

Potholes are typically caused by deterioration due to segregation, raveling, alligator cracking, or failures at joints and patches.



# REPAIR

## *of Asphalt Parking Lots and Driveways*

BY DWIGHT WALKER, P.E., EDITOR

Many owners of asphalt driveways and parking lots have found, at some point in time, that their pavements need repairs. The reasons for the problems vary widely. Lack of maintenance, poor drainage, inadequate thickness, accumulated wear-and-tear, and other causes all contribute to the eventual need for significant repairs. Some of the common problems encountered include potholes, deteriorated joints, and structural failures.

### **Potholes**

Potholes are bowl-shaped holes that result from the localized break-up of the pavement. They are typically caused by the continued deterioration of other type of distresses, such as segregation, raveling, alligator cracking, or failures at joints or patches.

Potholes should be permanently repaired by removing the failed material to the depth necessary to reach firm support, including removing part of the subgrade if necessary. Drainage may have to be installed if water in the pavement is contributing to the failure. The area to be removed should extend beyond the visibly damaged material to assure that solid material remains. To facilitate compaction of new material, the cut-out should be square-edged and rectangular-shaped.

The vertical edges and the bottom of the cut-out should be tacked. Then the hole should be filled with dense-graded hot mix asphalt (HMA), if available. If HMA is not available, a cold patching mix can be used. If the hole is deep (exceeding 6 inches), the new mix

should be placed in two layers. Each layer of new asphalt mix should be compacted thoroughly. Adequate compaction is critical for preventing shoving or deformation of the new material and to prevent water from entering the pavement.

For larger sites with numerous potholes to be repaired, spray-injection patching may be practical. This technique uses a specially-equipped truck having an emulsion tank, aggregate bin, and a high volume blower with an injection head. Compressed air is used to remove loose asphalt material and any debris. A hot emulsion tack coat is applied and then the aggregate and hot emulsion are blown into the patch. Compaction is achieved by the forced air as the mix is sprayed into the patch.

### Deteriorated Joints

Poorly constructed joints greatly reduce pavement life. Joint failure starts when air, water, and contaminants enter the joint through segregation, poor compaction, or lack of bonding between adjacent mats. If the distress is noted soon enough, a seal can be applied to correct the flaw. If the deterioration is not addressed, potholes may form and the problem is more difficult to correct. Repair is then similar to that described for potholes.

### Structural Failures

Many commercial pavements suffer structural failures as a result of load-related deterioration. These problems usually show up initially as "alligator cracking," a form of fatigue cracking. These cracks appear on the surface of the pavement as a series of interconnected, small blocks resembling an alligator's skin. This cracking occurs under repeated traffic loading and is caused by weak spots in the subgrade, too little pavement thickness, excessive loading, or a combination of these contributors.

Alligator cracking is caused by weak spots in the subgrade, too little pavement thickness, excessive loading, or a combination of these problems.

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If alligator cracking is allowed to progress, it can become a full structural failure. Pieces break away and potholes form. Moisture enters the subbase and pavement support is lost. When this occurs a full-depth repair must be done.

Many commercial pavements fail because the pavement is simply too thin to carry the loads. Practically all parking lots are subjected to some truck traffic; delivery vehicles and garbage trucks are a fact-of-life. Building a pavement with sufficient thickness to handle these vehicles is a wise investment.

When a base failure occurs, the failed asphalt must be removed, the underlying material stabilized, and the pavement replaced. The cause of the failure must be identified and addressed. If the problem is a soft spot in the subgrade, this weakness must be fixed. If the problem was due to too little pavement thickness, the repair area will have to be undercut to allow room for additional thickness to be placed.

### **Other Distresses**

Other types of pavement problems can be found in commercial and residential pavements. These concerns can include raveling,

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rutting, and slippage failures. Raveling is the loss of aggregate particles from the surface of the pavement. Raveling can occur when the asphalt binder hardens and loses its grip on the stone or when a poor quality mix is used. If caught early, raveling can be addressed by sealing. If the condition is severe, an HMA overlay or surface treatment is needed.

Ruts in asphalt pavements are channelized depressions in the wheel-tracks. Rutting results from consolidation or lateral movement of any of the pavement layers or the subgrade under traffic. It is caused by insufficient pavement thickness; lack of compaction of the asphalt, stone base or soil; weak asphalt mixes; or moisture infiltration. If rutting is minor or if it has stabilized, the depressions can be filled and overlaid with HMA or a surface treatment. If the deformations are severe, the rutted area should be removed and replaced with suitable material.

Slippage cracks are crescent-shaped cracks or tears in the surface layer(s) of asphalt where the new material has slipped over the



Slippage failures are caused by a lack of bonding between asphalt layers.

underlying course. This problem is caused by a lack of bonding between layers. The lack of bond may be because a tack coat was not used to develop a bond between the asphalt layers or because a prime coat was not used to bond the asphalt to the underlying stone base course. The lack of bond can be caused by dirt, oil, or other contaminants preventing adhesion between the layers. All of the area exhibiting the “stretch marks” will need to be removed. Make sure that the existing pavement is clean and dry after removing the failed layer. Then apply a tack coat to glue the old and new material together. Place and compact the new layer(s).

### Additional Assistance


This article is intended to provide general guidance for repair of commercial and residential asphalt pavements. Depending on site conditions, the repairs may need to be site-specific. More details on identifying and repairing pavement problems can be found in the Asphalt Institute’s publications, (MS-4) *The Asphalt Handbook* and (MS-16), *Asphalt in Pavement Maintenance*. In some cases, the input of an asphalt professional having experience with local materials and knowledge of good materials and construction practices may be required. ▲

## MS-22

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