

RECYCLE YOUR 'OLD' ROADS

Newest PennDOT-Approved Construction Method Cuts Waste, Improves Pavement Performance

Full-depth reclamation (FDR) can help townships recoup part of their initial paving investment by transforming old, deteriorated roads into “new” ones through in-place recycling. FDR using cement slurry adds yet another tool to your roadmaster’s tool belt.

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Full-depth reclamation (FDR) of asphalt pavement is a rehabilitation method that involves the in-place recycling of an existing asphalt pavement and its underlying layer(s) into a new base layer. The process begins by using a road reclaimer to pulverize the existing asphalt pavement and a portion of its underlying base, subbase, and/or subgrade.

Typically, the pulverized material is uniformly blended with an additional stabilizing material such as cement to provide an upgraded material. The material is then graded to proper cross slope with a motor grader, and finally, the stabilized material is compacted in place with rollers.

The result is a stiff, stabilized base that is ready for a new rigid or flexible surface course.

FDR has been used successfully on projects ranging from parking lots to

streets and local roads to highways. Now, a new technique — applying cement slurry in liquid form to the ground road base — simplifies and expedites the process.

When to consider FDR

Townships first need to determine which method to use to repair deteriorated pavement. FDR with cement becomes cost-effective when the existing pavement:

- shows damage that cannot be rehabilitated by resurfacing (*anything greater than 15 to 20 percent patching*);
- develops excessive rutting in the wheel paths;
- has base or sub-grade issues; and/or
- fails to support current or future traffic conditions.

The service life of FDR projects with a cement base may range from seven to 10 years where the surface is a thin overlay, such as chip seal, or up to 15 to

20 years where an asphalt overlay has been used. Experience shows that service life is affected greatly by the choice of the surface course, rather than the FDR base.

Why FDR?

There are several benefits to using full-depth reclamation, including:

- **Cost-effectiveness** — Since the process uses the existing pavement, the cost and effort involved in removing and disposing of existing material, as well as those associated with hauling and placing new materials, are greatly reduced when compared with “remove-and-replace” construction methods.
- **Increased structural capacity** — FDR increases the structural capacity of the new road by providing a stronger and more consistent base, which ultimately allows for a thinner surface course.
- **Increased durability (*compared to granular base materials*)** — A stiffer

One advantage of cement slurry, rather than dry cement, is the elimination of the dust.

How it Works: FDR with a Cement Slurry

base delays the occurrence of surface distress and extends pavement life.

- **Shortened construction schedule and improved staging** — Typically, completed sections of the FDR base can be opened almost immediately to local car traffic provided the curing material is not affected. This is a major benefit in urban areas where residential and commercial driveway access is critical during construction.

In addition to improved staging, reclaiming in-place materials shortens the overall construction schedule and minimizes the inconvenience to motorists.

- **Reduced carbon footprint** — Because the process uses in-place materials and reduces the amount of waste being hauled from a project site, FDR may be considered a sustainable construction practice.

Use of cement slurry

Full-depth reclamation using cement slurry is a new technique that can help PennDOT, local governments, and FDR contractors by providing a widely available method for stabilizing pavements.

Introduced by the Pennsylvania State Transportation Innovation Council's (STIC) Construction and Materials Technical Advisory Group in 2017, this innovation allows for cement slurry to be applied in liquid form to the ground road base during FDR projects to provide base stability. The process requires less equipment, expedites the FDR process, and provides environmental benefits by reducing the amount of dust created during application.

The cement slurry is supplied to FDR projects through a network of PennDOT-approved concrete plants and delivered in ready-mixed concrete trucks. Cement slurry can be used to replace or augment the practice of spreading dry cement on the roadway base.

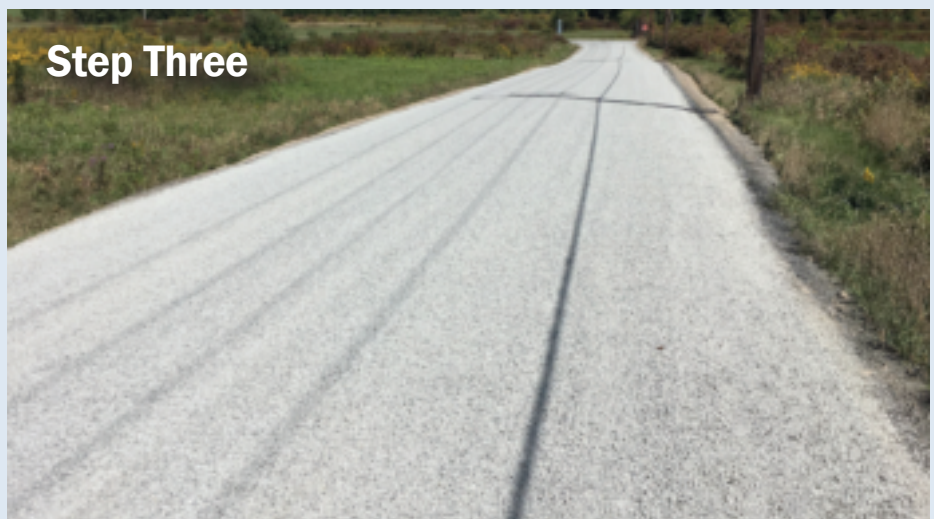
The addition of cement slurry into the existing FDR specification is designed to improve upon and expand the use of FDR, which has been proven to be a cost-effective, long-term improvement for Pennsylvania roads. One advantage of cement slurry, rather than dry cement, is the elimination of the



The cement slurry is distributed across a road in Lenox Township, Susquehanna County.



The slurry and pulverized road materials are combined, and the road is prepped for rolling.



After rolling, a surface layer, such as tar and chip (shown above), is applied. (Photos courtesy of the Pennsylvania Aggregates and Concrete Association.)

FDR

Full-Depth Reclamation

dust. This benefit is particularly useful for those projects that might be located in more urban or closed environments.

To put this innovation into practice, STIC's Construction and Materials Technical Advisory Group completed revisions to Section 344 (Full-Depth Reclamation) of PennDOT Publication 408, Section MS-0370-0035 of PennDOT Publication 447, and Appendix J of PennDOT Publication 242 to incorporate the specification change.

With approval from the Federal Highway Administration, the change will be published later this year. However, a special provision has been granted in the interim to allow PennDOT and local governments to begin using this technique.

Project experience

In 2016, one of PACA's members performed the first cement slurry application in Pennsylvania on a dirt and aggregate road located in Lenox Township, Susquehanna County. Another member of PACA supplied the cement slurry for the project.

"Full-depth reclamation using Portland cement is an excellent alternative to conventional reconstruction," the PACA member said. "Both conventional FDR and cement slurry FDR can be opened to traffic at the end of the day, and both can increase the structural strength of the existing base while allowing the overall pavement profile to be reduced."

* * *

For more information on the FDR process with cement slurry, contact Ken Crank at the Pennsylvania Aggregates and Concrete Association at (717) 468-0259 or ken@pacaweb.org.

Look for a video taken during the Lenox Township project at specify-concrete.org. Select "Videos" from the "Technical Center" drop-down menu at the top of the page. ♦

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