



Review of Method of Maintenance of Flexible Pavement by White topping

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Abstract : In developing countries like India where traffic capacity and traffic load is increasing day by day due to huge increase in numbers of vehicles. Pavements due to excess fatigue deteriorate in short time which increases the demand of maintenance work or formation of new pavements. White topping can be termed as new rehabilitation technique for damaged flexible pavement. In this study performance evaluation of white topping on existing flexible pavement as per Indian conditions has been carried out. Inspection of existing flexible pavement is carried out and the faults in the pavement are observed and cause of the fault is also studied. To investigate their performance as per Indian traffic and climatic conditions various test such as road roughness test, compressive strength etc. and visual inspection analysis has been carried out on existing flexible pavement. Overlay design has been carried out in this study.

In this study merits and demerits of white topping have been studied for the view of effectiveness of white topping as per Indian conditions. Cost comparison of conventional method of maintenance work and white topping is carried out in this study.

Keywords: BBD, Flexible Pavement, FWD, Life cycle cost analysis, White topping.

❖ INTRODUCTION

For the development of country like India, Roads can be referred as backbone for social, economic, industrial and cultural development. In developing country like India road infrastructure plays an important role in the economic growth. In India every year a large percentage of budget is granted for transportation sector. Indian road network includes Rural Roads, Major District Roads (MDR), State Highways (SH) and National Highways (NH). As per National Highway Authority of India (NHAI), 80% of country's passenger traffic is carried out by road network. India has third largest network after United States and China. As of 2018, the total length of country's roads has been 5.89 million kilometres.

The largest road network consists of over 1,14,158 km (1.94%) of National Highways (NHs), about 1,75,036 km (2.97%) of State Highways (SHs), about 5,86,000 (9.94%) of Major District Roads and an informal network (Rural, Other District Roads etc.) running to an astounding 59,50,00 km. Among the roads of India, 98% of roads are paved with Hot Mix Asphalt (HMA) due to technical reasons. Concrete roads have advantage of better performance over conventional bituminous pavements like longer service life, maintenance free life, fuel saving, low life cycle cost, environmental benefits etc.

In developing country like India there is significant increase in the number of automobiles which is observed in the recent years, which increased the demand of construction of new roads and maintenance work and rehabilitation process of existing pavement. Existing pavements are subjected to damage due to the repetitive wheel loads as well as temperature effects and other environmental conditions. When techniques or methods are properly applied at the appropriate time, rehabilitation techniques significantly increase the total life of concrete and asphalt pavements. In huge amount of money is spent each year on

rehabilitation of existing roads. Observing these facts it is the need of time to come up with new innovative and economical technologies which may serve the country as an substitute for new construction or for strengthening of existing pavements.

❖ Problem Statement

The decay of existing flexible pavements arises due to the deformation under traffic loading which is mainly associated with stresses caused due to heavy commercial vehicles. Various defects such as rutting, shoving and wash boarding can be observed at the intersections. These types of defects in existing pavements are also observed in various places such as exit/access ramps, busy intersections, parking areas, bus stops and many places which are subjected to slow moving traffic and highways. Due to this decay of the surface of the asphalt pavements takes place and arises the need to rehabilitate or maintain the surface before any further damage occur.

To overcome the damage we use a method or technique called as white topping which can also be termed as concrete overlay. The use of a concrete overlay is a new concept in existing pavement rehabilitation or maintenance work in India, so there is a need for evaluation of this method and its performance. We can say that, refined methods of design and analysis of existing flexible pavements are required along with evaluation of performance with respect to Indian conditions. With the help of white topping huge amount of money can be saved so it is necessary to evaluate this method and cost comparison must be done.

❖ Objectives of the study

The main and most important objective of this study is the analysis of this method and evaluation of performance of white topping subjected to different traffic and climatic conditions subjected to Indian conditions. The objectives and scope of the study can be summarized as follows:

- To inspect and find the drawbacks in the literature of the evaluation of performance and analysis of white topping on existing flexible pavements.
- To check the structural stability of the existing flexible pavement and to carry out various checks on properties of soil.
- To study the advantages and disadvantages of white topping on existing flexible pavement.
- To check the performance of white topping for Indian traffic and environmental conditions.
- To conduct cost analysis and comparison of conventional white topping and Ultratech white topping to study their effectiveness with respect to cost.

❖ Research Methodology

Step-1 Study the background and previous work of white topping overlay on flexible pavements.

Step-2 Study the merits and demerits of white topping overlay with respect to Indian conditions.

Step-3 Detailed inspection of faults or defects of flexible pavement at specified locations.

Step-4 White topping overlay of damaged flexible pavements.

Step-5 Cost comparison of white topping overlay on flexible pavements with conventional method of maintenance work on pavement surface.

Step-6 Analysis of Results

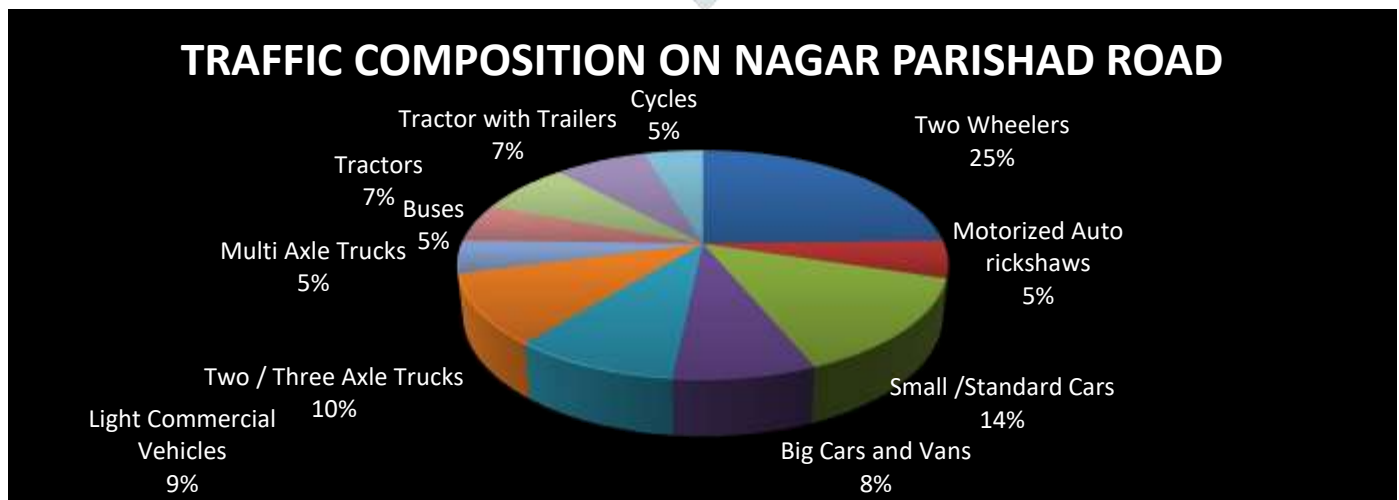
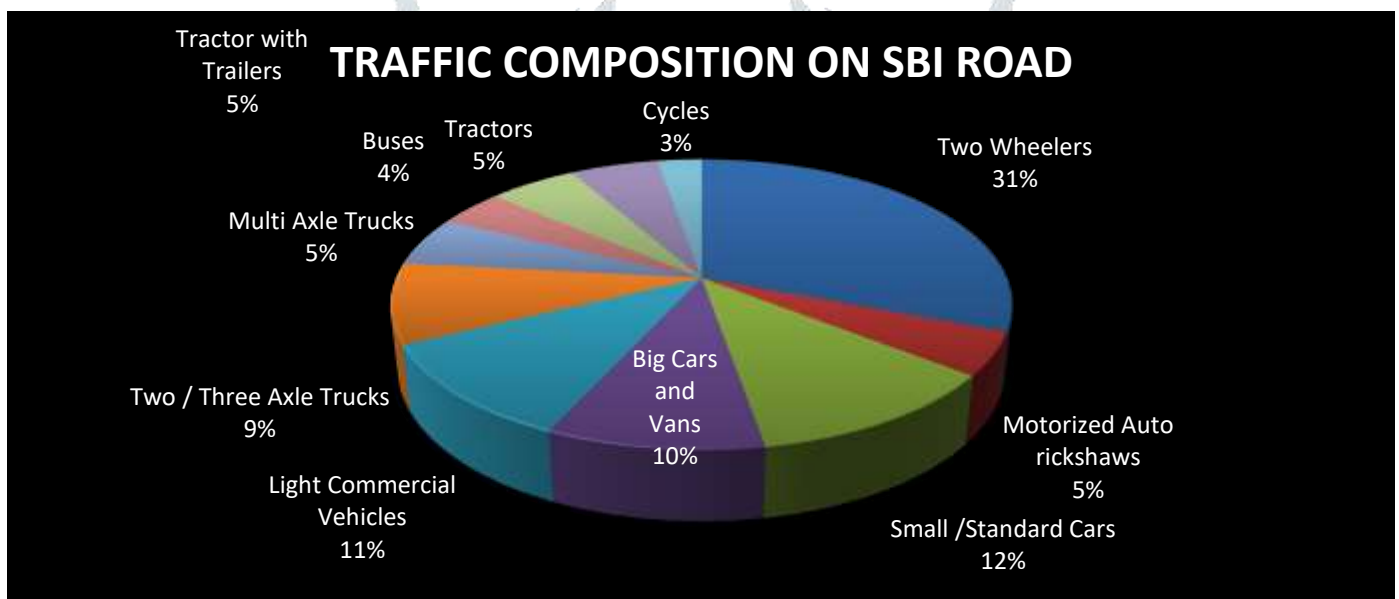
Step-7 Conclusion and Future Recommendation.

❖ Site Location

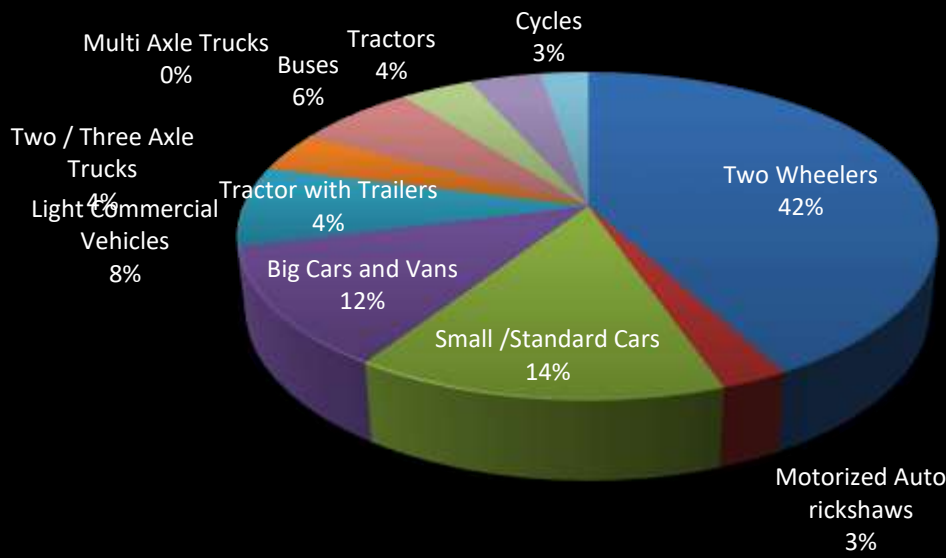


Fig.1 Map View of Site Location

❖ Traffic Survey



TRAFFIC COMPOSITION ON RAMPURI ROAD



TRAFFIC COMPOSITION ON MAYAWADI ROAD

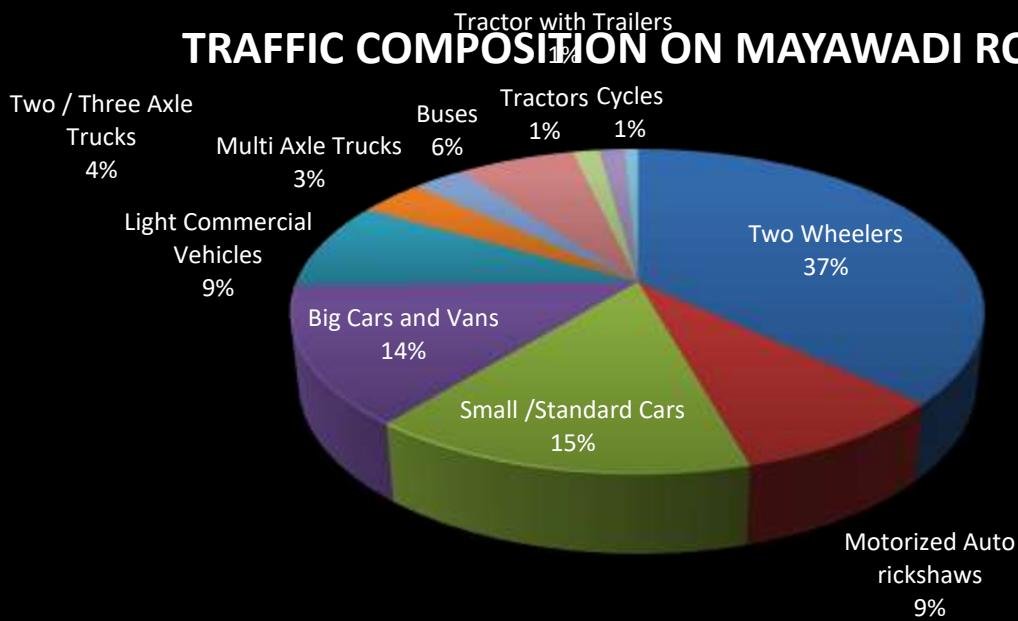


Fig 2. Traffic Survey Details

❖ Remarks On Road as Per PCI

S.N	Name of Road	Rating	Maintenance
1	SBI Road	Satisfactory	Resurfacing
2	Nagar Parishad Road	Fair	Resurfacing
3	Rampuri Road	Fair	Resurfacing
4	Mayawadi Road	Satisfactory	Resurfacing

Table 1. Remarks On Road as Per PCI

❖ Cost Comparison of Bituminous Overlay and White topping

S.N	Name of Road	Bituminous Overlay Thickness	Whitetopping Thickness	Life Cycle Cost of Bituminous Overlay Per Unit Length Per Year(in Lakhs)	Life Cycle Cost of White topping Per Unit Length Per Year(in Lakhs)	Total Saving	% Saving
1	SBI Road	100mm	120mm	17.12	13.46	3.66	21.38
2	Nagar Parishad Road	100mm	120mm	17.12	13.46	3.66	21.38
3	Rampuri Road	100mm	120mm	17.12	13.46	3.66	21.38
4	Mayawadi Road	100mm	120mm	17.12	13.46	3.66	21.38

Table 2. Cost Comparison of Bituminous Overlay and White topping

❖ Conclusion

The outcome of the study is that the use of white topping in place of new asphalt pavement is an environmental friendly and economical decision. The low traffic areas where heavy load vehicles are in less count the life of pavement can be increased in considerable amount by white topping. The site selected for the study work comes under the low traffic areas. We analysed the merits and demerits of white topping over a new pavement.

In our study the advantages which are observed of white topping over a new pavement is as follows:

Extension in Design life period of Road

There are various methods of maintenance of pavement out of which white topping is most effective method. With the help of white topping we can extend the life period of existing pavement. White topping comes under the category of maintenance work.

Reduces the total cost of pavement

Total cost of any pavement includes construction cost, maintenance cost and reconstruction cost. Cost of white topping is greater than the asphalt overlays but the service life of white topping is greater than asphalt overlays which do not requires cyclic maintenance which helps in reducing the total cost of pavement.

While comparing the cost of asphalt and concrete overlays we found that there is 20% of saving in white topping with the cost of concrete overlays.

Helpful in fuel saving

Asphalt overlays forms a visco-elastic surface which produces more deflection under heavy vehicle loads while thin white topping forms a rigid surface which produces less deflection which results in less fuel consumption of vehicles.

The site selected for the inspection work was completely replaced by a new pavement surface but if the existing pavement was maintained by white topping then the design life period of road gets increased considerably and there was saving in construction cost. Maintenance of existing pavement by white topping is an environmental friendly decision.

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