higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N6

30 JULY 2018

This marking guideline consists of 8 pages.

Copyright reserved

QUESTION 1

1.1
- Theodolite
- Optical plumb
- Plumb bob
- Laser (4)

1.2
- All points on a contour line are of the same elevation.
- No two contour lines can meet or cross each other except in the rare case of a vertical cliff or wall.
- Closely spaced contour lines indicate a steep slope.
- Widely spaced contour lines indicate a gentle slope.
- Equally spaced contour lines indicate a uniform slope.
- Closed contour lines with higher elevation towards the centre indicate hills.
- Closed contour lines with reducing levels towards the centre indicate a pond or other depression.
- Contour lines of a ridge show higher elevation within the loop of the contours.
- Contour lines of a valley show reducing elevation within the loop of the contours.
- All contour lines must close either within the map boundary or outside.

(Any 4 × 1) (4)

1.3 Grid north is the direction of a grid line✓ parallel to the central meridian✓ on the national grid. (2)
[10]

QUESTION 2

2.1 Offsets must be taken from the road reserve to the boundary of the site that is required✓ and a baseline parallel to the road drawn.✓ These offsets are taken from stipulated chainages on the site plan.✓ The remaining boundaries of the site are then measured, perpendicularly to the baseline✓ and the required site shape is then set out from the baseline.✓ (5)

2.2 $\text{Tan}\theta = 0{,}2/20$✓

$\theta = \tan - 10{,}01$✓

$\text{Tan}0{,}573 = H/100$✓

$H = 1{,}0001$✓

Slope = 1%✓ (5)
[10]

QUESTION 3

3.1 La = EC - BC✓

= 2 326,46 – 2 152,66✓

La = 173,80 m✓

(a = 7,34) = $\frac{1\,718{,}9 \times 7{,}34}{190 \times 60}$ = 01:06:24✓

(a = 20,00) = $\frac{1\,718{,}9 \times 20{,}00}{190 \times 60}$ = 03:00:56✓

(a = 6,46) = $\frac{1\,718,\ 9 \times 6{,}46}{190 \times 60}$ = 00:58:26✓

CHAINAGE	CHORD	ϑ	α
BC 2 152,66		00:00:00	360:00:00
2 160,00	7,34	01:06:24	358:53:36√
2 180,00	20,00	03:00:56	355:52:40√
2 200,00	20,00	03:00:56	353:51:44√
2 220,00	20,00	03:00:56	349:50:48√
2 240,00	20,00	03:00:56	346:49:52√
2 260,00	20,00	03:00:56	343:48:56√
2 280,00	20,00	03:00:56	340:48:00√
2 300,00	20,00	03:00:56	337:47:04√
2 320,00	20,00	03:00:56	334:46:08√
EC 2 326,46	6,46	00:58:26	333:47:42√
173,80√	173,80√	26:12:18√	26:12:18√

(0,5 × 14 + 6) (13)

3.2 $T = R \tan \frac{\Delta}{2}$

$T = 190 \times \tan 26:12:19$ ✓

$= 93{,}51 \text{ m} \rightarrow$ ✓

IP = BC + T✓

IP = 2 152,66 + 93,51✓

IP = 2 246,17 m✓ (5)

3.3 $$\text{Cd} = T \tan \frac{\Delta}{4}$$

$$\text{Cd} = 93{,}51 \times \tan 13:06:09 \checkmark$$

$$\text{Cd} = 21{,}76 \text{ m} \checkmark$$ (2)

[20]

QUESTION 4

Station		Distance		HI or middle hair MH	Angles		HI – MH + -	Height component + -	Height difference + -	Elevation of point	Remarks
From	To	Stadia	Hor		Hor	Vert					
F				1,48						724,00✓	
	F1	3,98 1,26	267,20√	2,62✓	84:34:00	97:38:00	-1,14✓	-35,81√	-36,95✓	687,05✓	
	F2	2,84 1,24	155,88√	2,04✓	182:46:00	80:46:00	-0,56✓	+25,34√	+24,78✓	748,78✓	
	F3	4,26 1,48	276,21√	2,87✓	268:02:00	85:24:00	-1,39✓	+22,22√	+20,83✓	744,83✓	
	F4	3,98 1,28	262,99√	2,63✓	344:44:00	99:16:00	-1,15✓	-42,91√	-44,06✓	679,94	BM 1

(0,5 × 8 + 16) **[20]**

Copyright reserved

QUESTION 5

5.1

Direction	GF	147:24:56	-00:00:56	= 222:47:16✓
Angle	FGH	75:23:16		
	GH	222:48:12✓		
Angle	HG	42:48:12	-00:01:52	= 286:10:42✓
	GHI	243:24:22		
	HI	286:12:34✓		
Angle	IH	106:12:34	-00:02:48	= 336:35:30✓
	HIJ	230:25:44		
	IJ	336:38:18✓		
Angle	JI	156:38:18	-00:03:44	= 322:48:50✓
	IJK	166:14:16		
	JK	322:52:34✓		
Angle	KJ	142:52:34	-00:04:40	= 231:43:42✓
	JKL	88:55:48		
	KL	231:48:22✓		
But	KL	= 231:43:42		

$$\text{Correction} = \frac{231:48:22 - 231:43:42}{5} = -00:00:56$$

(10)

5.2

NAME	JOIN	ΔY	ΔX	NAME	Y	X
G				G	+366,28	+1251,08
222:47:16		-114,70√	-123,92√			
168,86 m		-0,29√	+0,29√			
H				H	+251,29✓	+1 127,45✓
286:10:42		-276,92√	+80,34√			
288,34 m		-0,51√	+0,50√			
I				I	-26,14✓	+1 208,29✓
336:35:30		-98,90√	+228,45√			
248,94 m		-0,44√	+0,43√			
J				J	-125,48✓	+1 437,17✓
322:48:50		-144,96√	+191,07√			
239,84 m		-0,42√	+0,42√			
K				K	-270,86	+1 628,66
945,98✓		-635,48√	+375,94√		-637,14√	-377,58√
		-637,14√	+377,58√			
		-1,66√	+1,64√			

$\frac{-1,66}{945,98}$ X leg√ $\frac{+1,64}{945,98}$ X leg√

(26 × 0,5 +7) (20)
[30]

QUESTION 6

6.1 A contour line is a line drawn on a plan joining all points of the same height above or below some datum.

6.2 The difference in height between successive contour lines is called the vertical interval and it is always constant throughout one drawing.

6.3 True meridians pass through true north and true south.

6.4 The angle of direction is the angle measured in a clockwise direction between zero direction (south) and the line in question.

6.5 A closed traverse starts a known point and ends at a known point or at a point whose relative position is known.

(5 × 2) **[10]**

TOTAL: 100

Copyright reserved