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Road Survey and Alignment

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Abstract- We have done Survey, Soil test, CBR test, Pavement design and Estimation of the proposed road. The total cost for that road is Rs.13,73,170. We have also established a permanent bench mark to our college plinth level which is 298.45m above MSL.

Keywords- *Road Survey, alignment.*

1. Introduction

Mahamaya College Of Technology is established on 24 September 2007. The Founder is Mr. C. K. Shukla. The college has been started with 1000 students and 120 staff members. Total built-up area is 15500 meter square. In our Minor Project work, we have designed Flexible Pavement for internal road in our college campus starting from college main entrance at N.H.-06 to Kautilya hostel situated on the rear of college building. Total length of road is 996 m, of which 424 m will be dual carriage way of 15.4m width including medians and remaining 572 m will be of single lane width of 3.6m.

2. Work Procedure

[1] Survey-

- Establishing the R.L. of cross sections at different locations along the proposed road and along the alignment.
- Alignment of the proposed road using compass.

[2] Soil Testing-

- Optimum moisture content (OMC) test.
- California Bearing ratio (CBR) test.

[3] Mapping & Drawing of cross section of proposed road.

Survey Report-

[1] Reconnaissance Survey

- Map study
- Ground reconnaissance

[2] Preliminary Survey

- Collection of general information about traffic, soil, drainage, etc.
- Establishment of reference bench marks
- Fly leveling and cross section.
- Map preparation

[3] Final Location Survey

- Staking of final centre line
- Establishment of permanent bench marks
- Longitudinal cross sections

[4] Traffic Surveys

- Study of data from records
- Traffic counts, O-D Surveys etc.
- Traffic projections.

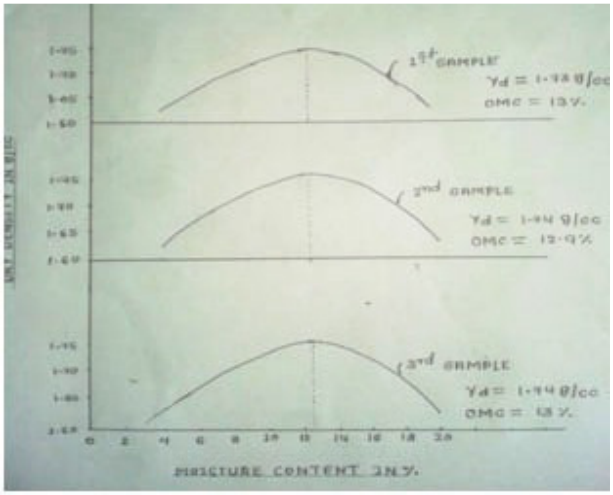
Bench Mark has been established at college plinth level with reference to Railway Bridge located at Kolhan stream near the college towards Arang road.

[1] Difference between HFL of Railway Bridge & bottom point of Flag Pole- 0.676m.
[2] Difference between HFL of Railway Bridge & College plinth-0.656m.
The H.F.L. of the railway bridge was situated at a high level where we were not able to place the staff so we have shifted that level downward 4m on a rock. That rock was our 1st R.L. We have established R.L. to our college plinth level by fly leveling which is **298.495m above Mean Sea Level**.
Soil test-

Three samples are collected from different places of construction-
Different tests are performed on all soil samples-
[1]Optimum Moisture Content Test
[2]Maximum dry density of soil
[3]C.B.R. Test

3. Additional Requirements

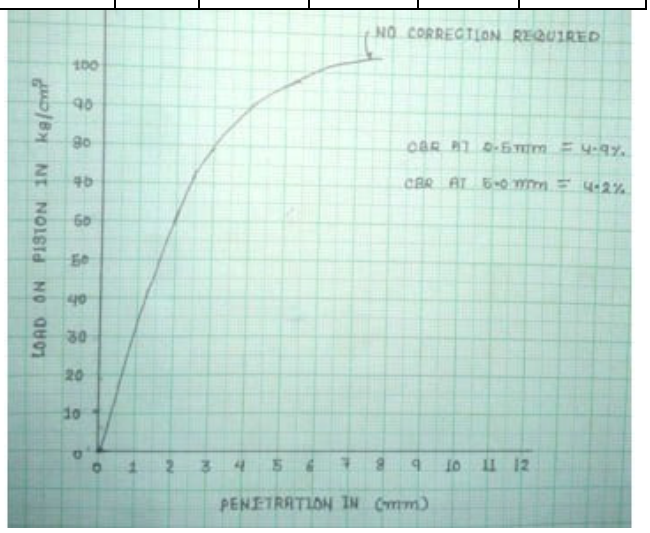
[1]Graph for OMC and MDD



4. CALCULATION OF CBR FROM LOAD PENETRATION CURVE

[1]Plot the load penetration curve in natural scale, load on Y - axis and penetration on X – Axis as shown in Fig: 2.3
[2] If the curve is uniformly convex upwards although the initial portion of the curve May be concave upwards due to surface irregularities make correction by drawing a tangent to the upper curve at the point of contra flexure as below
[3]Take the intersection point of the tangent and the X – axis as the origin.
Calculate the CBR values for penetration of 2.50mm and 5.00mm.
[4]Corresponding to the penetration value at which CBR is to be desired, take the
Corrected load values from the load penetration curve and calculate the CBR from the equation
PT x Cf = California Bearing Ratio = 4 x 100.

S. NO.	BACK SIGHT	I .S.	FORE SIGHT	HT.OF INSTRUMENT		R.L.
				RISE	FALL	
1.	1.770					295.150
2.	1.405		1.185	0.590		295.740
3.	1.805		1.750		0.345	295.390
4.	2.790		0.905	0.900		296.290
5.	0.350		0.485	2.305		298.595
6.	1.725		0.765		0.415	298.185
7.	1.325		1.450	0.270		298.455
8.	1.005		1.305	0.020		298.475
9.			0.985	0.020		298.495
SUM	12.170		8.830			



Design of Flexible Pavements

Flexible Pavement Design Method

As discussed earlier, the flexible pavement are built with number of layers .in design process, it is to be ensured that under the application of load none of the layer overstressed. This means that at any instance no section of the pavement structure subjected to excessive deformation to form a localized depression or settlement. The maximum intensity of stresses occurs in the top layer of the pavement .magnitude of load stresses reduces at lower layers. Hence the superior pavement materials are used in top layer of flexible pavement.
In the design of flexible pavement, it has yet not been possible to have a ratio design method wherein design process and service behavior of the pavement can expressed or predicated theoretically by mathematical laws .flexible pavement design method are accordingly either empirical or semi-empirical .in these methods knowledge

and experience gained on the behavior of the pavement in the past usefully utilized.

California Bearing Ratio Method

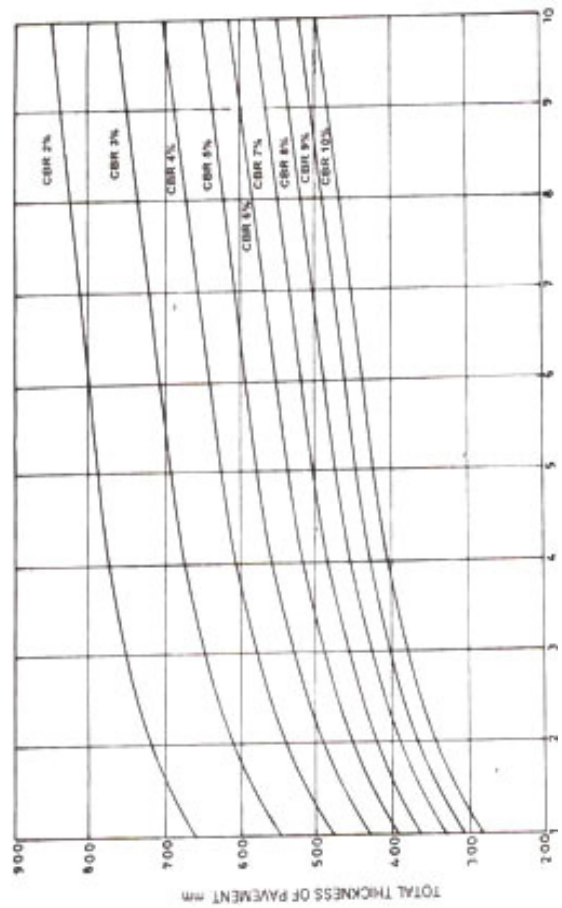
In 1928 California division of highways in the U.S.A. developed CBR method for pavement design. The majority of design curves developed later are based on the original curves proposed by O.J Porter .at the beginning of the second world war, the crops engineer of U.S.A. made survey of the existing method of pavement design and adopted CBR method for designing military airport pavement .one of the chief advantages of CBR method is the simplicity of the test procedure.

The CBR test were carried out by the California state highway department on existing pavement layers including sub grade ,sub-base and base course based on the extensive CBR test data collected on pavement which behaved satisfactorily and those which failed ,an empirical design chart was developed correlating the CBR value and the pavement thickness.
It is possible to extend the CBR design curves for various loading conditions, using the expression:

$$t = \sqrt{P}\left\{\frac{1.75}{CBR} - \frac{1}{p\pi}\right\}^{\frac{1}{2}}$$

$$t = \sqrt{P}\left\{\frac{1.75}{CBR} - \frac{A}{\pi}\right\}^{\frac{1}{2}} h$$

Here,
t = pavement thickness, cm
P = wheel load, kg
CBR = California bearing ratio, percent
p= tyre pressure, kg/cm^2
A = area of contact, cm^2



Flexible Pavement Design-
(As per IS 37:2001)
CBR Value- 4%
Distribution Factor (D.) -0.75
Cumulative No. of Standard excels (A) – 100cv/day
Vehicle Damage Factor (F) – 1.5
Traffic Growth Rate – 7.5%
Design Life (n) – 20years

$$N = \frac{365X[(1+r)^n - 1]}{r} * A * D * F$$

$$N = \frac{365X[(1+0.075)^{20} - 1]}{0.075} * 100 * 0.75 * 1.5$$

$= 1778198$
$= 1.77 * 10^6$
$= 1.8$ msa

For these value the total thickness = 540mm. from IS37:2001 fig 1 pg no.
Total thickness 540mm
WC =20mm PC
BC=50 B M
GB=225mm=220mm
GSB=265mm=250mm (from Pavement Design Catalogue-Plate 1)

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References

[1] IEEE Trans. Power Delivery, vol. 3, no.2, April 1988, pp. 549-557.
[2] For a book citation:
[3] Highway engg. Author : khanna and justo.
[4] IRC code book,IS 37:2001.