

## **Analysis of flexible pavement – its failure and Their maintenance**

Manjeet Gautam<sup>1\*</sup>, Ashok Raj<sup>2</sup>, Sandeep Yadav<sup>3</sup>

<sup>1,2,3</sup>(Civil Engineering, Bansal Institute of Engineering & Technology, India)

**ABSTRACT :** *According to the study, flexible pavement defects and their causes are described in terms of decreased serviceability caused by the development of various forms of deteriorations on the flexible pavement such as cracks, surface defects, disintegration, and so on. Before moving on to the maintenance section, we'll try to focus on the numerous problems and their causes. There are several causes of bituminous pavement collapse. The level of rectification in the current surface will increase the life of the maintenance work while also reinforcing the layer. Testing was performed to determine the cause of the pavement failures, and we discovered that the majority of the pavement had been damaged by alligator cracks caused by frequent heavy loading of the cars, as well as surface imperfections. The pavement was also damaged as a result of poor drainage, insufficient design, and poor material quality.*

**KEYWORDS:** *Flexible Pavement, distresses, analysis, evaluation*

### **INTRODUCTION**

Pavement is anything that is covered or paved, such as a solid substance such as a floor laid to create a pleasant and firm surface for travel. Road pavement is a long-lasting material for the surface of a structure designed to support automotive or pedestrian activity, such as a road or sidewalk. [I] Flexible pavement is the most common type of pavement.

#### **Flexible Pavement:**

A flexible pavement is one that has a varied number of layers of granular materials and is covered with one or more waterproofing asphalt layers. The wheels will cause the flexible pavement to deflect. The goal of this flexible pavement design is to prevent excessive bending of any layer of the pavement structure, which can occur if the layer's design fails, causing the pavement to break directly. Because the strength of each layer varies in these flexible pavements, the load distribution pattern varies from one layer to the next. The top layer should have the strongest material, while the bottom layer should have the weakest material.

#### **Problem Defining:**

A roadway that is either flexible or stiff might lose its serviceability owing to a variety of factors. These are the factors: 1. traffic loading 2. Environmental Aspects 3. Material quality 4. Drainage A pavement is planned for a 10-year design term, according to the IRC. Pavement is liable to fail after its design lifetime and requires maintenance activities to extend its life. But sometimes it may fail earlier to its design period

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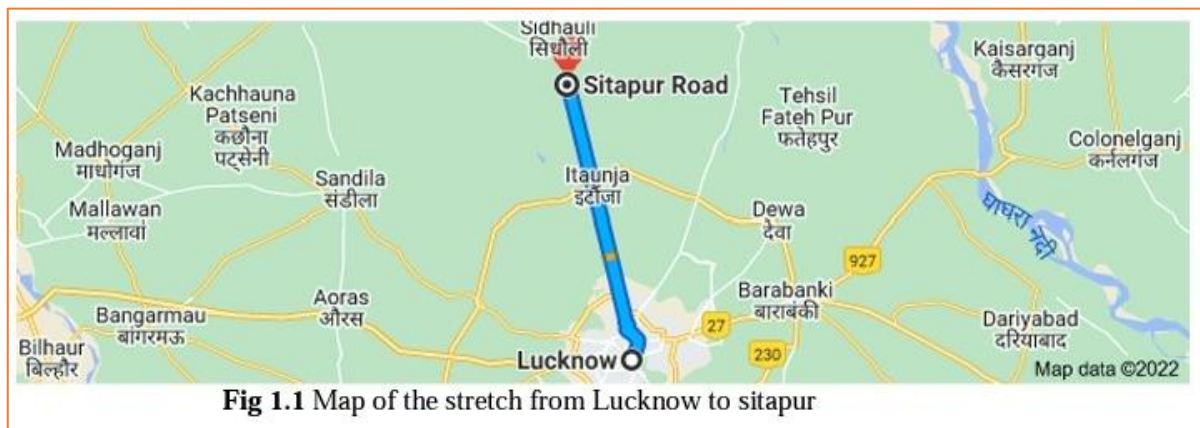
\* Corresponding Author: Manjeet Gautam  
Corresponding Author email: [gautammanjeet046@gmail.com](mailto:gautammanjeet046@gmail.com)  
Published online on [www.ijemt.com](http://www.ijemt.com) : June 2, 2022

because of low quality of material or may be by other factors. So, the possible causes which arise have been mentioned below. Various types of failures are:

- 1) Alligator Cracking or Fatigue Cracking
- 2) Block Cracking
- 3) Hungry Surface
- 4) Formation of Corrugations
- 5) Depressions
- 6) Fatty surface or Bleeding
- 7) Formation of Potholes
- 8) Loss of Aggregates
- 9) Stripping
- 10) Reflection Crack

## STUDY AREA

### Location:



The area of the site will be focusing on NH24- Lucknow to Sitapur Uttar Pradesh. The area was coming out to be 10 kms. Fig 1.1 Map of the stretch from Lucknow to Sitapur

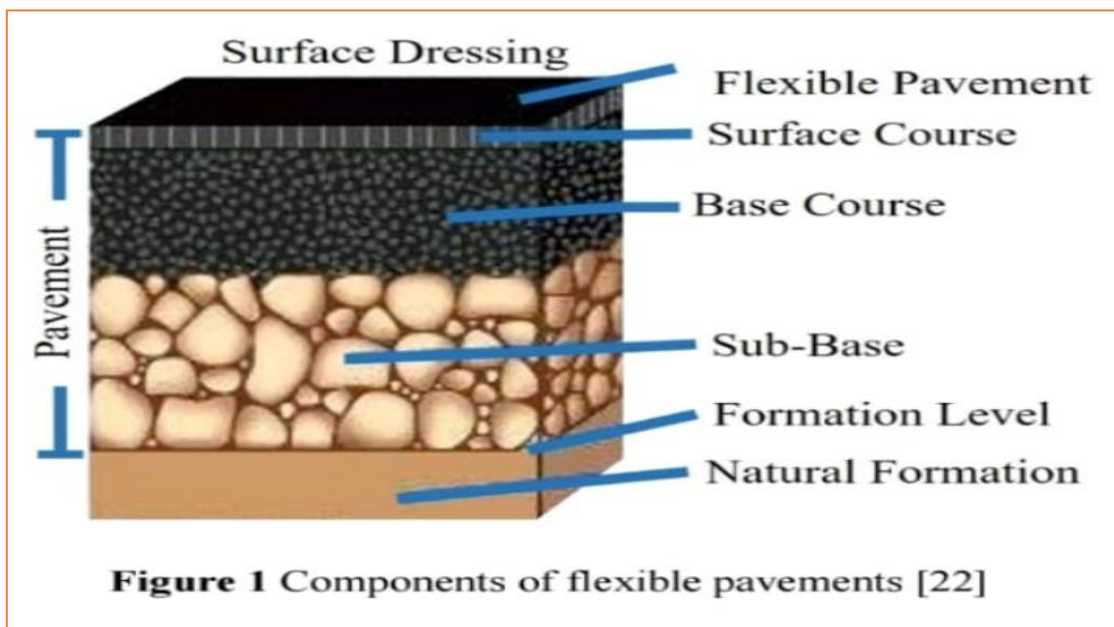
**Coordinates:** The coordinates at Lucknow to Sitapur are calculated approximately as 31°15'37.8"N 75°42'27"E (Entrance, LPU) to 31°18'39.68"N 75°21'53.94"E

**Elevations:** According to the map study, the elevation of the particular stretch is calculated 759 as minimum, 771 as average and 785 as maximum elevation

## LITERATURE REVIEW

### Flexible pavement deterioration and its causes:

(IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) ISSN: 2278-1684, PP: 09-15, Sharad. S. Adlinge, Professor AK Gupta). In this study, pavement failure was defined as a decrease in serviceability induced by the development of cracks and the creation of ruts. It is preferable to interpret the causes of failure before proceeding to the maintenance section. Bituminous pavement failures can occur for a variety of causes or as a result of a combination of factors. The use of proper measures in existing surfaces will extend the overall life of the pavement and its supporting strength. During this study, three characteristics were taken into account: the unevenness index, rutting, and pavement cracking. The goal of this study was to assess and explain the reasons of pavement breakdown.



**Alligator cracking:**



**Figure: Alligator cracking at Bkt**

**Block cracking:**



**Figure: Block cracking at Chatta meel**

**Slippage cracking:**



**Figure: Slippage cracking at IIM**

**Potholes:**



**Figure: Potholes at Tadikhana**

**Highway pavement maintenance:**

**Physical maintenance:** Activities such as sealing, patching, filling joints etc

**Traffic service activities:** Including painting pavement marketing, removing snow ice, etc

**Rehabilitation:** Including restoring or betterment of roadway such as resurfacing

## CONCLUSION

The case study was conducted to explore the road failures on a specific length of road (Lucknow to Sitapur), and the goal of this research is to assess and evaluate the pavement failures. The following are some of the findings and conclusions: 1) The strategy is based on previous experiences and literature research, and it has chosen the simplest and most appropriate way of analysis. 2) The Pavement State Index (PCI) was developed to determine the condition of the pavement based on its distress sheet as defined by ASTM-D6433 severity level. The pavement condition index approach revealed the state of the pavement, which was found to be quite poor in the range. The faults with the highest severity level were discovered to be alligator cracks. 3) Because the pavement is harsh, the maintenance option is necessary. So several types of tests were run on the sample that was collected from the site, and we discovered that the failures were caused by numerous factors, which I have already stated in Chapter 4 of Part 4, and we provided the best maintenance solution for the pavement problems.

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