



# higher education & training

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

T170(E)(M27)T

## **NATIONAL CERTIFICATE**

## **BUILDING AND STRUCTURAL SURVEYING N5**

(8060045)

**27 March 2018 (X-Paper)**

**09:00–12:00**

**Nonprogrammable calculators may be used.**

**This question paper consists of 4 pages, 1 information sheet, 1 formula sheet and 1 answer sheet.**

**DEPARTMENT OF HIGHER EDUCATION AND TRAINING**  
**REPUBLIC OF SOUTH AFRICA**  
NATIONAL CERTIFICATE  
BUILDING AND STRUCTURAL SURVEYING N5  
TIME: 3 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. Start each question on a NEW page.
  5. Sketches should be neatly and clearly labelled.
  6. Write neatly and legibly.
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**QUESTION 1**

Choose the correct word or words from those given in brackets. Write only the word or words next to the question number (1.1–1.5) in the ANSWER BOOK.

- 1.1 When levelling is done an intermediate site falls between (back and fore sight/rise and fall/mean sea level and benchmark).
- 1.2 Dips are done to identify whether a fill has reached the required (level/density/porosity).
- 1.3 Pegs for benchmarks are usually made of (steel/wood/plastic).
- 1.4 Topsoil is removed to a depth of about (150 mm/20 mm/75 mm).
- 1.5 To set out a point using the 3 : 4 : 5 method we need (three people/two people/one person).

(5 × 2) [10]

**QUESTION 2**

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (2.1–2.5) in the ANSWER BOOK.

- 2.1 A traveller is mainly used to take measurements along the road construction.
- 2.2 A theodolite can be used to set out vertical and horizontal angles.
- 2.3 Cross errors and systematic errors are classified as the two most common errors when reading a staff.
- 2.4 One of the basic requirements when setting up a levelling instrument is to adjust the circular bubble to be in its centre.
- 2.5 A staff is always held at an angle of 45° to the eyesight of the observer.

(5 × 2) [10]

**QUESTION 3**

Briefly explain each of the following words used in surveying:

- 3.1 Change point
- 3.2 Intermediate sight
- 3.3 Fore sight
- 3.4 Back sight
- 3.5 Benchmark

(5 × 3) [15]

**QUESTION 4**

- 4.1 Explain the relationship between *co-ordinates* and *direction*. (4)
- 4.2 Name FOUR mistakes that may occur in surveying. (4)
- 4.3 A plot has the shape of a trapezium. The long side is 74 m and the short side is 39 m. The perpendicular distance between the two sides is 24 m.
- Calculate the area of the plot in hectares. (6)
- 4.4 A length of 120 m was measured horizontally in catenary, and the measurement was done in three equal bays. The mass of the tape is 0,015 kg/m and the tension applied is 7 kgF.
- Calculate the correct length. (6)
- [20]**

**QUESTION 5**

FIGURE 1 on the attached INFORMATION SHEET shows details of junction C1–C7 shows of REESTON INTERNAL SERVICES AREA C – SEWER LAYOUT. Five sections of the pipeline are to be considered.

- 5.1 Calculate the total length of the pipework from C1 to C7. (25)
- 5.2 Name any FIVE tools used during step chaining. (5)
- [30]**

**QUESTION 6**

The table on the attached ANSWER SHEET shows bookings made during a levelling job.

Use the TWO given benchmarks (TBM) at A and B to find the reduced levels. Do the necessary checks for errors.

Do NOT do any corrections. Do ALL the calculations the attached ANSWER SHEET and submit it with the ANSWER BOOK. **[15]**

**TOTAL: 100**

**ANSWER SHEET****BUILDING AND STRUCTURAL SURVEYING N5****EXAMINATION NUMBER:**

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**TABLE 1**

POINT	BACK SIGHT	INTER SIGHT	FORE SIGHT	RISE	FALL	REDUCED LEVEL	REMARKS
A	2,634						TBM 29,735
B	2,333		2,563				
C	2,375		1,530				
D		2,075					
E	2,335		1,450				
F			2,162				TBM

# INFORMATION SHEET

## BUILDING AND STRUCTURAL SURVEYING N5

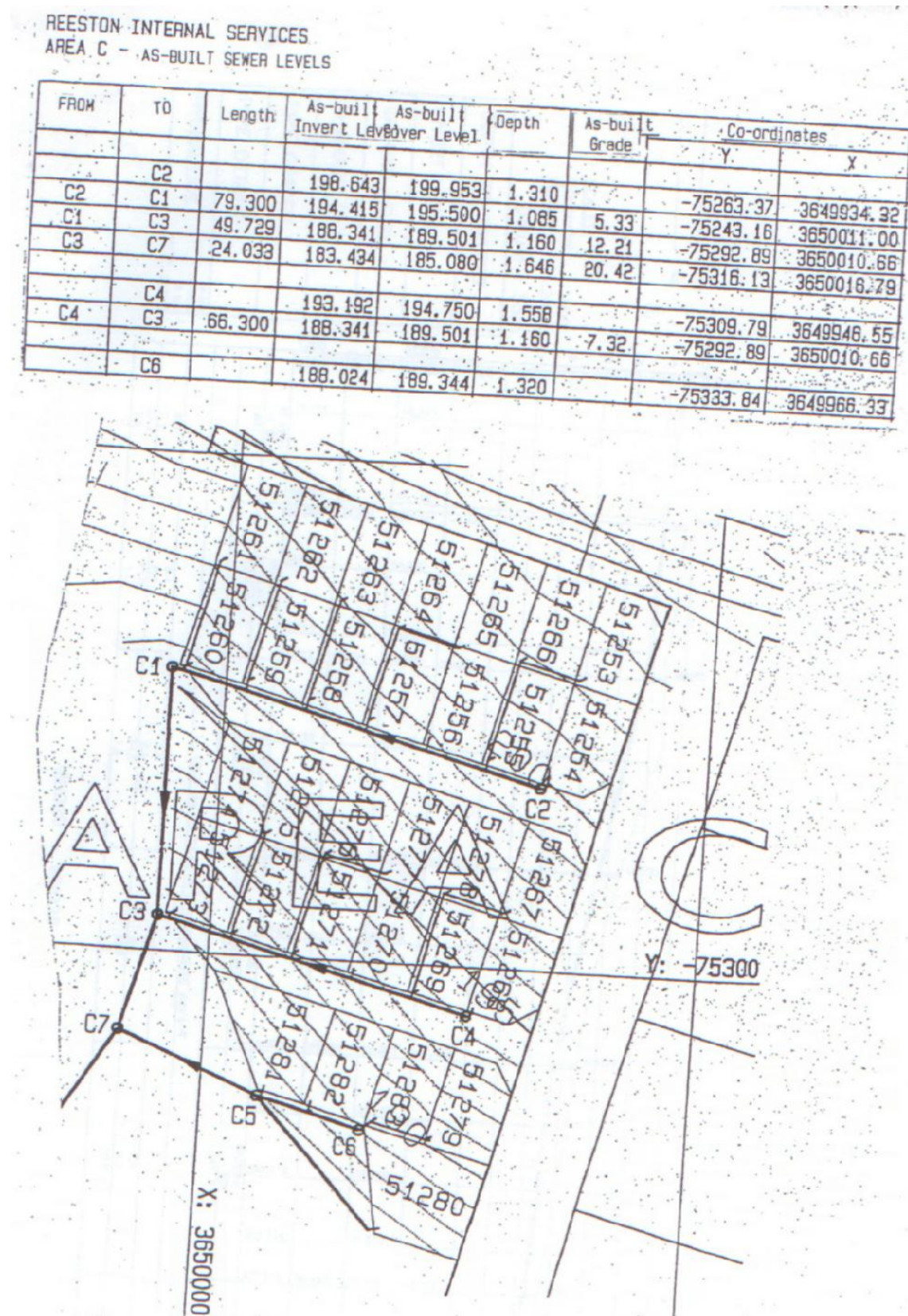


FIGURE 1



**FORMULA SHEET****BUILDING AND STRUCTURAL SURVEYING N5**

Any applicable formula may be used.

$$\Delta h = 50l \sin 2\theta + HI - MH = 100l \sin \theta \cos \theta + HI - MH$$

Or

$$V = -KS \cos \theta \sin \theta$$

$$HD = 100 / \cos^2 \theta \text{ of } K S \cos \theta$$

$$Ct = L.e.(Tm-Ts), Ct = L.e(Tm-Ts) \text{ of } L[1+e(Tm-Ts)]$$

$$Cs = L. (1-\cos \theta)$$

$$Cs = H (\sec \theta - 1)$$

$$Ce = L.H/R$$

$$\text{Slope} = \Delta h / HD$$

$$V = d/3 [(y_1 + y_n) + 2(y_3 + y_5 + \dots + y_{n-2}) + 4(y_2 + y_4 + \dots + y_{n-1})]$$