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A Study Report on Flexible Pavement Construction in Vidisha

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Abstract: ***The last century has seen an intensive process of urbanization in rural as well as metro cities, which has led for a need of rapid construction of roads and transportation infrastructure. The demand for good roads and services required researchers, designers and builders to explore innovative and cost effective engineered products to satisfy increasing demand that would economize the construction as well as increase durability.***
Pavements are essential features of the urban communication system and provide an efficient means of transportation, where flexible pavements are preferred over cement concrete roads because of their certain advantages like they can be strengthened and improved in stages with the growth of traffic. The flexible pavements are less expensive in regards to initial cost and maintenance. The largest advantage of using rigid pavement is its durability and ability to hold a shape against traffic and difficult environmental conditions. Thus, the main objective of this study is to present a review report of under-construction flexible pavement of vidisha and monitor the quality of construction material and alignment techniques. The various aspects of the construction process covered in the minor project report.
Keywords: flexible pavement, Alignment, Transportation, urban communication, maintenance.

I. INTRODUCTION

Flexible pavements are based on the principle of grain to grain load transfer, hence they are made in layers for the smooth transportation of vehicles and the connectivity of outskirts to the urban areas. The flexible pavements are made up of bitumen, hence cost efficient. The is the material design of competent layers of the flexible pavement, such as the sub base, base, or surface course. In addition to the strength characteristics of such layers, factors of durability also must be recognized in establishing their design. The second part of the problem is concerned with the thickness design of the component layers, wherein it is required that sufficient strength be built up to carry the imposed loads.
Road pavement is constitution consisting of different layers by using special materials on top of the natural soil sub-grade, whose main carry out is to vehicle masses to the sub-grade. The pavement structure must to be prepared to provide a surface of suitable riding excellence, sufficient skid effort, favorable light weight reflective individuality and low effluence.
Flexible pavements which will transfer wheel load to the deeper layers by grain-to-grain transmit through the points of contact in the pavement structure. The wheel load performance on the pavement is obtainable and distributed to a wider space, and also the stress decreases with the depth. This strain portion attribute, flexible pavement usually has several layers.

A flexible pavement is a structure consisting of superimposed layers of processed materials above the natural soil sub-grade, whose primary function is to distribute the applied vehicle loads to the sub-grade.

II. OBJECTIVE OF STUDY

India is growing its transportation system each day and now it it highly required to study the technique used in the construction of highway. It has been observed that the life span of the flexible pavement is low as compared to the other counties. This project has planned to investigate the following parameter of under consecution flexible pavement in the vidisha.

A. To observe the method of geometric design of flexible pavement
B. To observe the calculation of design load
C. Investigate the quality of the construction material
D. To work out on the process of pavement alignment
E. To investigate the soil condition

III. METHODOLOGY

The various test has performed for the monitoring of the quality of material used in the construction. Details has mentioned below

Table 1Sieve Analysis of Aggregates

SIEVE SIZE	Weight of aggregate retained determination				%age of total weight retained	Cumulative %age of total weight retained	% age passing
	(1)	(2)	(3)	Avg.			
1	2	3	4	5	6	7	8
20mm	0	0	0	0	0	0	100%
16mm	52	46	44	47.3	4.73	4.73	95.27%
12.5mm	536	454	492	494	49.40	54.13	45.87%
10mm	320	408	396	374.7	37.47	91.60	8.40%
4.75mm	86	82	60	76.0	7.60	99.20	0.80%
pan	06	10	08	8.0	0.80	100%	0%

Table 2AGGREGATE CRUSHING VALUE TEST

Sample Number	Total weight of dry sample, W1 g	Weight of fine passing 2.36 mm IS sieve W2 g	Aggregate crushing value =W2/W1X100 %
(1)	(2)	(3)	(4)
1	18.1g	17.3g	95.58 %
2	17.9g	17.4g	97.20 %
3	18.0g	17.6g	97.77 %

Table 3viscosity of bitumen

SR#	TIME REQUIRED FOR FLOW OF 50ML		ENGLER SPECIFIC VISCOSITY
	Liquid Asphalt	Distilled water	
	(sec)	(sec)	(E)
1	49.09	11.28	4.352
2	47.69	11.01	4.332
3	53.12	10.45	5.083

Table 4California bearing ratio

Time of penetration @ 1025 mm/min.	Penetration (mm)	Providing dial reading	Load on Plunger (kg)	Corrected Load	Average C.B.R (%)
0-0	0.0	00	00		
0-24	0.5	11	1.19		
0-48	1.0	18	1.99		
1-12	1.5	28	3.02		
1-36	2.0	35	3.78		
2-0	2.5	40	4.32	70	6.13
2-24	3.0	45	4.86		
3-12	4.0	52	5.62		
4-0	5.0	58	6.26	105	5.96
6-0	7.5	70	7.56	134	
8-0	10.0	79	8.53	162	
10-0	12.5	87	9.40	183	

Table 5Atterberg limit test

DESCRIPTION	LIQUID LIMIT				PLASTIC LIMIT	
	1	2	3	4	1	2
NO. OF BLOWS	17	23	27	34		
CONTAINER NO.	I	II	III	IV	I	II
WT. OF SOIL	38.24	36.10	40.14	39.58	32.29	34.79
WT OF CONTAINER	20.18	21.37	24.28	20.48	26.10	21.46
WT OF DRY SOIL(a)	33.52	32.46	36.43	35.32	31.20	32.51
WT. OF WATER	4.72	3.64	3.71	4.26	1.09	2.23
WT OF DRY SOIL(b)	13.34	11.09	12.15	14.90	5.10	10.65
MOISTURE CON. a/b*100 %	35.38	32.82	30.50	28.59	21.37	20.94

Table 6flash and fire point

Percentage Of Polymer	Polyethylene		Polypropylene		Polystyrene	
	Flash Point	Fire Point	Flash Point	Fire Point	Flash Point	Fire Point
0.25	280	340	320	345	240	300
0.50	290	350	330	340	270	310
0.75	295	330	333	350	280	315
1.00	340	350	350	355	295	320

Table 7 penetration test

Sample	Penetration	
	Readings	Mean
1	78	75.33
	75	
	73	
2	78	75
	74	
	73	
3	79	75
	74	
	72	

Summary Report

LIQUID LIMIT - 31.82%
PLASTIC LIMIT - 21.155%
PLASTICITY INDEX - 10.66%
Viscosity of cutback bitumen = 4.589 seconds.
Mean specific viscosity = 4.589
California Bearing Ratio at 2.5mm penetration = 6.13 %
California Bearing Ratio at 5.0mm penetration = 5.96 %

IV. CONCLUSION

A. We Observed the methods of geometric design of flexible pavement in the locality of Vidisha , where new pavements were made to connect the outskirt villages to the district. Moreover the existing pavements were redesigned to improve there geometry.
B. Observe the calculation of design load, the pavements which were experienced with heavy traffic were made of some improved materials.
C. Investigate the quality of the construction material, the basic factor which is the responsible for lifespan of the pavement is the raw material, good quality of material leads to the effective life span .proper testing of material is made to have a good pavement design .
D. Work out on the process of pavement alignment , alignment is required for smooth transportation of the vehicles and the proper fiction between the wheel and the pavement surface. A proper aligned pavement possess a good service life
E. Investigate the soil condition, flexible pavement has the tendency of grain to grain load transfer. Therefore it is mandatory to have a good soil bed for the pavement and hence the tests are been carried out for the safety.
F. In sieve analysis test we get the 20mm single size
G. In aggregate crushing value obtained in two test as the aggregate crushing value.
H. In Atterbergtest the liquid and plastic limits of the soil are concluded and the safe value obtained were , liquid limit- 31.82% , plastic limit – 21.155% and plasticity index- 10.66% .
I. In viscosity test the viscosity of the cutback bitumen was obtained to be 4.589 second .
J. The result of CBR , values obtained at at 2.5mm penetration = 6.13% and at 5mm penetration = 5.96 % .
K. Lower penetration value (65mm) and hence higher load carrying capacity.

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