



Well-built Bases Help Assure Low-maintenance Pavements

Most pavement failures that are not mix or design-related are caused by improperly prepared bases, or bases that have collected moisture through bad drainage. Road departments pay an extraordinary amount of maintenance funds to correct base deficiencies and replace surfaces that have failed as the result of these base failures.

Fatigue cracking of hot-mix asphalt (HMA) pavement begins at the bottom layer of HMA and works its way up, sometimes all the way to the top. Capillary action will draw water from non-drained bases up into the pavement, where it damages the pavement structures through reflection cracking, cracks along longitudinal joints, cracks in wheel paths, alligatoring, raveling and potholes.



And there is no way to fix the problem without digging out the base, rebuilding, stabilizing and replacing the pavement structure. That's why it's important to get the base right the first time.

The subgrade soil material under most prepared bases needs to be compacted, as well as the base itself, because it acts as a platform on which the base is placed. Each needs to be compacted at or near its optimum moisture content, neither too dry nor too wet. Although too dry is better than too wet for any compaction.

But if it's not within about 2 percent of its optimum moisture content, it will never be densified or compacted to the point it has the strength and durability to carry the prepared base and pavement above.

That's critical because nearly every road agency will have a spec and conduct test to determine what the moisture should be for the construction. But agency staff reductions and loss of qualified field personnel can result in supervisory oversights, and base problems permanently built into the completed structure may not reveal themselves until years later.

Bases for flexible HMA and portland cement concrete roads differ greatly. The base beneath a rigid PCC slab is there to provide profile, as the loading from traffic is carried by the slab. Not much force is transmitted beneath the slab.

For the HMA pavement, traffic loads are transmitted by tires through the pavement to the underlying base. The greatest concentration to pressure will be at the surface, and then distributed in a bell shape to depths below.

Crushed aggregate base gets its strength from the frictional interlock of the stone. Point loading tends not to dissipate so far, and deflection of the base is not as great, so the base serves excellent for profile.

But when cohesive materials like clays comprise the base, stabilization with asphalt emulsion, lime, cement or fly ash, or foamed asphalt, is indicated to counter the effect of the material's adverse reaction to the presence of water, when it can expand and destroy a pavement. The more cohesive the soils are, the more likely they will be to react adversely in the presence of moisture. The stabilizing agent effectively seals or waterproofs the base to keep the moisture out and make it more stable.