

Experimental Investigation On Design Of Flexible Pavement

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ABSTRACT-

Pavements are required for the smooth, safe and systematic passage of traffic. Pavements are generally classified as flexible and rigid pavements. Flexible pavements are those which have low flexural strength and are flexible in their structural action under loads. Rigid pavements are those which possess noteworthy flexural strength and flexural rigidity.

The profound development in automobile technology has resulted in heavy moving loads on the existing highways for optimization of the transport cost. In the project report, an attempt is made to design a road near Sontyam, based on the principles of pavement design. On the existing alignment of the road, soil samples are collected for the determination of soil characteristics like consistency limits, sieve analysis, C.B.R. values etc., Based on this the thickness of the pavement (flexible) is designed. The alignment of the road is also designed and fixed by surveying and leveling. The total road length being 497 meters of which, one section is 247m, other is 200m and the third section is 50m.

Key Words: Flexible Pavement, Bitumen, Base course, Wearing course, Highway

1. INTRODUCTION-

For economic and efficient construction of highways, correct design of the thickness of pavements for different conditions of traffic and sub-grades is essential. The science of pavement design is relatively new. In India, previously road crust was designed on some rational data but more on the experience of the road engineer.

Some arbitrary thicknesses of the pavements were used which lead to costly failures and wastage as in some cases, the thickness of pavements was insufficient and in the other cases expensive. As there are no proper design criteria, the construction of roads was more or less uneconomical in almost all cases. Hence judicious method of designing and calculating the crust thickness on the basis of estimation of traffic loads and bearing capacity of sub-grade etc., will lead to economical construction of roads.

2. OBJECTIVES-

- The surface of a pavement should be stable and non-yielding, to allow the heavy wheel loads of the

road traffic to move with least possible rolling resistance.

- The road should be even along the longitudinal profile to enable the fast vehicles to move safely and comfortably at the design speed.
- The elastic deformation of the pavement should be within the permissible limits, so that the pavement can sustain a large number of repeated load applications during the design life.
- It is always desirable to construct the pavement well above the maximum level of the groundwater to keep the sub-grade relatively dry even during monsoons.

3. METHODOLOGY-

In this project we have considered Group index method and California bearing ratio. Some of the properties are Traffic load and Temperature

3.1. GROUP INDEX METHOD:

D.J. Steel suggested the thickness requirements with the Highway Research Board method based on the group index values in 1945. Group index value is an arbitrary index assigned to the soil types in numerical equations based on the percent fines, liquid limit and plasticity index. GI values of soil vary in the range of 0 to 20. The higher the GI value, the weaker is the soil subgrade and for a constant value of traffic volume, the greater would be the thickness requirement of the pavement.

3.2. CALIFORNIA BEARING RATIO METHOD

In 1928, California divisions of highways in the USA developed the CBR method for pavement design. The majority of curves developed later are based on the original curves developed by O.J. Porter. At the beginning of the second world war, the corps engineer of the USA made a survey of the existing method of pavement design and adopted the CBR method for designing military airport pavements. One of the chief advantages of the CBR method is the simplicity of the test procedure.

Most of the road pavements designed in CBR method on the CBR value of sub grade soil determined by conducting CBR test in the laboratory on the sub grade soil disturbed or remoulded depending on whether an existing subgrade is utilized for the pavement without improvement or a new sub grade is to be constructed with proper control over its properties, especially compaction characteristics.

CBR value is defined as the ratio of load required to cause a specified penetration, say 2.5mm or 5mm of a standard plunger into the sample to the load required to produce the same penetration of same plunger into standard stone aggregate sample, expressed as a percentage.

CBR value varies from 0 to 100%. More CBR indicates stronger soil. If density

is less, CBR is less. The CBR is expressed as the percentage of penetration resistance of a given pavement material to that of a standard value of penetration resistance obtained for a crusher stone aggregate available in California.

4. RESULT

Liquid limit of soil = 33.5

Plastic limit of soil = 21.12

California Bearing Of Soil = 14.36%

5. CONCLUSIONS-

- In this project work, an attempt is made to incorporate latest techniques of geometric design, pavement design for a road for an existing colony which is 2 km away from NSRIT college, sontyam.
- The IRC specifications are based on rational thinking, the proposed road is safe in both geometrics as well as pavement design.
- It is also proposed to design a flexible pavement by Group Index method and CBR method.
- Some more methods are available in the design of flexible pavement, which are much more advanced like California resisting value method, Mc load method, Tri-axial method and Burnister method.
- Because of the limitations of time and scope, only the GI method and CBR method are adopted.
- To have a practical concept of estimation analysis, an attempt is made to estimate the

quantities of earth work of flexible pavement.

6. REFERENCE-

- “Highway Engineering” by S.K.Khanna and C.E.G.Justo
- “Highway Engineering” by T.D.Ahuja
- “Estimation and costing in civil engineering” by B.N.Dutta
- “Soil mechanics and foundation engineering” by K.R.Arora
- “Surveying” by K.R.Arora