

Causes and Corrections of Reflective Cracking

When asphalt pavement overlays are placed over jointed and/or severely cracked rigid and/or flexible pavements, the cracks and joints in the existing pavement structure can reflect to the surface over time. If not properly maintained, these cracks can allow water to penetrate the underlying layers causing further damage to the bond between the existing pavement and overlay and causing moisture damage in the pavement layers. Reflective cracks have to be monitored and maintained to prevent increased roughness and possible further pavement distress.

Numerous studies have attempted to develop methods and materials to prevent reflective cracks from occurring within the design period. Most of the materials and methods in use today, however, only briefly delay or limit the severity of the reflective cracks. One possible reason for the shortened service life of overlays is that the rehabilitation strategy selected for a specific project is insufficient for the condition of the existing pavement, subgrade and drainage conditions.

Rubblizing concrete pavement and overlaying with asphalt pavement is a cost-effective way to greatly reduce reflective cracking from occurring. For more information on rubblization, see “RUBBLIZATION: A COST-EFFECTIVE OPTION (Nov. 2009)” at www.asphaltisbest.com/resources_engineering.asp.

Description: Reflective cracks in a flexible overlay of a pavement over an unstable base and/or subgrade layer. In an overlay, the cracks can occur directly over the underlying pavement joints and cracks. Reflective cracking can include cracks that occur away from an underlying joint or from any other type of base (e.g. reflective cracks due to subgrade shrinkage cracking or culverts or other utilities).

Problem: Allows moisture infiltration and can cause roughness in the pavement ride.

Possible Causes: Movement of the concrete slab beneath the asphalt surface because of thermal and moisture changes, or shrinkage cracking in the subgrade and reflection up through the surface layers, or too thin of flexible pavement surface. Generally not load initiated, however loading can hasten deterioration.



Repair: Strategies depend upon the severity and extent of the cracking:

- **Low severity cracks** (< 1/2-inch wide and infrequent cracks). Use crack sealant CRS-2 to prevent (1) entry of moisture into the subgrade through the cracks and (2) further raveling of the crack edges. In general, rigid pavement joints will eventually reflect through an overlay without proper surface preparation.
- **Medium severity cracks** (> 1/2-inch wide and higher frequency of cracks). Use crack sealant CRS-2 to coat the exposed aggregate base layer in the crack, insert a flexible filler such as a backer rod and then fill with crumb rubber (Mn/DOT Spec 3719) flush with surface. May require partial depth repairs.
- **High severity cracks** (> 1/2-inch wide and numerous cracks, severe spalling around cracks). May require partial depth repairs and/or removing and replacing the cracked pavement layer. This may include reclaiming, reshaping and repaving/new pavement surfacing. Reference “Repair of Potholes with Asphalt (Apr. 2003)” and Tight Blade Spec (Apr. 2010) at www.asphaltisbest.com/resources_engineering.asp before any overlay.

