



Study on Potholes

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Abstract

This paper highlights pothole detection methods and identifies a cost-effective solution for potholes in order to give timely alerts to drivers to avoid accidents and vehicle damages.

Keywords: Potholes, Materials, Repair

1. Introduction

Due to existence of water in the underlying soil structure and the movement of traffic over the affected area Potholes are formed. Introduction of water to the underlying soil structure first weakens the supporting soil. Traffic then fatigues and breaks the poorly supported asphalt surface in the affected area. Continuous traffic movement ejects both asphalt and the underlying soil material to create a hole in the pavement. Pot holes are small bowl-shaped holes developed on the surface layer of flexible pavements, generally after the rains. Formation of pot holes is the most common type of distress or defect that develops in flexible pavements with bituminous surfacing, at several isolated locations. Highway pavements are constructed in different terrains with topography, soil, drainage and environmental conditions. In due course of time, these locations may develop as weak spots resulting in formation of potholes. If the potholes are left unattended, both the depth and area of potholes increase at a rapid rate, developing as large size pot holes, due to the combined action of traffic and water. Therefore, each pot hole should be rectified with in shortest possible time gap soon after the small pothole is formed, by maintenance personnel.

2. Causes of Potholes:

The most common causes for development of pot-holes is as follows:

1. Lack of bond between the bituminous surfacing and the base course below due to improper application of prime coat and track coat.
2. Presence of weak spots in any of the pavement layers at some locations of the roadway, at the construction stage itself.
3. Insufficient compaction between mix during laying resulting the surface remaining permeable due to less fines.
4. Segregation of bituminous mix during laying resulting the surface remaining permeable due to less fines.
5. Stagnation of water on the pavement surface at local depression or due to inadequate cross slope and stripping of bitumen binder from aggregates.
6. Ingress of water into the pavement through the surface and the

shoulders rendering the pavement layers weak and the aggregate on the surface course getting loosened.

3. Study on Pothole

Throw-And-Roll Repair: This method is widely used due to its simplicity and speed, especially as an expedient method when the material is placed under unfavourable conditions of water or temperature. It can also be employed at times when the pothole is dry and clean with more lasting results.



Semi permanent repair: In this method Removing water and debris from the pothole & Making clean cuts along the sides of prospective patch area to assure that vertical sides of the repair are in sound pavement Placing the hot or cold patch mix material and Compacting the patch with a device that is smaller than the patch area, e.g. vibratory rollers or a vibratory plate.



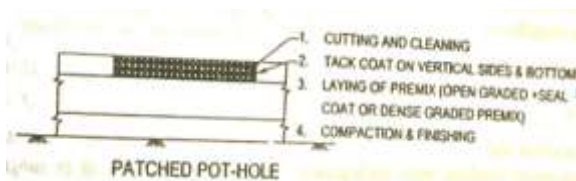


Spray-Injection Repair: It consist of blowing water from pothole and spraying coat of binder on the sides and bottom of pot hole and placing asphalt and aggregate into pothole



Rectification method: The bituminous pavement surface adjoining the pothole also gets partially deteriorated and therefore the weak material around the pothole should be cut and removed before carrying out patching work. the cutting has to be done using suitable tool up to the maximum depth of the existing pothole. After cutting, the loose materials and dust are thoroughly removed by brushing and blowing.

The prepared pothole is filled using premix of aggregates and bituminous binder in one or more layers and tamped if required. The pre-mix used for patching may be either a hot mix or a cold mix. The choice of the bituminous binder for preparation of pre-mix depends on different factors, particularly the climatic conditions. The top of patched pothole is compacted well using an appropriate road roller such that finished surface of the patched pothole is the same level of the adjoining pavement surface. The patched pothole is protected from traffic movement with the help of barricades or traffic cones for the prescribed curing period, which depends on the type of bituminous binder used in premix.



The steps involved in proper patching of potholes:

- Step 1 Marking a rectangle of slightly larger size around the pothole and barricading the area.
- Step 2 Cutting around the pothole area to rectangular shape with vertical edges up to maximum depth of the existing pothole and removed all the loose aggregates.
- Step 3 Cleaning and removing all loose materials and dust.
- Step 4 Application of tack coat of suitable bituminous binder at the bottom and all vertical edges of the cut pothole.
- Step 5 Filling up the prepared pothole with dense bituminous premix, alternatively an open graded premix and seal coat adopted.
- Step 6 Compaction of the patched mix using a suitable roller and finishing level with the adjoining pavement surface.
- Step 7 Opening to traffic after the prescribed curing period depending on the type of mix.

Isolated cracked areas: Cracks may be develop on the bituminous pavement surface at isolated locations within a limited area which may be considered as weak pockets within a paved area cracks ma develop due to passage of heavy vehicles over the depressions that are formed due to localised settlement of pavement layers. Also if the shallow depressions remain unattended for some period of some time and surface water that stagnates in these areas accelerates the crack formation and their widening. Alligator cracks of different crack widths are formed in this area within a short period. if such cracked area remain unattended for more time, they develop as large pot holes .



Localised depression due to settlement : Localised shallow depression are formed due to settlement of the lower layer of the pavement resulting from inadequately compacted pockets of fill or sub grade or other pavement layers : some undulations and shallow depressions may also be formed during laying of the surfacing course by manual methods when a mechanical paver is not available.

Such shallow depressions on the pavement surface lead to the adverse effects such as (i) Poor the riding quality (ii) Stagnation of surface water during rains and (iii) Water stagnation for prolonged periods leading to development of potholes.

Rectification method:

- Cleaning the surface to remove the loose materials and dust.
- Marking the affected area and barricading the same.
- Placing a pre-mix of dense graded bituminous mix using suitable aggregate sizes in the depression.
- Spraying tack surface to remove the loose materials and dust.
- Compacting well with a roller.

3. Conclusion:

Repairing any existing potholes makes the pavement safer, good appearance and cost efficient

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