higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND STRUCTURAL SURVEYING N6

6 April 2020

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 Area of triangle ABC $= \sqrt{[s(s-a)(s-b)(s-c)]}$

$S = (a + b + c)/2$

$= (73{,}9 + 113{,}7 + 134{,}0)/2$✓

$= 160{,}8$✓

$\therefore A = \sqrt{[160{,}8(160{,}8 - 73{,}9)(160{,}8 - 113{,}7)(160{,}8 - 134{,}0)]}$✓

$= 4\ 199{,}82\ m^2$✓ (4)

1.2 Area of triangle CDA $= \sqrt{[s(s-a)(s-b)(s-c)]}$

$S = (a + b + c)/2$

$= (63{,}4 + 101{,}2 + 134{,}0)/2$✓

$= 149{,}3$✓

$\therefore A = \sqrt{[149{,}3(149{,}3 - 63{,}4)(149{,}3 - 101{,}2)(149{,}3 - 134{,}0)]}$✓

$= 3\ 072{,}17\ m^2$ ✓ (4)

1.3 $A = A_1 + A_2$

$= ½(a_1 + b_1)h_1 + ½(a_2 + b_2)h_2$

$= ½(3{,}0 + 2{,}2)(45{,}7) + ½(2{,}2 + 6{,}5)(28{,}2)$✓

$= 241{,}49\ m^2$✓ (2)

1.4 $A = A_1 + A_2$

$= h/3[\text{first} + \text{last} + 4(\text{even offsets}) + 2(\text{odd offsets})] + ½(a_2 + b_2)h_2$✓

$= 10/3[2{,}6 + 3{,}7 + 4(2{,}8 + 2{,}3 + 2{,}8 + 2{,}9 + 3{,}2) + 2(2{,}7 + 2{,}5 + 3{,}0 + 3{,}4)]$

$+ ½(3{,}7 + 3{,}4)13{,}7$✓

$= 285 + 48{,}64$✓

$= 333{,}64\ m^2$✓ (4)

1.5 $A = A_1 + A_2 + A_3 + A_4 + A_5$

$= ½(a_1 + b_1)h_1 + ½(a_2 + b_2)h_2 + ½(a_3 + b_3)h_3 + ½(a_4 + b_4)h_4 + ½(a_5 + b_5)h_5$✓

$= ½[(4{,}1 + 3{,}9)20 + (3{,}9 + 3{,}7)18{,}2 + (3{,}7 + 3{,}5)16{,}8 + (3{,}5 + 2{,}6)5 + (2{,}6 + 1{,}1)3{,}4]$✓

$= 231{,}18\ m^2$ ✓ (3)

1.6 $A = A_1 + A_2 + A_3 + \ldots + A_n$

$= ½[(1 + 3{,}5 + 2 \times 2{,}8)4 + (3{,}5 + 3{,}6)4{,}3 + (3{,}6 + 3{,}6)2{,}5 + (3{,}6 + 3{,}6)3{,}2 +$

$(36 + 3{,}7)22 + (3{,}7 + 4 + 2 \times 3{,}6)20 + (4 + 4{,}1)21{,}2]$✓

$= 371{,}15\ m^2$✓ (2)

1.7 $A = 4\ 199{,}82\ m^2 + 3\ 072{,}17\ m^2 + 241{,}49\ m^2 + 333{,}64\ m^2 + 231{,}18\ m^2 +$

$371{,}15\ m^2$ ✓

$= 8\ 449{,}45/10\ 000$✓

$= 0{,}845$ Ha✓ (3)
[22]

QUESTION 2

2.1 Chainage of pi = 1 060 m
Intersection angle $\Delta = 60{:}00{:}00$
Radius of curvature = 570 m
$\Delta/2 = 30{:}00{:}00$✓

Tangent length $t = r\tan(\Delta/2)$✓
$= 570\tan(30{:}00{:}00)$✓
$= 329{,}09$ m✓✓ (5)

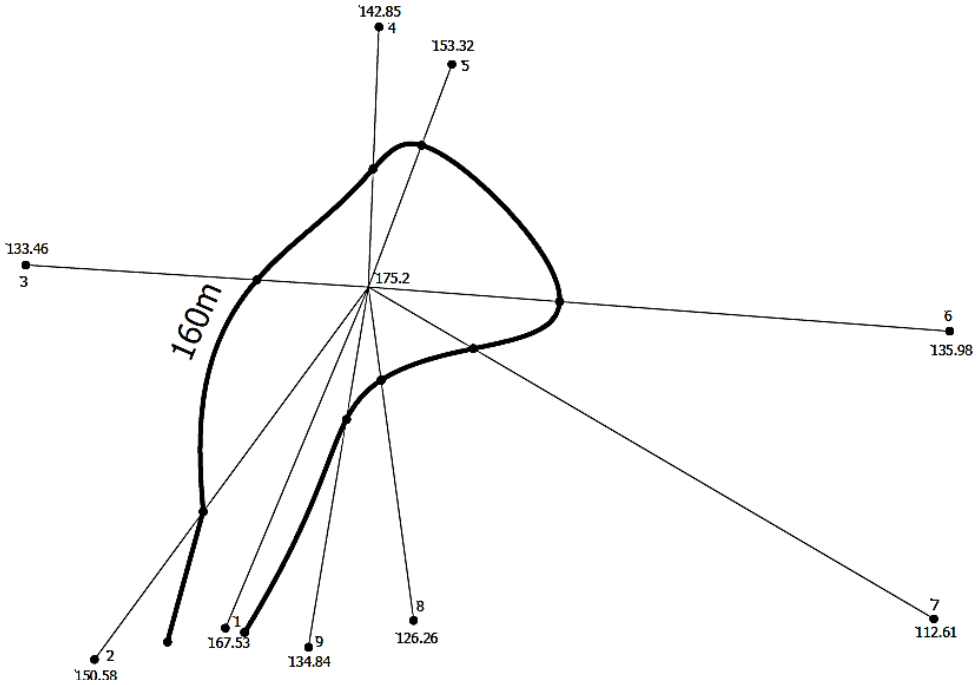
2.2 $A = \pi\Delta R/180$✓
$= (\pi \times 60 \times 570)/180$✓
$= 596{,}90$ m✓✓ (4)

2.3 BC = PI – TL
= 1 060 – 329,09✓
= 730,91 m✓✓

EC = BC + A
= 730,91 + 596,90✓
= 1 327,81 m✓✓ (6)

2.4 $D = 2r\sin(\Delta/2)$
$= 2 \times 570 \times \sin(30{:}00{:}00)$✓
$= 570$ m✓✓ (3)
[18]

QUESTION 3



(5)

Join	Gradient	Intercept (m)	Scaled intercept (mm)
A2	(175,2 – 150,58)/197,66 = 0,124	(160 – 150,58)/0,124 = 75,97	75 970/2 000 = 37,99
A3	(175,2 – 133,46)/151,12 = 0,276	(160 – 133,46)/0,276 = 96,16	96 160/2 000 = 48,08
A4	(175,2 – 142,85)/111,28 = 0,291	(160 – 142,85)/0,291 = 58,93	58 930/2 000 = 29,47
A5	(175,2 – 153,32)/103,05 = 0,186	(160 – 153,32)/0,186 = 35,91	35 910/2 000 = 17,96
A6	(172,5 – 135,98)/246,91 = 0,148	(160 – 135,98)/0,148 = 162,30	162 300/2 000 = 81,15
A7	(172,5 – 112,61)/280,20 = 0,214	(160 – 112,61)/0,214 = 221,45	221 450/2 000 = 110,73
A8	(175,2 – 126,26)/145,63 = 0,336	(160 – 126,26)/0,336 = 100,42	100 420/2 000 = 50,21
A9	(175,2 – 134,84)/153,49 = 0,263	(160 – 134,84)/0,263 = 95,67	95 670/2 000 = 47,84
21	(167,53 – 150,58)/55,73 = 0,304	(160 – 150,58)/0,304 = 30,99	30 990/2 000 = 15,50
91	(167,53 – 134,84)/35,39 = 0,927	(160 – 134,84)/0,927 = 27,23	27 230/2 000 = 13,62

(10)

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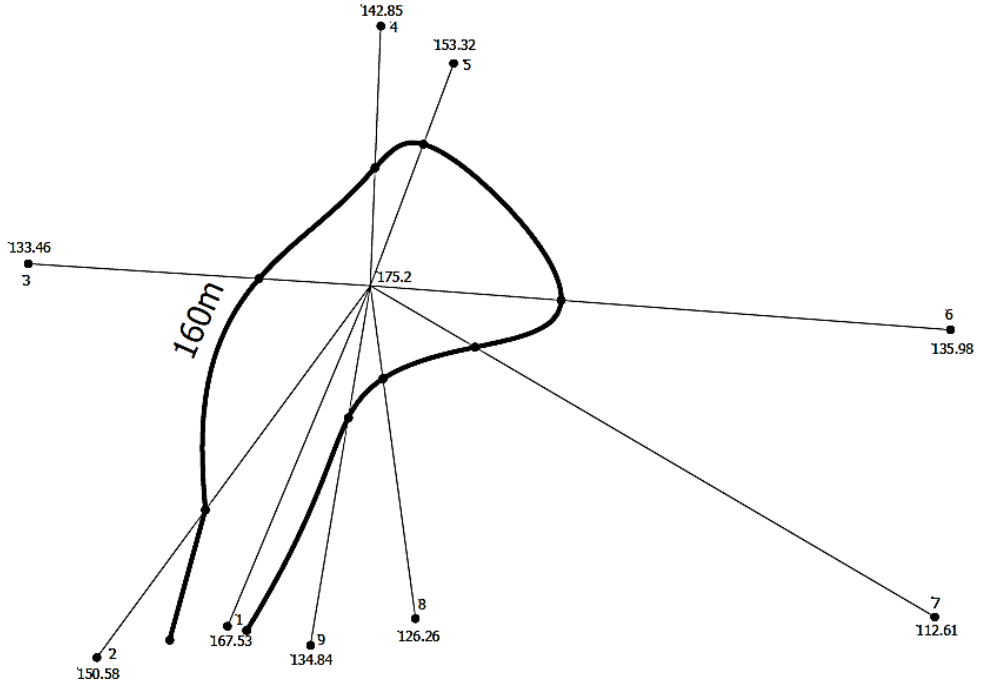

(5)
[20]

QUESTION 4

BS	FS	HOC	RL	CORRECTION	ADJUSTED RL	REMARK
0,805		100,805	100,000		100,00	BM 101
1,380	3,090	99,095	97,715	+0,0022	97,717	
1,360	1,385	99,070	97,710	+0,0044	97,714	
1,365	1,440	98,995	97,630	+0,0066	97,637	
1,485	1,435	99,045	97,560	+0,0088	97,569	
1,225	1,195	99,075	97,850	+0,0110	97,861	
1,305	1,275	99,105	97,800	+0,0132	97,813	
1,400	1,545	98,960	97,560	+0,0154	97,575	
1,205	1,155	99,010	97,805	+0,0176	97,823	
2,615	1,300	100,325	97,710	+0,0198	97,730	
1,370	0,355	101,340	99,970	+0,0220	99,992	
	1,365		99,975	+0,0250	100,00	BM101
ΣBS – ΣFS			$RL_L - RL_F$		$RL_L - RL_F$	
15,515 – 15,510			99,975 – 100,000		100,000 – 100,000	
-0,025			-0,025		0,000	

[20]

QUESTION 5

Station	Join	∆Y	∆X	Station	Y	X
A				**A**	+6316.800	+1032.200
234:26:40		-740.318	-370.006			
827.632		+0.021	-0.091			
B				**B**	+5576.503	+662.103
295:01:26		-961.986	+449.070			
1061.641		+0.027	-0.117			
C				**C**	+4614.544	+1111.057
254:29:40		-768.325	-213.156			
797.345		+0.020	-0.088			
D				**D**	+3843.239	+897.813
268:48:43		-935.963	-19.410			
936.164		+0.024	-0.103			
				E	+2910.30	+878.300
∑P = 3622.782		∑∆Y = -3406.592	∑∆X = -153.502		$Y_E - Y_A$ = -3406.500	$X_E - X_A$ = -153.900
		e∆Y = +0.092	e∆X = -0.398			

[20]

TOTAL: 100

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