

Pavement Distress – Slippage Cracks

Slippage cracks are crescent-shaped or horseshoe-shaped cracks which have the open end of the horseshoe pointed in the direction of traffic travel. This type of crack, shown below (Figure 1) is caused by shoving of the mix in a forward direction under the wheels of vehicles. The cause of the shoving itself, however, is related to two primary factors – a lack of bond between the surface course and the underlying asphalt layer or excessive deflection of the pavement structure.

Lack of Bond: Due to lack of bond, the asphalt surface course mixture is unable to withstand the shearing force applied to it by the passage of traffic. The mix then begins to shove and move forward. Slippage cracks are usually found in areas where traffic is accelerating or decelerating, since these are locations where the shear force applied to the pavement is the greatest.

Excessive Deflection: Slippage cracks can also be associated with fatigue cracking. In some locations, where the pavement is underdesigned for the traffic using it, excessive deflection of the pavement structure under load will cause alligator cracking of the asphalt layers. The alligator cracking comes from the bottom up. Before the fatigue cracks can reach the surface layer however, the bond between this layer and the underlying course may be broken, due to the excessive deflection. The surface course will then slide or shove, resulting in a slippage-type crack.

This type of slippage crack is different from one caused by a lack of bond because of the condition of the underlying layers.

In a deflection related slippage crack, the asphalt surface course exhibits distress and the course below the surface layer may have failed or has not failed yet in fatigue.

Repairs: The type of repair needed is dependent on the type and severity of slippage crack. For slippage cracks caused by a lack of bond between pavement layers, it is necessary to remove the surface course and replace it. The failed area should be taken up to the point where a good bond is found between the old and new pavement courses. The exposed surface should be thoroughly cleaned and made free of foreign debris (i.e. dust, oil, sealant, etc.). Next a tack coat should be applied to the old surface. For deflection or fatigue related slippage cracks, complete pavement removal and replacement is needed. Thicker lift thickness, especially the wear course layer, as opposed to a multiple series of traditional thinner lifts, is also an acceptable repair consideration (i.e. bypasses, crossovers, etc.).

SUMMARY

Slippage cracks are caused by a lack of: 1) Bond between the pavement layers or 2) Excessive deflection of the whole pavement structure. Repair of slippage cracks most often requires the removal and replacement of the failed area.

