

A Review Paper on Highway Pavement Failure and Their Maintenance Kota - Borkhera Road

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Abstract— As we know that about 35% of total road in kota city are in very bad conditions the types of failures on the road such as water bleeding, edge cracking, rutting extra and some others also such as over loading of vehicles, traffic jam, accident of vehicles and many bad drainage systems. which make dis comfortable for the passengers in travel time. for maintenance use of the appropriate design structure of the highway. we have to avoid unnecessary congestion which make the road to damage. The highway maintenance include surface maintenance, traffic service, bridge maintenance and drainage maintenance extra. Today we are not using the new ideas for a maintenance of road for giving more strength, we are using low quality materials for maintenance in pavement road that in case more failure in road. The purpose of this study is to identify common defects of cracks and defects in kota city road and use good suitable maintenance process. I selected 10km of road for study. This survey has been explored for several reasons of cracking and the failure of many different types of pavement.

Keywords: Pavement failure, Defects, Highway maintenance

I. INTRODUCTION

The process of dipping the pavement starts immediately after the traffic is open, this process starts very slow conditions so that it is not noticeable and over time it gets faster at faster rates. Maintenance of road network involves many types of operations such as detection of short comings of road, planning, programming, and scheduling for real implementation and monitoring in the field. The main purpose should be to keep the road surface and apprehensions in good condition and extend of the road life. Engineers have been always with open mind so that any material can be adopted for its use for the purpose of construction and maintenance.

A. *Types of highway construction:* -

- 1) Earth road and gravel roads
- 2) Soil stable road
- 3) Bituminous roads
- 4) Cement concrete roads

B. *Types of pavements:* -

Can be classified from the perspective of structural performance

1) *Flexible pavement:* -

A flexible pavement structure is usually made up of several layers of materials. Each layers receive load from the upper layer and spreads them or crosses these loads on the next layer below. Thus the stress will be reduced. A flexible pavement will bend under the load of a tire.

2) *Rigid pavement:* -

The hard pavement provides the ability to with stand the power of flexible power or beam strength, allowing slab to

bridges minor irregularities in sub grade, sub base. Semi rigid pavement represents an intermediate position between flexible and hard pavement. It is much less flexible than a concrete slab.

C. *Highway maintenance:* -

The purpose of highway maintenance is to improve the defects and preserve the pavement. Deteriorated through the physical inspection of the affected highway stretch, maintenance activities were classified under three operations- regular maintenance, periodic maintenance, and special repairs.

Deteriorating the pavement is a process by which the crisis in the pavement develops as a result of traffic load and environment conditions.

D. *Objectives:* -

- 1) Identify the type of common defects in flexible pavement.
- 2) Identifying the causes of highway failures and effects of highway failures.
- 3) Identifying recommendations for measures and highway failures.
- 4) To identifying the unique qualities of flexible pavement.
- 5) To identifying the factors affecting the performance of the pavement.

II. METHODOLOGY

Types of common defects of pavement with repair method

- A. Cracking
- B. Surface deformation
- C. Disintegration
- D. Surface defects

A. *Cracking*

Common types of cracking are: -

- 1) Fatigue(Alligator) cracking
- 2) Transverse cracking
- 3) Slippage cracking
- 4) Reflective cracking
- 5) Longitudinal cracking

1) *Fatigue cracking:* -

Fatigue cracking fails due to flexible base. Fatigue cracking is connect with drainage system. Initially a longitudinal crack is visible. Measurement of unit in sq.m of surface area at different critical levels.



a) Repairs method: -

Fatigue repair usually occurs in one of two categories

- For small area - Remove the torn pavement area and then excavate and change the area of the poor subgrade, and if necessary, improve the drainage of the area. Patches on repaired subgrade.
- For large area - Place an HMA overlay on the surface of the entire pavement. This overlay should be strong enough to carry structuredly anticipated loading because the underlying fatigue crack pavement contributes to the most likely or any power.

2) *Transverse cracking*:-

Transverse cracks are formed on the right angles at the center of the road. They are on a regular distance and there are some of the reasons for longitudinal cracks. Transverse cracks will spread widely in the beginning. reflection of shrinkage crack and due to transverse cracking or repairs are similar to longitudinal cracks.



a) Repairs method: -

Fill the cracks with bituminous binder and hail seal or sand bituminous premix patching for wide, center cracks. Fur seals, if cracks are found and spread to large areas.

3) *Slippage cracking*:-

Slippage cracks are half-moon shaped cracks, whose to end point to incoming vehicles. They are created by traffic from horizontal forces. They are usually the result of bad relationship between asphalt surface layer and bottom layer.



a) Repairs method: -

The only proper way to fix slippage cleavage is to remove the surface layer around the crack from the point where the good bond is found between the layers. Be sure to use a bargain coat in the new pavement.

4) Reflective cracking: -

Reflective cracking occurs when the pavement hot mix is inserted with asphalt concrete and the cracks are visible through the new surface.



a) Repairs method: -

They can repair the above mentioned techniques in other cracking techniques. Must be repaired properly before placing any overlay or wear cracks of course.

5) Longitudinal cracking: -

Longitudinal cracks are long cracks that move parallel to the center of the center of the road.



a) Repairs method: -

Remove and replace the torn pavement layer with an overlay. This phenomenon, which is known as a decline, is usually an indication that repair of crack is not a proper solution.

B. Surface deformation:-

Surface distortions can be threatened by traffic. Can be distortions with cracking.

Types of surface deformation-

- 1) Rutting
- 2) Shoving
- 3) Corrugations
- 4) Swell
- 5) Depressions

1) Rutting:-

Longitudinal surface depression, which deviates from the flexible pavement's wheel paths.

2) Shoving:-

Shoving is also a form of plastic which makes plastic movement in the layer of asphalt surface which localize the pavement. Minor shoving repair by remove and changing. An overlay may be required for large fields joining the surface.

3) Corrugations:-

Corridors are usually located in areas where the vehicles is fast or sluggish. Minor corrugation repair can be done with overlay or surface milling.

4) Swell: -

The bottom of the hinge or beneath the layers is due to the extension of the supportive layers. Swell extension is usually due to frost or due to moisture.

5) Depression:-

Depression is small, localized bowl-shaped areas, which can be include cracking. Repairs by digging and reconstruction of local sediments.

C. Disintegration:-

The progressive breakdown of the pavement in small, loose pieces is called dissolution (disintegration).

Two common types are: -

- 1) Pot holes
- 2) Patches

1) *Pot holes:-*

These surface layers contain bowl-shaped holes of different sizes or expand in the base course. Pot holes are come often there are located bad drainage system. Fill the pot holes by patch work after cleaning and repairs.



2) *Patches:-*

Patch work are start there some replacement bituminous, damage area, pot holes etc. patch is usually used to fix defects in a pavement or to cover utility gap. Patch failure can cause more widespread failure of the surrounding pavement.



D. *Surface defects:-*

The surface defect are related to the problem of layer in surface. Common types of surface defects are-

- 1) Revelling
- 2) Bleeding
- 3) Polishing
- 4) Delamination

1) *Revelling:-*

Revelling problem's come when the loss of material from the surface of pavement. Some revelations in chip seals are due to improper manufacturing techniques.

2) *Bleeding:-*

A film of asphalt on the surface of the pavement. It usually creates a bright, glass like surface that can be quite sticky, sometimes known as "flushing".

The bleeding can often be cured by putting thick sands to burn more asphalt binder. Major bleeding can be cured by cutting excess asphalt with a motor grader or by removing it with a heater planner.

3) *Polishing:-*

Due to traffic, the coating is polished on the surface of the pavement. This can be a dangerous consequence.

- a) Due to highway failures
- Most common highway failure reasons are: -
 - Bad design and manufacturing.
 - Heavy traffic and loading.
 - Bad maintenance culture system.
 - All types bad highway facilities.
 - Bad condition laboratory and dead test on soil.
 - Using low qualities material in construction.
 - Bad workmanship and method of construction.
 - Wrong supervision.
 - Low knowledge base standard.
 - Local construction process.
 - Insufficient restriction for highway failure.
 - Environmental variation.
 - Expansive subgrade soil.
 - Poor drainage system.
- b) Impact of highway failures
- Accidents ratio.
 - Increase the defective vehicle.
 - Waste of travel time.
 - Increase traffic congestion.
 - Increase crime rate.
 - Reasons for soil erosion.
 - Unfavourable to economic development.
- c) Measures for advertising highway failures
- Provision of adequate and reasonable design.
 - Decomposition of the road.
 - Road maintenance.
 - Provision of highway facilities.
 - Adequate soil testing in road construction.
 - Suitable road construction material.
 - Well trained road engineer.
 - Suitable restrictions for highway failures.
 - Increased use of other means of transportation.
- d) The unique qualities of flexible pavement
- Fat decline over time.
 - Loads frequently.
 - Variable weight volume.
 - Increase in traffic.
 - Change in physical properties with environmental conditions.
 - Multi-layer system.
- e) Factors affecting the performance of the pavement
- Traffic
 - Moisture
 - Subgrade type
 - Construction quality
 - Maintenance
 - Temperature
 - Vehicle speed
 - Repetition of loads
 - Precipitation
- f) There are many problems during maintenance of the highway:-
- Efficient drainage is very important for any highway system, particularly in high hills and low lying areas.
 - Lack of skilled labour, updation guidelines for the lack of modern technology and maintenance of roads standards and non- existence of norms.
 - Insufficient thickness of poor quality control and pavement during initial blocking phase.
- g) Routine maintenance:-
- Regular(routine) maintenance can be defined as those treatments that apply on the pavement so that the pavement can work properly.
 - While repairing small carriageways, there are many tools that are suitable for maintenance engineers. In the main, repair will be done by repairing permanent repairs from the pots and usually as conventional patching methods or by the use of proper asphalt repair techniques.
- h) Periodic maintenance:-
- The purpose of these treatments is to restore the life of a pavement by restoring desirable properties, while such measures are still cost-effective.
- i) Future scope the work:-
- Maintenance effectiveness is developing a data base that will allow a growing understanding of selected treatment in expanding pavement service life or reducing the development of pavement crisis.
 - It includes the study or the effectiveness of pavement maintenance treatments and the establishment of the study method, which can be followed by highway agencies to develop other maintenance therapies.

III. CONCLUSIONS

The pavement maintenance and management system will be more efficient if all possible and possible maintenance works including redistribution works are considered.

Classification of all kinds of crisis has been identified. Reasons and treatments are different for different severity levels of each crisis.

In this study it is believed that the parameters affecting are cracks and cracks, roughness, rough depth, pot hole and deflection. It was told that understanding the reasons for the deterioration of the pavement, effective maintenance techniques in important savings for the long term life of the roads and the government will make significant contribution in the proper selection of results.

Combined method with the experience of highway engineer and adequate material testing will help ensure that the reason for the failure of the pavement can be determined reliably.

IV. REFERENCE

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