

# ASSESSMENT ON THE ROAD PAVEMENT FAILURE AND MAINTENANCE OF ROAD SECTION FROM NIMANI CIRCLE TO MAHARASHTRA UNIVERSITY OF HEALTH SCIENCE NASHIK CITY (MH)

Suraj D. Mhaisdhune<sup>1</sup> & Dr. P. L. Naktode<sup>2</sup>

<sup>1</sup>(PG student in Transportation Engineering & Planning, Department of Civil Engineering, SOET, Sandip University, Nashik, Maharashtra, India)

<sup>2</sup>(Prof and HOD in Transportation Engineering & Planning, Department of Civil Engineering, SOET, Sandip University, Nashik, Maharashtra, India)

Email-Id: mhaisdhunesuraj7@gmail.com<sup>1</sup>, premanand.naktode@sandipuniversity.edu.in<sup>2</sup>

**Abstract:** The study reveals that about 10% of total road lengths in Nashik City are always exist in failure condition. Types of failure existing on the roads are water bleeding, cracks, depressions, edge subsidence, rutting, edge damage, local aggregate loss, potholes and shovel. The possible causes of road failures are insufficient strength properties of bituminous mixes, movement of over loading vehicles, bad drainage condition and natural disaster. Due to lack of properly and timely maintenance the failure area is gradually increased. As a result, failure of road surface causes traffic jam and accident. At the same time vehicle operating cost is increased. It makes discomfort to the passengers. In this study, at first the conventional road maintenance procedure is discussed. Then the maintenance procedure practice in RCC is compared. It reveals that about 60% of the maintenance procedure practice in RCC is similar to the conventional road maintenance procedure. The investigation found that the authority of RCC performs their maintenance work once in a year when allocated fund available.

**Keywords:** Bitumen, RCC, road pavement failure, rutting, road, traffic.

## 1. INTRODUCTION

For rapid economical, social and cultural development of any country, a good system of transportation is very essential. Transportation system comprises of good network of roads, railways, well developed waterways and airways. Nashik is a developing city. Every year the city needs to construct definite mileages of roads. With this poor fund a small fraction of the above mileage can be constructed, if a heavy construction is given, such that maintenance cost will be low. But the mileages demand for development is not fulfilled and subsequently, the communication system will remain in dark rather than developing. This is why light construction procedure is followed in Nashik. In Nashik major portion of roads are constructed and maintenance by Public works department. Some are constructed and maintained by local bodies for instance the Municipal Corporation, the district councils, the Upo-zilla parishads and the union councils. Every year the country needs to maintain a road and as a result a huge amount of investment is required. But particularly this maintenance work not keeps the road in a satisfactory condition as a result the road condition not ensures safe passage at an appropriate speed and with low user cost. With above requirements in view the

present study has been taken in order to investigate the road maintenance procedure adopted by Public work departments Nashik.

## **2. OBJECTIVES OF THE STUDY**

The objectives of the study are as follows:

- a) To investigate the typical failures of flexible pavement under Nashik City Corporation area.
- b) To review the maintenance procedure practice by Nashik City Corporation and Public work department.

## **3. ROAD PAVEMENT FAILURE AND MAINTENANCE**

Several investigations were made to locate and identify the types of failure in Nashik City Corporation area. Different types of road failure are listed below:

1. Transverse cracking
2. Longitudinal cracking
3. Potholes
4. Raveling
5. Water bleeding
6. Rutting

### **3.1. TRANSVERSE CRACKING**

Location: In Panchavati area. Figure 3.7 found near CDO office.

Problem: Allows moisture infiltration, roughness.

Cause: Sharp temperature drops, top-down cracking

Repair: Several options are available, based on severity of the cracking, future expected traffic

count, climate, user delay costs and available funds. The important thing is to prevent moisture

from entering the crack and damaging the underlying structure.

### **3.2. LONGITUDINAL CRACKING**

Location: In Panchavati area near CDO office. Figure 3.8 found CDO office area.

Problem: Allows moisture infiltration, roughness, structural failure.

Cause: An unstable base, poor construction, top-down cracking

Repair: Several options are available, based on severity of the cracking and the condition of the pavement structure. For very minor cracking, the important thing is to prevent moisture from entering the crack and damaging the underlying

structure. More severe longitudinal cracking usually indicates a larger problem with pavement structure.

### **3.3. POTHOLES**

Location: It is the most common failure in all over the road section from Nimani circle to Maharashtra Health University. Figure 3.9 found in Mhasrul area.

Problem: Roughness, moisture infiltration.

Cause: Inadequate structure, accumulated damage, age hardening, poor drainage etc.

Repair: No matter what cure is chosen, it is important to fix the situation which caused the pothole.

### **3.4. RAVELING**

Location: In area Near Mhasrul gaon bus stand. Figure 3.10 found near Mhasrul gaon bus stop.

Problem: Loose debris in the pavement, roughness, loss of skid resistance.

Cause: Asphalt binder unable to hold aggregate in place, dusty aggregate, insufficient compaction, and aged asphalt binder

Repair: If the cause is superficial, a surface treatment will solve the problem. If poor drainage is causing a stripping problem, the drainage should be corrected.

### **3.5. WATER BLEEDING**

Location: It is also the common problem in all over the road section from Nimani circle to Maharashtra Health University office. Figure 3.11 found near University office.

Problem: Decreased skid resistance, decreased structural support.

Causes: Poor mixing design, high water table, poor drainage.

Repair: If the problem is a high-water table or poor drainage, sub-grade drainage should be improved. If the problem is a porous mix a fog seal slurry seal may be applied to limit water infiltration.

### **3.6. RUTTING**

Location: In RTO corner, Dindori road. Figure 3.15 found in RTO corner.

Problem: Ruts filled with water can cause vehicle hydroplaning.

Cause: Heavy trucks, low, stopping & standing traffic, poor aggregate, poor construction, postconstruction compaction by traffic

Repair: If the existing pavement is continuing to rut, the unstable portion should be milled off and replaced with.



Fig.1. Transverse Cracking on Road



Fig.2. Longitudinal Cracking



Fig.3. Potholes on Road



Fig.4.Raveling on road

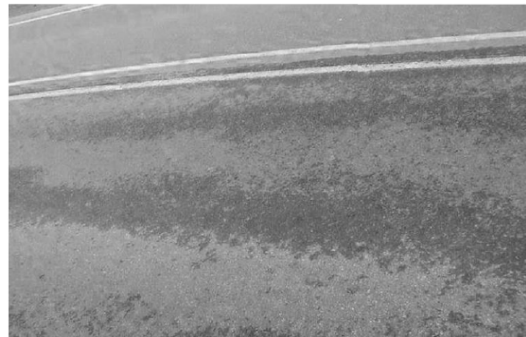


Fig.5. Water Bleeding on Road



Fig.6. Rutting on Road

Table-1. Table for type of failure, its maintenance type, machinery use in maintenance.

Type of Failure	Maintenance type	Machinery use
Longitudinal Cracking	Routine	Hoes, Pay loader, Dump truck, Smooth roller.
Transverse Cracking	Routine	Hoes, Dump truck, Smooth roller
Potholes	Routine	Hoes, Hand road roller and Mixing machine
Raveling	Routine	Hoes, Bitumen distributor, Dump truck, Smooth roller
Water Bleeding	Routine	Back hoe, Dump truck, Tractor, Water

		sprinkler, Bitumen distributor, Asphalt mixing plant, Road sweeping vehicle etc.
Rutting	Routine	Hoes, Bitumen distributor, Dump truck, Smooth roller.

## CONCLUSIONS

On the basis of various data collected from different roads construction and maintenance authority, the following conclusions drawn:

- i. Most of the road maintenance works are done by on emergency basis. As a result proper quality control is not always possible. Due to lack of quality control, highway and road needs early and repeated maintenance.
- ii. Study of data about equipment for highway maintenance owned by different authorities indicates that equipment's are neither sufficient nor well distributed.

## RECOMMENDATIONS

On the basis of the study, the following recommendations are made:

- i. The road maintenance deserve much more importance than is usually placed on it in order to protect the investment that have been made on our road system and maintenance programme should be collected be chalked out by the concerned department well ahead to take up the maintenance work in time on the basis of priority determined in relation to field conditions and available funds.
- ii. Funds required for proper and timely maintenance of roads should be provided to the organizations concerned.
- iii. Departments and organizations should have adequate number of professionals, technical and skilled personnel to look after and carry out maintenance work appropriately. Departments and organizations concerned with road maintenance work should take steps to acquire adequate number of equipment's and machineries in order to undertake maintenance work speedily and effectively.

## REFERANCES

- [1] Singh, G.C (1996); "Highway Engineering", Standard Distributors, New Delhi, India.

- [2] Paul H. Wright (1996); "Highway Engineering", Jhon Niley & Sons, New York, USA.
- [3] Hewes, L.I & Oglesby, C.H (1996); "Highway Engineering".
- [4] Sushil Kumar Das and Abul Kalam Azad; "A project Report on Maintenance of Roads and Highways in Bangladesh.
- [5] B.L. Gupta and Amit Gupta; Roads, Railway, Bridges, Tunnels and Harbour Dock Engineering" (Aug. 1978), 5th edition.
- [6] Dr. S.K. Khanna and Dr. C.E.G. Justo; "Highway Engineering" (1971).8th edition.
- [7] Radnor J. Paquetta, Norman J. Ashford and Paul H. Wright "Transportation Engineering Planning & Design". Second edition, Published by Jhon Wiley & Sons. Inc. Singapore.
- [8] Gur Charan Singh; "Highway engineering".
- [9] Practical Guidelines for Rural Road maintenance; "International Road Maintenance Handbook" (1982), Volume III.
- [10] Obi, F. (2010). War against road accident, Lagos residents set to tackle incessant truck induced crashes. Daily sun newspaper Monday 20th December 2010, page16.
- [11] Oguara, T. M. (2010). A management model for road infrastructure maintenance. Book of Proceedings, 19th Engineering Assembly, Council for the Regulation of Engineering in Nigeria.
- [12] Ogundipe, O. M. (2001). Causes of Highway failures in South Western Nigeria. A project report submitted to Civil Engineering Department, University of Ado-Ekiti.
- [13] Okigbo, N (2012). Road maintenance in Nigeria, the way forward. International Journal of Research in Engineering Science. Pan African Journal series Accra Ghana. Vol 2, issue 4
- [14] Okigbo, N. (2013). Causes of Highway Failures in Nigeria. International Journal of Engineering Science and Technology. (IJEST). Vol. 4 No. 11. Pp: 4695- 4702.
- [15] Onyelowe, K. C. (2011). Index Analysis of the Causes of Vehicular Traffic Congestion in South-Eastern Nigeria. Journal of Emerging Trends in Engineering and Applied Sciences. (JETEAS) 2(6): 925-933 Manchester.

[16] Sultan, T. and Mohmood, S. (2013). Causes of cracks and deterioration of pavement on highways in Jordan from contractors perspective, Paper from Civil and Environmental Research Vol.3. No.10.