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Improvement and Asphalting of State Highway and Major District Road of Koppal District

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Abstract - *It is a well-known fact that India is developing country with an ample spread of Road network. Road network plays an important role in overall development of the country. In this regard improvement and asphalting needs to be the given due consideration for maintaining of existing road network. In this regard improvement and asphalting of two major network is carried out. Various studies and coast of work was estimated as well. Work of the same was carried out in Koppal district choosing both SH and MDR network. PWD department shall have a through studies of the Road network and decide the action to be taken like resurfacing or restructuring for better maintence of road network*

Key Words: **Asphalting, Improvement, CBR, Estimation, MDR, SH, Resurfacing and Restructuring.**

1. INTRODUCTION

The proposed improvement of both the State highway and Major district road of Koppal district. In case of Major district road KAVALOOR-MANGALOOR road from km. 17.00 to 26.00 in Yelburga tq. Similarly in the case of State highway RARAVI – BELUR SH-63 from km. 141.00 to 162.20. These selected stretch for the overall improvement, restructuring, resurfacing and asphalting as per requirement of the present condition. Detailed studies of the road network was carried out in order to obtain the existing condition details. Bar chart and CBR design method was followed for overall designing of the road network. Overall cost of the project was estimated and was submitted to the PWD department for insight of the work to be carried out.

1.1 Details of study area

The proposed improvement of SH RARAVI – BELUR SH-63 from km. 141.00 to 162.20. The total length of the road recognized for improvement is 103.78 Kms

The proposed improvements to MDR Kavallor-Mangaloor road in Koppal district starts at Ch.18.25 Km (near Mannapur village limit) and ends at Ch. 26.00Km(Near Kukanur town). The total length of the road taken up for improvements is 7.75 Kms from near Mannapur to Kukanur Ch: 18.25 to 26.00KM taken for improvements.

Table -1: Details of selected road stretch of MDR

SL.NO	DETAILS	LENGTH
	NAME OF THE ROAD	**KAVALOOR-MANGALOOR**
1	ROAD CATEGORY.	MDR
2	LENGTH IN KOPPAL TALUK	6.80 KM
3	LENGTH IN YALBURGA TALUK	43.20 KM
	TOTAL LENGTH	**50.00 KM**

Table -2 Details of selected stretch of state highway

SL.NO	DETAILS	LENGTH
	NAME OF THE ROAD	**RARAVI - BELUR**
1	ROAD CATEGORY.	SH
2	LENGTH IN GANGAVATI TALUK	44.78 KM
3	LENGTH IN KOPPAL TALUK	7.61 KM
4	LENGTH IN YALBURGA TALUK	51.39 KM
	TOTAL LENGTH	**103.78 KM**

Table 1 and 2 gives the detail outline of the total length of the Road network in that particular stretch. On this particular road stretch certain length of road is elected based on the reconnaissance survey in order to understand and find out the best alternative for improvement. Complete stretch is surveyed and selected stretch details are identified based on the service it caters and alternative measures are been chosen for the same. Tables 3 and 4 gives us the details of the length of the selected stretch for overall improvement.

1.2 Details of selected stretch

After carrying out the study of the selected locations, only those affected area is analyzed with various field test.
Based on the level of the damage and present traffic conditions various alternative measures are proposed for improvement. Certain stretch it was recommended for reconstruction as well as restructuring. Based on the studies carried out in the field length of the road stretch selected is tabulated below.

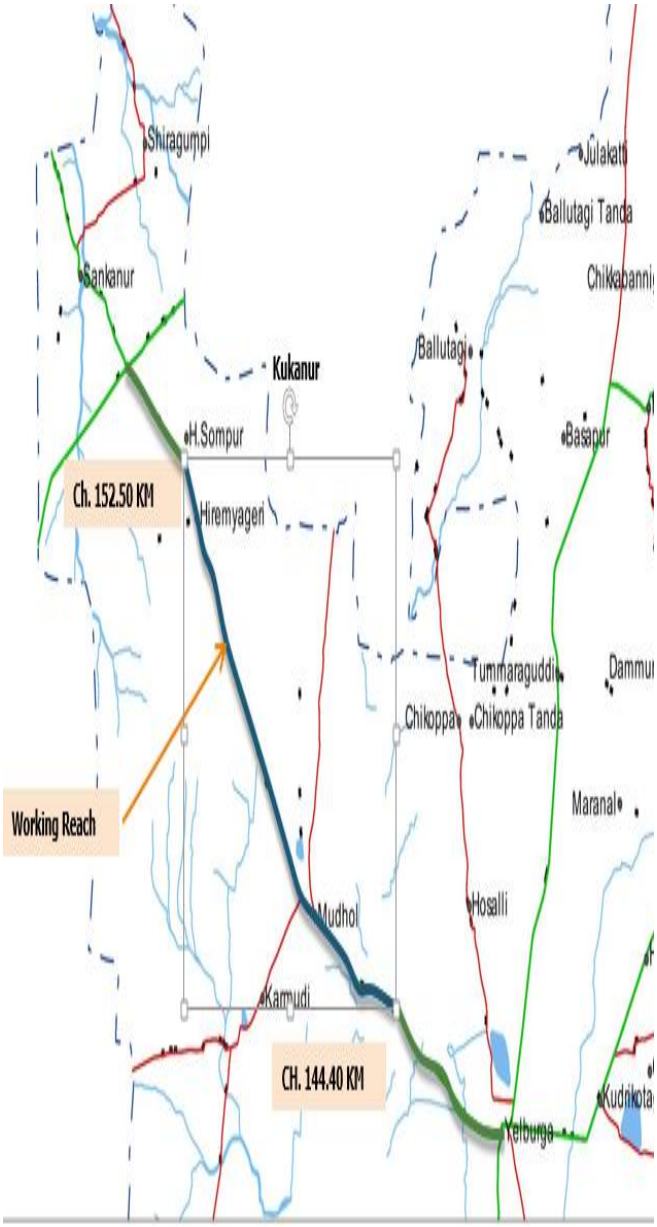

Fig-1: Map showing proposed stretch for improvement from ch.144.40km-ch.152.50km

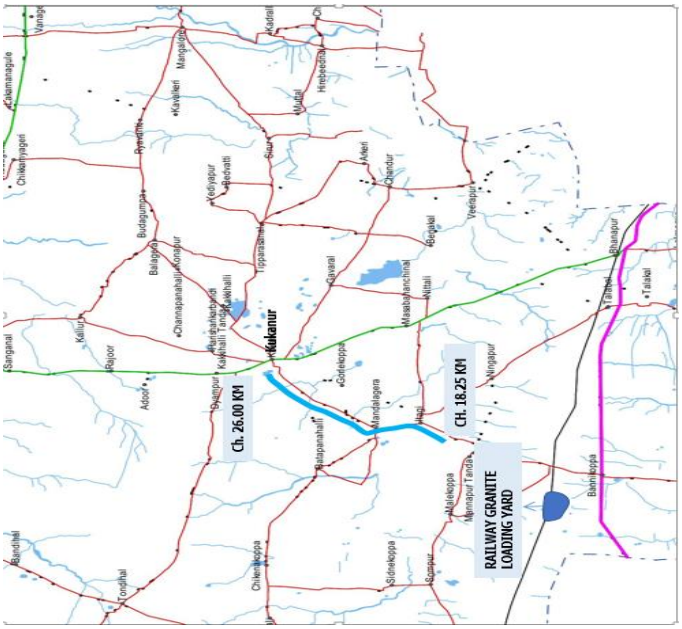

Fig-2: Map showing selected stretch from ch.18.25km to ch. 26.0 km

Table-3: Details of road length covered under the project

SL.NO	DETAILS	LENGTH
1	TOTAL LENGTH	8.10 KM
2	STARTING POINT NEAR MUDHOL	CH. 144.40 KM
3	END POINT NEAR HIREMYAGERI	CH. 152.50 KM
4	PROPOSED IMPROVEMENT	FROM CH. 144.40KM TO 152.50KM(4.60KM RECONSTRUCTION3.50KM RESURFACING)

Table-4: Road length chosen for improvement and resurfacing

SL.NO	DETAILS	LENGTH
1	TOTAL LENGTH	7.75 KM
2	STARTING POINT NEAR MANNAPUR	CH. 18.25 KM
3	END POINT AT KUKANUR	CH. 26.00 KM
4	PROPOSED IMPROVEMENT	FROM CH. 18.25KM TO 26.00KM

After carrying out survey the details of the findings are submitted to the PWD department to take a final call for the improvement of the project. Overall in a total length of 8.10Km, 7.75 Km was chosen for overall improvement and estimation of the overall work was calculated for the same

2. NECESSITY OF THE PROJECT

For both MDR and SH certain parameters quant essential to carry out improvement of the road. This road is important MDR road (Kavallor-Mangaloor road) starts from km. 0.00 in kavaloor village in koppal taluk and ends at kudremuthy cross at km. 50.00. In this road near Bannikoppa granite loading yard is situated, due to movement of heavy multi-axle granite Lorries from Bagalkot district to bannikoppa railway station, the riding surface was completely damaged. Due to continuous pressure from public & elected representatives the department has made efforts to repair the road with the intention of making it traffic worthy by utilizing the available funds during the last 3 years.

Duly observing the present condition, at some stretches normal repair & renewal is not a solution, hence reconstruction is taken, and remaining length is proposed for resurfacing for improve the riding quality. At present Rs. 5.0 crores has been sanctioned under appendix-e 5054 MDR improvements for the year 2017-18.

The existing road is of Intermediate lane having deteriorated bituminous surface, the existing crust is on an average 220 to 250mm WBM and 20mm Carpet, due to considerable increase in the traffic the improvement of crust is essential. Wherever the road has sunken considerably reconstruction is proposed and some reaches wherever asphalt surface is worn-out resurfacing is proposed. An Amount of Rs. 500 Lakhs is sanctioned under Appendix-E 5054 SH Improvements for the year 2016-17.

2.1 Important factors governing the traffic on project road (kavaloor – mangaloor).

Certain important factor found out during the study which effect the overall traffic and Road conditions are as follows:

1. Agricultural tractors & trucks
2. Granite trucks.

It was found out during study that certain major reason for the overall effect on the road condition was found out to be agricultural trucks and tractors. Which had hindered the overall traffic conditions of that stretch. It was also found out more number of granite truck was seen plying on this road and effecting the overall condition of the road structure.

Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

2.2 Important factors governing the traffic on project road (Raravi – Belur).

Major reason for overall effect on traffic in this particular stretch was:

1. Sand mining vehicles.
2. Agricultural tractors & trucks
3. Increased traffic intensity since last five years

Since the selected location is near to more number of agricultural fields and it was also observed that there was increase in traffic intensity due to sand mining in that particular stretch. Thus it leading to effect on the selected stretch.

3. EXISTING CONDITION OF THE ROAD

The existing condition of the road is severely damaged. The CBR considered for design of pavement is 4%.The existing road condition of the road taken due consideration and even crust is inspected for the proposed road. Once the necessity data was obtained in the field overall what best can be proposed is seen and recommended for the selected stretch of road.

Few roads stretch was effected beyond the resurfacing and restructuring was suggested. Cross section details are drawn as obtained in the field.

Fig-3: Existing condition of road at Ch.18.40 (Reconstruction)

Fig- 4: Existing condition of road at Ch.146.10 (Reconstruction)

Fig- 5: Existing condition of road at Ch.146.10 (Reconstruction)

Fig-6: Examination of road crust in the field

3.1 Details of the existing road cross section and proposed cross section

3.1.1 Improvement of Raravi- Belur road

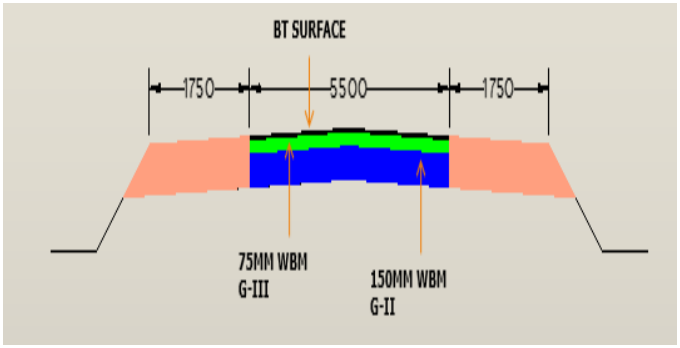

Fig- 7: existing road cross section (reconstruction in B.c soil)(ch. 144.40 to 146.80 km & 148.80 to 151.00 km)

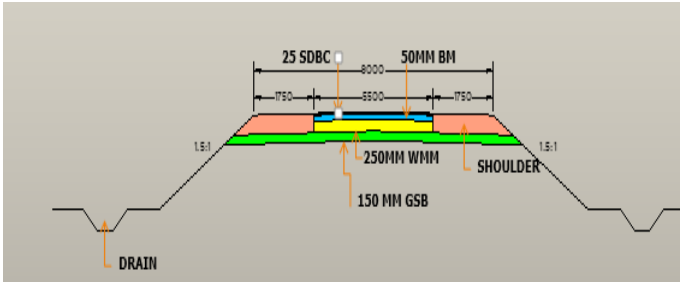

Fig-8: proposed cross section for reconstruction from ch.144.40-146.8 km and 148.80-151.00 km

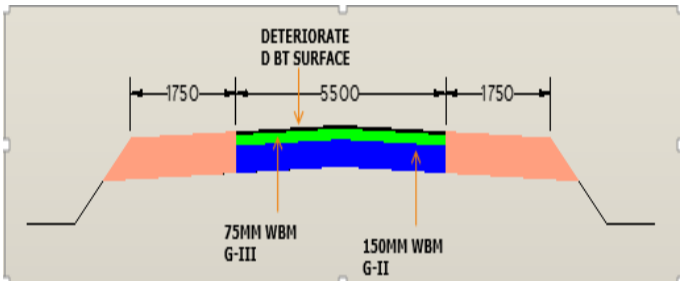

Fig-9: Existing road cross section (resurfacing in red soil)(Ch. 146.80 to 148.80 & 151.00 to 152.50 km)

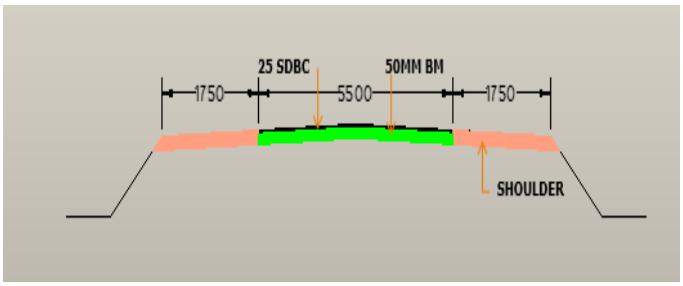

Fig-10: Proposed road cross section (resurfacing in red soil) (Ch. 146.80 to 148.80 & 151.00 to 152.50 km)

3.1.2 Improvement of kavloor – Mangaloor

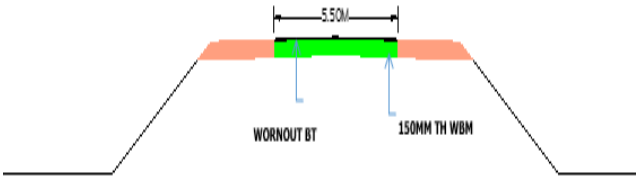

Fig- 11: Existing c/s of road (reconstruction) (Ch. 18.25 to 19.75km & 23.75 to 25.25 km)

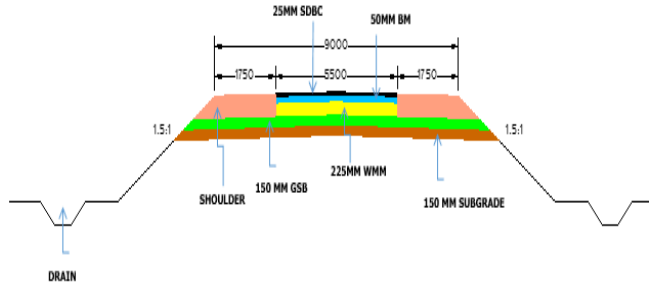

Fig-12: Proposed c/s of road (reconstruction) (Ch. 18.25 to 19.75km & 23.75 to 25.25 km)

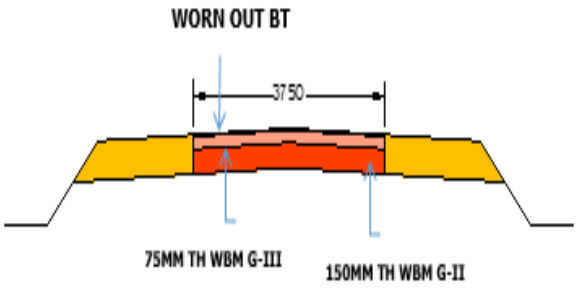

Fig-13: Existing c/s of road (resurfacing)
(Ch. 19.75 to 23.75 km)

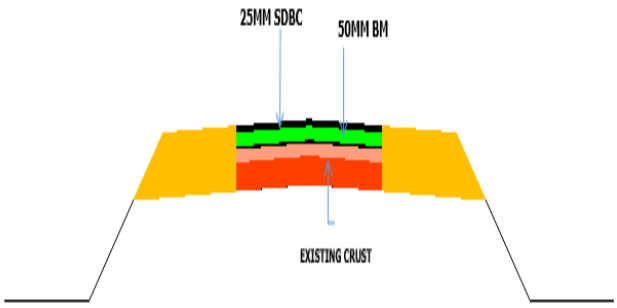

Fig-14: Proposed c/s of road (resurfacing)

4. DESIGN APPROACH AND PRESENT TRAFFIC DETAILS

Flexible pavement is designed as per IRC 37-2012, by taking into consideration vehicle composition and vehicle damage factor as well. Traffic volume count survey was carried out in order to find out various categories of vehicle for said stretch of road.

4.1.1 Traffic volume data of Raravi-Belur road

Table-5: Present traffic details of Raravi-Belur road

PCU	6153
NO. OF COMMERCIAL VEHICLES	938 CVPD
VDF	3.50

Table-6: Flexible pavement design data

COMMERCIAL VEHICLES	938 CVPD
DESIGN PERIOD	10 YEARS
VDF	3.50

4.2.2: traffic volume data of Kavaloor-Mangaloor road

Table-7: Present traffic details of Kavaloor-Mangaloor road

COMMERCIAL VEHICLES	1047CVPD
DESIGN PERIOD	10 YEARS
VDF	3.50

Table- 8: Details of pavement crust value of State highway

Pavement layer	Design crust	Existing crust	Proposed crust	
BC	40	-	SDBC	25
DBM	100	-	BM	50
Granular base	250	225	WMM	250
Granular sub base	300	-	GSB	150
TOTAL	**690**	**225**	**475**	

Table-9: Details of pavement crust value of major district road

Pavement layer	Design crust	Existing crust	Proposed crust	
BC	40	-	SDBC	25
DBM	90	-	BM	50
Granular base	-	225	WMM	-
Granular sub base	-	-	GSB	-
TOTAL	**130**	**225**	**75**	

5. OVERALL COST OF CONSTRUCTION AND REPRESENTATION OF WORK CARRIED OUT

Overall cost of construction as well as the other miscellous cost was also considered in estimation of overall cost of project. In this regard certain culverts and bridges were also needed do be repaired and widened hence it lead to increase of cost of project. Abstract of cost of both the project is nearly 5 crore for each project.

Table-10: Cost estimated for overall proposed project

PARTICULARS	AMOUNT IN LAKHS
ROAD COST	484.85
MISCELLANEOUS	15.15
TOTAL	**500.00**

Table-11: Abstract of coast estimated for MDR

PARTICULARS	AMOUNT IN LAKHS
ROAD COST	428.30
CULVERTS CONSTRUCTIONS & REPAIRS	50.30
MISCELLANEOUS	21.40
TOTAL	**500.00**

Further bar charts representing the overall work carried out in the selected stretch is plotted. This bar chart helps in identifying easily what best alternative work has been carried out for the said project.

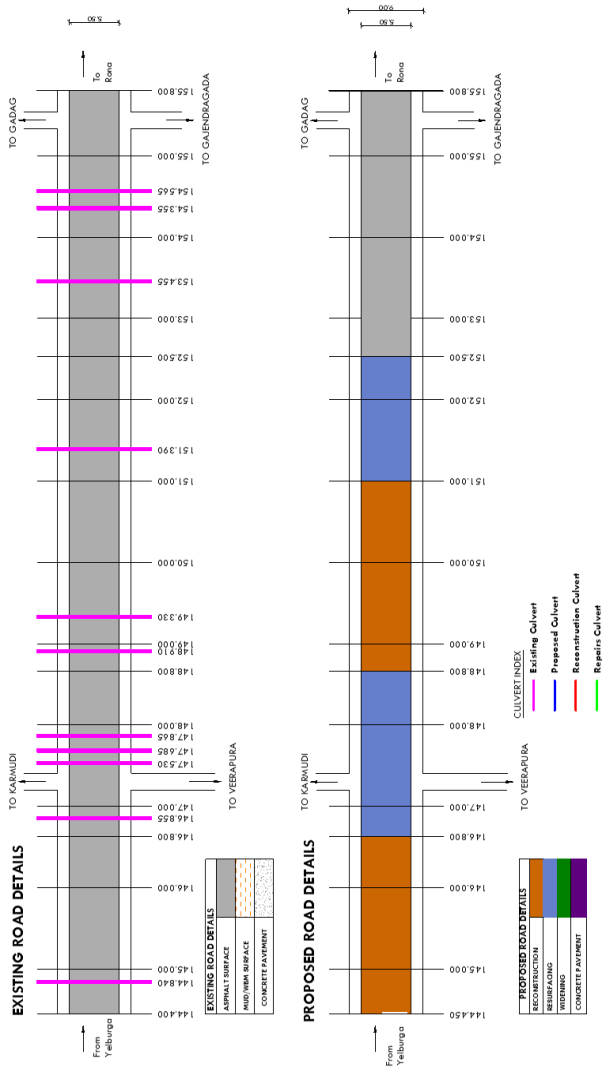

Chart-1: Bar chart exhibiting details of proposed work in selected stretch of road with repair of culverts as well

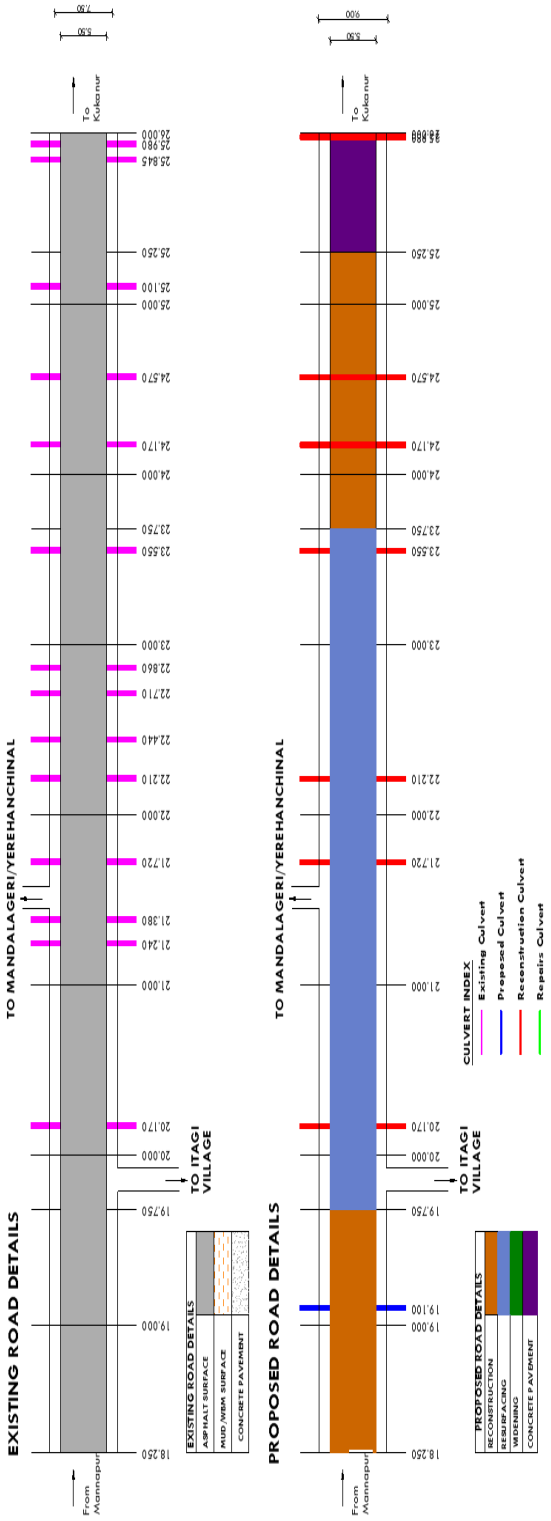

Chart -2: Bar chart exhibiting existing and proposed road details

6. CONCLUSION

Based on the work survey and data collection of the selected road network following conclusions can be drawn:

1. It was found out that presence of ample source of pink-granite in that particular area has led to increase in traffic volume
2. Due to presence of quarry pit in selected stretch it has led to movement of multiple axle vehicle ,which in turn has effected the overall life of the pavement
3. In MDR road CBR value of 5 % and 7% was obtained based on field test and same was utilized for deigning of flexible pavements using IRC37-2012
4. In case of state highway CBR value of 4% for embankment,8% for subgrade and 6% for overall
5. In case of state high design curst of (690mm), existing crust of (225mm) and proposed crust of (475mm) was obtained and adopted for selected stretch.
6. In case of MDR design curst of (130mm) , existing crust of (225mm) and proposed crust of (75mm) was obtained and adopted for selected stretch.
7. Based on the field experiment it was proposed that wet mix macadam and granular sub base was not suggested for MDR stretch.
8. Overall cost of reconstruction and restructuring of proposed project was found out to be 500 lakhs

ABBREVATIONS

CVPD: Commercial vehicles per day
WMM: Wet mix macadam
WBM: Wet bound macadam
GSB : Granular sub base
VDF : Vehicle damage factor
BC : Bituminous course
SH : State highway
MDR: Major district road

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BIOGRAPHIE

Mr. B. Vinayaka has completed BE (civil) and Mtech (Transportation engineering) from Reva college of engineering, Bangalore. He has received Gold medal from VTU, Belgaum. His area of interest is in the field of transportation engineering