

Unique Whitetopping Approach Offers Strength and Durability in Wyoming

For years, pavement engineers have used ultra-thin whitetopping (UTW) to rehabilitate old asphalt pavements. In this process, a thin layer of concrete (three to four inches) is bonded to the existing asphalt pavement. The new concrete provides an economical, smooth riding surface that is much stronger and more durable than the old asphalt pavement.

To be successful, the UTW must be placed over asphalt that does not show signs of deep pavement distress. If potholes, alligator cracking or deep fissures exist in the asphalt, the concrete will not form an adequate bond, resulting in pavement that lacks adequate support.

In early 2003, the City of Sheridan, Wyo., faced just this situation: a stretch of West 8th Street was in need of restoration, but the existing asphalt pavement was too deteriorated to provide a good base for a bonded concrete surface. The city considered excavating the existing asphalt and base and reconstructing the pavement from the subgrade up, but deemed the method cost-prohibitive. City engineers met with cement and concrete industry representatives to evaluate possible alternatives to full reconstruction and traditional UTW.



Existing asphalt pavement on West 8th Street had deteriorated too much to accept a traditional ultra-thin whitetopping surface.

Recycled Base

Discussions centered around a procedure called full-depth reclamation (FDR), a type of pavement recycling that has been used successfully to rehabilitate old asphalt pavements by pulverizing the existing surface and base and stabilizing the mixture with portland cement and water. While FDR is a proven method for base stabilization, the technique had never been used as the base for a UTW surface. After considering the alternatives, it was decided to launch a pilot project to evaluate the benefits of placing concrete over a reclaimed base.

Pavement design called for 3 1/2 inches of whitetopping with control joints sawn in a four-foot grid over eight inches of cement-stabilized reclaimed base, creating a roadway 540 feet long and 34 feet between curb sections. Typically, road reclaimers/mixers are used to pulverize and mix in-place the old asphalt surface, base material and cement. However, for this project, the material was mixed off site.



A grader was used to place the new cement-stabilized base, consisting of the pulverized asphalt and old base material.

First, crews used a milling machine to pulverize and recover the old pavement section to a depth of eight inches, placing the reclaimed material in a stockpile. The original plan called for blending the reclaimed material with 5% cement in an off-site central plant pug mill and trucking it to the project site, but scheduling difficulties made the equipment unavailable. Instead, the material was blended with cement in transit mixers and placed on the subgrade. The discharged material was initially too wet to compact immediately with a roller; however, after some additional in-place mixing with a grader, the cement-stabilized material achieved the proper moisture content for compaction. Crews then placed whitetopping over the base using a deck-finishing unit.

Pavement Performs

Tests performed after construction showed the cement-stabilized base had a compressive strength of about 320 psi in 28 days; the concrete achieved a compressive strength of 5,250 psi in 28 days. The most important aspect of the pilot project—the bond between the whitetopping and the stabilized base—was evaluated with core samples taken shortly after construction. The cores showed excellent bonding between the surface and base layers.

Today, after almost one year of traffic, the section is performing well, and the City of Sheridan is pleased with the results. City engineers will continue to monitor the West 8th Street project in coming years. Those who worked on the pilot project say the process shows promise for use in other projects where old, deteriorated asphalt pavement can be reclaimed and surfaced with UTW.

Full-Depth Reclamation with Cement

Deteriorating roads are a constant problem for cities and counties. That's why engineers and public works officials are turning to a process called full-depth reclamation (FDR) with cement.

This process rebuilds worn-out asphalt pavements by recycling the existing roadway. The old asphalt and base materials are pulverized, mixed with cement and water, and compacted to produce a strong, durable base for the new pavement surface.

Full-depth reclamation recycles the old asphalt and base material for the new road. There's no need to use new aggregate or dispose of old material.

More Information

PCA offers a broad range of resources on soil-cement and roller-compacted concrete applications for pavements. Visit our Web site at www.cement.org/pavements for design and construction guidelines, technical support, and research on cement-modified soils, soil-cement base, cement-treated base, and full-depth reclamation.



Crews place ultra-thin whitetopping over the cement-stabilized base.



The new concrete roadway provides an economical, smooth, light surface, with excellent strength, durability, and appearance.

For more information on ultra-thin whitetopping, visit the Web site of the American Concrete Pavement Association (www.pavement.com).

For local support, tap into the cement industry's network of regional groups covering the United States. Contact information is available at www.cement.org/local.



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