

Road Maintenance Management System

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ABSTRACT

India is one of the fastest developing country in the world, and India has 2nd largest road network in the world. Road network plays an important role in the transportation sector so this is right time to plan and prepare a maintenance system for that road network. In current practice's measurement of pavement distress is done by physical inspection only. If the cost of maintenance work is more than the cost of reconstruction of road then it is uneconomical. So the provision of an economical solution plan is required. This study deals with the measurement of distress quantity and distress severity to define the condition of road network in Sangli district as a study area. By analyzing this distress data the priority for the maintenance work for selected road network is defined and develops a maintenance system. Economic analysis of this maintenance work should be performed to differentiate economically in between maintenance work and reconstruction of the road. Road maintenance management system will be developed according to all this work.

I. INTRODUCTION

India is under developing country and to become a well-developed country all credit should be given to infrastructure sector which include highways, dams, bridges, flyovers, airports, sea-links. Transportation by using road network achieved a very important position in the overall transportation sector in India. India has 2nd largest road network in the world in which the part of rural road network is large. Population growth rate of the country is high so the percentage of road users increases. The road traffic is

tremendously increasing, 60% of all goods and 85% of all passengers are transported by using road network [15]. So more importance is now given to rural road network to make the main cities and rural area well connected. Indian economy will increase by rate of 6% per year after 20 years so Indian government planned 30 kilometers of road construction per day by taking future transportation need in consideration. In a developing country like India, transportation projects are undertaken upon the basis of initial cost of construction owing to the negligence of future costs (i.e. M & O costs) incurred in the entire life of the project. This has been done because of lack of funds from the government than the required in the development of infrastructure. Such decisions had led most of the infrastructure projects throughout the country in deteriorating condition or failure since they underestimate the necessary future uncertainties associated in the project. Road projects are one of the infrastructure projects that are facing such situation in recent era. Lots of funds have been accrued for such projects yet still the cost of maintenance and operation overweighs the initial construction costs. In construction management, if project cost will be low then it is not necessary this project should be most economic or perfect project. By taking the economical aspect of the project in consideration, many costs are appear during the service life of the project, in these costs following costs will be included, maintenance cost, operation cost, reconstruction cost, and at the end of the service life of the project demolition cost and salvage cost, which all are effective for the project. A project planning department should take into consideration that all the costs, at the time of studying the project.

II. LITREATURE SURVEY

1) Afaf Mahmoud, Hassan Y. Ahmed, Ayman M. Othman,” Deterioration of egyptian desert roads in al-minea district”

In this paper author done work on development on a deterioration model for roads in Egyptian deserts road. For the preparation of the model collect the data regarding to progressive deterioration stages of road surface. He took 10 road segments for the study each segment had length 500 meters. For all 10 segments current pavement condition index calculated and plotted against the time for each road, and he developed a deterioration prediction model for Egyptian desert roads.

2) Yogesh U.Shaha, S.S. Jainb, Devesh Tiwaric, M.K.Jaind, “Development of overall pavement condition index for urban road network”[20]

In this paper, author describes the evaluation of pavement performance done using pavement condition indicators and pavement condition indicator basic component of the pavement management system. The pavement maintenance management strategy decided over pavement condition index, present serviceability index, roughness index. In this paper, author did work on development of overall combined index for the Noida urban road network.

3) Ary Setyawana, Jolis Nainggolanb, Arif Budiarto, “Predicting the remaining service life of road using pavement condition index”

In this paper author described that there are various distress which causes the damage to pavement surface so the remaining service life of existing pavement is unpredictable. The aim of this paper is to evaluate the condition of the pavement and damages to calculate the remaining service life of

pavement. The pavement condition calculated according to ASTM procedure and deflection data ,air, temperature , surface temperature, ground water level measured with the help of falling weight deflectometer and the correlation between PCI value and remaining service life calculate into Microsoft excel program.

4) Bharath Boyapati, R. Prasanna Kumar,” Prioritisation of pavement maintenance based on pavement condition index”

The main objective of this research is a calculation of pavement condition index (PCI) by using field data collection and analyses this data to give priority to maintenance work on the pavement. Data regarding to patches, potholes, rutting, cracks, etc. collected for selected sections to measure the severity of distress. Corrected to deduct values are obtained by assigning importance to distress severity and pavement condition index is calculated.

5) Hakan Sahina, and Paul Narcisoa, and Narain Hariharan,“ Developing a five-year maintenance and rehabilitation (m&r) plan for hma and concrete pavement networks”

In this paper, the author describes steps involved in developing a multi-year pavement maintenance and rehabilitation (M&R) plan. These include: condition assessment, network inventory, identification of pavement sections requiring M&R, needs analysis; and impact analysis. In this research Texas university campus road network taken as a case study consist of 13.95 miles of roadway. The pavement condition index is calculated by the help of ASTM D-6433-07 and identified the road sections which required M & R. and cost effective M & R plan prioritized. Impact analysis used to determine impact of reduced budget.

6) Akhai Mudassar Mohammed Shafi, Ahmed Afaque Shakeel, and Siddesh Kashinath Pai,” Life cycle cost analysis of road pavements in rural areas”

In this paper author described about future need of road network in India. According to author we are behind the actual plan of constructing the road network. In this paper he described about total cost of construction required for flexible and rigid pavement for per meter square. Also cost of maintenance for flexible and rigid pavement is calculated by using PMGSY report for year 2016. According to him cost of construction of rigid pavement is 20%-25% greater than flexible pavement.

Consequently, groups where members are allowed to express high level of relationship conflict, the work productivity dwindles.

III. PROPOSED SYSTEM

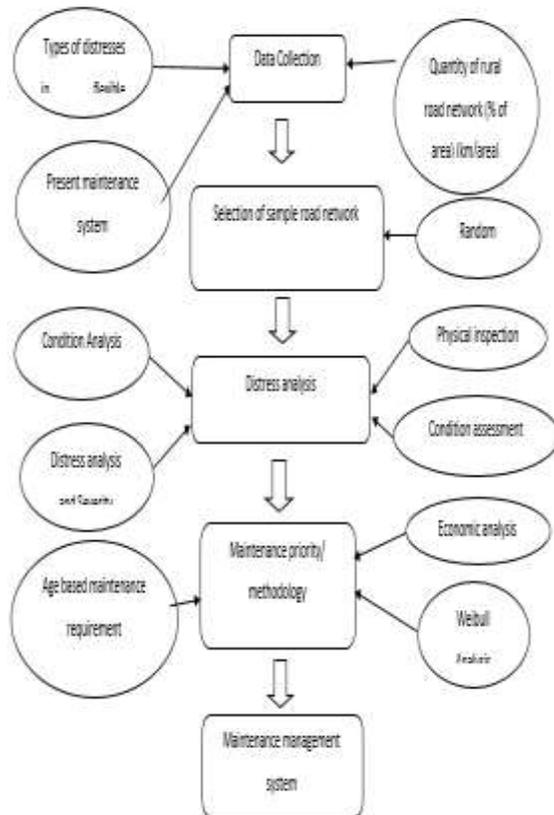


Figure 1 Proposed System

The work carried out to achieve the research objectives is discussed in methodology chapter. Stepwise procedure to achieve all objective has been discussed in Figure 1 of methodology and what data

is required to fulfill the need of objective and collection of primary and secondary data from various sources is also explained in the methodology.

IV. CONCLUSION

The PMMS will help in the assessment of financial need, to develop a maintenance strategy, and also help to give priority to the maintenance work. In this situation, development of an effective PMMS would provide proper information, helpful analysis and most cost-effective decisions which will help in the preservation of the road networks. PMMS is a tool which will help to take management decisions. PMMS predicts the future deterioration of pavement due to traffic, weather and recommends maintenance and repair plan according to type and age of pavement section. This project aim is to develop the PMMS which will be based on following parameters such as material management, inspection of the road network, condition assessment of road network, condition analysis against the distresses, maintenance work planning

References

1. Sreedevi BG. Study on The Performance of Flexible Pavements on Mature Soil Sub grades. Thesis Doctor of Philosophy in Faculty of Engineering. 2014; p. 1-318.
2. IRC: 81-1997. Guidelines for Strengthening of Flexible Road Pavements using Benkalman Beam Deflection Technique. Indian Roads Congress (IRC). 1997; p. 1-36.
3. IRC: 82-1982. Code of Practice for Maintenance of Bituminous Surface of Highways. Indian Roads Congress (IRC). 1982.
4. Building & Construction Engineering Department. Highway and Bridge Branch Forth Class. Flexible Pavement Distress. Highway Maintenance. 2001; p. 1-36.
5. Sun L, Gu W. Pavement Condition Assessment Using Fuzzy Logic Theory and Analytic Hierarchy Process. Journal of Transportation Engineering, ASCE. 2011; 137:648-55. Crossref.
6. Bianchini A. Pavement Maintenance Planning at the Network Level with Principal Component Analysis.



Journal of Infrastructure Systems. 2014; 20(2):1-7.
Crossref.

7. Al-Hassan MS. Factors affecting quality of pavement construction in Saudi Arabia. Thesis Doctoral dissertation, Dept of Construction Engineering and Management, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia. 1993.