Recycling Roads with Cement Can Pay Big Dividends

From small Goliad County to urban Tarrant County, a recycling process is giving more mileage to roadways and yielding huge savings on road repair budgets. At the same time, taxpayers are experiencing less traffic construction headaches and seeing projects completed more quickly.

Full-depth recycling (FDR) with cement is a process of rebuilding and stabilizing worn-out asphalt pavements by mixing existing pavement and base materials in place with portland cement. While the cement recycling process is not new, it has seen a resurgence in the past few years.

The basic procedure is fast and easy and can provide big benefits. Users rave about the cost-savings on materials and the elimination of transportation fees for hauling off old materials. The speed of the process and the creation of a stronger roadway, along with the conservation of natural resources by reusing existing materials, are other pluses.

Robert Lopez, executive director of the Cement Council of Texas, said a recycled roadway can last between 15 years and 20 years, depending on traffic.

FDR can be used on streets, parking lots, airports or any roadway experiencing failure. The use of cement in the recycling process, which helps keep water out by bonding materials together, makes FDR an excellent choice for low-water crossings, said Donald Taubert of Capitol Cement in San Antonio.

Charles Cummings, of Cummings Paving Co. in Blanco, called cement recycling "the most practical way to permanently fix failed base material." His company recently completed a cement recycling job in Medina County.

Cummings said he sees the process, which the Texas Department of Transportation has used for several years, becoming a major trend in reclaiming roads.

On Location in Three Texas Counties

Ted Long, Goliad County commissioner, called the recycling process "the best thing that has happened to Goliad County roads."

Long said the county uses traditional road equipment (motor grader with scarifier, water truck, and pneumatic roller) for the process. Since the county began using FDR five years ago, it has recycled about seven miles of roadway. The county even has paved more than four miles of gravel road using the existing material, demonstrating the process can work to stabilize roads that do not have an asphalt surface.

Richard Schiller, director of field operations for Tarrant County Precinct 3, said his precinct has recycled more than 51 lane-miles of county roads and city streets (360,000 square yards) in the two and a half years it has been using the process. Plans for this year include 25 lane-miles (180,000 square yards).

Tarrant County has opted to purchase equipment specifically designed for FDR, a high horsepower recycler/reclaimer. This equipment allows better quality control and increased productivity, said Schiller.

Glen Whitley, Tarrant County

Above: Proper pulverization of the base materials and asphalt is an important step in the cement recycling process.

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commissioner, said he sees the process as a "win-win-win" situation. Those wins, he explained, are saved time, money and natural resources.

Medina County completed a first cement-recycled road project in one of its precincts in December. The county opted to use a contractor for the job, which equaled 0.2 miles.

Royce Hartmann, Medina County commissioner, said the county used the process in an area that had been problematic for some time, holding moisture. At this point, Hartmann said he is pleased with the result and will use cement recycling again if the test area holds up.

Both Goliad and Tarrant counties said they went into the process as a means to save money – and develop a better roadway along the way.

Schiller says full-depth recycling saves 75 percent of costs compared to total reconstruction. In addition, it can be completed in two-thirds less time.

Long said Goliad County is saving at least half the cost of traditional repair work.

Material costs for cement and prime coat materials run about $1.20 per square yard, said Schiller. Counties add to that costs of labor, equipment and surfacing.

Schiller said his six-person crews (five operators and a traffic control worker) can recycle up to 4,500 square yards per day.

Taubert said counties considering cement recycling can use existing equipment, like Goliad County; purchase process-specific equipment, such as Tarrant County; or bid out the job to a contractor familiar with the process, like Medina County. Pulverizing equipment also is becoming more available for rent.

Cummings Paving Co. kept one lane open during cement recycling work on County Road 4516 in Medina County to allow vehicles and equipment to continue traveling. Here, crews mix cement into the pulverized base materials to strengthen the road and help prevent water-related base failures.

How the Process Works

The FDR process, which can be completed in one day, follows these steps:

1. Scarify and pulverize the old asphalt and base.
2. Pre-wet the roadway and shape it to the desired crown and grade.
3. Spread a prescribed amount of portland cement over the pulverized base.
4. Mix the cement, water and pulverized roadway to a depth of six to 10 inches.
5. Compact the base and allow it to cure (usually two to three days). Local traffic can get back on the roadway immediately after compaction of the new cement-recycled base, whether it has a wearing surface or not.
6. Top the roadway with a riding surface (usually a chip seal or hot-mix asphalt). The cement council suggests this occur within two weeks.

Experts recommend some upfront work to ensure success and to help save money down the line.

Jeff Hawk, manager of the Cement Council of Texas' Soil-Cement Program, encourages lab work to determine the type of base material. This will aid in figuring cement content, which usually ranges from 3 percent to 5 percent of the mixture by weight.

Too much cement can cause too rigid a base, resulting in cracking.

The lab work also can include mixing material samples to replicate what will be used on the roadway.

Hawk said counties should design for strength, aiming for a 250 psi to 400 psi load-bearing capacity. The final result, in most cases, will be a stronger road than the one being replaced.

Pavement thickness should be determined ahead of time. The road site should be examined to determine the cause of failure. That information can aid in creating the right mix for the recycled roadway.

To find out more about FDR, visit www.recyclingroads.org.★

– By Tammy Wishard