



STEP 1

vehicle
car
bus
medium truck
heavy truck
articulated truck

construction time
3.5 years
design life
20 years

step 3

vehicle

car

bus

medium truck

heavy truck

articulated truck

step 4

Vehicle	Class
car	
bus	4
medium truck	6
heavy truck	
articulated truck	

step 5

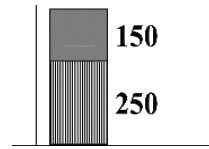
		The cummulative	
Vehicle	Class	T (m)	
car		2008024	
bus	4	2110624	
medium truck	6	1920082	
heavy truck		1480368	
articulated truck		1582968	

based on the above analysis the road L
and the **subgrade**

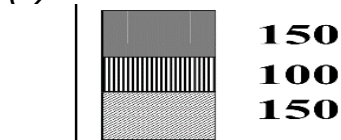
STEP 6

choose the type and thick

from chart C1



from chart C2



STEP 7

	VOLUME OF
C1	bituminous (HMA) wearing $0.15\text{m} \times 23\text{r}$ granular road b $0.25\text{m} \times 23\text{r}$
C2	bituminous (HMA) wearing $0.15\text{m} \times 23\text{r}$ granular road b $0.1\text{m} \times 23\text{r}$ cement or lime estab $0.15\text{m} \times 23\text{r}$
D1	bituminous (HMA) wearing $0.09\text{m} \times 23\text{r}$ bituminous $0.15\text{m} \times 23\text{r}$

GIVEN DATA

YEAR REQUIRED FOR CONSTRUCTION
 EXPECTED YEAR OF SERVICE
 SUBGRADE CBR
 GROWTH RATE UNTIL CONSTRUCTION
 GROWTH RATE AFTER CONSTRUCTION
 ROAD WIDTH
 ROAD LENGTH

Traffic volume at feasibility study and design stage	
class	AADT(m)0
	137
4	144
6	131
	101
	108

traffic growth rate	
until road construction	
3.80%	3.5
rate	N
5.60%	20

The project AADTs at the opening of the road or after 3.5 years
 use the following equation

$$AADT(m)1 = AADT(m)0 * (1+i)^n$$

class	AADT in 3.5 year (in two direction)	AADT(m)0
		137
4		144
6		131
		101
		108

the cumulative number of vehicles over the design period

$$T(m) = 365 \times AADT(m) \frac{[(1+i)^N - 1]}{i}$$

The AADT(m)0 to find T(m) is the AADT(m)1 found in year of road opening

AADT(m)1		$[(1+i)^N - 1]/i$	T(m)
Total Number of Vehicle Over 20 Years			
AADT(m)3.5		$[(1+0.056)^{20} - 1]/0.056$	T(m)
156		35.2423455629556	2008024
164		35.2423455629555	2110624
149		35.2423455629555	1920082
115		35.2423455629555	1480368
123		35.2423455629555	1582968

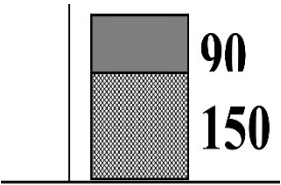
e numbers of ESAs over the design period

Equivalency Factor = EF (m)	Total ESA in Million	90 % of	Total ESAs
0		0	0
1.35		2.85	2.56
0.17		0.33	0.30
0.64		0.95	0.86
9.44		14.95	13.45
total ESAL		19.08	17.18

Under study belongs to the **traffic class T8**
strength class is S6 with CBR OF 32%

Thickness of pavement layers from the **CATALOGUE**
 With **T8** and **S6**

from chart D1



MATERIALS

course and binder coarse
n*12100m

41745 m3

base GB2 and 3
n*12100m

69575 m3

course and binder coarse
n*12100m

41745 m3

base GB2 and 3
n*12100m

27830 m3

finished road base CB2
n*12100m

41745 m3

course and binder coarse
n*12100m

25047 m3

road base
n*12100m

41745 m3

3.5YEARS
20 YEARS

32
3.80%
5.60%

	in one direction	
(1+i)^n	AADT(m)1	
1.14	156	78
1.14	164	82
1.14	149	75
1.14	115	58
1.14	123	62

→ **8160 Kg**

step 2

mean equivalency of axle

for car take ESA of

for bus take ESA of

MEDIUM TRUCK

vehicle load	axle1	EF
9460	3311	0.02
8660	3031	0.01
8720	3052	0.01
8880	3108	0.01
9800	3430	0.02
4020	1407	0.00
5560	1946	0.00
8970	3139.5	0.01
7850	2747.5	0.01
6890	2411.5	0.00

HEAVY TRUCK

vehcile load	axle1	EF
15640	3910	0.04
15480	3870	0.03
15860	3965	0.04
15940	3985	0.04
15470	3867.5	0.03
15600	3900	0.04
15400	3850	0.03

15100	3775	0.03
16160	4040	0.04
16120	4030	0.04

ARTICULATED TRUCK

vehicle load	axle1	EF	axle2
33980	6456.2	0.35	5436.8
46980	8926.2	1.50	7516.8
55320	10510.8	3.12	8851.2
63220	12011.8	5.70	10115.2
64100	12179	6.06	10256
61650	11713.5	5.09	9864
49890	9479.1	1.96	7982.4
58780	11168.2	4.11	9404.8
54670	10387.3	2.96	8747.2
64280	12213.2	6.14	10284.8

axle load

0.00

1.35

axle2	EF	total
6149	0.28	0.30
5629	0.19	0.20
5668	0.19	0.21
5772	0.21	0.22
6370	0.33	0.35
2613	0.01	0.01
3614	0.03	0.03
5830.5	0.22	0.23
5102.5	0.12	0.13
4478.5	0.07	0.07
mean		0.17

axle2	EF	axle3	EF
4692	0.08	7038	0.51
4644	0.08	6966	0.49
4758	0.09	7137	0.55
4782	0.09	7173	0.56
4641	0.08	6961.5	0.49
4680	0.08	7020	0.51
4620	0.08	6930	0.48

4530	0.07	6795	0.44
4848	0.10	7272	0.60
4836	0.09	7254	0.59

EF	axle3	EF	axle4	EF	axle5
0.16	4077.6	0.04	6116.4	0.27	4417.4
0.69	5637.6	0.19	8456.4	1.17	6107.4
1.44	6638.4	0.40	9957.6	2.45	7191.6
2.63	7586.4	0.72	11379.6	4.47	8218.6
2.80	7692	0.77	11538	4.75	8333
2.35	7398	0.64	11097	3.99	8014.5
0.91	5986.8	0.25	8980.2	1.54	6485.7
1.89	7053.6	0.52	10580.4	3.22	7641.4
1.37	6560.4	0.37	9840.6	2.32	7107.1
2.83	7713.6	0.78	11570.4	4.81	8356.4

total

0.63

0.60

0.67

0.69

0.60

0.63

0.59

0.54

0.73

0.73

mean

0.64

EF

axle6

EF

total

0.06 7475.6 0.67 0.89

0.27 10335.6 2.90 3.82

0.57 12170.4 6.04 7.98

1.03 13908.4 11.02 14.55

1.10 14102 11.73 15.48

0.92 13563 9.84 12.99

0.36 10975.8 3.80 5.01

0.74 12931.6 7.94 10.48

0.54 12027.4 5.73 7.56

1.11 14141.6 11.88 15.68

mean

9.44