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Section " 'A'

Deppt " BE (C)

Semester " 6th

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Subject " Highway and Traffic Engineering

binder

3) Temperature:
150 to 190 degree Celsius

(4) Density:
2330 Kg/m³, 145 pound/ft³

5 Size:
if we required less flexible pavement then we will use larg size aggregate they varies blw 10 to 14 mm and if we want more flexible pavement then we will use small size aggregate the varies blw 5 to 10 mm

3 Density:
1040 kg/m³

Boiling point of Bitumen is 525 degree Celsius

QNo. 2

A crest vertical curve joining a +3 percent and a -4 percent grade is to designed for 75 mi/h. if the tangents intersect at station (345 + 60.00) at an elevation of 250 ft, determine the station and elevation of the BVC and

Find the value of a_2 from layer co-efficient table and m_2 from drainage co-efficient table.

→ Thickness of base course (D_2).

$$D_2 = (SN_2 - SN_1) / a_2 m_2$$

$$D_2 = (3.8 - 2.64) / 0.14 \times 0.80$$

$$D_2 = 10.36''$$

Use 12"

So the thickness of base course is 12"

$$SN_2 = 0.14 \times 0.80 \times 12 + SN_1$$

$$SN_2 = 1.34 + 2.64$$

$$SN_2 = 3.98$$

⇒ Finding SN_2 & D_2 (Subbase course) and also layer co-efficent a_3 and drainage coeff m_2 from their respective table.

$$D_3 = (SN_3 - SN_2) / a_3 m_3$$

Bleeding

Problem :- Lack of Skid resistence when wet

Cause:

⇒ Excessive asphalt binder ~~during~~ in the HMA.

⇒ Excessive application of asphalt binder during BST application

Polished Aggregate:

Repeated traffic application. This can occur quicker if the aggregate is susceptible to abrasion

Repair:- Apply a skid-resistant sealing seal, BST or mix.

Block Cracking

Allow moisture Infiltration

HMA Shrinkage
Asphalt binder aging
poor choice of asphalt binder in the mix design

Repair :-

Low severity cracks (< 1/2 inch wide crack seal to prevent entry of moisture

High Severity cracks (> 1/2 wide and cracks with raveled edges) remove and replace the cracked pavement layer with an overly.

Potholes

Small bowl-shapped depression in the pavement surface that penetrate all the way through the HMA layer down to the base course.

Rutting

→ Sub base = 6"

→ Total pavement thickness = 24"

QNo4

What are the different pavement distresses? Explain detail:-

Pavement Distress.

→ Distress is a condition of the pavement structure that reduces serviceability or leads to a reduction in service life.

→ Distress could occur in a pavement due to:

- Unstable mixes
- Higher wheel loads than those considered in design.

Step No # 04

Draw a horizontal line from point C to intersect the design serviceability loss (PSI) curve at point D. So here

$$\Delta PSI = 4.5 - 2.5 = 2$$

Step No # 05

The structure number required to protect the base course, and to find the thickness 'D1' of the surface course is 2.6

Step No # 06

Determine the appropriate structure layer coefficient from each construction material. Resilient value of asphalt 450000 lb/in^2 therefore $a_1 = 0.44$

$$D_1 = SN_1 / a_1$$

$$= 2.6 / 0.44 = 5.9''$$

Thickness should be taken to the nearest 0.5 inches so the thickness of the surface course is 6".

$$SN_1 = D_1 \times a_1$$

$$= 6'' \times 0.44 = 2.64$$

→ Now find SN_2 and D_2 (base course)

→ CBR Value of base course material 100 → Mr 31,500 lb/in²

→ CBR Value of Sub Base course material 22 → Mr 13,500 lb/in²

→ CBR Value of Subgrade material 6

→ Mr of Subgrade 6 X 1500 = 9000 lb/in² = 9ksi

Ans :-

Step No#1

Draw a line joining the reliability level of 99% & the overall standared division So of 0.49 and extend line to intersect the first TL line at point A.

	BUC 344 +00	932	345.20	13.52
	BUC 345 +00	1032	348.20	17.64
	BUC 346+00	1132	351.20	20.54
	BUC 347 +00	1232	354.20	24.32
	BUC 348+00	1332	357.20	28.43
	BUC 349+00	1432	360.20	32.86
	BUC 350+00	1532	363.20	37.61
	BUC 351+00	1632	366.20	42.68
	BUC 352+00	1732	369.20	48.07
	BUC 353+00	1832	372.20	53.77
	BUC 354+00	1932	375.20	59.82
	BUC 355+00	2032	378.20	66.17
	BUC 356+00	2132	381.20	72.84
	BUC 356+52	2184	382.76	76.44

whole station.

Solution:-

For a design of 75 mi/h,
K = 312, From Table 15.5,

Minimum length = $312 \times [3-(-4)]$
= 2184 ft

Station of BVC = $(345+60)-\left(\frac{21+84}{2}\right)$
= 334 + 68

Station of EVC = (334+68) + (21+84)
= 356 + 52

Elevation of BVC = $250-\left(0.03 \times \frac{2184}{2}\right)$
= 217.24 ft

Station	distance from BVC (x) (ft)	Tangent Elevation	offset $\left[Y=\frac{kx^2}{200L}\right]$ (ft)	Elevation (Tangent Elevation ± offset) (ft)
BVC 334+68	0	217.24	0.01	217.24

The wet mix macadam as its specification do not involve the use of mixing plant and pavers

(2) water bound macadam required more time for construction

(3) wet mix macadams voids are superior the water bound macadam in all aspects but the WBM is the old method of construction having less construction cost because it has been traditionally a labour oriented specification.

Part "C"

(C) Difference b/w asphalt and Bitumen

Q1 Part 'A'

(a) what differente btw flexable and rigid pavement ?

	Flexable pavement	Rigid Pavement
(1)	Grain to grain load transfer	Slab action take place
2)	Initial cost is low	Initial cost is high
(3)	Joint agent required	Joint are required
(4)	Durability is less	Durability is high
(5)	Good subgrade is required	Good subgrade are not required
(6)	life span is short *15 years*	long life span ≈ 30 years
(7)	Repair work is easy	Repair work is tough
(8)	Maintenance cost is high	maintenance cost is low
(9)	Poor night visibility due to use of bitumen	Good night visibility.

PART "B"

(b) what is the advantage of water bound over wet mix macadam?

Ans Advantage of W.B.M over W.M.M