COSTS AND PROCEDURES FOR DESIGNING OF DIFFERENT PAVEMENTS

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Abstract

For the smooth, secure and systematic passage of traffic, pavements are important. Over cement concrete paths, flexible pavement is favoured as they have a great benefit that they can be reinforced and enhanced in stages with traffic growth and their surfaces can also be milled and recycled for restoration. With regard to initial investment and maintenance, flexible pavements are often less costly. Although rigid pavement is costly, it has less maintenance and good design time. The economic portion is carried out by using the result obtained by the design method and its corresponding component layer thickness for the design pavement of a segment.

Introduction

Street outside in India was recently planned on some levelheaded information however more out and about architect's experience. Some discretionary asphalt thicknesses were utilized, prompting expensive disappointments and wastage, as asphalt thickness was deficient in certain examples and exorbitant in different occasions. Since there are no legitimate plan prerequisites, the structure of streets in practically all cases was pretty much uneconomical. On the off chance that it can spread the wheel load worry about a more noteworthy territory for each unit profundity of the layer, an asphalt layer is viewed as more proficient or unrivaled. The asphalt's versatile disfigurement should be inside as far as possible, so countless monotonous burden applications can be supported over the plan life of the asphalt. To keep the sub-level sensibly dry in any event, during rainstorm, it is regularly attractive to assemble the asphalt well over the greatest degree of the ground water.

Components to be considered in the design of pavements

- Design wheel load
- Sub grade soil
- Climatic factors
- Pavement component material
- Environmental factors
- Special factors in the design of different types of pavements.

Flexible pavement design:

Various approaches for flexible pavement design may be classified into three broad groups:

(a) Empirical methods:

These depend on actual properties and strength boundaries of soil sub evaluation. The bunch list strategy, CBR technique, Stabilometer strategy and Mc leod technique etc..., are observational strategies.

(b) Semi empirical methods or semi theoretical methods:

These methods are based on stress strain function and experience.

E.g.: Triaxial test method

(c) Theoretical methods:

These are based on mathematical computations. For example, Burmister

method is based on elastic two-layer theory.

Design of pavement using cbr method: irc

CBR tests should be carried out in the laboratory on remolded soils and in-situ tests are not recommended for design purposes. The soil should be compacted with proctor density at OMC. Test samples should be immersed in water before processing for 4 days. However it is not appropriate to soak in the dry zone (<50cm precipitation). At least three samples at the same density and moisture content should be checked on each type of soil. An average of six samples should be considered if the variance is greater than the allowable value.

Cost analysis of Pavement

Quotes are made at different occasions during the improvement of answers for distinguished transportation needs and lacks. These assessments uphold subsidizing and program choices. The assessing approach that is utilized at these different occasions should adjust to the data accessible when the gauge is readied. For instance, when just idea data is accessible, at that point calculated assessing techniques are utilized to decide arranging level cost projections. Cost assessing the board is rehearsed as ventures are recognized and created. Cost assessing the board strategies will likewise shift contingent upon the degree of task scope definition and cost subtleties gave in the evaluations. Accordingly, the advancement stages and their portrayals in this Guidebook, as introduced in Figure 1 and talked about in Table 1 individually, were adjusted from a National Cooperative Highway Research Program Synthesis 331, Statewide Highway Letting Program Management.

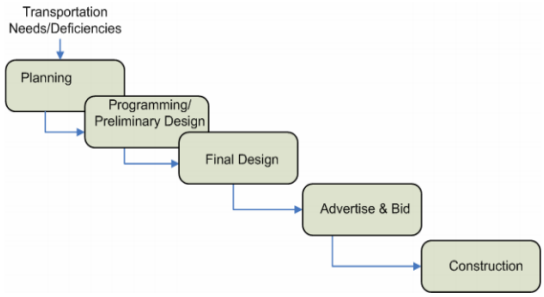

Fig 1 : Typical Transportation Need Development Phases for Highway Projects

Table 1 : Development Phases and Activities (Anderson and Blaschke 2004)

Development Phases	Typical Activities
Planning	Purpose and need; improvement or requirement studies; environmental considerations; public involvement/participation; interagency conditions.
Programming and	Environmental analysis; schematic development; public hearings; right of way impact; project economic feasibility and funding authorization.
Preliminary Design	Right of way development; environmental clearance; design criteria and parameters; surveys/utility locations/drainage; preliminary plans such as alternative selections; geometric alignments; bridge layouts.
Final Design	Right of way acquisitions; PS&E development – final pavement and bridge design, traffic control plans, utility drawings, hydraulics studies/drainage design, final cost estimates.
Advertise and Bid	Prepare contract documents, advertise for bid, pre-bid conference; receive and analyze bids.
Construction	Determine lowest responsive bidder, initiate contract, mobilization; inspection and materials testing; contract administration; traffic control, bridge, pavement, drainage construction.

METHODS USED FOR COST ESTIMATION OF ROAD:

For somebody to make quality appraisals dependent on these factors, there are three conditions that should be met to make a solid cost assessment work. The primary condition centers around the determination of the factors. Each undertaking should be checked on and acclimated to appropriately ascertain pre-plan costs. The subsequent condition depends on the assortment and maintenance of chronicled information, alongside its availability. For this technique to work appropriately, there

should be past information to develop the pre-plan cost work.

There are critical advantages that relapse based cost assessment strategies produce. The primary advantages of the relapse cost work strategy incorporate the accompanying:

(1) Encouraged capacity and use of information and

(2) a mechanized execution of the capacity.

Methodology

Procedure is the deliberate, hypothetical investigation of the strategies applied to a field of study. It includes the hypothetical investigation of the group of strategies and standards related with a part of information.

A strategy doesn't decide to give arrangements - it is in this way, not equivalent to a technique. All things considered, a strategy offers the hypothetical supporting for understanding which technique, set of strategies, or best practices can be applied to a particular case, for instance, to ascertain a particular outcome.

Experimental Investigation

The different types of tests conducted on the samples are;

a) Index Properties

1. Liquid limit
2. Plastic limit
3. Specific gravity
4. Sieve analysis

b) Engineering Properties

1. Standard Proctor test

Liquid limit of soil:

Definition

Liquid limit is the moisture content at which 25 blows in standard liquid limit apparatus will just close a groove of standardized dimensions cut in the sample by the grooving tool by a specified amount.

FIG.2: Liquid Limit ApparatusObservations & calculations (sample 1):

S.No	Observations	trial 1	trial 2	trial 3
1	Water percent added , w%	40	44	47
2	Number of blows	95	55	25
3	Weight of container (M1)(gms)	35	40	40
4	Weight of container +wet soil(M2)(gms)	42	45	47.46
5	Weight of container+dry soil(M3)(gms)	40.5	43.5	46
6	Weight of water (M2-M3)	1.5	1.5	1.46
7	Weight of oven dry soil(M3-M1)(gms)	5.5	3.5	6
8	Water content (%)	27.27	42.85	24

Weight of soil sample taken=150gm

GRAPH:

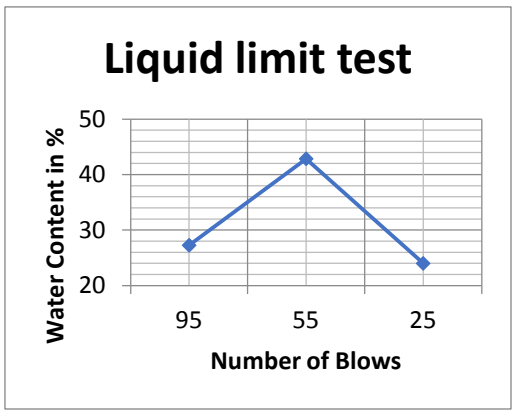

FIG. 3: Graphical Representation of Liquid Limit Test (Sample 1)

From graph,

Water content corresponding to 25 blows = 24%

Therefore, the liquid limit of the soil sample 1 is 24%

Proctor compaction test:

Procedure

- The test comprises of compaction of soil at different water substance in the shape in three equivalent layers, each being given 25 blows with the 2.6 kg hammer dropped from a stature of 31cm
- The dry thickness of the dirt example can be gotten by finding the mass thickness of compacted soil and its water content
- About 5kg of air dried, pounded soil going through 4.75mm sifter is taken and blended altogether with a self-assertive water content say,6%
- The blended soil test in the shape and compacted by giving blows with the sledge consistently over the surface to such an extent that the compacted stature of the dirt is around 1/third of the tallness of the form. The second and third layers are comparably compacted each being given 25 blows
- The last compacted layer ought not extend more than 6mm into the collar. The collar is taken out and the overabundance soil is managed off to make it level with the highest point of the shape.
- The weight of the form with base plate and the compacted soil is taken. A delegate test is taken from the focal point

of the compacted example and is kept in the broiler for water content assurance.

- The compacted soil is removed from the form, broke with hand and remixed with expanded water content. Again the dirt is compacted in a form in three equivalent layers as depicted above and the relating dry thickness (γd) and the water content (w) are hence decided.
- The test is rehashed on soil tests with expanding water content and the comparing dry densities are resolved.
- A compaction bend is plotted between water content as the abscissa and the relating dry densities as ordinates.
- The dry thickness continues expanding as the water content is expanded till the greatest dry thickness is reached. The water content comparing to the greatest dry thickness is called ideal dampness content (w).

FIG.4: Proctor Compaction Test Apparatus

Observations & calculations (sample 1):

Mould diameter = 10cm

Mould height = 12cm

Mould volume = 942.47 cc

Table 3: Proctor Compaction test (sample 1)

S. No	Observation	8%	10%	12%	14%
1	Empty weight of base plate+cylinder(W1)	6.39	6.39	6.39	6.39
2	Weight of cylinder+soil(W2)	10.89	10.98	11.03	11
3	Mass of compacted soil(W2-W1)(W3)	4.5	4.59	4.64	4.61
4	Bulk density (W3/V)	2037.18	2077.92	2100.56	2086.98
5	Water content(w)	8.2	5.41	14.88	20.74
6	Dry density	1.882	1.971	1.828	1.72

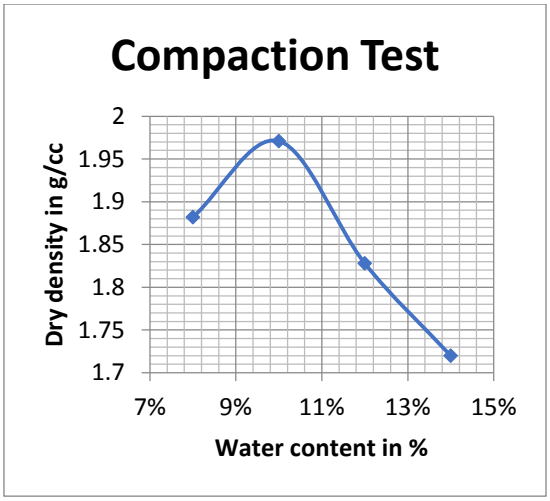

FIG.5: Graphical representation of proctor compaction test (Sample 1)

Graph

The optimum moisture content of the soil sample = 10.63%

Maximum dry density of the soil sample = 1.678 g/cc

Results

To characterize the fine grained soils inside one gathering and for making a decision about their appropriateness as sub evaluation material, an ordering framework has been presented in HRB characterization which is named as Group Index. Gathering Index is capacity of rate material passing 200 lattice strainer (0.074mm), fluid cutoff and versatility list of soil and is given by condition: (0.074mm) . Fluid breaking point and versatility list of soil and is given by condition:

GI=0.2a+0.005ac+0.01bd

Here,

a=that portion of material passing 0.074mm sieve, greater than 35 And not exceeding 75 %

b=that portion of material passing 0.074mm sieve, greater than 15

And not exceeding 35%

c = that value of liquid limit in excess of 40 and less than 60

d = that value of plasticity index exceeding 10 and not more than 30

Or

GI= (F-35) 0.2+0.05(WL -40) +0.01(F-15) (IP-10)

DATA:

F =66%

WL=55%

IP =31%

GI = (F-35)0.2+0.05(WL -40)+0.01(F-15)(IP-10)

=17.35

So Pavement Thickness =700mm

Thickness of Surface Course =35mm

Thickness of DBM =145mm

Thickness of Base Course=200mm

Thickness of Sub Base=320mm.

Cost comparison of pavements

S. No	Method Used	Cost for construction of 3Km road in Rs
1	Group Index	1394451.45
2	CBR	1444406.04

Conclusion

In this venture work, an endeavor is made to consolidate most recent methods of mathematical plan, asphalt plan for a street for a current settlement which 2 km away from Car Shed Junction, P.M.Palem. It is likewise proposed to plan an adaptable asphalt by Group Index strategy. Some more strategies are accessible in the plan of adaptable asphalt, which are quite exceptional like California opposing worth technique, Mc leod strategy, Triaxial technique and Burnister technique. On account of the restrictions of time and degree, just GI technique and CBR strategy are received. To have a viable

idea of assessment examination, an endeavor is made to appraise the amounts of earth work of adaptable asphalt. The expense for construction of Rigid asphalt is 1444406.04

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