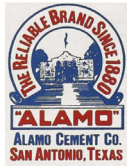


Full-Depth Reclamation Plus

Richard B. Rogers, P.E.
Executive Director
Cement Council of Texas

The Cement Council of Texas Members



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Presentation Outline

- Introduction
 - Definition of Full-Depth Reclamation (FDR)
- Construction Process
- FDR Plus
 - New Market Opportunity
- FDR Plus Placement
- Our Message
- Questions?

Introduction

Definition of Full-Depth Reclamation (FDR)

- Method of flexible pavement rehabilitation that utilizes the existing asphalt, base, and possibly subgrade material to produce a new stabilized base course for an asphalt, chip seal, or concrete wearing surface.

A new cement recycled base will be stronger, more uniform, and more moisture resistant than the original base, resulting in a long, low-maintenance life

Definition of FDR Plus

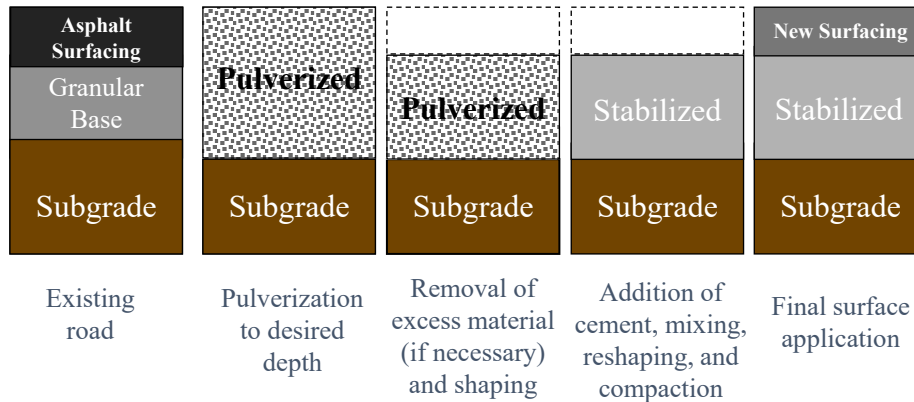
- Tradition FDR with the addition (*Plus*) of aggregates for widening of the pavement.



Construction Process

FDR Construction Process

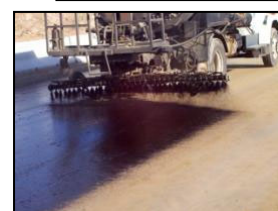
➤ Pulverize, Shape, Add Cement, Mix In Place, Compact, and Surface



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FDR Process

- Pulverize
- Spread cement
- Add water as necessary for optimum moisture and mix
- Grade and compact
- Cure
- Overlay



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“FDR Plus”

New Market Opportunity

- FDR has become widely accepted as a pavement rehabilitation tool
 - Commonly used to widen narrow roads
 - Contractor will cut a trench and either push pulverized material or asphalt millings into the trench to widen

- VDOT has over ten years experience with FDR
 - VDOT has a very large research group compared to the other states in our region
 - They have extensive research on the performance of FDR
 - They have used FDR on very high-volume roads while others have limited it to lower volume routes
 - Virginia materials were hauled to Auburn University test track and were used to reproduce I-81 pavement
 - NCAT results are excellent for FDR

New Market Opportunity (cont.)

- NCAT experience proves it is possible to build an FDR pavement out of hauled material
 - Synthetic FDR is constructed on new location with hauled material and some subgrade
 - Can be constructed with asphalt millings, crushed concrete, or virgin aggregate
 - Generally consists of 40% to 80% hauled material and subgrade
 - Uses more cement than a comparably thick cement-treated base with crushed stone
 - Additional cement costs more than offset by savings in aggregate



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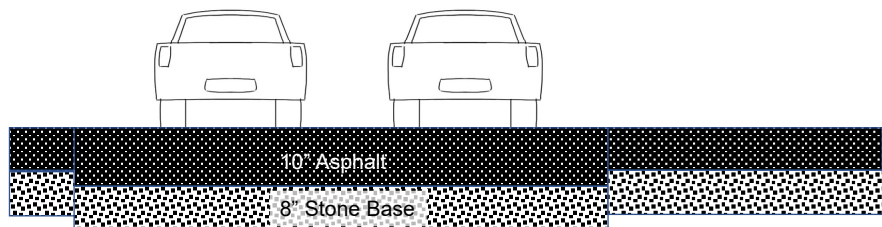
New Market Opportunity (cont.)



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FDR Plus Placement

Example of FDR Plus on Interstate Pavement



Example of FDR Plus on Interstate Pavement (cont.)



Step 1: Remove and stockpile left shoulder material,
cut 22' wide, 20" deep trench next to pavement



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Example of FDR Plus on Interstate Pavement (cont.)



Step 2: Mill remaining pavement 8" deep and place in trench



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Example of FDR Plus on Interstate Pavement (cont.)

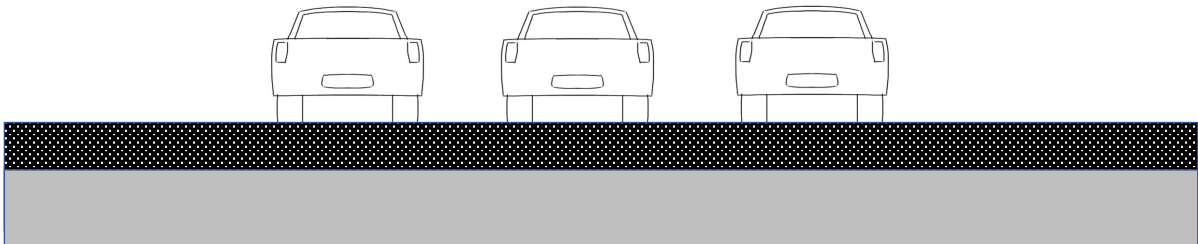


Step 3: Reclaim entire width 12" deep with cement



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Example of FDR Plus on Interstate Pavement (cont.)



Step 4: Overlay with 6" asphalt



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FDR Plus – New Market Opportunity

- VDOT is performing essentially these steps on I-64
 - Removing and crushing existing concrete instead of asphalt millings
 - Estimates savings in excess of \$15 million over conventional design

- Possibility of reproducing I-64 technique on I-440 reconstruction in Nashville
 - Innovation would be use of portable crushing plant to windrow concrete instead of hauling to central plant



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FDR Plus – New Market Opportunity (cont.)

- SCDOT has approved “Synthetic FDR” as a VE change to I-20 reconstruction near Columbia
 - Used 12” synthetic FDR with crushed concrete in lieu of 8” cement treated aggregate
 - Will have PCC instead of asphalt overlay

- NCDOT is evaluating “Synthetic FDR” as a VE change to I-77 reconstruction near Charlotte
 - Similar plan to I-20
 - Will also have PCC instead of asphalt



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Our Message

Our FDR Message

“Reuse, Rebuild and Restore Failing Roads”

- FDR is **Quick**
 - Reclaimed Base can be constructed under traffic and used same day for light traffic
- FDR is **Less Expensive**
 - Is the lower cost option if you need to patch asphalt pavement 15% or more
- FDR is **Recyclable**
 - Reuses existing in-place materials saving both time and money
- FDR is **Versatile**
 - Has been used on low volume rural routes to interstate truck routes and Parking Lots
- FDR is **Sustainable**
 - Creates a base with infinite fatigue life and with a well-executed pavement preservation strategy, the pavement life could exceed 25 years

Resources

PCA Resources

➤ Guide to FDR with Cement

- https://www.cement.org/docs/default-source/fdr/guide_to_fdr_with_cement_jan_2019.pdf

➤ FDR with Cement Fact Sheet

- <https://www.cement.org/docs/default-source/th-paving-pdfs/fdr/full-depth-reclamation-pca-logo.pdf?status=Temp&sfvrsn=0.17429406079748477>

➤ FDR Case Studies

- [https://www.cement.org/cement-concrete-applications/paving/full-depth-reclamation-\(fdr\)/full-depth-reclamation-\(fdr\)-case-histories](https://www.cement.org/cement-concrete-applications/paving/full-depth-reclamation-(fdr)/full-depth-reclamation-(fdr)-case-histories)





The Cement Council of Texas Staff



Richard B. Rogers, P.E.
Executive Director
rrogers@cementx.org
Direct: 512-751-0280



Amy C. Swift
Director of Administration
aswift@cementx.org
Direct: 817-281-6799



Nancy Aguirre, Ph.D., EIT.
Program Manager,
Highways and Airports
naguirre@cementx.org
Direct: 915-203-0387

Visit our website at <http://www.cementx.org/>