



# higher education & training

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

T140(E)(J24)T

## **NATIONAL CERTIFICATE**

### **BUILDING AND STRUCTURAL SURVEYING N5**

(8060045)

**24 July 2018 (X-Paper)**  
**09:00–12:00**

**Nonprogrammable calculators may be used.**

**This question paper consists of 4 pages, 2 addenda and 1 formula 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. Sketches should be neatly and clearly labelled.
  5. Start each question on a NEW page.
  6. Write neatly and legibly.
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**QUESTION 1**

Study the cadastral diagram in FIGURE 1 on ADDENDUM A (attached) and indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.1-1.5) in the ANSWER BOOK.

- 1.1 All the private roads are 10 m wide.
- 1.2 The total number of erven illustrated is thirty.
- 1.3 MH020-MH037 is illustrated manholes/inspection chambers.
- 1.4 The scale is 1 : 1 000.
- 1.5 Erf 191 is illustrated as a private open space (POS).

(5 × 2) **[10]**

**QUESTION 2**

- 2.1 The co-ordinates of points A and B are as follow:

	Y	X
A	+10 148,250	+10 156,324
B	+10 000,00	+10 000,00

Calculate direction and distance AB. Any method is acceptable if it will give the correct answer.

(15)

- 2.2 Explain how to set out points A and B on-site stationed on a survey station of known coordinates. (Do NOT show any calculations.) Assume that point B is also in existence.
- 2.3 Explain how taping can be executed if the chain line is obstructed by a building.

(5)

(5)

**[25]**

**QUESTION 3**

- 3.1 A square plot has an area of  $16 \text{ m}^2$ . If the land is to be represented on a plan 1 : 150, find the length in millimetres.
- 3.2 Give TWO practical uses of contours.
- 3.3 A sloping rectangular site has to be set out. As site surveyor you are required to put profiles for excavation to level the site.

(6)

(4)

Explain how you would go about transferring your information levels onto the profiles based on the length of your traveller.

(10)

**[20]**

**QUESTION 4**

Study Reeston Internal Services Area C' – sewer layout details junction C1-C7 in FIGURE 2 on ADDENDUM B (attached).

**NOTE:** There are five sections of the pipeline to be considered.

4.1 Calculate the total length of pipework C1 to C7. (25)

4.2 The standard temperature of the tape is 16 degrees Celsius and the coefficient of expansion is  $0,00012/^{\circ}\text{C}$ .

What is the reduced horizontal distance if the measured distance is 348 m in a slope of  $5^{\circ}50'$  and a temperature of  $32^{\circ}\text{C}$ ?

(5)  
[30]

**QUESTION 5**

5.1 The following off-sets were taken from baseline to the shoreline of a site that is along the coast at 10 m intervals for a distance of 100 m. The offset were 75 m, 85 m, 95 m, 105 m, 110 m, 100 m, 98 m, and 80 m.

Calculate the area of the site.

(5)

5.2 Briefly explain the following terms used in surveying:

5.2.1 Staking

5.2.2 Plane surveying

5.2.3 Booking

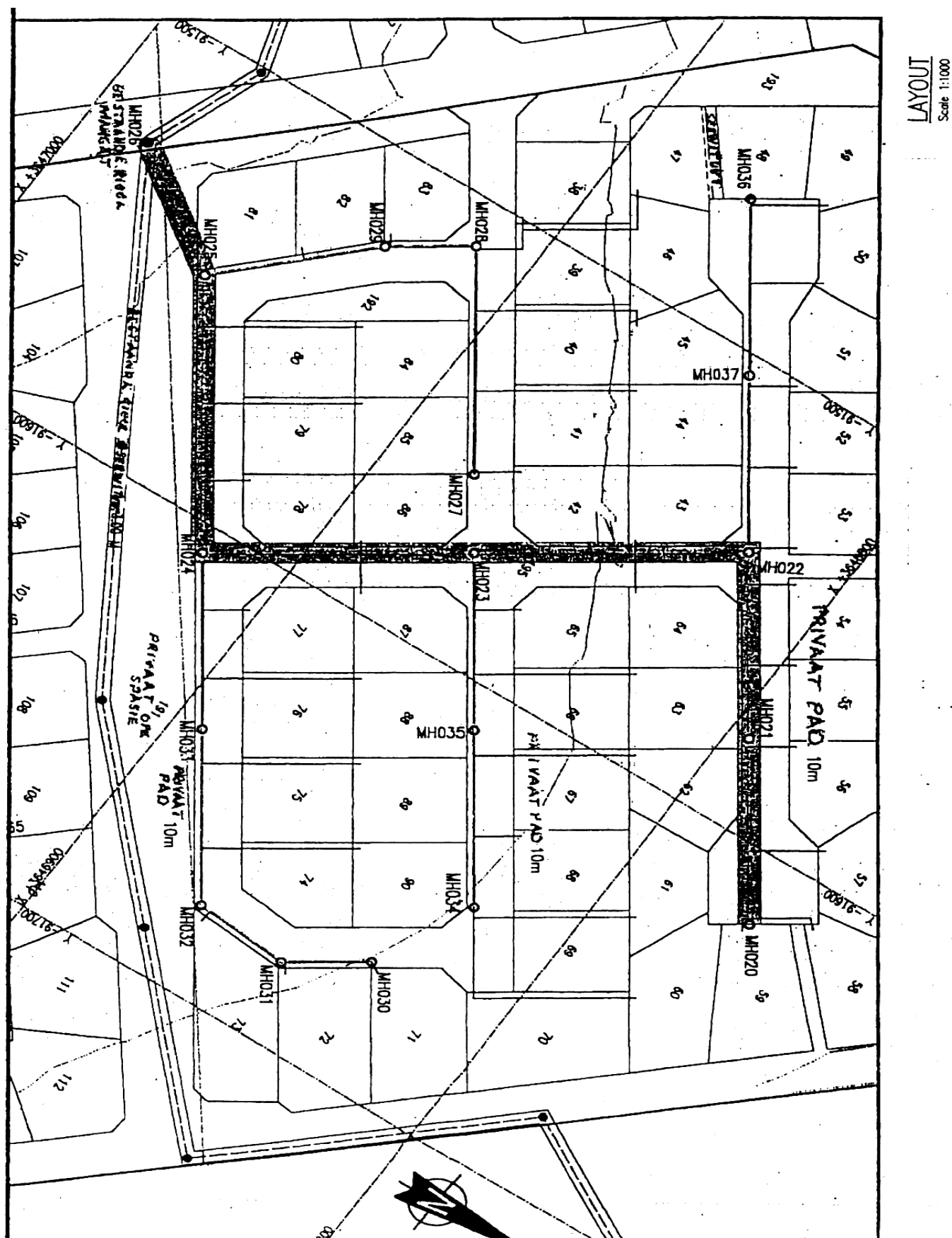
5.2.4 Scale

5.2.5 Plan

(5 × 2) (10)  
[15]

**TOTAL: 100**

## ADDENDUM A

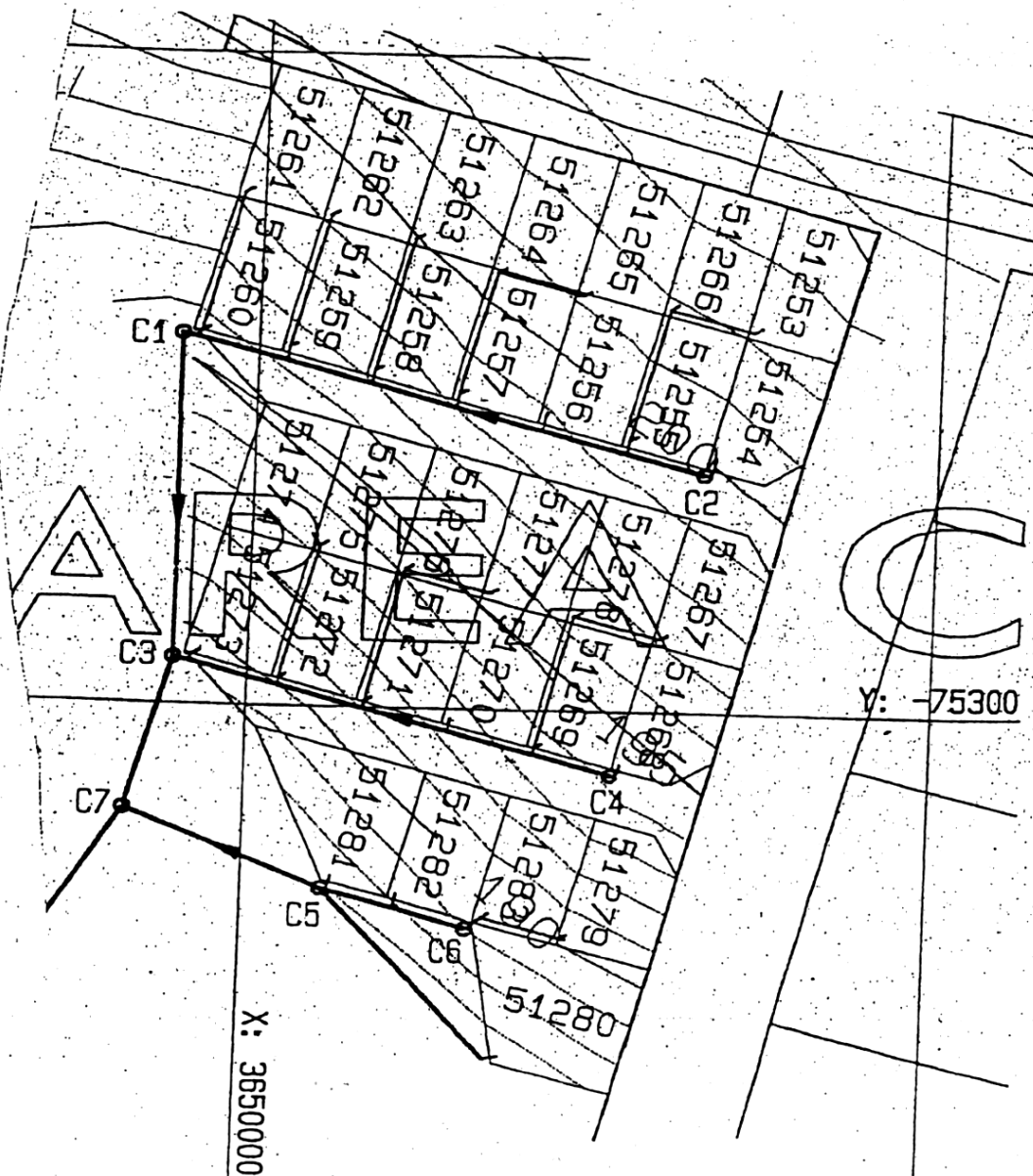


### FIGURE 1

**ADDENDUM B**

REESTON INTERNAL SERVICES  
 AREA C - AS-BUILT SEWER LEVELS

FROM	TO	Length	As-built Invert Level	As-built Cover Level	Depth	As-built Grade	Co-ordinates	
							Y	X
	C2		198.643	199.953	1.310			
C2	C1	79.300	194.415	195.500	1.085	5.33	-75263.37	3649934.32
C1	C3	49.729	188.341	189.501	1.160	12.21	-75243.16	3650011.00
C3	C7	24.033	183.434	185.080	1.646	20.42	-75292.89	3650010.66
							-75316.13	3650016.79
	C4		193.192	194.750	1.558			
C4	C3	66.300	188.341	189.501	1.160	7.32	-75309.79	3649946.55
							-75292.89	3650010.66
	C6		188.024	189.344	1.320			
							-75333.84	3649966.33

**FIGURE 2**

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

Any applicable formula may be used.

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

Or

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

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

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

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

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

$$Ce = L.H/R$$

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

$$V = \frac{d}{3} [(y_1 + y_n) + 2(y_2 + y_3 + \dots + y_{n-2}) + 4(y_4 + y_6 + \dots + y_{n-1})]$$

$$\alpha = \tan^{-1} \Delta y / \Delta x$$

$$\alpha = \tan^{-1} \Delta x / \Delta y + 90^\circ$$

$$\alpha = \tan^{-1} \Delta y / \Delta x + 180^\circ$$

$$\alpha = \tan^{-1} \Delta x / \Delta y + 270^\circ$$

$$S = \Delta y / \sin \alpha$$

$$S = \Delta x / \cos \alpha$$