11. For the purpose of the examination, brick sizes should be taken as 230 × 115 × 75 mm.
12. All the abbreviations and symbols must comply with the latest national building regulations and all relevant SANS (SABS)-codes.
13. Write neatly and legibly.

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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) in the ANSWER BOOK

1.1.1 What are the functions of the clerk of work?

A Is engaged to prepare bills of quantities.
B Is in charge of a trade gang.
C Orders materials, obtains quotations for the supply of materials and services.
D Is employed on large contracts as the architect's on-site representatives.

1.1.2 What are the contractor's functions?

A Orders materials, 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 into the cost aspects of the proposed contact.
D Prepares and submits accounts to clients and makes payments to suppliers and subcontractors.

1.1.3 What are the engineer's functions?

A The person who commissions the work and directly or indirectly employs everybody.
B Specialists such as structural engineers are employed to work with the architect on that particular 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 progress made with payment.

1.1.4 A queen closer may be placed …

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

1.1.5 The foundations are placed below ground level, to increase …

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

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

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

1.1.7 The under surface of an arch, is called …

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

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

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

1.1.9 The angular steps used for changing 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 The direction of the prevailing winds in the area.
B The exposure of the walls and roof of the buildings to the rays of sun.
C The extent to which the sunrays penetrate the veranda.
D All of the above.

❖ (10 × 1) (10)

1.2 With the aid of a drawing explain the 3:4:5 method used in the construction of houses; also mention where this method is used. (5)

[15]

QUESTION 2: FLOOR PLAN LAYOUT

DIAGRAM SHEET 1 (attached) shows a sketch plan of a hexagon cabin/house that your client found on the internet. Your client made some notes on the sketch. ❖

BRIEF SPECIFICATIONS	
Roof pitch	5°
Roof type	Gable roof
Roof truss	Specially made trusses
Roof cover	IBR roof sheets
Roof overhang	250 mm
Ceiling height	30 brick courses
Exterior walls	1 brick face brick wall with 15 mm plaster on the inside
Interior walls	½ brick wall with 15 mm plaster both sides
Barge boards	250 × 10 mm Nutec Fascia
MATERIAL AVAILIBLE ON-SITE	
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 (12DT12)
2 ×	900 × 600 aluminium window frame (9T6)

The clients wants you as draughtsperson to design a cottage that looks more or less like the one in the sketch by using the materials that are already available on site.

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

2.1 2 bedrooms, kitchen, living room and bathroom, as indicated on sketch plan [DIAGRAM SHEET 1 (attached)] (12)

2.2 Room names and floor finishes (2)

2.3 All external, internal and wall dimensions (7)

2.4 Window and door symbols ❖ (2)

2.5 Sanitary installation symbols must be in accordance with the SABS code of practice for building drawing (2)

2.6 Window codes [see DIAGRAM SHEET 2 (attached)] (1)

2.7 Section arrows (2)

2.8 Title and scale (2)

2.9 True north ❖ (2)

[32]

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QUESTION 3: SECTION THROUGHT THE COTTAGE

Draw, to scale 1:50, a section A-A horizontal through the middle of cottage.

Indicate the following specifications:

3.1	The pitch, roof cover, truss and ceiling [see INFORMATION SHEET 1 (attached)]	(3)
3.2	Gutter on fascia	(2)
3.3	Roof covering (eaves projection) = 250 mm	(2)
3.4	Strip foundation (include sizes)	(2)
3.5	Concrete slab, 510 mm above NGL	(2)
3.6	Damp-proof course (to include minimum height above FGL)	(2)
3.7	Damp-proof membrane	(2)
3.8	Compacted fill	(2)
3.9	Screed	(2)
3.10	External and internal walls	(2)
3.11	Finished ground level and finished floor level	(2)
3.12	Dimension the ceiling height, roof overhang, total height and minimum damp-proof course distance from the ground level.	(3)
3.13	Title and scale	(2)
		[28]

QUESTION 4: ELEVATION

Draw, to scale 1:100, all the views (north, east, south and west) of your design of the complete dwelling.

Indicate the following on each elevation:

4.1	Wall finish ,face brick, with brick-on-edge window sill.	(4)
4.2	Window and door codes [see DIAGRAM SHEET 2 (attached)]	(4)
4.3	Title and scale	(2)
		[10]

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QUESTION 5: SITE PLAN

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

The following must be included and indicated on the site plan:

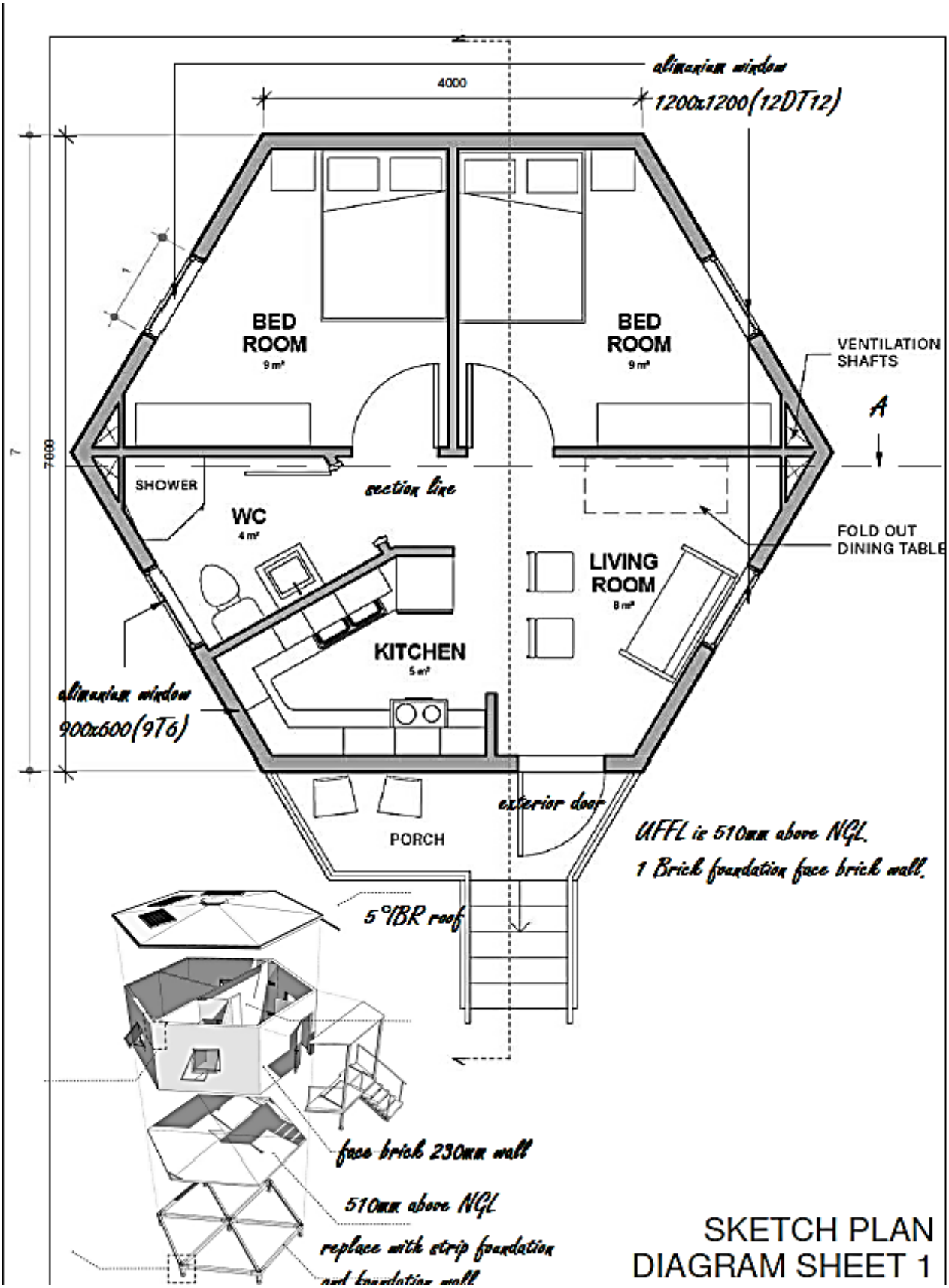
5.1	The boundary lines and pegs	(2)
5.2	The position of the driveway (carriage-way crossing)	(2)
5.3	The building lines	(2)
5.4	The complete dwelling in the correct position (show the roof as seen from the top)	(2)
5.5	The drainage system	(2)
5.6	The direction of the true north	(2)
5.7	Title and scale ❖	(2)
5.8	The name of the street	(1)
		[15]

TOTAL: 100

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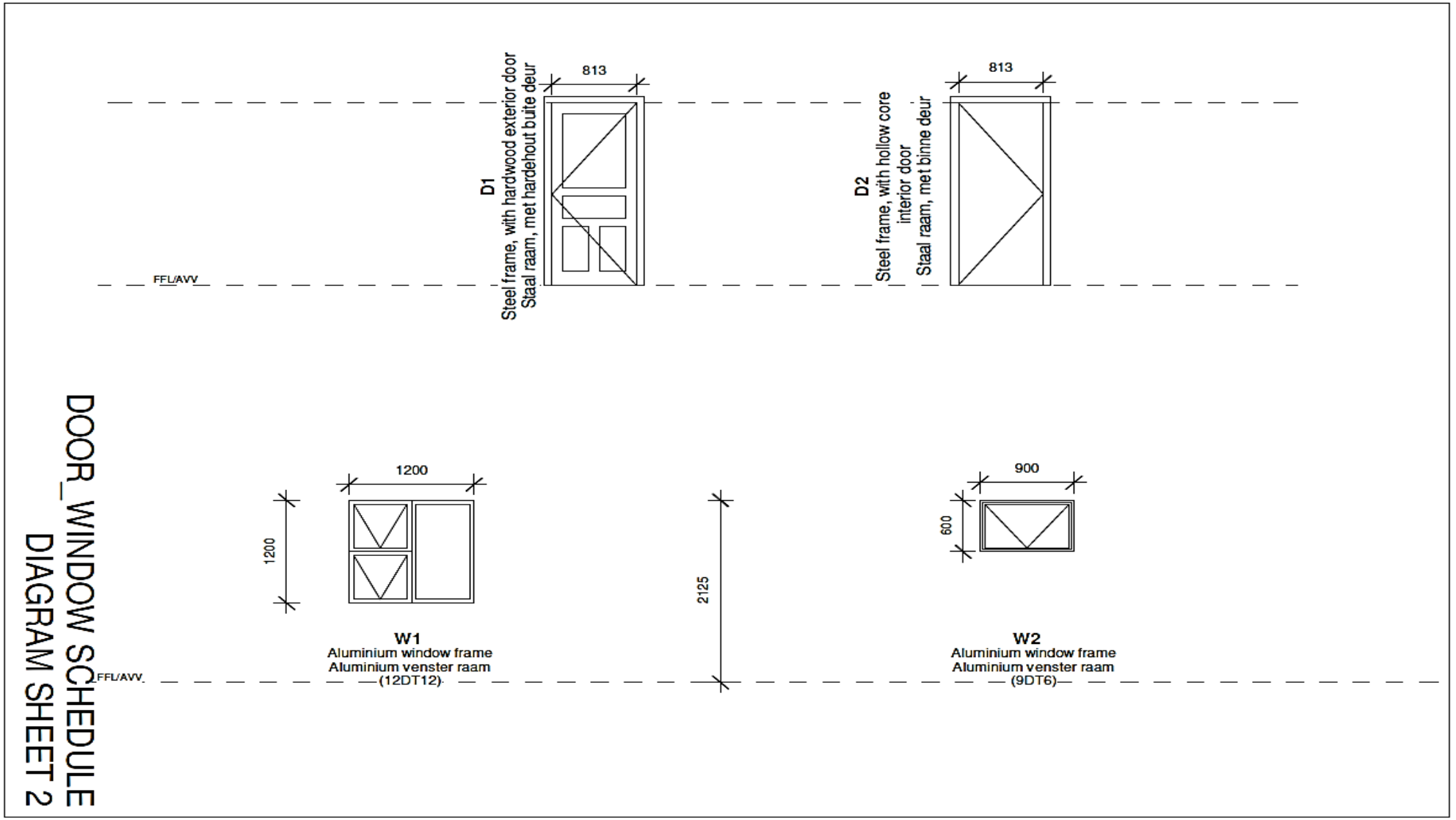
DIAGRAM SHEET 1



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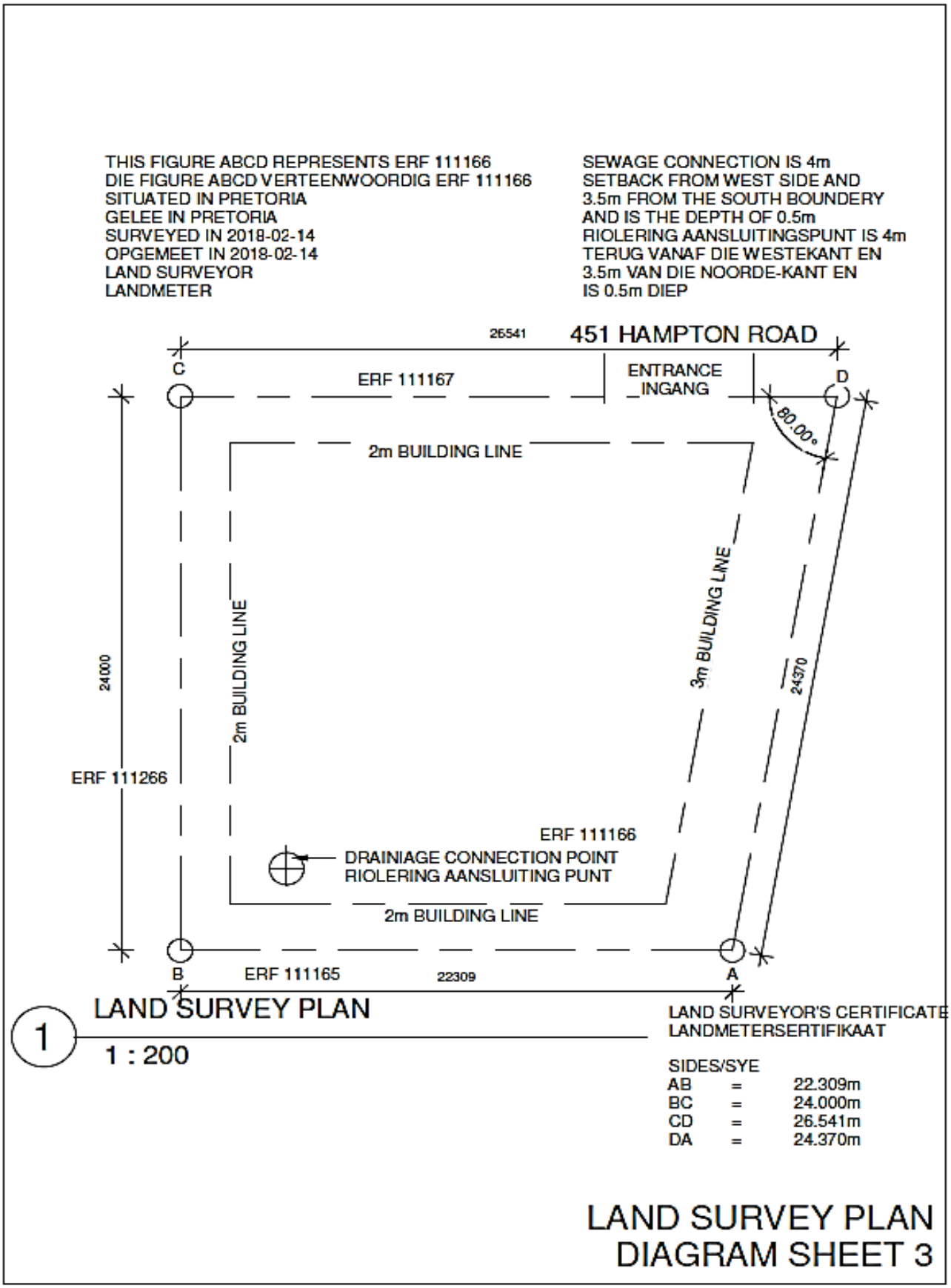
DIAGRAM SHEET 2



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DIAGRAM SHEET 3



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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**
							TC[d]		**BC**		**Web**		
	Minimum	**Maximum**	**Recommended**				**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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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.	6 m² with no linear dimension of less than 2 m.
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 their dimensions	
Room or space	**Minimum height**
Bedroom	2,4 m above a floor area of at least 6 m² with a clear height of at least 1,8 m at any point more than 0,75 m from the edge of the floor space
Any other habitable room in a dwelling house or a dwelling unit	2,4 m above a minimum of 70% of the floor area, and not less than 2,1 m above the 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 a toilet pan	2,1 m above any area where a person would normally be in a standing position
Open mezzanine floor which has an area not exceeding 25% of the area of the floor immediately below it	2,1 m above and below the mezzanine floor

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