

Finding Buried Treasure With Diamond Grinding

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By CONCRETE CONSTRUCTION Staff

With an unprecedented number of roadways in need of repair across the U.S., cost-effective pavement rehabilitation techniques remain a pressing issue for roadway engineers and owners. In the past, transportation agencies covered structurally sound concrete pavement with an asphalt overlay to improve the ride and friction, or reduce tire pavement noise. With rising asphalt prices, the mill and overlay option is becoming too expensive. Diamond-ground pavement surfaces often meet and exceed the smoothness, friction, and noise characteristics of asphalt surface treatments at half the cost. Provided the underlying concrete pavement is structurally sound, diamond grinding an overlaid pavement is a cost-effective solution. This innovative process is frequently referred to as “buried treasure.”

How it works

The first step in implementing the buried treasure concept is to evaluate the pavement to ensure the underlying concrete pavement is worth investment. Once the overlay is removed, a variety of concrete pavement restoration (CPR) options can be used to manage the rate of pavement deterioration. As a nonoverlay option, it repairs areas of distress in concrete pavement without changing its grade. This procedure restores the pavement to a condition close to or better than original, and reduces the need for major repairs in the future. CPR techniques include slab stabilization, full and partial depth repair, dowel bar retrofit, diamond grinding, and joint resealing.

After structural repairs, the removal of the thin surface layer of hardened portland cement concrete begins by using closely spaced diamond saw blades. This results in a smooth, level pavement with a longitudinal texture, desirable friction, and low noise characteristics.

Case in point

The McCarter Highway, in Newark, N.J., consisted of a jointed reinforced concrete pavement design comprised of 73-foot mesh reinforced panels using stainless steel dowels. In 1993, a 9.8-mile stretch of the road received a micro-surfacing treatment. By 2001, the treatment began to delaminate and a second micro-surfacing treatment applied. When this treatment failed in 2008, the NJDOT used CPR for a long-term repair solution. Because the existing concrete pavement was structurally sound, NJDOT removed the asphalt overlay to diamond grind the underlying concrete pavement.

The sandy soil beneath the pavement was susceptible to washouts under the transverse joints, so the slabs had to be stabilized. Polyurethane grout filled voids under suspect areas of roadway. Four small holes were drilled on each side of the transverse joint, and the polyurethane grout was pumped into the voids.

Where full-depth repairs were needed, precast panels were constructed in three sizes and cast with ¼-inch-thick strips of foam on the bottom so the panel could be embedded into the sub base.

Partial-depth repairs had to carry traffic in a short amount of time, so the design called for the use of a hot-pour patching material that bonds to the concrete surface, yet remains flexible to allow for movement without cracking or debonding. After the patching material was placed, a friction layer of black granite sand was added to the surface.



Once the overlay is removed, a variety of CPR options can be used.

After completing repairs, diamond grinding could begin on the pre-existing concrete pavement. Because of the proximity of the steel mesh to the surface of the concrete, all of the milling operations had to be exact, in order to leave as much of the old concrete as possible. After the asphalt overlay was removed, the drainage inlet structures were lowered. After all repairs and diamond grinding were complete, the joints were resealed with a hot-pour material.

Although the McCarter Highway project recently was completed, the diamond grinding already has improved the road's ride.

As long as the underlying pavement is structurally sound, CPR and diamond grinding can be cost-effective tools to restore ride and longevity to an old concrete pavement. According to Robert W. Sauber, supervising engineer of the Bureau of Materials for NJDOT, this project proves that an asphalt overlay of an existing concrete pavement can be removed effectively and replaced with a diamond-ground surface texture.

For more information on diamond grinding, contact the the International Grooving & Grinding Association (IGGA) at www.igga.net.