PERFORMANCE EVALUATION AND DETERMINATION OF PAVEMENT CONDITION INDEX (PCI) OF FLEXIBLE PAVEMENT

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ABSTRACT

In India, the growth of road traffic in the post-Independence era has been quite unprecedented, both in terms of goods and passenger traffic. The vehicular traffic has increased manifolds from 0.3 million to 45 million during the period 1951-2001. But unfortunately, the growth in the road network has not been commensurate with the huge growth in vehicular population, which has increased from 0.4 million km to just 3.3 million km, during the same period. Thus, there is a need of developing a scientific approach towards determining the maintenance and rehabilitation requirements of pavements. The development and practice of an efficient Pavement Management System (PMS) would provide objective information and useful analysis to ensure consistent and cost-effective decisions related to preservation of the highway network. The objective of this research work is to describe the development of a Pavement Management System (PMS) for an identified National Highway (NH) network in India. This PMS has been necessitated to assist the engineers responsible for maintaining the NH network, as well as the authorities responsible for allocating funds, in making consistent and cost effective decisions, related to maintenance management of the NH network. The internationally recognized Highway Development and Management System (HDM-4), has been customized and used to predict future economic, and technical outcome of possible investment decisions concerning maintenance management of the NH network. The pavement deterioration models incorporated in HDM-4 have been calibrated and adapted to local conditions. An unconstrained works programme has been prepared for an analysis period of 10 years and the total budget requirements for maintaining the NH network at a pre-defined maintenance serviceability level have been determined. An optimized and prioritized works programme has also been prepared to maintain the NH network within the available budget. The effects of reducing budget levels, and deferring maintenance works on the condition of the highway network will also be taken into consideration. From the various given alternatives of M & R strategies, the optimum M & R strategy will be chosen based on the life cycle cost, maintenance and budget constraints.

Keyword: - *Pavement Management System, Maintenance, Rehabilitation, etc..,.*

1. INTRODUCTION

Transportation Engineering is the application of technology and scientific principles to the planning, functional design, operation and management of facilities for any mode of transportation in order to provide for the safe, efficient, rapid, comfortable, convenient, economical and environmentally compatible movement of people and goods. Transportation engineering, as practiced by civil engineers, primarily involves planning, design, construction, maintenance, and operation of transportation facilities. The basic modes of transport are by land, water and air. Land has given scope for development of road and rail transport. Water and air have developed waterways and airways respectively. Apart from major modes of transportation other mode include pipelines, elevators, cable cars, etc.., The four major modes of transportation are roadways or highways, railways, waterways and airways. Roads play a very important role in the transportation of goods and passengers for short and medium distances. It is comparatively easy and cheap to construct and maintain roads. Road transport system establishes easy contact between farms, field, factories, and markets and provides door to door service. Roads act as great feaders to railways. Without good and sufficient roads, railways cannot collect sufficient produce to make their operation possible. Roads can negotiate high gradient and sharp turns which railways cannot do. As such, roads can be constructed in hilly areas also.

1.1 Highway Pavement

Pavement is the actual travel surface especially made durable and serviceable to withstand the traffic load commuting upon it. Pavement grants friction for the vehicles thus providing comfort to the driver and transfers the traffic load from the upper surface to the natural soil. The function of pavement is to transfer load from surface to subgrade. Pavement evaluation is classified as flexible pavement and rigid Pavement. Pavements which reflect the deformation of subgrade and the subsequent layers to the surface. Flexible, usually asphalt, is laid with no reinforcement or with a specialized fabric reinforcement that permits limited flow or repositioning of the roadbed underground changes. It has four layers such as surface course (wearing course), base course, sub-base course and sub-grade. The rigid characteristic of the pavement are associated with rigidity or flexural strength or slab action so the load is distributed over a wide area of subgrade soil. Rigid pavement is laid in slabs with steel reinforcement. Rigid pavements are composed of a PCC surface course. It has three layers such as surface course, sub-base course and subgrade.

1.2 Pavement Failures

Pavement fail prematurely because of many factors. When boiled down to basics, there are four primary reasons pavement fail prematurely. The failure may be done in design, construction, materials and maintenance. The typical failures in flexible pavement includes alligator cracking, consolidation of pavement layers, shear failure, longitudinal cracking, frost heaving, reflection cracking, formation of waves and corrugation.

1.3 Pavement Maintenance

Pavement maintenance is a treatment of road defects. The first step in maintenance of pavement is collection of information about defects. Some defects are environmental related defects and some are traffic induced. Maintenance programs can be classified according to the time of carrying out the maintenance operations as routine maintenance, periodic maintenance, extra ordinary maintenance. Engineering studies have determined that there are preferred strategies for the different levels of pavement deterioration. As a pavement ages and the amount of deterioration increases, the strategy changes. When the pavement is in a good condition, relatively inexpensive preventive maintenance treatments are cost-effective. When the pavement reaches the end of its design life, expensive reconstruction will be necessary. In general, there are four maintenance/repair strategies that should be considered for road surfaces.

1.4 Experts in Pavement Management

The development of expert system, a new information technology derived from artificial intelligent research, in the area of pavement management has been in existence since a few decades ago. It was developed to simulate or reproduce intelligent problem solving behaviour in a computer program. The application of expert system for this area is growing rapidly due to reduction in pavement budgets. These systems are designed to provide a structured and comprehensive approach to pavement management. They assist decision makers in finding strategies for providing and maintaining pavements in a serviceable and safe condition at the most possible cost effective way. The various expert systems are Paver and Micro Paver, PMAS, Rose, SCEPTURE etc.., However, in the present study, HDM-4 is used.

2. NEED FOR STUDY

The vehicular traffic has increased manifolds from 0.3 million to 45million during the period 1951-2001. But unfortunately, the growth in the road network has not been commensurate with the huge growth in vehicular population, which has increased from 0.4 million km to just 3.3 million km, during the same period. National Highways (NH) constitutes the primary system of road transportation in the country. These highways constitute less than 2 percent of the total road length, but carry about 40 percent of total road traffic. The traffic axle loadings have also been much heavier than the specified limit of 10.2 tonnes. Consequently, the existing highway network is being heavily stressed, resulting in accelerated deterioration of road pavements leading to their premature failure. But the maintenance and rehabilitation measures of pavements are based on subjective judgment and past experience of the highway engineers only. Therefore, there is a need of developing a scientific approach towards determining the maintenance and rehabilitation requirements of pavements. The development and practice of an efficient Pavement Management System (PMS) would provide objective information and useful analysis to ensure consistent and cost-effective decisions related to preservation of the highway network.

3. OBJECTIVES OF THE RESEARCH

The objectives of this research work are:

(i) To develop the performance evaluation models of the proposed stretch.
(ii) To determine the pavement condition index (PCI) through field collection data and
(iii) To prioritize the maintenance of pavement and to estimate the future corrective actions.

4. RESEARCH METHODOLOGY

The research methodology includes the selection of the highway stretch. It is followed by the assessment of various distresses in the proposed stretch is to be determined to divide the selected stretch into various sub-sections. Then, the necessary data has to acquired and collected which includes distress data, traffic volume data, maintenance cost data. The pavement condition index of the highway stretch has been determined using the collected data. The HDM-4 software has to be calibrated for the analysis of M&R strategies. Then, the pavement deterioration models has to be developed. The base alternative, alternative 1 and alternative 2 of M&R strategies has to be prepared and analysed. The life cycle cost analysis has to be done in order to determine its life period of the pavement. The budget optimization and prioritization has to be prepared for constrained and unconstrained programme. The selection of optimum M&R strategy has to be done based on the software analysis.

5. SELECTION OF HIGHWAY STRETCH

The highway stretch which has been identified for the present study is the National Highway 67 which is from the Nagapattinam – Needamangalam. It covers 54 kms. The stretch NH 67 covers Nagapattinam to Needamangalam via Sikkal, Athipuliyur, Kidarankondan and Thiruvarur. The National highway 67 is a main state highway from Nagapattinam – Needamangalam via Thiruvarur. This is the national highway that gets connected to many local roads. The selected highway stretch is divided into various sections for the study. The national highway NH 67 covers 54 kms from Nagapattinam to Needamangalam via Sikkal, Athipuliyur, Kizhvelur, Kidarankondan and Thiruvarur. The type of pavement on the selected stretch is flexible type. Carriageway width of the stretch is 7.5 m with paved shoulder for 1.5 m on both the sides. The number of lanes of the selected stretch is two. The flexible pavement has five layers. The bottom layer of the pavement consists of subgrade for 500 mm, followed by granular sub-base for 250mm in two layers as (125 + 125) mm. Then, GSB is followed by Wet Mix Macadam for 250 mm in two layers as (125+125), and followed to Dense Bituminous Macadam for 75 mm. At last, the top layer consists of Bituminous Concrete (BC) for 40mm. The selected highway stretch of 54 kms has been divided into different sections based on the landmarks of the stretch.

6. FIELD TRAFFIC SURVEY OF THE STRETCH

Traffic volume is defined as the no. of vehicles crossing a particular cross section per unit time. It is measured in vehicle per minute, vehicle per hour and vehicle per day. In order to express the traffic flow on a road per unit time, it is necessary to convert the flow of the different vehicle classes into a standard vehicle class known as Passenger Car Unit (PCU). The traffic volume is dynamic and varies during 24 hours of the day. Daily traffic volume varies on different days of a week and different months and seasons of the years. Traffic surveys aim to capture data that accurately reflects the real-world traffic situation in the area. Traffic survey has been conducted on an identified highway stretch to calculate the Annual Average Daily Traffic (AADT). Survey has been conducted at peak hours of the day so that we can find approximately the number of vehicles passing the stretch. The field survey is done on the selected highway stretch. The survey includes traffic survey, distress survey and deflection survey. There are many methods for traffic survey. In this project, the Origin & Destination method of traffic survey is used. The first stretch has highest motorized AADT value of 4500 and non-motorized value of 38. The annual average growth rate of the various types of vehicles has been calculated using the obtained AADT and the last recorded AADT values. These values have been calculated for both motorized and non-motorizd vehicles. It has been tabulated for motorized vehicles as follows:

Table-1: Annual Average Growth Rate of Vehicles

Sl.No	Vehicle Type	Compositionof Traffic Flow (%)	Annual Avearage Growth rate (%)
1	Bus	17.33	11
2	Light Commercial Vehicles (LCV)	4.28	10
3	Heavy Commercial Vehicles (HCV)	21.58	7
4	Medium Commercial Vehicles (MCV)	6.42	10.7
5	Passenger Cars	16.26	11.5
6	Motorcycles & Two Wheelers	34.13	24

7. FIELD DISTRESS SURVEY OF THE STRETCH

Failures in flexible pavements can be due to failure of its component layers which undergo distress due to various causes. Instability in any of the layers will result in the complete failure of the pavement system. This makes it necessary to construct each layer with utmost care and precision. There are different types of failures in flexible pavements. The major flexible pavement failures are fatigue cracking, rutting, and thermal cracking. The fatigue cracking of flexible pavement is due to horizontal tensile strain at the bottom of the asphaltic concrete. The failure criterion relates allowable number of load repetitions to tensile strain and this relation can be determined in the laboratory fatigue test on asphaltic concrete specimens. Rutting occurs only on flexible pavements as indicated by permanent deformation or rut depth along wheel load path. Major distresses that are found in the stretch are potholes, longitudinal cracking, alligator cracking, rutting, depression, edge cracking and transverse cracking. The following distresses have been identified in the selected stretch:

Fig-1: Alligator Cracking

Fig-2: Transverse Cracking

Fig-3: Potholes

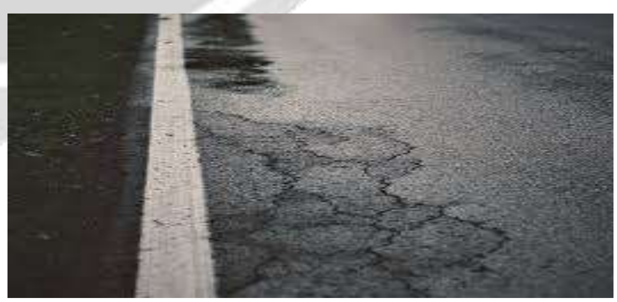

Fig 4: Edge Cracking

7.1 Evaluation of Pavement Distresses

Damage and deterioration of pavements will occur as a result of traffic, pavement and climatic and environmental factors. These factors cause surface distress, consolidation or shear developing in sub grade, sub base or surface. The deterioration of a pavement is also apparent by various external signs and indicators called distress. Generally the pavements are fall into either cracking, Distortion or Disintegration. The functional failure causes distress in pavement surface resulting in cracks, depressions, rut formations and poor riding quality. The distresses in the selected flexible pavement has been identified and its dimensions has been determined using various basic linear measurements. The measured distresses are tabulated as follows:

Table-2: Distress Data-I

SECTION ID	TYPES OF DISTRESSES			
	POTHOLES		LONGITUDINAL CRACKING	
	Diameter (m)	Thickness (cm)	Length (m)	Thickness (cm)
SECTION 01	2.3	5.01	13.2	2.4
SECTION 02	2.8	4.2	11.3	1.16
SECTION 03	2.15	5.08	15.18	2.17
SECTION 04	1.86	3.9	12.8	2.5
SECTION 05	2.2	4.01	12.71	2.73
SECTION 06	1.1	5.1	13.8	3.2
SECTION 07	-	-	14.4	2.6
SECTION 08	1.6	3.0	13.3	2.4

Table-3: Distress Data-II

SECTION ID	TYPES OF DISTRESSES			
	ALLIGATOR CRACKING		RUTTING	
	Length (m)	Breadth (m)	Length (m)	Breadth (m)
SECTION 01	7.6	2.3	8.4	2.1
SECTION 02	8.4	3.3	11.3	2.0
SECTION 03	11.89	1.79	10.97	1.45
SECTION 04	10.5	3.69	12.15	1.23
SECTION 05	8.1	3.52	15.23	4.35
SECTION 06	6.5	1.1	-	-
SECTION 07	9.4	1.9	-	-
SECTION 08	8.6	1.4	14.5	3.2

Table 4: Distress Data-III

SECTION ID	TYPES OF DISTRESSES					
	DEPRESSION		EDGE CRACKING		TRANSVERSE CRACKING	
	Length (m)	Breadth (m)	Length (m)	Thickness (cm)	Length (m)	Thickness (cm)
SECTION 01	13.6	2.4	13.2	2.1	4.4	2.3
SECTION 02	14.3	3.2	9.4	1.9	-	-
SECTION 03	-	-	5.1	2.17	3.9	2.35
SECTION 04	12.41	1.88	5.02	2.7	3.06	1.97
SECTION 05	14.16	2.36	17.53	2.36	4.45	1.7
SECTION 06	11.1	1.8	8.3	1.8	-	-
SECTION 07	10.3	0.9	-	-	8.4	3.0
SECTION 08	11.0	1.4	14.2	1.4	4	1.4

7.2 Structural Evaluation of the Stretch

Pavement performance is a function of its relative ability to serve traffic over a period of time. Pavement evaluation is carried out to determine the existing condition of pavements in terms of its surface and structural adequacy. Evaluation of in service pavements is very vital for keeping them in good serviceable condition. The magnitude of pavement rebound deflection is an indicator of the ability of the pavement to withstand traffic loading. Higher the rebound deflection, poor is the structural capacity and performance. The practice is to use the Benkelman Beam deflection (BBD) method for evaluating the structural condition of the flexible pavement. This test procedure covers the determination of the rebound deflection of a pavement under a standard wheel load and tyre pressure, with or without temperature measurements.

Table-5: Average Rebound Deflection of the Stretch

Sl.No.	SECTION ID	AVERAGE DEFLECTION VALUE (mm)
1	SECTION 01	0.07
2	SECTION 02	0.28
3	SECTION 03	0.47
4	SECTION 04	0.33
5	SECTION 05	0.56
6	SECTION 06	0.56
7	SECTION 07	0.24
8	SECTION 08	0.70

8. PAVEMENT CONDITION INDEX

The Pavement Condition Index (PCI) is a numerical index between 0 and 100 which is used to indicate the general condition of a pavement. It is widely used in transportation civil engineering. It is a statistical measure and requires manual survey of the pavement. The method is based on a visual survey of the number and types of distresses in a pavement. The result of the analysis is a numerical value between 0 and 100, with 100 representing the best possible condition and 0 representing the worst possible condition. PCI is an evaluation process which is determined according to the procedures contained in ASTM D 5340 and it is adopted worldwide for measuring the condition of the pavements by considering the functional parameters with the significance of structural performance. Occasional maintenance on the same pavements will exhibit variations in performance levels with time and it can also be used for prediction of present condition of pavements. In this study, the distresses which are conceived to reflect the pavement Condition are cracked area (%), patched area (%). In order to the find pavement condition based on these distresses, it is necessary to assign weightages to the different types of distresses, according to their severity levels. The weightages should be assigned/allotted to all types of distress considering the severity levels and its extent. Based on that weightages, acceptability levels are calculated. The acceptability levels of distresses are calculated using:

$$\text{Cracked Area} = e^{(0.0137 - 0.024\ CRA)}$$
$$\text{Patched Area} = e^{(0.155 - 0.0398\ PA)}$$
$$\text{Rut Depth} = 1.03952 - 0.0351\ (RD)$$
$$\text{Potholes} = e^{(0.073 - 0.077\ PT)}$$

Where, CRA = Crack Area in %, PA = Patch Area in %, RD = Rut Depth in mm, PT = Area of Potholes in %. The following are the acceptability levels for studied sections and the acceptability levels for Nagapattinam – Needamangalam.

Table-6: Acceptability Levels

Type of Distresses	01	02	03	04	05	06	07	08
Cracks	0.12	0.56	0.34	0.75	0.82	0.12	0.62	0.35
Patches	0.74	0.68	0.75	0.75	0.75	0.74	0.73	0.85
Potholes	0.97	1.00	1.00	1.00	0.95	0.97	0.94	0.96
Ruts	0.81	0.71	0.72	0.60	0.50	0.70	0.75	0.80

8.1 Determination of Deduct Values

Deduct values are those which states the present condition of the pavements i.e., the quantity of the distress a pavement has encountered. Deduct values are calculated for every kilometre for all types of distress. Deduct values can be calculated by multiplying the percentage of distress and weight of severity level of distress Weightage Deduct value = Weight of severity level of distress x percentage of distress. Total Deduct Values (TDV) are also to be calculated for each section and the summing of all the deduct values will gives the TDV.

8.2 Determination of PCI Values

The (PCI) is a numerical representation of existing pavement condition which is related to the pavement surface condition and its integrity. The PCI is a function of type, severity, extent and density of distress. It is impossible to find the PCI in any case if any of the distresses are neglected. PCI is meant to provide a basis for determining maintenance and rehabilitation needs and priorities for pavement. The pavement condition index (PCI) is given as PCI = 100 – CDV Where CDV = corrected deduct value. Generally the PCI ranges from 0 to 100, in which a score of 100 represents a pavement in good state which is having more rider comfort ability and a score of 0 represents a pavement in worst/poor state. PCI values for all the selected pavement sections have been determined. The following table shows the PCI values of distinct pavement sections along with TDV and CDV for all study sections and the calculated TDV, CDV and PCI are as follows:

Table-7: Estimated PCI Values

Sl.No	SECTION ID	TDV	MCDV	PCI	PCI RATING
1	SECTION 01	47	46	54	Fair
2	SECTION 02	52	54	46	Fair
3	SECTION 03	50	52	48	Fair
4	SECTION 04	47	46	54	Fair
5	SECTION 05	55	53	47	Fair
6	SECTION 06	50	56	44	Fair
7	SECTION 07	53	57	43	Fair
8	SECTION 08	74	76	24	Very Poor

From the above calculated PCI values, it has been found that the section NH 6708 has very poor PCI value and hence occupy this category. This section needs immediate maintenance or rehabilitation.

9. ANALYSIS USING HDM-4

The Highway Development and Management system (HDM-4) is a new international standard assisting pavement managers to predict future economic, technical, social and environmental outcome of possible investment decisions concerning maintenance management of pavements. The HDM-4 system assists pavement managers in making effective investment choice at all management levels. The possibilities range from policy or strategic planning studies, through programmed allocation of funds to maintenance or improvement works on a network, to the detailed economic assessment of investment options at the project level. A more comprehensive type of evaluation based on HDM-4 is a network evaluation, which assesses an entire road network to help decision makers in their strategic planning of road investments and/or the definition of a rational road works program, with or without budget constraints. The HDM-4 allows the users to carry out three types of analyses. They are Strategy Analysis, Programme Analysis and Project Analysis. Strategy Analysis deals with the concept of strategic planning of medium to long term road network expenditures requires that a road organization should consider the requirements of its entire road network asset. Thus, strategy analysis deals with entire networks or sub-networks managed by one road organization. Programme Analysis deals primarily with the prioritization of a defined long list of candidate road projects into a one-year or multi-year work programme under defined budget constraints. It is essential to note that here, we are dealing with a long list of candidate road projects selected as discrete segments of a road network. Project Analysis allows the users to assess the physical, functional and economic feasibility of specified project alternatives by comparison against a base case, or a without-project alternative. The analyses have been done as per Indian Standards. The key processes of analysis are the life cycle costing of pavement structural performance, prediction of road deterioration, estimation of road user costs (vehicle operating costs, travel time and accidents), modelling of road works effects and the costs of these to the road administration, calculation of economic or financial benefits from comparisons of the project alternatives. The aim is to determine which project alternative is most cost-effective. Thus, the base alternative, alternative 1 and alternative 2 are assigned for each identified sections are as follows:

Table-8: Maintenance & Improvement Standards for Sections

SECTION ID	BASE ALTERNATIVE	ALTERNATIVE 1	ALTERNATIVE 2
SECTION 01	M - Crack sealing, Routine Maintenance I – Lane addition, Partial Widening	M - Crack Sealing I – Lane addition	M - Routine Maintenance I – Partial Widening
SECTION 02	M - Periodic Maintenance, Crack sealing + Pothole Patching I – Lane addition, Partial Widening	M - Periodic Maintenance I – Lane addition	M - Crack sealing + Pothole Patching I – Partial Widening
SECTION 03	M - Routine Maintenance, Edge Repair I - Lane addition, Partial Widening	M - Routine Maintenance I – Lane addition	M - Edge Repair I – Partial Widening
SECTION 04	M - Routine Maintenance, Periodic Maintenance I – Lane addition, Partial Widening	M - Routine Maintenance I – Lane addition	M - Periodic Maintenance I – Partial Widening
SECTION 05	M - Periodic Maintenance, Crack Sealing I - Lane addition, Partial Widening	M - Periodic Maintenance I - Lane addition	M - Crack Sealing I – Partial Widening
SECTION 06	M – Milling + Replace, Overlay 50 mm I – Partial Widening	M – Milling + Replace I – Partial Widening + Reconstruction	M - Overlay 50mm I - Lane addition

SECTION 07	M - Periodic Maintenance, Crack Sealing I - Lane addition, Partial Widening	M - Periodic Maintenance I - Lane addition	M - Crack Sealing I – Partial Widening
SECTION 08	M – Milling + Replace, Overlay 50 mm I – Partial Widening	M – Milling + Replace I – Partial Widening + Reconstruction	M - Overlay 50mm I - Lane addition

10. RESULTS AND DISCUSSIONS

From the above analyses, it is clear that some of the defined M&R strategies have satisfied the basic functional requirements of the stretch but some of the defined strategies does not meet the functional requirements. The best alternative is obtained by comparing all the three alternatives against each other with the defined maintenance and improvement standards. The defined maintenance and improvement strategies are almost similar because the selected stretch has the minimum length of 54 kms and it has the same condition for the entire stretch.

Table-9: Descriptionof Best Alternative Section

SECTION ID	BEST ALTERNATIVE	DESCRIPTION OF BEST STRATEGY
SECTION 01	Base alternative	M – Crack Sealing, Routine maintenance I – Lane addition, Partial Widening
SECTION 02	Alternative 1	M – Crack Sealing I – Lane addition
SECTION 03	Alternative 2	M – Crack Sealing, RM I – Lane addition, Partial Widening
SECTION 04	Alternative 1	M – Crack Sealing, RM I – Lane addition, Partial Widening
SECTION 05	Alternative 1	M – Crack Sealing, RM I – Lane addition, Partial Widening
SECTION 06	Alternative 2	M – Routine maintenance I – Partial Widening
SECTION 07	Alternative 1	M – Crack Sealing and Partial Widening
SECTION 08	Base alternative	M – Crack Sealing, Routine maintenance I – Lane addition, Partial Widening

For section NH 67 crack sealing and routine maintenance has been obtained as the best strategy. If they do these maintenance activities on that particular section the pavement will be maintained in a serviceable condition. And moreover progression of roughness will be less and vehicle operating cost will be reduced. Similarly for all the other sections each alternatives will be compared against each other and finally best strategy can be selected based on the roughness progression. The best strategy will provide us the best optimal and cost-effective maintenance strategy. It has been clear that the alternative 1 of the various alternatives is the best and optimal alternative to implement its maintenance and rehabilitation strategies.

11. CONCLUSIONS

Roads play a very important role in the transportation of goods and passengers for short and medium distances. It is comparatively easy and cheap to construct and maintain roads. Pavement is the actual travel surface especially made durable and serviceable to withstand the traffic load commuting upon it. Pavement grants friction for the vehicles thus providing comfort to the driver and transfers the traffic load from the upper surface to the natural soil. The function of pavement is to transfer load from surface to subgrade. A PMS provides a systematic process for collecting, managing, analyzing, and summarizing pavement information to support the selection and implementation of cost-effective pavement construction, rehabilitation, and maintenance programs. The research work has been carried out in five stages. Traffic volume has been determined in terms of AADT for the selected stretch in the first stage. The distress survey has been conducted on the selected stretch in the second stage. The rebound deflection of the pavement has been determined using BBD test. Pavement Condition index has been determined for the divided sections in the fourth stage. The fifth stage includes the analysis of maintenance and rehabilitation strategies of a selected highway network using HDM-4 software. Thus, the steps involved in the performance evaluation of a selected highway stretch has been clearly justified. The best alternative of M&R strategies has been determined from the observed results.

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