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**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**



**ENGINEERING GRAPHICS AND DESIGN  
PAPER 1**

**NOVEMBER 2019**

**MARKS: 200**

**TIME: 3 hours**

**This question paper consists of 6 pages.**

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**INSTRUCTIONS AND INFORMATION**

1. The question paper consists of FOUR questions.
2. Answer ALL the questions.
3. All drawings must be drawn to scale 1 : 1, unless otherwise stated.
4. The questions must be answered on the answer sheets provided.
5. All the answer sheets must be re-stapled in numerical sequence and handed in irrespective of whether the question was attempted or not.
6. Careful time management is essential in order to complete all the questions.
7. Print your name in the block provided on every ANSWER SHEET.
8. All answers must be drawn accurately and neatly.
9. Any details or dimensions not given must be estimated in good proportion.
10. ALL drawings are in first angle orthographic projection, unless stated otherwise.

| <b>FOR OFFICIAL USE ONLY</b> |          |          |                |
|------------------------------|----------|----------|----------------|
|                              |          |          | MODERATED MARK |
| 1                            |          |          |                |
| 2                            |          |          |                |
| 3                            |          |          |                |
| 4                            |          |          |                |
| <b>TOTAL</b>                 |          |          |                |
|                              | <b>2</b> | <b>0</b> | <b>0</b>       |
|                              |          | <b>2</b> | <b>0</b>       |
|                              |          |          | <b>0</b>       |

| <b>FINAL CONVERTED MARK</b> | <b>CHECKED BY</b> |
|-----------------------------|-------------------|
| <b>100</b>                  |                   |

| <b>COMPLETE THE FOLLOWING:</b> |
|--------------------------------|
| <b>NAME</b>                    |
|                                |
| <b>NAME</b>                    |
|                                |
| <b>EXAMINATION CENTRE</b>      |
|                                |
| <b>EXAMINATION CENTRE</b>      |
|                                |



FIGURE 1:

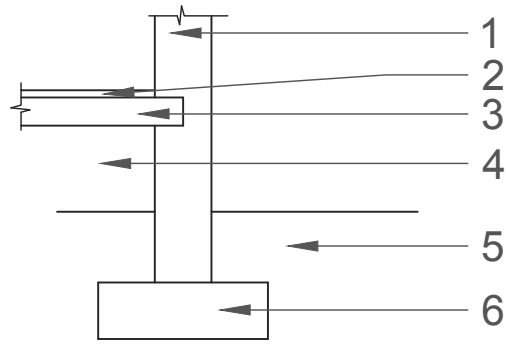


FIGURE 3:

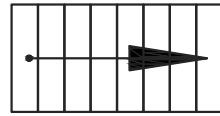


FIGURE 4:



**QUESTION 1A: ANALYTICAL (CIVIL)**

**Given:**

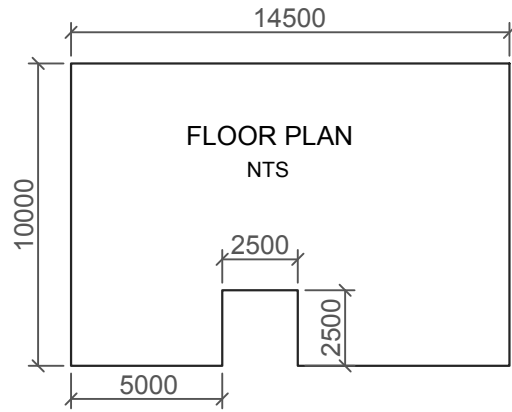
Figure 1: Incomplete wall and foundation detail.  
 Figure 2: A view of a floorplan with measurements (not to scale).  
 Figure 3: The plan view of the SANS 10143 symbol for steps.  
 Figure 4: A symbol with a specific meaning.

**Instructions:**

Complete the table below by neatly answering the questions, which refer to the accompanying figures (1 to 4) and civil content. **[35]**

|        |   |                         |    |  |  |
|--------|---|-------------------------|----|--|--|
| 1      | What SI-unit was used for the dimensions in figure 2?   |                         | 1  |  |  |
| 2      | In which colours must the following features be shown on a civil drawing according to the SANS 10143?   | ALL EXISTING MATERIALS  | 1  |  |  |
|        |   | NEW WOOD                | 1  |  |  |
|        |   | NEW DRAINAGE / SEWERAGE | 1  |  |  |
|        |   | NEW MASONRY             | 1  |  |  |
|        |   | NEW GLASS               | 1  |  |  |
| 3      | Name the parts from 1 to 6 of the incomplete wall and foundation detail shown in figure 1.  | NEW CONCRETE            | 1  |  |  |
|        |   | 1                       | 1  |  |  |
|        |   | 2                       | 1  |  |  |
|        |   | 3                       | 1  |  |  |
|        |   | 4                       | 1  |  |  |
|        |   | 5                       | 1  |  |  |
| 4      | What does the abbreviation NTS, in figure 2, stand for?   | 6                       | 1  |  |  |
|        |   | 1                       | 1  |  |  |
| 5      | In the space provided (ANSWER 5) determine the total perimeter of the house, in figure 2, in meters. Show all calculations.   |                         | 3  |  |  |
| 6      | In the space provided (ANSWER 6) determine the total area of the house, in figure 2, in square meters. Show all calculations.   |                         | 4  |  |  |
| 7      | What does the arrow in figure 3 mean?   |                         | 1  |  |  |
| 8      | Name the symbol in figure 4.  |                         | 1  |  |  |
| 9      | In the space provided (ANSWER 9.1 - 9.3), draw, in neat freehand, the front view and top view of the SANS 10143 graphical symbol for the following:<br>9.1 BATH; 9.2. SINGLE SINK; 9.3 TOILET |                         | 12 |  |  |
| TOTAL: |   |                         | 35 |  |  |

FIGURE 2:



ANSWER 5:

ANSWER 6:

ANSWER 9.1

ANSWER 9.2

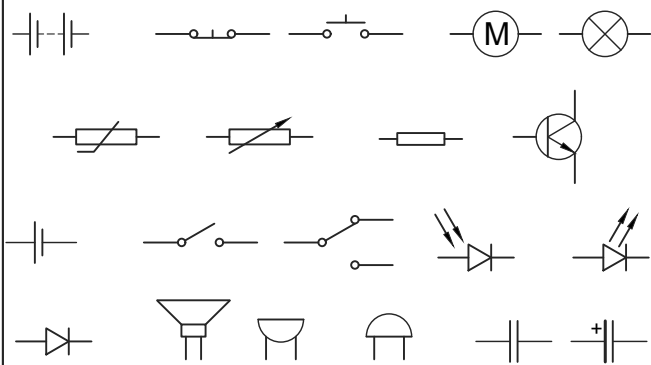
ANSWER 9.3

BATH

SINGLE SINK

TOILET

FIGURE 5:



**QUESTION 1B: ELECTRONICS**

**Given:**

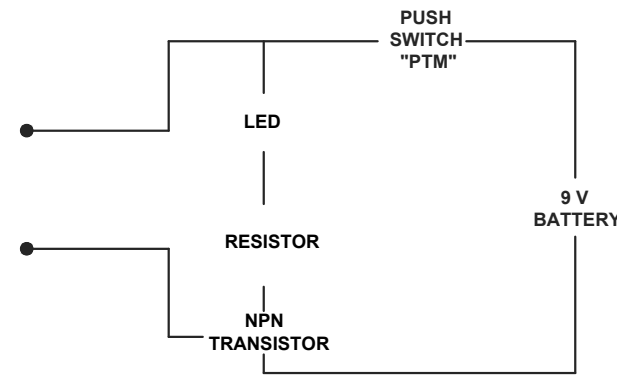
Figure 5: A table with symbols of electronic components.  
 Figure 6: A diagram with labels of a touch sensor.

**Instructions:**

Draw the electronic diagram with the correct electronic symbols, in free hand, in the space provided under ANSWER 1B.

[6]

FIGURE 6:



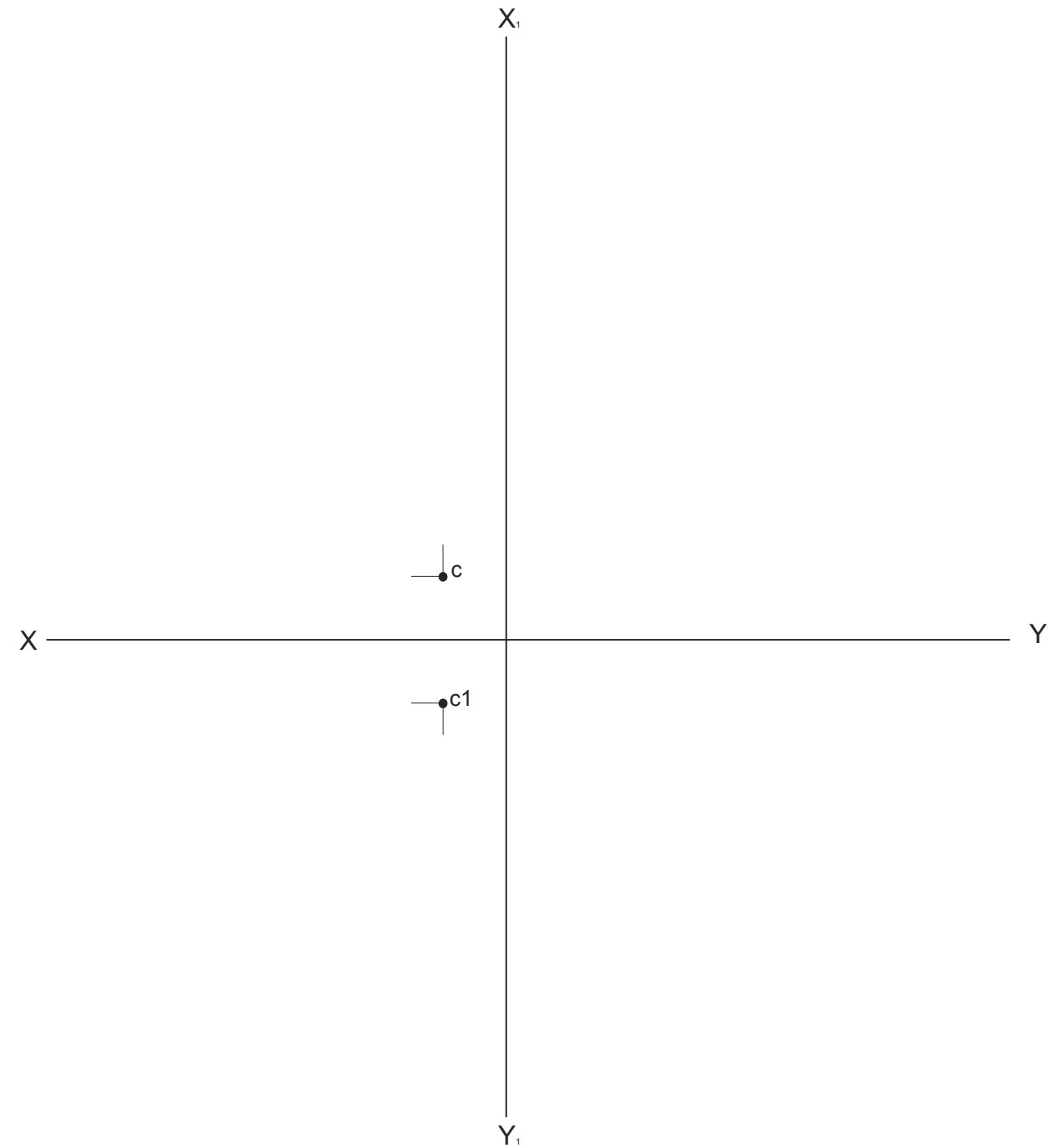
ANSWER 1B:

| MARKS      |           |
|------------|-----------|
| Q 1A       | 35        |
| Q 1B       | 6         |
| <b>TOT</b> | <b>41</b> |

NAME

NAME

2



**QUESTION 2: TRANSITION PIECE**

**Given:**

- The top view and front view of a square to triangle transition piece, drawn in first-angle orthographic projection.
- An isometric help view of the transition piece.
- Axis XY and -X<sub>1</sub>Y<sub>1</sub> and a starting point c and c1.
- Starting point ABC and the direction of development.

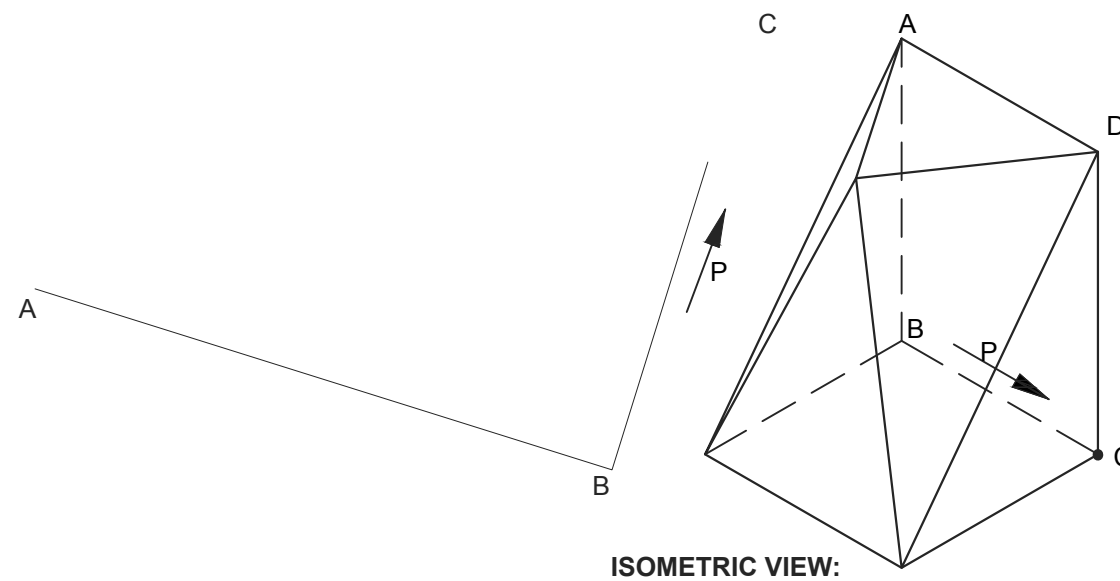
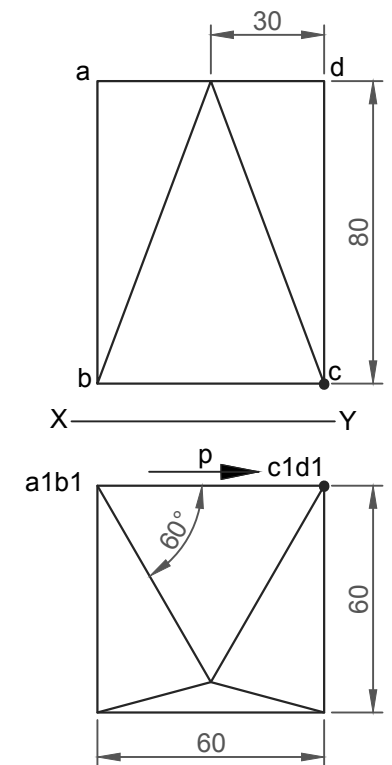
**Instructions:**

Draw, to scale 1 : 1, the following views of the transition piece. Start at C, C1.

- 2.1 The given top view.
- 2.2 The given front view.
- 2.3 The left view.
- 2.4 The development of the transition piece, starting and ending with seam AB. The direction of the arrow P indicates the direction of the development.

Show ALL constructions.

[36]



ISOMETRIC VIEW:

| ASSESSMENT CRITERIA |                         |           |  |  |
|---------------------|-------------------------|-----------|--|--|
| 1                   | CONSTRUCTIONS + PLACING | 4         |  |  |
| 2                   | TOP VIEW                | 6         |  |  |
| 3                   | FRONT VIEW              | 5         |  |  |
| 4                   | LEFT VIEW               | 4         |  |  |
| 5                   | DEVELOPMENT             | 17        |  |  |
| <b>TOTAL</b>        |                         | <b>36</b> |  |  |

|             |          |
|-------------|----------|
| <b>NAME</b> |          |
|             |          |
| <b>NAME</b> | <b>3</b> |



**QUESTION 3: PERSPECTIVE**

**Given:**

Three views of a HOUSE WITH A PORCH and the information needed to draw a two-point perspective drawing.

PP – Picture plane

HL – Horizon line

GL – Ground line

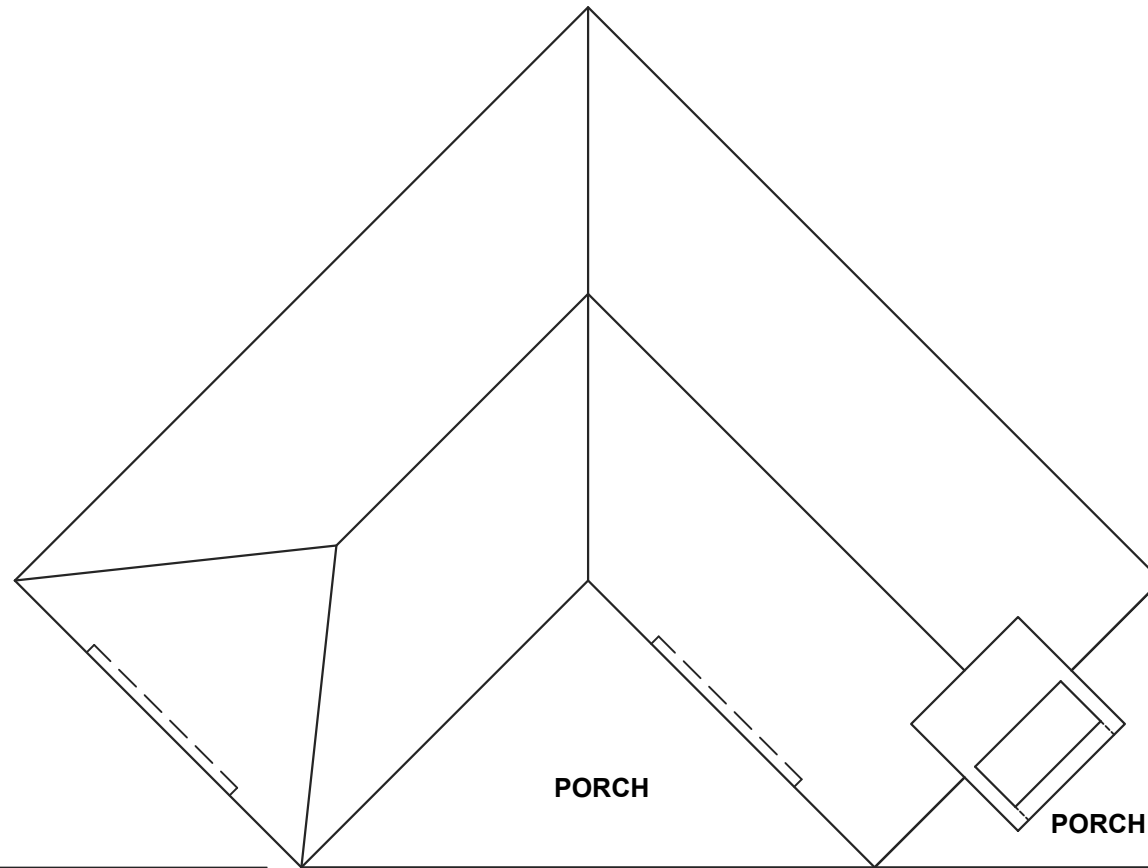
SP – Station point

**Instructions:**

Complete the perspective drawing.

- Align the drawing sheet with the ground line (GL).
- Determine and label the vanishing points.
- Show ALL necessary construction.
- NO hidden detail is required.

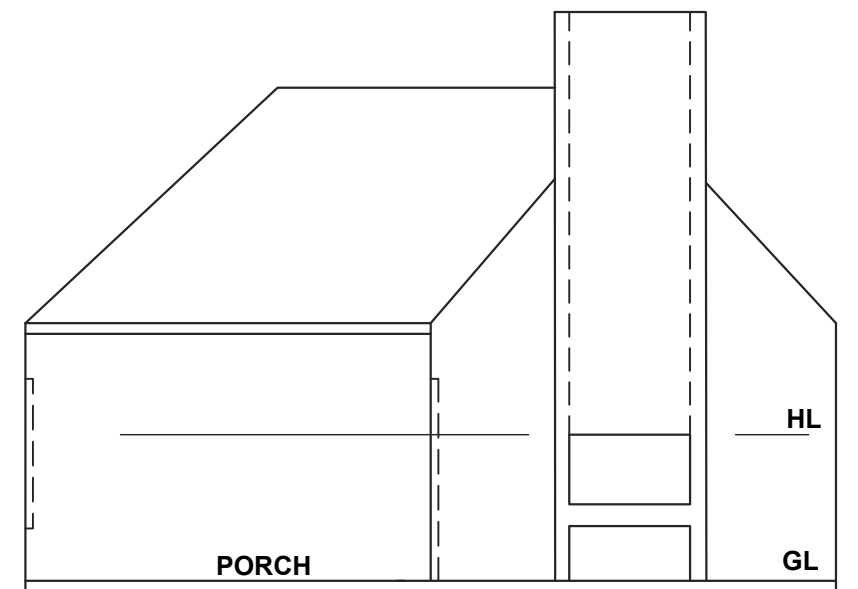
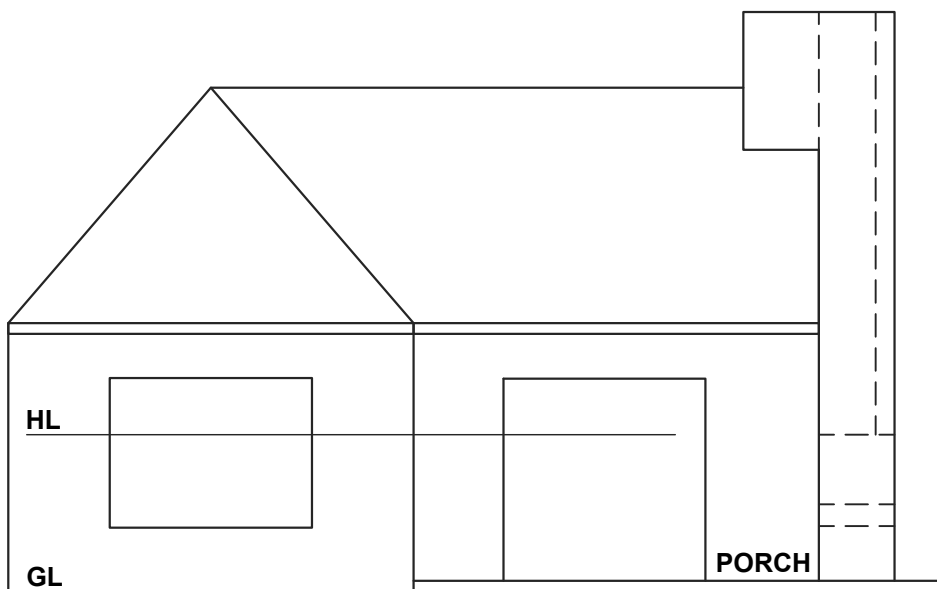
[41]



| ASSESSMENT CRITERIA |                         |           |  |  |
|---------------------|-------------------------|-----------|--|--|
| 1                   | CONSTRUCTION + VPs      | 6         |  |  |
| 2                   | ROOFS                   | 7         |  |  |
| 3                   | WALLS + BRAAI + CHIMNEY | 15        |  |  |
| 4                   | WINDOW + DOOR           | 8½        |  |  |
| 5                   | PORCH                   | 4½        |  |  |
| <b>TOTAL</b>        |                         | <b>41</b> |  |  |

PP

PP



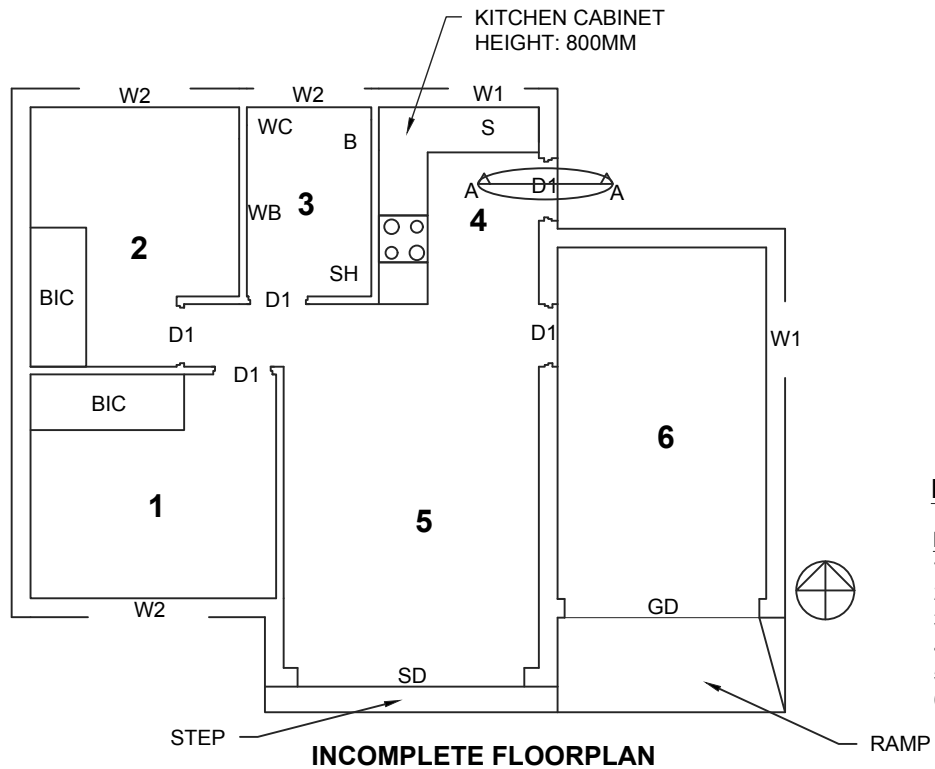
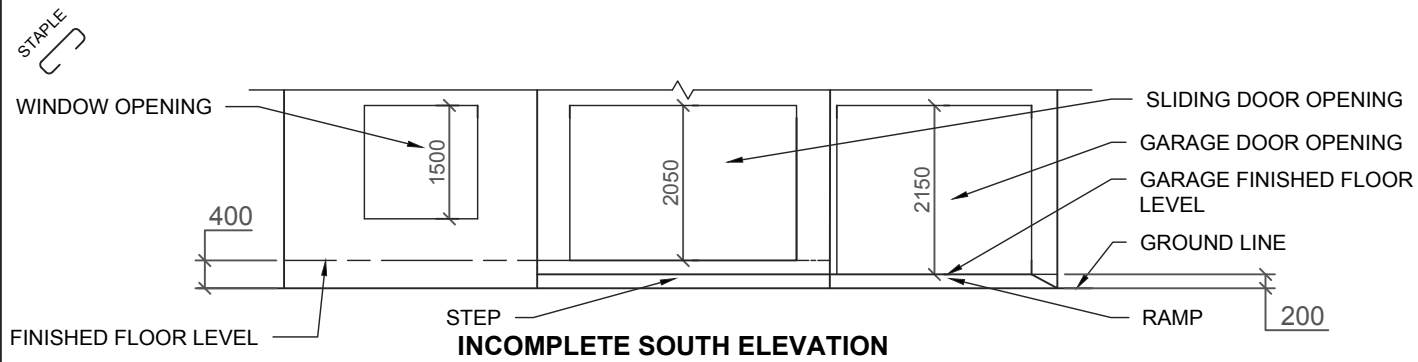
+

SP

NAME

NAME

4



**FEATURES**

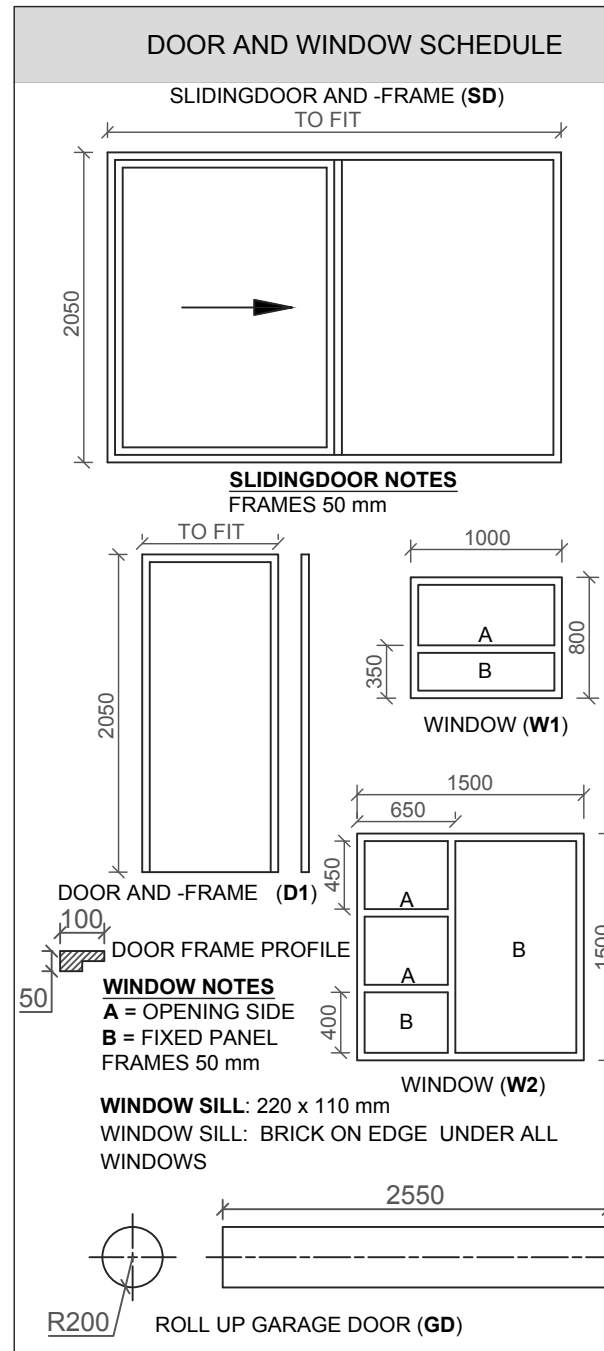
- D1 DOOR
- SD SLIDING DOOR
- W1 WINDOW
- W2 WINDOW
- GD ROLL UP GARAGE DOOR

**FIXTURES**

- WC TOILET
- B BATH
- WB WASH BASIN
- SH SHOWER
- S SINK
- BIC BUILT IN CUPBOARD

**ROOM DESIGNATIONS**

- FLOOR FINISHES**
- 1. BEDROOM CARPET
- 2. BEDROOM CARPET
- 3. BATHROOM TILE
- 4. KITCHEN TILE
- 5. LIVING ROOM TILE
- 6. GARAGE GRANO



**QUESTION 4: CIVIL DRAWING**

**Given:**

- The incomplete SOUTH ELEVATION of a **proposed new dwelling**, showing the walls, step as well as window-, door- and roll up garage door openings.
- The incomplete floor plan showing the walls, position of the doors, windows and sanitary fixtures.
- The incomplete foundation and wall detail.
- Room designations and floor finishes.
- A door, window and garage door schedule.
- A table of sanitary fixtures.
- The floor plan of the new dwelling as well as a breakline and the natural ground level in the south elevation, drawn to **scale 1:50** and the starting point and breakline for the sectional view to **scale 1:20** (on page 6).

**Instructions:**

Answer this question on page 6.

4.1 Using the given incomplete floor plan, draw in first-angle orthographic projection and to scale 1 : 50, the following views of the **new dwelling**:

**4.1.1 THE COMPLETE FLOOR PLAN**

**Add the following features to the drawing:**

- ALL doors and windows.
- ALL fixtures as indicated by the abbreviations.
- ALL hatching detail.

**4.1.2 THE SOUTH ELEVATION**

**Show the following features on the drawing:**

- The outside walls, step, window-, door- and roll up garage door detail below the given breakline.
- The finished floor level.

4.2 Draw in the space provided on page 6 to **scale 1 : 20**, a **DETAILED SECTION** according to cutting plane A-A of the area in the ellipse shown on the floor plan.

**Show the following features:**

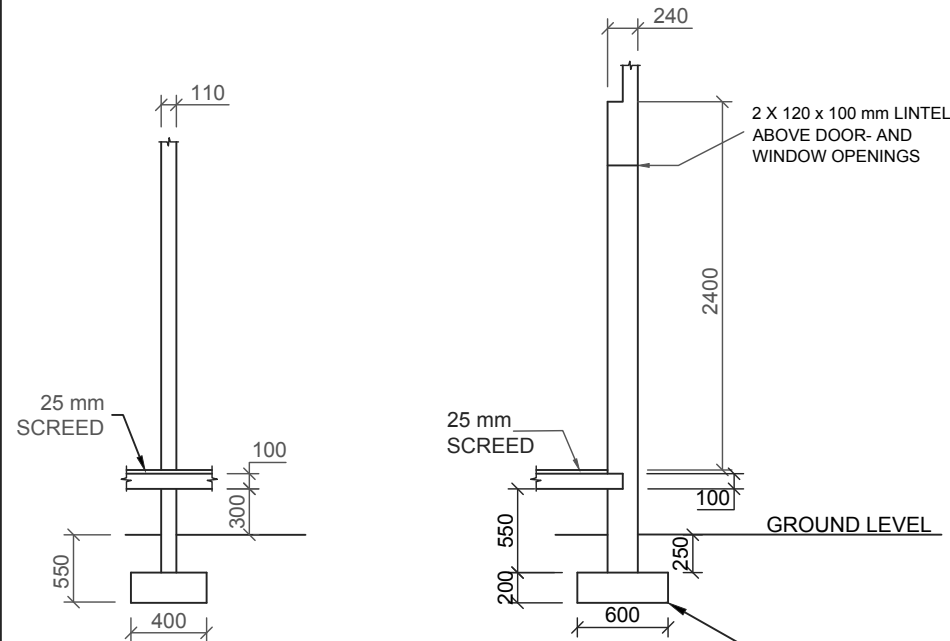
- The complete foundation, external wall and door detail.
- The lintels above the door.
- The partial window in the kitchen.
- A partial kitchen cabinet.
- ALL hatching detail. ALL substructure hatching may be drawn neat in freehand.

**Label the following:**

- The south elevation and scale.
- The room designations and floor finishes.
- Using the correct abbreviations, label the following features in the correct view: natural ground level, finished floor level and damp proof course.

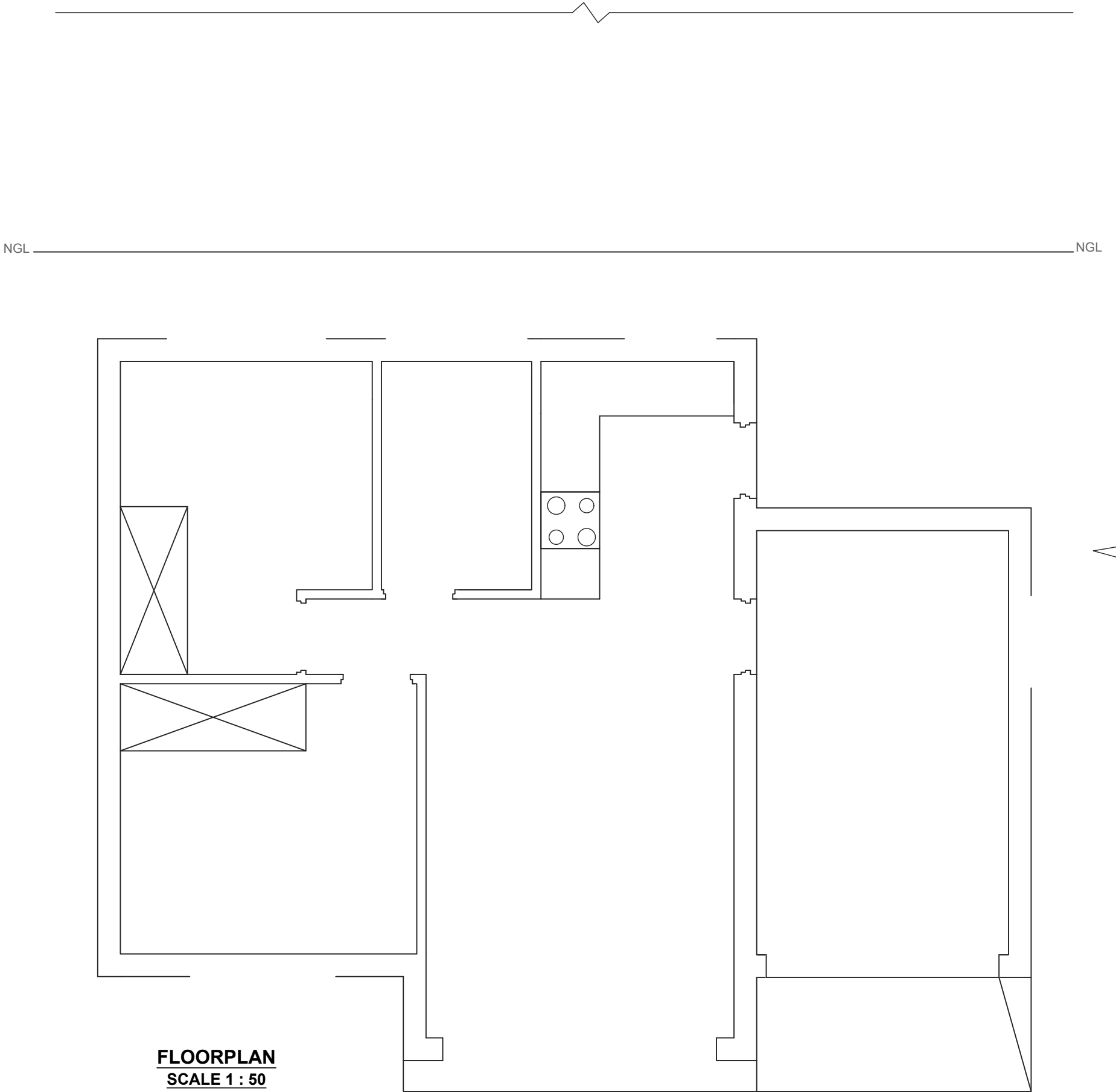
**NOTE:**

ALL drawings must comply with the **guidelines** and **graphical symbols** contained in the **SANS 10143**. [82]



STARTING POINT FOR DETAILED SECTION

|      |   |
|------|---|
| NAME |   |
|      |   |
| NAME | 5 |



**FLOORPLAN**  
SCALE 1 : 50

STARTING POINT FOR  
DETAILED SECTION  
DETAILED SECTION ON A-A  
SCALE 1 : 20

| PENALTIES                  |                                |  |
|----------------------------|--------------------------------|--|
| 1                          | INCORRECT OVERALL SCALE        |  |
| 2                          | INCORRECT POSITIONING OF VIEWS |  |
| 3                          | NON-ALIGNMENT OF VIEWS         |  |
| <b>TOTAL PENALTIES (-)</b> |                                |  |

| ASSESSMENT CRITERIA |  |           |  |  |
|---------------------|--|-----------|--|--|
| FLOOR PLAN          |  |           |  |  |
| 1                   | DOORS + WINDOWS                          | 20        |  |  |
| 2                   | FIXTURES                                 | 9         |  |  |
| 3                   | HATCHING                                 | 3         |  |  |
| 4                   | LABELS                                   | 6         |  |  |
| <b>SUB TOTAL</b>    |  | <b>38</b> |  |  |
| SOUTH ELEVATION     |  |           |  |  |
| 1                   | WALLS + STEP + FFL                       | 5         |  |  |
| 2                   | WINDOW + DOOR + GARAGE DOOR              | 10        |  |  |
| 3                   | LABELS                                   | 4         |  |  |
| <b>SUB TOTAL</b>    |  | <b>19</b> |  |  |
| DETAILED SECTION    |  |           |  |  |
| 1                   | FOUNDATION + WALL + FLOOR                | 9         |  |  |
| 2                   | DOOR + LINTEL + WINDOW + KITCHEN CABINET | 8         |  |  |
| 3                   | HATCHING                                 | 5         |  |  |
| 4                   | LABELS                                   | 3         |  |  |
| <b>SUB TOTAL</b>    |  | <b>25</b> |  |  |
| <b>TOTAL</b>        |  | <b>82</b> |  |  |
| PENALTIES (-)       |  |           |  |  |
| <b>FINAL TOTAL</b>  |  |           |  |  |

|             |   |
|-------------|---|
| <b>NAME</b> |   |
|             |   |
| <b>NAME</b> | 6 |