International Journal of Advanced Technology in Engineering and Science
Vol. No.5, Issue No. 08, August 2017
www.ijates.com
ijates
ISSN 2348 - 7550

"DESIGN AND PROPOSAL OF AN ALTERNATIVE ALIGNMENT FOR BOLWAR-PUTTUR ROAD OF DAKSHINA KANNADA DISTRICT"

Shivanand[1], Chethan Kumar N. T[2]. Prashanth H. D.[3]

Dinesh Kumar B[4]

[1,2,3,4]Department of Ci vil Engineering

[1]Asst. Professor, V C E T Puttur (India)

[2]Asst. Professor, S C E M., Mangaluru. (India)

[3]Asst. Professor, V C E T Puttur. (India)

[4]Lecturer, D S Dinakar Polytechnic, Shivamogga. (India)

ABSTRACT

Bannur village road is one of the important roads which connect Kabaka Puttur Railway Station of Dakshina Kannada District in Karnataka State. The Roadways and Railways are always interconnected to one another which help in the development of a city. Kabaka-Puttur Railway Station which belongs to South Western Railway, located on the Mangaluru-Hassan Railway line. At present the existing road has very less utility factor due to improper maintenance and drainage facilities. The project deals with the study on feasibility alignment and traffic count of this road. Traffic volume is the basic requirements for planning the road development and particular section of road network road. The main objective of our report is to increase the utility factor of the existing road by providing proper geometric conditions. The project work is carried out initially by Reconnaissance survey to identify the present conditions and objects present near the site. Permeability of soil mass decreases with addition of quarry dust bitumen blend, and to understand behaviour of soil upon addition of stabilizer, a basic study was taken up with the soil.

Keywords: Alignment details, Reconnaissance survey, Road Inventory survey, Traffic volume. Quarry dust-bitumen blend, Clay soil, California bearing ratio, Unconfined Compressive Strength.

I. INTRODUCTION

Puttur is a Town Muncipal Council city in Dakshina Kannada District, Karnataka condition of India. It is situated at 12.77°N 75.22°E and it is the second greatest town in the region, arranged on Mangalore-Mysore Highway and it is 52kms far from Mangalore, the District head quarter. It is an agro based town of beach front locale encompassed by a few hillocks with rich woods arranged in the belt of Western Ghats overwhelming precipitation. The Puttur Town Muncipal Council has a population of 53,061 as per report released by census India 2011. It has a tropical climate. Most months of the year are marked by significant rainfall. The average annual temperature in Puttur is 26.8$^{\circ}C$. The temperature is high on April at average of 29.1$^{\circ}C$, the variation in temperature throughout the year is 3.6$^{\circ}C$.The average annual rainfall in Puttur is 4329mm and the least amount

of rainfall occurs in January with an average of 0and the highest amount of precipitation occurs in July with an average of 1489mm.

Bannur village road is one of the important road in Puttur which connects Kabaka Puttur Railway Station of Dakshina Kannada District in Karnataka State. The road network comes under the classification of Other District Road (ODR) and has single lane carriageway section with width of 3.75m and it is a sub-arterial road. The existing road belongs to Puttur town municipal council and has a stretch of about 800m to reach the railway station. Bannur is the medium size village located in Puttur with a population of 1,155 as per population census 2011. The distance between Kabaka Puttur railway station road and KSRTC Puttur bus stand is 4 Km or 2.5 miles. Most of the traffic on this railway line is of transportation of materials from and to Mangalore port. Nehru Nagar, Haradi, Padil, Bannur Road, Bolwar are the nearby localities to the existing road. This is an important road within the district which connects the people to railway station easily. Traffic volume count, traffic speed study and road inventory studies were carried out and the results were conclusive on the fact that easy vehicular movement is not possible.

II.MATERIALS

A. Soil

The soil sample used for this study is collected near kabaka-puttur railway station connecting road, Dakshina Kannada district.

Table 1: Geotechnical Properties of Soil Sample

Liquid limit (%)	33
Plastic limit (%)	21.95
Plasticity index	11.05
Percent finer	3.7
IS classification	CI
OMC (%)	15
MDD (gm/cm³)	2.1
CBR Soaked	1.82

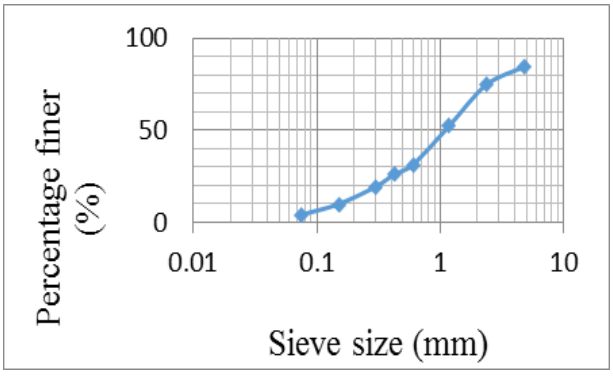


Fig.1 Grain Size Analysis for clay soil

B. Quarry Dust-Bitumen Blend:

The quarry dust-bitumen blend used was collected from a bitumen plant at Bramhavara, Udupi District, Karnataka. Experiments were conducted on the samples blended with waste materials at different percentages.

Table 2: Properties of Quarry Dust-Bitumen Blend

Specific gravity	2.75
OMC (%)	13.5
MDD (gm/cm^3)	0.755
Gravel Size particles (%)	0.3
Sand Size particles (%)	96
Fine Size particles (%)	3.7

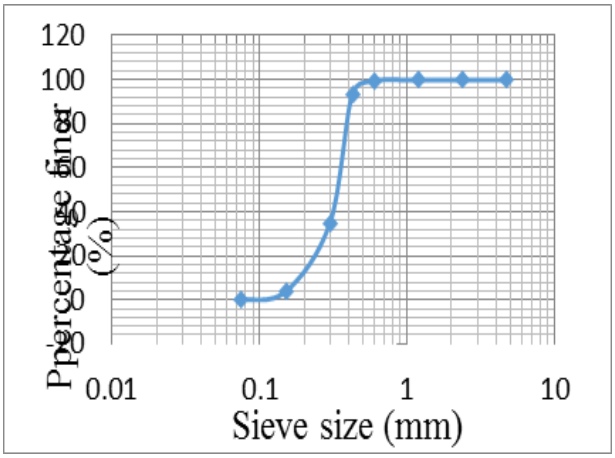


Fig.2 Grain Size Analysis for Quarry Dust-Bitumen blend

III. RESULTS AND DISCUSSIONS

Experiments were conducted on the samples blended with varying percentages of Quarry dust-bitumen blend to determine the index and engineering properties of the soils.

A. Plasticity Characteristics:

The liquid limit and plasticity index of the conventional soil shows that the soil is a clay with intermediate plasticity (CI) as per the plasticity chart given in IS: 2720 (part 5)-1985.

Table 3: Variations of L.L, P.L and P.I for Soil+ QuarryDust Mixes

Soil+ Quarry dust (%)	L.L (%)	P.L (%)	P.I (%)
100+0	33	21.95	22.05
90+10	31	11	20
80+20	29	13.63	15.37
70+30	28	21.95	6.05
60+40	26	23	3
50+50	24	25	1

B. Compaction Characteristics

The moisture content-dry density relationship of a given soil is determined by standard proctor test as per IS 2720 (Part-7)-1980 (REAFFIRMED-1997.

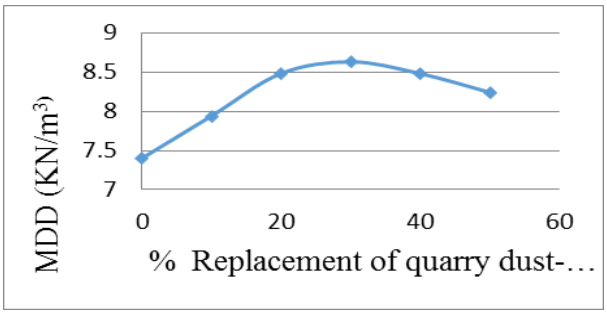


Fig.3 Effect of Soil +Quarry Dust-bitumen blend Mixes on MDD

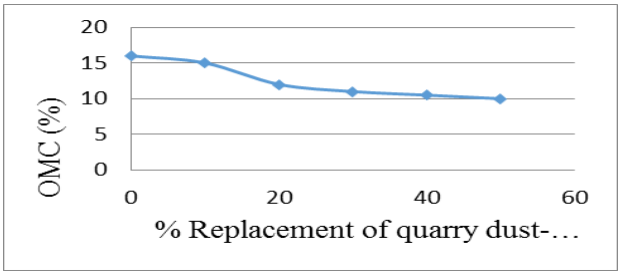


Fig.4 Effect of Soil +Quarry Dust-bitumen blend Mixes on OMC

Table 4: Variation of OMC and MDD for soil+ quarry dust-bitumen blend

Soil+ Quarry	OMC	MDD
100+0	15	7.40
90+10	13.5	7.94
80+20	12	8.48
70+30	11	8.63
60+40	10.5	8.48
50+50	10	8.24

C. California Bearing Ratio:

CBR tests were conducted on samples compacted to optimum moisture content obtained from the standard proctor test as per IS 2720 (Part-16)-1987.

CBR value of Soil is increases as percentage of Quarry dust-bitumen blend increases upto 30%, further more increase in Quarry dust reduces the CBR value. As higher percentage of reduction in void ratio affects in the higher CBR value in Soil+ 30%) Quarry dust-bitumen blend mixes.

Table 5 CBR Value for Soil +Quarry Dust Mixes

Soil+ Quarry Dust-bitumen blend (%)	CBR (%) Soaked
100+0	1.87
90+10	2.4
80+20	2.48
70+30	3.72
60+40	2.48
50+50	1.89

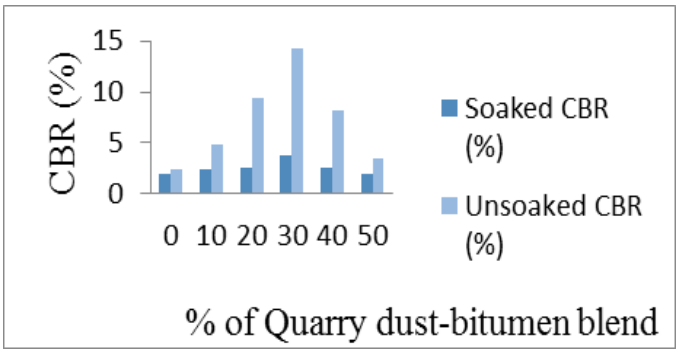


Fig.5 Variation of CBR with for Soil +Quarry Dust Bitumen Blend Mixes

3.1 GENERAL

The topography of the study stretch is surveyed by using Total station. The traffic survey is conducted for 3 days as per ADT and the total count of traffic is recorded and the design traffic is calculated for the design of 15 years and the future traffic growth rate has been also calculated. The pavement thickness is designed as per IRC: 37-2012. Stopping sight distance, Overtaking sight distance, Headlight sight distance and Horizontal curve are designed as per IRC. The earthwork for excavation of roads has computed, detailed and abstract estimation is calculated.

3.2 Traffic Composition (Direction: Puttur to Nagara)

Composition of traffic has been observed at Puttur to Nagara road and second day composition of traffic has shown in fig 4.9. The share of two wheelers is 41% and the four wheelers composition is 26%.

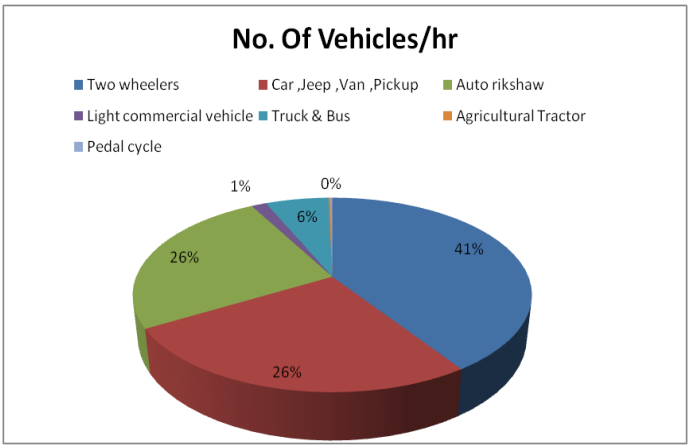


Fig 4.8: Day-2 Traffic composition

Table 4.14: PCU value of Day-2

Type of Vehicles	Two Wheeler	Four Wheeler	Auto-Rickshaw	LCV	Truck & Bus	Tractor	Pedal Cycle
No. of Vehicles	225	144	141	8	34	1	1
PCU/hr	169	144	282	12	75	4	1

IV. RESULTS AND ANALYSIS

As per IRC 106-1990 the given urban stretch is Arterial road. Therefore the capacity of 2lane (two-way) is 1500PCU/Hour.

For Nehru Nagara road in both directions the V/C ratio was found to be 0.79, hence as per IRC-106-1990 the Level of Service "D"

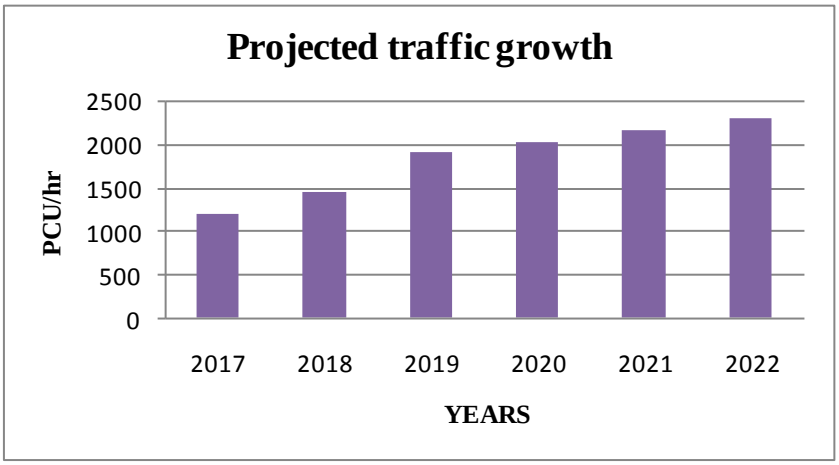
Table 4.20: LOS of Nehru Nagar

	2 wheeler	4 wheeler	Auto	LCV	Truck, Bus	Tractor	Pedal Cycle	Total	LOS
Veh/hr	289	203	217	13	86	1	3	812	**D**
PCU(Veh/hr)	217	203	434	25	317	2	1	1199	
Vol/Capacity	**0.79**								

4.1TRAFFIC PROJECTION AT SELECTED SITE

Table4.21: Traffic projection

Sl. No	Year	Volume PCU/hr	Capacity PCU/hr	V/C	LOS
1	2017	1199	1500	0.79	D
2	2018	1450	1500	0.96	E
3	2019	1898	1500	1.26	F
4	2020	2021	1500	1.35	F
5	2021	2153	1500	1.44	F
6	2022	2293	1500	1.53	F



Graph 4.1: Graph showing projected traffic growth

4.1 Proposed Road Width of Kabaka Puttur Railway Station Road

Table 4.27: Proposed road width of Kabaka Puttur Railway station Road

Road	Proposed road width(m)	Shoulder width (m)		Drainage width (m)	
		Left	Right	Left	Right
	5.5	2.5	2.5	0.5	0.5

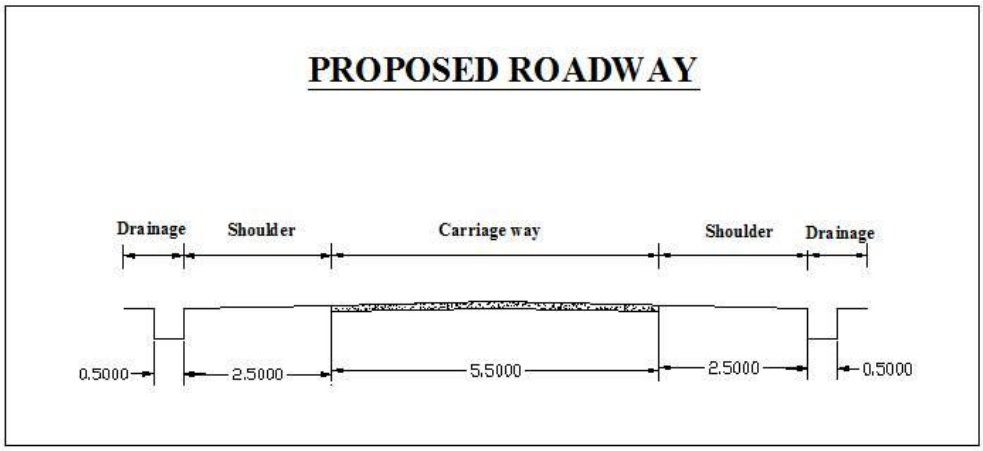


Fig 4.13: Proposed Road width of Kabaka Puttur Railway Station Road

4.2 Design Details of Proposed Highway Project

- The stopping distance of the road = 91.38m
- Overtaking sight distance of the road = 318.22m
- Headlight sight distance = 339.8m
- Super elevation of the road =0.07
- Length of Transition Curve by Rate of Change of Centrifugal Acceleration =68.16m
- Length of Transition Curve by Rate of Introduction of Super Elevation =70m

V. CONCLUSIONS

Quarry dust-bitumen blend can be used as replacement in clay soil up to certain limits. The properties which improves are discussed here,

1. The traffic study data including V/C ratio Value, speed studies Value and geometric parameters on existing road way between Bolwar-Puttur suggested that the present geometric design parameters are insufficient to handle the existing traffic.
2. V/C ratio Value and speed studies conducted on proposed alternate alignment suggested that there exists a free traffic flow and is a better alternative alignment in compassion to the existing one.
3. The initial laboratory tests showed that collected clay soil having, high compressibility and low bearing capacity.

4. It was observed that by the addition of 30% quarry dust-bitumen blend for clay soils, a significant increase in density of 16.56% was observed. Further addition of quarry dust-bitumen blend density and OMC decreases.
5. CBR values got increased from 2.87% to 14.23% in un-soaked condition and from 1.87% to 3.72% in soaked condition for the addition of 30% quarry dust-bitumen blend. Further addition of quarry dust-bitumen blend decreases the CBR value.UCS
6. got increased by increasing the percentage of quarry dust-bitumen blend.
7. This method of soil stabilization will be more economical as the quarry dust-bitumen blend is waste material available at free of cost. Hence overall cost of the road construction becomes very less in comparison with the conventional method of subgrade soil stabilization.
8. The pavement design for existing CBR (1.82%) and for stabilized subgrade with CBR (3.85%) value resulted in following specifications of pavement components. comparison shows that the pavement design after stabilizing the soil subgrade resulted in thickness reduction of various layers of the flexible pavement.

REFERENCES

[1] Dr. Pradeeta Kumar Samanta,(2015) "*Development of Rural Road Infrastructure in India*". Pacific Business Review International Vol.7 Issue 11, May 2015.

[2] HameedAswad Mohammed,(2013) "T*he Influence of Road Geometric Design Elements on Highway Safety*". International Journal of Civil Engineering and Technology n (IJCIET), ISSN 0976-6308, ISSN 0976-6316 Vol.4, Issue 4, July-August 2013.

[3] Hardik H Patel, Prof. Amit A Vankar and Dr.L.B.Zala,(2013), "*A Study on Performance Based Design of Flexible Pavement for State Highway-A Case Study*", JIARM, ISSN:2320-5803, Vol.1, Issue 4, May 2013, pp no 490-497.