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1170483

section * 1

I Pledge not to use any help from anyone and not to communicate about the exam through any former media.

Waseem

Question * 1 my number is 1170483

So my Group is B

PC station = $225 + 15.50$

$e = 6\%$

crowm = 1.5%

runoff = 120 m

$\frac{2}{3}$ on the tangent
of runoff

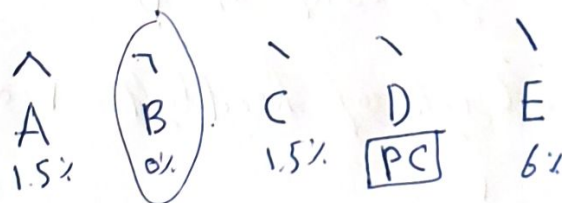
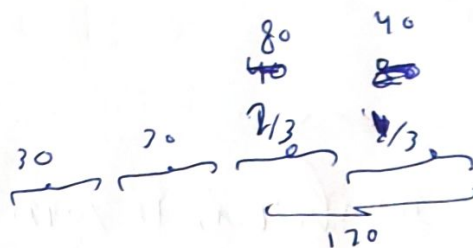
tangent

$$\frac{6\%}{120} = \frac{1.5}{x} \Rightarrow x = 30\text{ m}$$

Station @ start of runoff @ B

$$225 + 15.50 - \frac{2}{3}(120) - 30 =$$

~~$222 + 5.50\text{ m}$~~
 $= 220 + 5.50\text{ m}$



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Qr: my number is 1170483

so my group is D

Height of headlight = 120 cm

Min stop sight distan = 500m

2.5% 0.8%

min req length of sag vertical curve

Question #3 my number 1170483
my group is C

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$A = 125,000 \text{ m}^2$
rural turf meadows
 $T_1 = 30 \text{ min}$
 $n = 2 \text{ years}$

Q =

using table 12-2 $C = 0.1 - 0.4$ so 0.25 is my choice

Q =

~~I = 100 mm/hr~~

$I = 60 \text{ mm/hr}$ Fig 12-2

$$Q = CIA / 360$$

$$= \frac{0.25(60) \left(\frac{125000}{10000} \right)}{360} = 0.52 \text{ m}^3/\text{s}$$

$$0.52 \frac{1}{\text{s}} \frac{60 \text{ s}}{1 \text{ min}} = \boxed{31.25 \text{ m}^3/\text{min}}$$

Q#4 6-lane rural
freeway

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$$h = 25 \text{ years}$$

$$S_0 = 0.3$$

$$e \cdot f = 1.2$$

AADTT = 1450 for first year in each

$$r = 2.7\%$$

$$PSI_i = 4.8$$

$$T = \left(\frac{(1 + 0.027)^{25} - 1}{0.027} \right) 1450 \times 365 = 18,535 \text{ m}$$

$$W_{18} \text{ ESAL} = 18,535 \times 1.2 \times 0.7 = 15.6 \text{ million}$$

using table 16.5 \rightarrow 0.7
3 lanes

Reliability table 16-6 $\boxed{= 0.9}$

$$PSI_{\text{terminal}} \text{ for othrs} = 2 \Rightarrow 4.8 - 2 = 2.8$$

$$a_1 = 0.33 \text{ using Fig 16-13}$$

$$a_2 = 0.135, M_r = 29000$$

table 16-15

$$a_3 = 0.087, M_r = 11500$$

table 16-16

A.C
B.C
S.B
material grad

M_r for material grad $M_r = 8900$ using Fig 16-3

~~SW₁~~ SW₁ = 3.5 Using 16-11

$$D_1 = \frac{SW_1}{\alpha_1} = \frac{3.5}{0.33} = 10.6 \approx 11'$$

$$SW_1^* = 11 \times 0.33 = \boxed{3.63}$$

SW₂ = 4.4

$$D_2 = \frac{(4.4 - 3.63)}{(0.135)(1.15)} = 4.96 \approx 5'$$

↓
table 16-7

$$SW_2^* = 5(1.15)(0.135) + 3.63 = 4.406$$

SW₃ = 5

$$D_3 = \frac{5 - 4.406}{(0.087)(0.95)} = 7.12 \approx 7.5'$$

↓
table 16-7

$$SW_3^* = 0.33(11) + (0.135)(5)(1.15) + (0.087)(7.5)(0.95)$$

$$= \boxed{5.026}$$

layer	R-Cost	α	same thickness	Cost
AC	32	0.33	1	32
Base	12	$0.135(1.15) = 0.15525$	2.125	25.5
SB	7	$0.087(0.95) = 0.08265$	3.826	26.78

Base cheapest