higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# NATIONAL CERTIFICATE:
# MULTIDISCIPLINARY DRAWING OFFICE PRACTICE

# BUILDING DRAUGHTING

(2050035)

**20 November 2019 (X-Paper)**
**09:00–13:00**

**REQUIREMENTS: ONE A2 drawing sheet**

**Calculators, drawing instruments and CAD software may be used.**

**This question paper consists of 6 pages, 2 diagram sheets and 2 information sheets.**

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# DEPARTMENT OF HIGHER EDUCATION AND TRAINING
# REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE:
MULTIDISCIPLINARY DRAWING OFFICE PRACTICE
BUILDING DRAUGHTING
TIME: 4 HOURS
MARKS: 100

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**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. Clearly show QUESTION NUMBERS.
5. Use both sides of the DRAWING SHEET.
6. Draw a 15 mm border around the DRAWING SHEET on both sides.
7. Do ALL drawing work, including candidate information, in pencil.
8. Take brick sizes as 220 × 110 × 75 mm.
9. ALL drawing work must comply with the SABS Recommended Code of Practice for Building Drawing as well as the SANS 10111-1990.
10. ALL building regulations must comply with the National Building Regulations SANS 10400-1990.
11. ALL abbreviations and symbols must comply with the latest National Building Regulations and ALL relevant SANS (SABS) codes.
12. A balanced layout is very important and candidates will be penalised for poor planning.
13. Work neatly.

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## QUESTION 1

1.1 Requirements for building plans that must be submitted to a local authority must be in accordance with the National Regulations.

Copy and complete the following table pertaining to abbreviations used on building plans:

| ABBREVIATION | DESCRIPTION |
|---|---|
| WC | |
| RE | |
| IL | |
| CONC | |
| SP | |
| MH | |
| FFL | |
| RWP | |
| AO | |
| IE | |

**NOTE:** ALL information must be printed freehand or stencilled 3 mm high.

(10 × ½) (5)

1.2 List the FIVE main categories of construction drawings in a table.

**NOTE:** ALL information must be printed freehand or stencilled 3 mm high. (5)

**[10]**

## QUESTION 2

FIGURE 1, DIAGRAM SHEET 1 (attached), shows a 3D site plan of an incomplete house with a complete double garage.

| **Brief specifications:** | |
|---|---|
| Roof pitch | 20° |
| Roof type | Matches double-garage roof |
| Roof truss | Howe-type |
| Roof cover | Matches double-garage roof |
| Roof overhang | 630 mm |
| Ceiling height | 2 720 mm (32 courses) |
| Foundation walls | 40 mm cavity wall |
| Exterior walls | One-brick wall, 15 mm plaster both sides |
| Interior walls | Half-brick wall, 15 mm plaster both sides |
| Barge boards | Matches double-garage roof |
| **Material available on-site:** | |
| 1 × entrance door | |
| 1 × kitchen door | |
| 6 × interior doors and doorframes | |
| 1 × 2 000 × 1 245 steel window frame (ND11F) | |
| 5 × 1 511 × 1 245 steel window frame (ND4F) | |
| 1 × 1 511 × 654 steel window frame (NE4) | |
| 2 × 1 022 × 949 steel window frame (NC4F) | |

Your client bought this incomplete house on auction. You must redesign the interior of the house by using what has already been built and the material on-site. Use the outside dimensions given on the attached plan.

Draw, to scale 1:100, a fully detailed working drawing of the floor-plan layout of the dwelling. Include and indicate the following on the plan:

2.1 THREE bedrooms, a kitchen, dining/living room and full bathroom (use INFORMATION SHEET 1 (attached)) (9)

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 in accordance with the SABS Code of Practice for Building Drawing (2)

2.6 Window codes (1)

2.7 Section arrows (2)

2.8 Title and scale (2)

2.9 True north (2)

**[29]**

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## QUESTION 3

Draw, to scale 1:50, a section A-A through the dwelling as shown on the 3D site plan of the completed house designed in QUESTION 2. Indicate the following specifications:

| | | |
|---|---|---|
| 3.1 | Pitch, roof cover, truss and ceiling | (3) |
| 3.2 | Gutter on fascia | (2) |
| 3.3 | Roof covering (eaves projection) = 630 mm | (2) |
| 3.4 | Foundation wall (cavity wall) | (3) |
| 3.5 | Strip foundation (to include sizes) | (2) |
| 3.6 | Concrete slab | (2) |
| 3.7 | Damp-proof course (to include minimum height above FGL) | (2) |
| 3.8 | Damp-proof membrane | (2) |
| 3.9 | Compacted fill | (2) |
| 3.10 | Screed | (2) |
| 3.11 | External and internal walls | (2) |
| 3.12 | Finished ground level and finished floor level | (2) |
| 3.13 | Dimensions of ceiling height, roof overhang, total height and minimum damp-proof course distance from the ground level | (3) |
| 3.14 | Title and scale | (2) |
| | | **[31]** |

## QUESTION 4

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

| | | |
|---|---|---|
| 4.1 | Wall finish (plaster) | (4) |
| 4.2 | Window and door codes | (4) |
| 4.3 | Title and scale | (2) |
| | | **[10]** |

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**QUESTION 5**

Refer to FIGURE 2, DIAGRAM SHEET 2 (attached).

Do NOT copy the given view, but draw, to scale 1:50, the interior views of only the kitchen (ALL FOUR walls). Include and indicate the following on the site plan:

| | | |
|---|---|---|
| 5.1 | Cabinets | (5) |
| 5.2 | Sink  | (2) |
| 5.3 | Stove and hood | (2) |
| 5.4 | Tiles against the walls (tiles up to door and window-sill height) | (5) |
| 5.5 | Dimensions | (4) |
| 5.6 | Title and scale | (2) |
| | | **[20]** |

**TOTAL: 100**

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## DIAGRAM SHEET 1

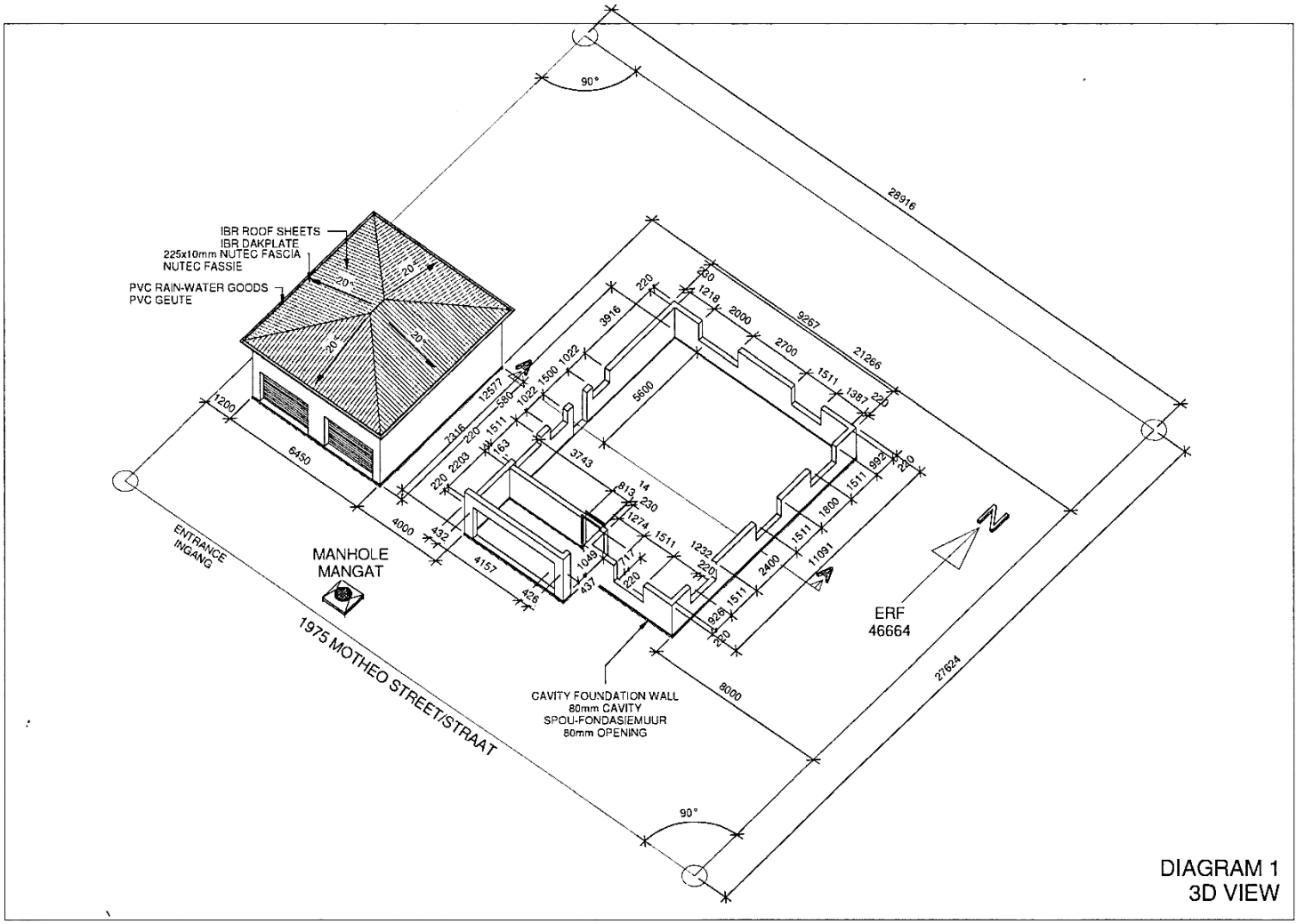



**FIGURE 1**

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## DIAGRAM SHEET 2

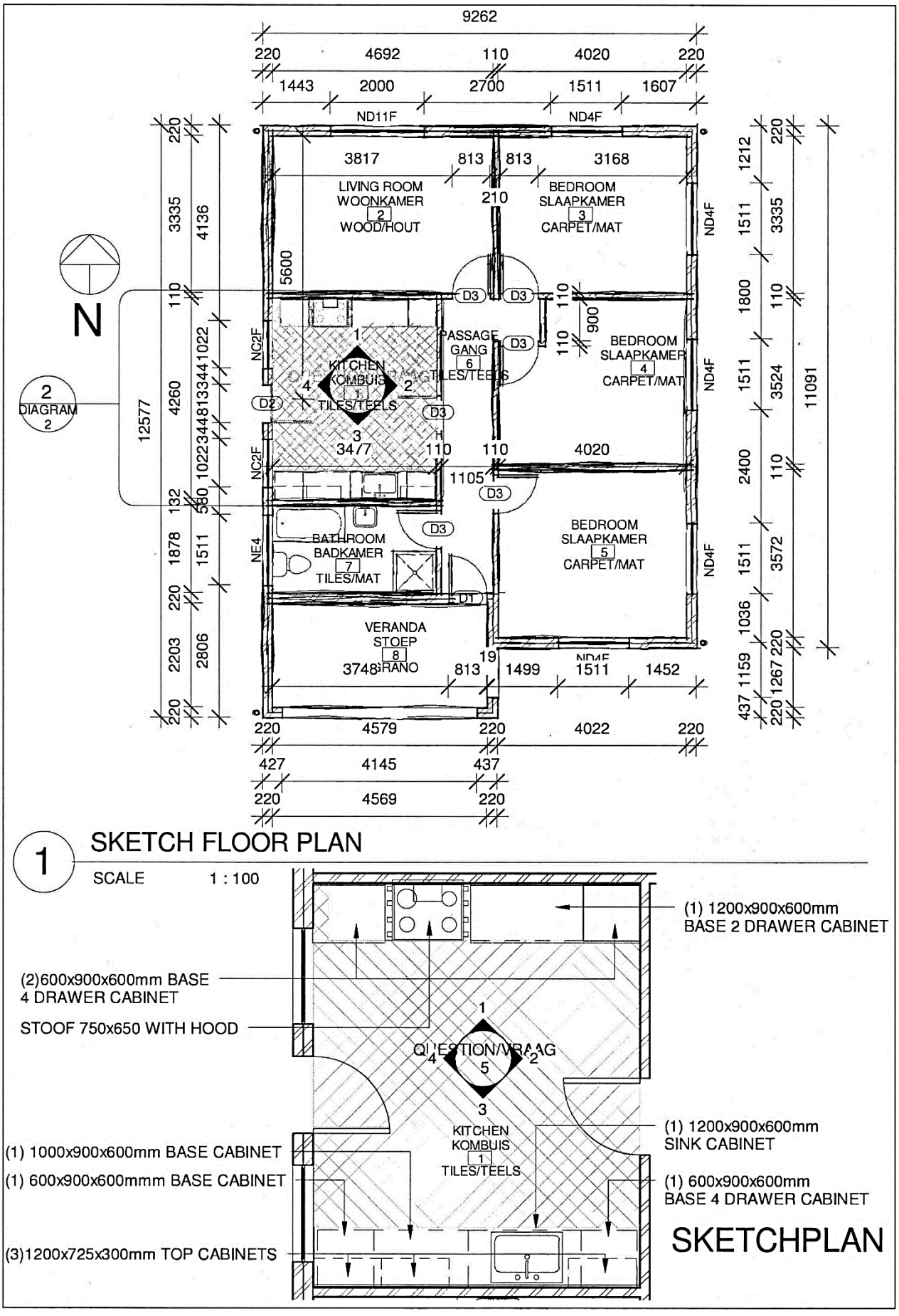



**FIGURE 2**

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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<br>4,0<br>5,0<br>6,0<br>6,5<br>7,0<br>7,5<br>8,0 | 760 (650 where slates or tiles have a self-mass in excess of 55 kg/m$^2$) | 2 × M12 | 114 | 5 | 114<br>114<br>114<br>114<br>114<br>152<br>152<br>152 | 5 | 114 | 5 | 2<br>4<br>4<br>4<br>6<br>6<br>6<br>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<br>4,0<br>5,0<br>6,0<br>6,5<br>7,0<br>7,5<br>8,0 | 1 200 | 2 × M12 | 114 | 5 | 114<br>114<br>114<br>114<br>114<br>152<br>152<br>152 | 5 | 114 | 5 | 2<br>4<br>4<br>4<br>6<br>6<br>6<br>6 |
| Metal tiles with 38 mm × 38 mm battens spaced in accordance with the manufacturer's instructions | 15 | 30 | 20 | 3,0<br>4,0<br>5,0<br>6,0<br>6,5<br>7,0<br>7,5<br>8,0 | 1 000 | 2 × M12 | 114 | 5 | 114<br>114<br>114<br>114<br>114<br>152<br>152<br>152 | 5 | 114 | 5 | 2<br>4<br>4<br>4<br>6<br>6<br>6<br>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:<br>0,8 m² per person but not less than 6 m²<br>Population 16–100:<br>0,6 m² per person but not less than 12 m²<br>Population more than 100:<br>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, 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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