higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N6

25 November 2024

This marking guideline consists of 7 pages.

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QUESTION 1

STA.	Circle-left	Circle-right	Mean Angle	Cor.	Adj. Angle
K	236:30:49	56:30:22			
L	98:20:36	278:20:12			
K - L	221:49:47	221:49:50	221:49:48	+0: 0: 5	221:49:53✓
L	98:20:36	278:20:12			
M	186:34:40	6:34:10			
L - M	88:14:04	88:13:58	88:14:01	+0: 0: 5	88:14:06✓
M	186:34:40	6:34:10			
K	236:30:26	56:30:16			
M - K	49:55:46	49:56:06	49:55:56	+0: 0: 5	49:56:01✓
			359:59:45	+0: 0: 15	✓ 360: 00: 00

$\Delta y\ B-K = (+2\ 617{,}14) - (+\ 1\ 737{,}40)$

$= +879{,}74$ ✓

$\Delta x\ B-K = (-2\ 597{,}62) - (-2\ 012{,}16)$

$= -585{,}46$✓

$2nd\ Quadrant$

$Direcction = \dfrac{+879{,}74}{-585{,}46}$

$\alpha = \tan^{-1} -1{,}502647491 + 180°$

$= 123:38:46$✓

Direction $B-K = 123:38:46$

$< K-B-L = 221:49:53$

$B-L = 345:28:39$✓

$< B-L-M = 88:14:06$

$B-M = 73:42:45$✓

$< B-M-K = 49:56:01$

$B-K = 123:38:46$✓ (✓ × 10) **[10]**

QUESTION 2

2.1

	TA 98:21:06		
	AT 278:21:06		
	TAB 119:13:04		
	AB 37:34:10✓	-0:00:05	37:34:05✓
	BA 217:34:10		
	ABC 300:16:26		
	BC 157:50:36 ✓	-0:00:10	157:50:26 ✓
	CB 337:50:36		
	BCD 114:15:56		
	CD 92:06:32✓	-0:00:15	92:06:17✓
	DC 272:06:32		
	CDE 235:43:02		
	DE 147:49:34✓	-0:00:20	147:49:14✓
	ED 327:49:34		
	DER 127:06:52		
	ER 94:56:26✓	-0:00:25	94:56:01✓

(✓ × 10) (10)

2.2

NAME	JOIN	ΔY	ΔX	NAME	Y	X
A				A	+340,66	+1553,90
37:34:05		√+252,72	√+328,55			
414,50		√+0,50	√-0,72			
B				B	✓+593,88	✓+1881,73
157:50:26		√+72,22	√-177,34			
191,48		√+0,23	√-0,33			
C				C	✓+666,33	✓+1704,06
92:06:17		√+106,75	√-3,92			
106,82		√+0,13	√-0,18			
D				D	✓+773,21	✓+1699,96
147:49:14		√+100,32	√-159,43			
188,37		√+0,23	√-0,33			
E				E	+873,76	+1540,20
✓901,17		√+532,01	√-12,14		√+533,10	√-13,70
		√+533,10	√-13,70			
		√+1,09	√-1,56			

$\sqrt{\frac{+1,09}{901,17}}$ x leg $\sqrt{\frac{-1,56}{901,17}}$ x leg

√ × 26 = 13 + ✓ × = 7 : [20]

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QUESTION 3

Station		Distance		HI or Middlehair MH	Angles		HI – MH + -	Height Component + -	Height Difference + -	Elevation of point	Remarks
From	To	Stadia	Hor		Hor	Vert					
R				1.60						✓239,00	BM
	R1	3,97 2,42	✓154,68	✓3,20	23: 47: 25	92: 35: 20	√-1,60	✓-6,99	√-8,59	✓230,41	
	R2	2,19 1,70	✓48,67	✓1,95	38: 23: 15	94: 42: 10	√-0,35	✓-4,00	√-4,35	234,65	
	R3	2,53 1,00	✓151,11	✓1,77	94: 39: 00	96: 22: 30	√-0,17	✓-16,88	√-17,05	✓221,95	
	R4	1,62 0,56	✓104,99	✓1,09	92: 30: 00	84: 24: 40	√+0,51	✓+10,27	√+10,78	✓249,78	
			4	4			2	4	2	4	**[20]**

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QUESTION 4

4.1 4.1.1 Contour line – a line of intersection of a level surface✓ with the surface of the earth.✓

4.1.2 Embankment – a walk or bank of earth consisting of compacted soil✓ which carries a load or acts as a wall to prevent waterways from overflowing and flooding.✓

(2 × 2) (4)

4.2 4.2.1 The nature of the ground – the contour interval depends on the general topography of the terrain.✓ In flat and uniformly sloping terrain, the contour interval should be small,✓ but if the ground has large variations in levels (such as hills and ponds), the contour interval should be large otherwise the contours will come too close to each other.✓ (3)

4.2.2 The purpose and extent of the survey – Contour intervals on a map also depend on the purpose for which the map is to be used.✓ If the map is prepared for setting out a highway on hills or slopes, a larger contour interval might be suitable.✓ But, if the map is required for the construction of factory buildings, a small contour interval will be required for more accurate work.✓ (3)

[10]

QUESTION 5

5.1 5.1.1 Setting out – the establishment of marks and lines to define the position and level of the elements for construction work,✓ it's also the reference of surveying details of a site or area from a drawing to the ground.✓

5.1.2 Survey grid – this is a grid that is drawn on a survey plan,✓ with the original traverse stations forming the control of the grid.✓

(2 × 2) (4)

5.2
- It is for the vertical transfer of control points or lines to higher or lower level.
- For the provision of vertical control lines.
- Checking of the verticality of the construction elements. (Any 2 × 1) (2)

5.3 To check the verticality of building, use the following instruments:
- Theodolite
- Optical plumb
- Plumb bob
- Laser
- Spirit level (Any 4 × 1) (4)

[10]

QUESTION 6

$\Delta = 38:44:28$✓

Chainage at point of

$\Delta Y\ BC - PI = (+2\ 528{,}46 - (+1\ 321{,}91) = +1\ 206{,}55$✓

$\Delta X\ BC - PI = (+3\ 012{,}42 - (-5\ 812{,}38) = -2\ 799{,}96$

$\sqrt{(1\ 206{,}55)^2 + (-2\ 799{,}96)^2} = 3\ 048{,}86\ m$✓

$T = R.\tan\frac{\Delta}{2}$

$= 170\ x\ tan\frac{38:44:28}{2} = 59{,}77\ m$✓✓

$BC = PI - T$

$= 3\ 048{,}86 - 59{,}77 = 2\ 989{,}09\ m$✓✓

$La = \frac{\pi\ x\ \Delta\ x\ R}{180°}$

$= \frac{\pi\ x\ 38:44:28\ x\ 170}{180°} = 114{,}95\ m$✓✓

$EC = BC + La$

$= 2\ 989{,}09 + 114{,}95 = 3\ 104{,}04\ m$ ✓

$(a - 10{,}91) = \frac{1718{,}9\ x\ 10{,}91}{170\ x\ 60} = 1:50:19$✓

$(a - 20) = \frac{1718{,}9\ x\ 20}{170\ x\ 60} = 3:22:13$✓

$(a - 4{,}04) = \frac{1718{,}9\ x\ 4{,}04}{170\ x\ 60} = 0:40:51$✓

Chainage	Chord	Deflection Angle	Off-set Angle
BC√ 2 989,09			√360:00:00
3 000,00	10,91	1: 50: 19	√ 358:09:41
3 020,00	20,00	3: 22: 13	√ 354:47:28
3 040,00	20,00	3: 22: 13	√ 351:25:15
3 060,00	20,00	3: 22: 13	√348:03:02
3 080,00	20,00	3: 22: 13	√ 344:40:49
3 100,00	20,00	3: 22: 13	√ 341:18:36
EC√ 3 104,04	4,04	0: 40: 51	√ 340:37:45
√114,95	√ 114,95	√ 19:22: 15	√ 19:22:15

(√ × 14) = 7
(✓× 13) = 13
20

[20]

TOTAL: 100

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