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Design of Flexible Pavement from Shirsoli to Mohadi Village

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Abstract –Shirsoli and Mohadi are two villages in Jalgaon district. In today's date there is no direct connectivity between these villages. For general transportation purpose villagers has to come Jalgaon. Actually Shirsoli, Mohadi and Jalgaon is triangular in position. But connectivity line of shirsoli and Mohadii.e(road) is missing in this triangle. In this paper we are going to connect those villages to make complete connectivity triangle of Shirsoli, Mohadi and Jalgaon. In the process of design of flexible pavement various types of surveys, design considerations and advance materials are take into consideration.

Key Words:Mohadi, Shirsoli, Jalgaon, Flexible, Pavement, geogrid

1.INTRODUCTION

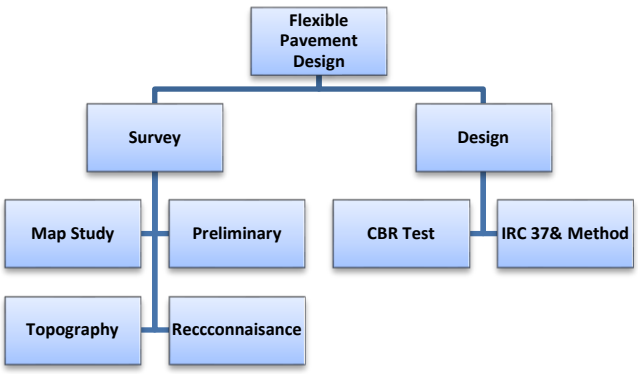

Fig 1 : Flowchart

In this paper new alignment between two villages is designed. Shirsoli and Mohadi are two villages in Jalgaon district. In today's date there is no direct connectivity between these villages. For general transportation purpose villages has to come Jalgaon. Actually Shirsoli, Mohadi and Jalgaon is triangular in position. But connectivity line of shirsoli and Mohadii.e(road) is missing in this triangle. In this paper we are going to connect those villages to make complete connectivity triangle of Shirsoli, Mohadi and Jalgaon. In the process of design of flexible pavement various types of surveys, design considerations and advance materials are take into consideration.

2. LITERATURE REVIEW

Neetu B. Ramteke et al. [1] This study reveals that the CBR value increases with the increase in sand content and reaches to a desirable CBR value for subgrade of pavement. Normally soaked CBR value is considered for pavement design. Experimentally it is found that the addition of sand content in the soil results in the improvement of soaked CBR value from 1.93% to 7.39%.

Animesh Das et al.[4] This study reveals while designing a bituminous pavement with cemented base/ sub-base, it is generally assumed that the propagation of fatigue cracking is sequential. That is, the cemented layer undergoes fatigue cracking failure first, and after its fatigue life is exhausted, the fatigue cracks start propagating through the bituminous layer.

Saurabh Jain et al.[19] The pavement is designed as a flexible pavement upon a black cotton soil sub grade, the CBR method as per IRC 37-2001 is most appropriate method than available methods. The pavement is designed as a flexible method from which each method is designed on the basis of their design thickness from which each method has different cost analysis of a section, from which CBR as per IRC is most appropriate in terms of cost analysis pavement but maintenance cost is very less.

3. SURVEY FOR ALIGNMENT

3.1 Map Study

If the topographic map study of the area isavailable, it is possible to suggest the likely routes of the road , In India , topographic maps are available from the survey of India with 15 or 30 meter counter intervals . The main features like hills, river,valleys,etc are also shown on these maps

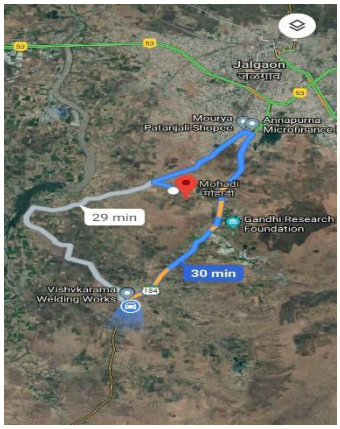

Fig 2 map

3.2 Preliminary Survey

The main objectives of preliminary survey are:

- To survey the various alternate alignment proposed after the reconnaissance survey and to collectall the necessary physical information and details of topography, drainage and soil.
- To compare the different proposals in view of the requirements of a good alignment.

3.3 Reconnaissance Survey

The second stage of engineering survey for highway alignment is the reconnaissance survey .during the reconnaissance, the engineer visits the site and examines the detailed study .a field survey party may inspect a fairly broad stretch of land along the proposed alternative routes of the map in the field .only very simple survey instrument are used by the reconnaissance party to collect additional details rapidly, but not accurately

4. DESIGN OF PAVEMENT

4.1 CBR Test

After conducting the test on soil sample the result of CBR value for the sample is 8.6% for the alignment of the road.

4.2Flexible Pavement Design as per IRC37:2001Second Revision (Guideline for flexible pavement design)

Traffic Volume Study :-

Initial traffic volume study :

In this study , it is necessary to know the traffic rate on proposed pavement .As per the requirement initial traffic volume obtained after making the traffic volume study in working hours at Mohadi to Shirsholi road which is as follow :

Table 1 vehicle distribution

Vehicle classification	Observation in one day
Trucks	12
Tractors	30
Light motor vehicle	120
Motor cycle	60
Auto rickshaw	4
Total	226

Traffic Growth Rate :

As per IRC 37-2001 it is necessary to find out traffic growth rate by studying the past trends of the traffic growth by establishing econometric models.If the adequate data is not available .It is recommended that an average annual growth rate of 7.5 %may be adopted.

Design Life :

According to IRC 37-2001, roads like national highway design for 10 – 15 years and urban roads for 20 years. Therefore consider design life of this pavement 20 years.

Vehicle Damage factor :-

Vehicle damage factor (VDF) is multiplier factor used to convert different number of axel load into standard axel load repetition for new pavements , it should calculated by the vehicle axle load survey .If adequate data is not available following data is used which is suggested by the IRC 37-2001

Table 2 vehicle damage factor

Initial traffic volume in terms of number Commercial vehicle per day	TERRAIN	
	Rolling/ Plain	Hilly
0-150	1.5	0.5
150-1500	3.5	1.5
More than 1500	4.5	2.5

Vehicle Distribution :-

Single lane traffic distribution adopted as it is very convenient . In single lane roads , traffic tends to be more channelized than two lane roads . The design should be based on the total number of commercial vehicle in both the directions

Computation of designed traffic from IRC 37- 2001

A=p (1+Y) *

Where A= no of heavy vehicles / day for design (weight > 3T)

P = no of vehicles / day at the last count

R= annual rate of increase of vehicles

n = no of years between the last count and the year of completion of construction.

Computation of designed traffic

From, IRC37:2001

Where,

A = number of heavy vehicle per day for design.

P = number of heavy vehicle per day @ last count.

ϒ = annual rate of increase of heavy vehicles.

x = number of year between last count and year of completion of construction.

A = p(1+r)x

A = 226+(1+0.075)2

=227.075

now, N = 365x ((1+r)n -1)/r x A x D x F

$N=365x[(1+0.075)^{20} – 1]/0.075$ x 227.075x1x1.5

N = 5383792.25

N = 5.38 msa

Overall Pavement Thickness:-

Overall pavement adopts from standard chart of IRC37:2001 of CBR versus traffic in msa. In this case, different CBR test made on soil using different stabilizer such as Quarry .Among this stabilizers quarry dust gives effective result as compare to other stabilizers and it is easily available at surrounding area hence here considered soil stabilization using quarry dust which CBR test result as follows :

As per IRC CBR Value = 8.68 % and 5.38 msa

Table 3

Cumulative Traffic Msa	Total Pavement Thickness	Bituminous Surfacing			
		Wearing Course (mm)	Binding Course (mm)	Granular Base (mm)	Granular Sub-Base (mm)
5	475	25 SDBC	50 BM	250	150
10	550	40 BC	60 BM	250	200
Interpolation for 5.38	480.7	26.14 pc	50.76 BM	250	153.8

5.SUMMARY

Table 5 Summary

Pavement Length	12 km
Initial Traffic	226
Traffic Growth Rate	7.5%
Design Life	**20 years**
Vehicle Damage Factors	1.5
Vehicle Distribution	Single lane
Computation of Design traffic	5.38
CBR	**8.68 %**
Layers Thickness	**Wearing course = 26.14pc** **Binding course = 50.76mm** **Base course = 250mm** **Sub base course = 153.8mm**

6. CONCLUSION

For design of flexible pavement, it is essential to know the CBRvalue of soil and if it is low then improve by stabilization.Design of flexible pavement between Mohadi to Shirsoli will be more time saving for public in society. It will save time, fuel and will salo control pollution.

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