



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T170(E)(J26)T

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N5

(8060045)

**26 July 2019 (X-Paper)
09:00–12:00**

Nonprogrammable calculators may be used.

This question paper consists of 4 pages, 3 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

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. Write neatly and legibly.
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QUESTION 1

1.1 Briefly explain each of the following terms used in surveying:

1.1.1 Invert level

1.1.2 Contour interval

1.1.3 Instrument



1.1.4 Chainage

1.1.5 Taping

(5 × 3) (15)

1.2 Study ADDENDUM A (attached) to indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

1.2.1 All private roads are 10 m wide.

1.2.2 The total number of erven illustrated is thirty.

1.2.3 MH020–MH037 are illustrated manholes/inspection chambers.

1.2.4 The scale used is 1:1000.



1.2.5 Erf 191 is illustrated as a private open space (POS).

(5 × 2) (10)
[25]

QUESTION 2

ADDENDUM B (attached) shows details of REESTON INTERNAL SERVICES AREA – SEWER LAYOUT junction C1–C7. There are FIVE sections of the pipeline to be considered.

2.1 Calculate the total length of pipework from C1–C7.

(25)


2.2  State FIVE points on how to achieve accurate taping.

(10)

2.3 List any FIVE tools necessary to conduct step chaining.


(5)
[40]

QUESTION 3

- 3.1 Reduce the levelling information in TABLE 1 on ADDENDUM C (attached) to obtain elevations of points A–I using the rise and fall method. Do the necessary checking for errors but do NOT do any corrections. DO all calculations on TABLE 1 and hand in ADDENDUM C with the ANSWER BOOK.  (15)
- 2.2 Explain how you would measure distance using a chain if the chain line is obstructed by a building. (5)
- [20]

QUESTION 4

A certain line A –D was measured in three sections:

- A–B 100,261 m at a slope of $3^{\circ} 44'20''$
- B–C 72,408 m at a slope of $7^{\circ} 45'00''$
- C–D 50 m at a slope of $1^{\circ} 51'00''$ 

Calculate the horizontal distance A–D.

[15]

TOTAL: 100

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		-75263.37	3649934.32
C2	C1	79.300	194.415	195.500	1.085	5.33	-75243.16	3650011.00
C1	C3	49.729	188.341	189.501	1.160	12.21	-75292.89	3650010.66
C3	C7	24.033	183.434	185.080	1.646	20.42	-75316.13	3650016.79
	C4		193.192	194.750	1.558		-75309.79	3649948.55
C4	C3	66.300	188.341	189.501	1.160	7.32	-75292.89	3650010.66
	C6		188.024	189.344	1.320		-75333.84	3649966.33

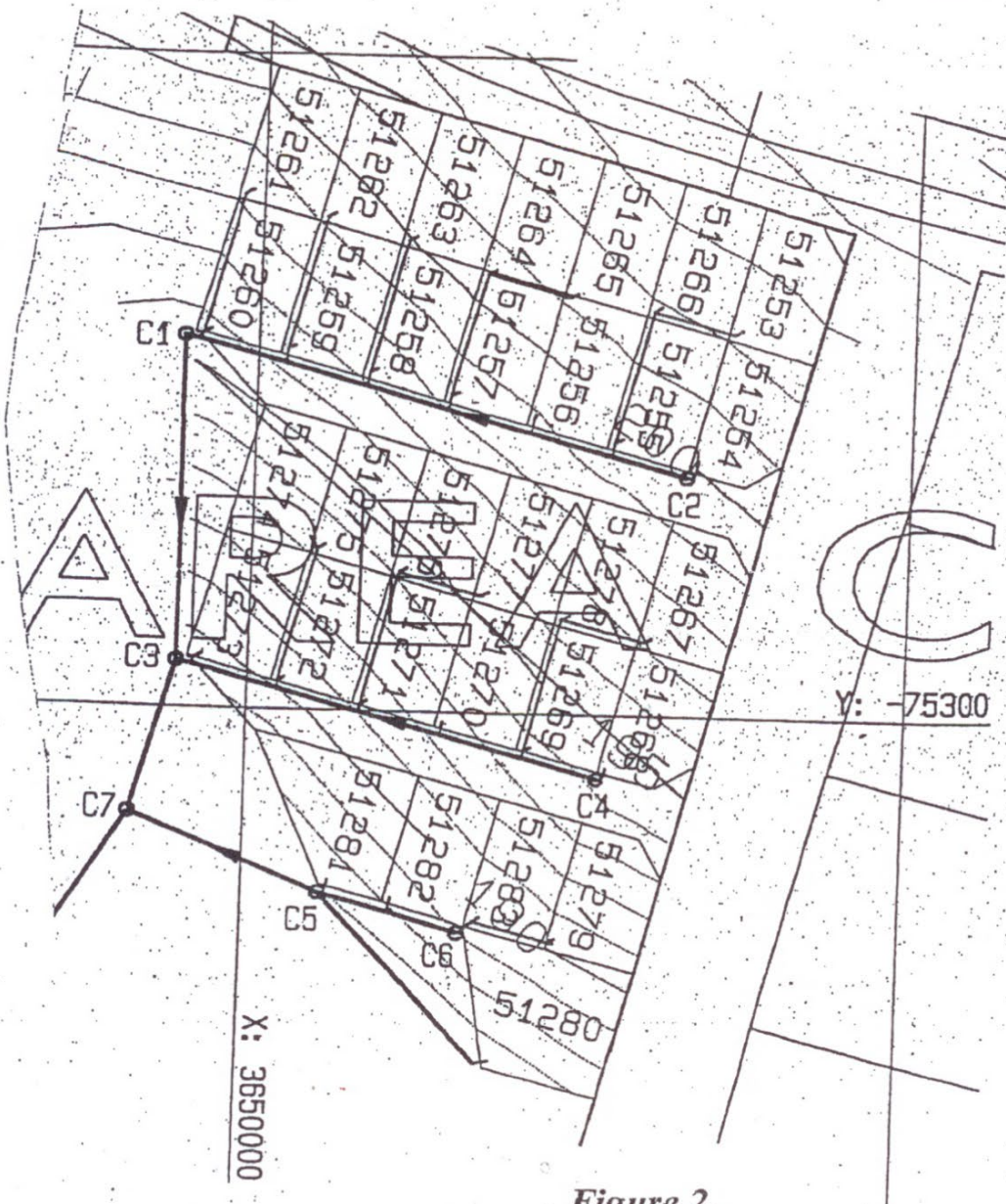


Figure 2.

BUILDING AND STRUCTURAL SURVEYING N5**ADDENDUM C****EXAMINATION NUMBER:**

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TABLE 1

BACK SIGHT	INTER. SIGHT	FORE- SIGHT	RISE	FALL	RDEUCED LEVEL	REMARKS
1.17						Benchmark 30.23
	1.42					A
2.18		1.76				B
	2.28					C
0.81		0.93				D
1.43		3.00				E
1.46		1.35				F
	1.35					G
	1.40					H
		0.52				I

BUILDING AND STRUCTURAL SURVEYING N5

FORMULA SHEET

Any applicable formula may be used.

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

Or

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

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

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

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

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

$$Ce = L.H/R$$

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

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

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

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

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

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

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

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