

Virginia Pavement Recycling Conference

November 26-27, 2012



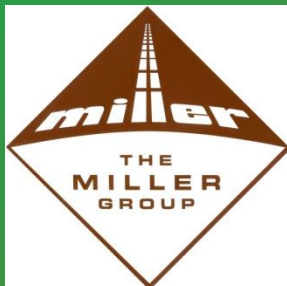
Glen Allen, Virginia

Virginia Pavement Recycling Conference

Full Depth Reclamation Construction & Inspection

Kimbel Stokes, General Manager
The Miller Group, Inc.

ARRA FDR & Soil Stabilization
Committee Chairman

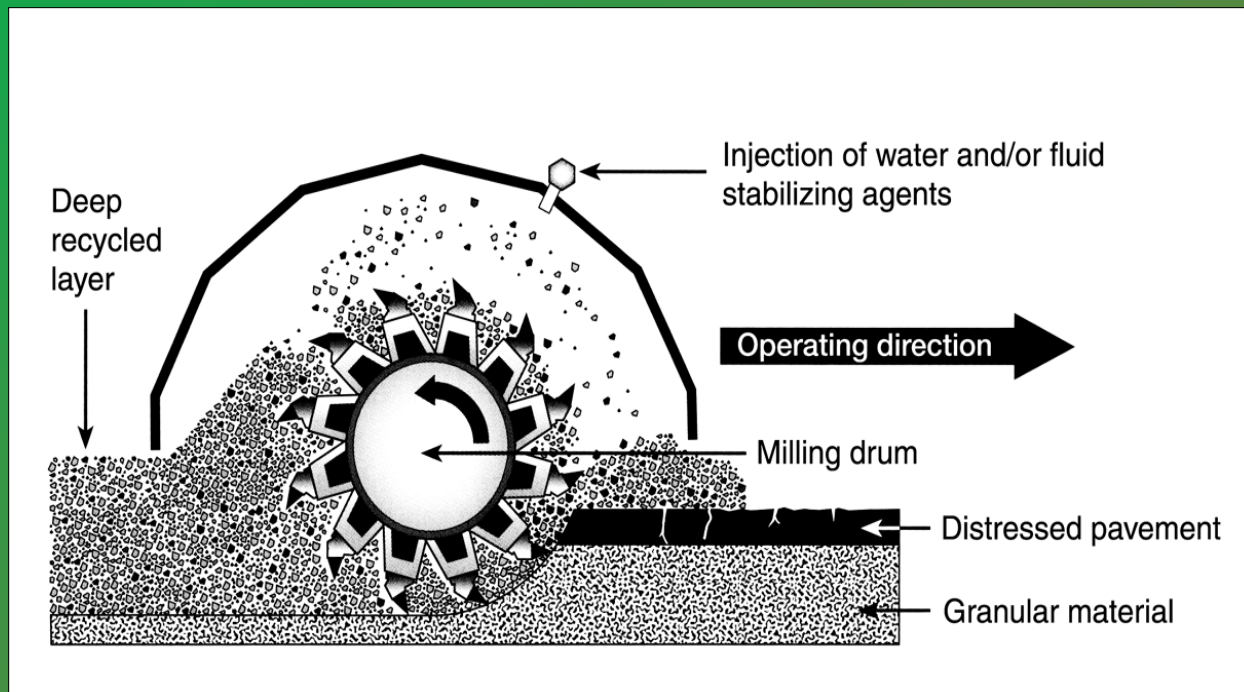


Presentation Outline

- What is FDR?
- Perceived Barriers
- Equipment & Construction
- Quality Control Plan
- Safety Considerations
- Questions

What is FDR?

Full Depth Reclamation (FDR) is a pavement rehabilitation technique in which the full flexible pavement section and a predetermined portion of the underlying materials are uniformly pulverized and blended together to produce a stabilized base course (SBC); additional structural strength may be obtained through the use of additives.



Perceived Barriers of FDR

- Working in confined urban areas
- Achieving the desired curb reveal
- No Traffic Until Cured
- Lowering and raising of utility structures
- Fugitive Dust



Traffic Control



Maintain Traffic With Pilot Vehicle



Construction Layout



Clip Edges



Widen Existing Lanes



Mixer



Pulverize

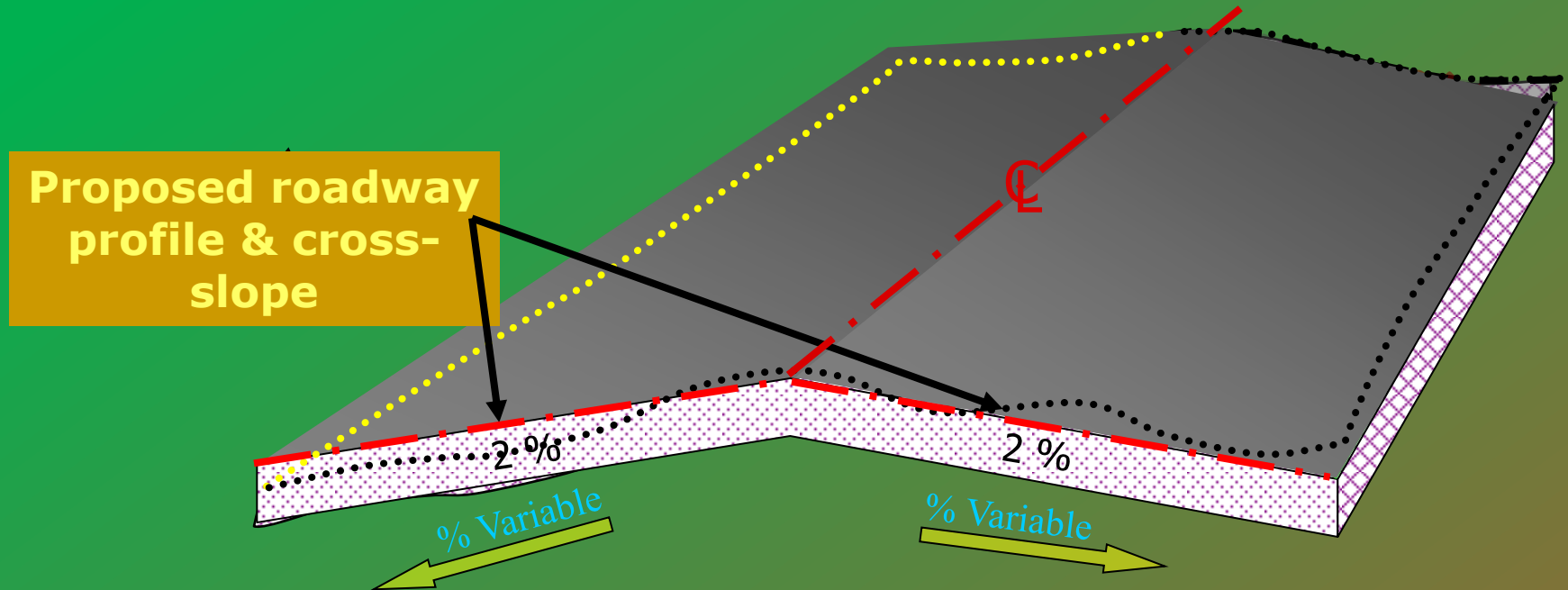


Material Management

- Achieving desired curb reveal is really a material management exercise
- Pre-milling should be avoided
- Pre-pulverization method is preferred
- Remove excess blended material after pulverization process



Re-establish Profile



Check Grade



Loading Tanker



Spreading Cement



Injecting Emulsion

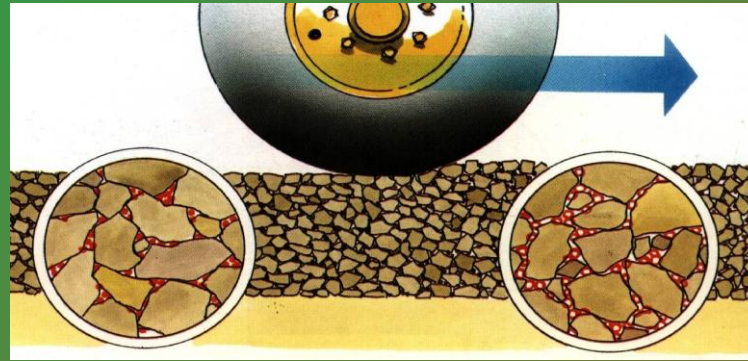
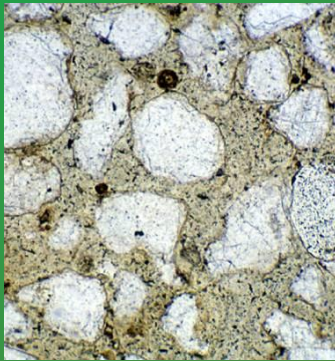


Mix



Compaction

- Compactors & compaction
 - Recycled material - high internal friction
 - Large rollers (pneumatic and vibrant)
 - Role of water is critical



Laminating Effect of Compaction

Compaction Roller Pattern Bottom - Up



Grade



Maintain Centerline



Maintain Moisture Content





After Prime

Quality Control Plan

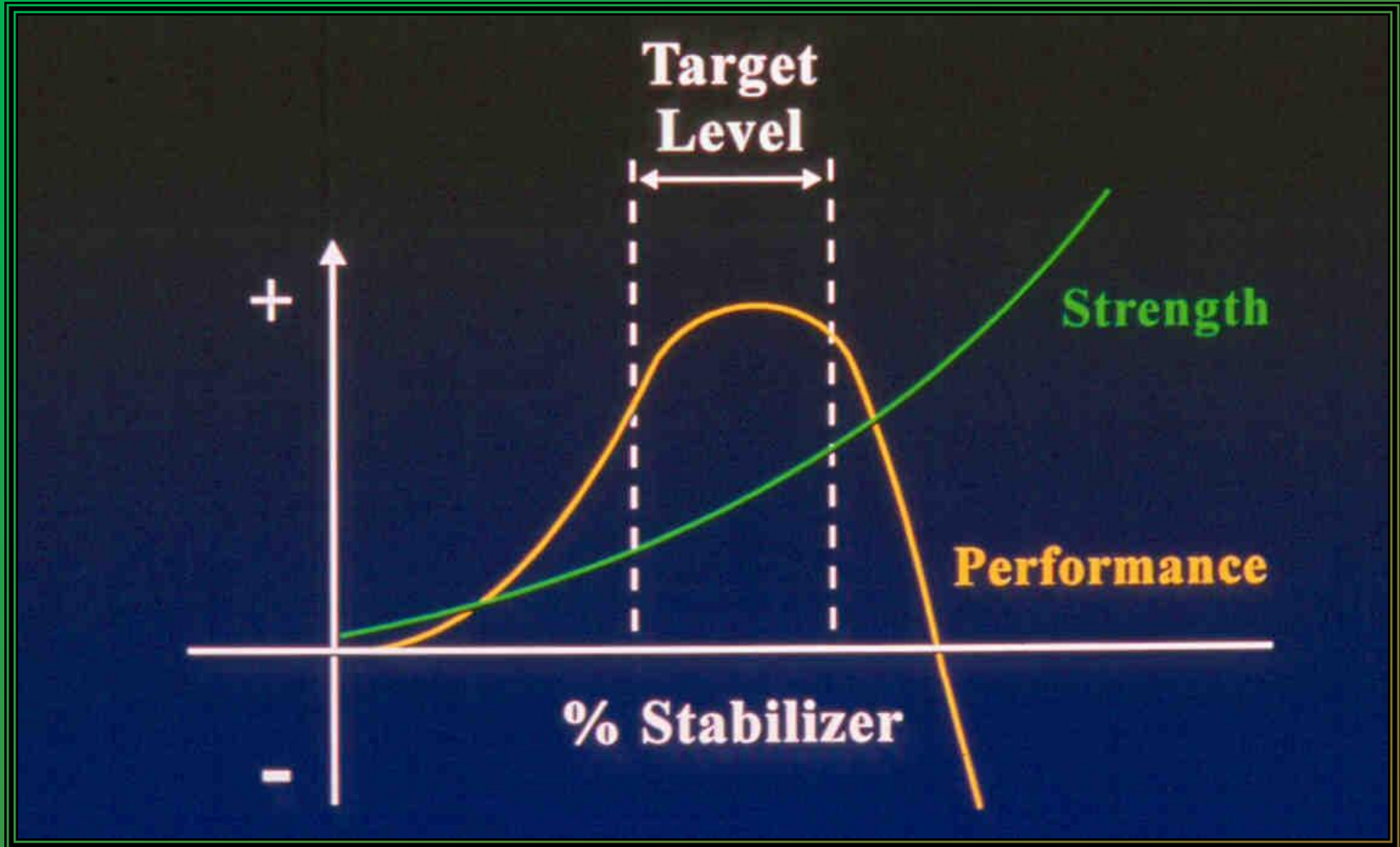
- Material Classifications
- Mix Design
- Traffic Control Plan
- Utility Conflicts
- Project Safety Plan
- Location and Alignment
- Monitor Yield of Stabilizing Additive
- Monitor Characteristics of Reclaimed Material
- Check Depth
- Monitor Amount of Water/Moisture
- Monitor Density/Compaction
- Grading Profile and Cross Slope
- Finished Surface
- Acceptance Reports
- Daily Diary

Test for Strength

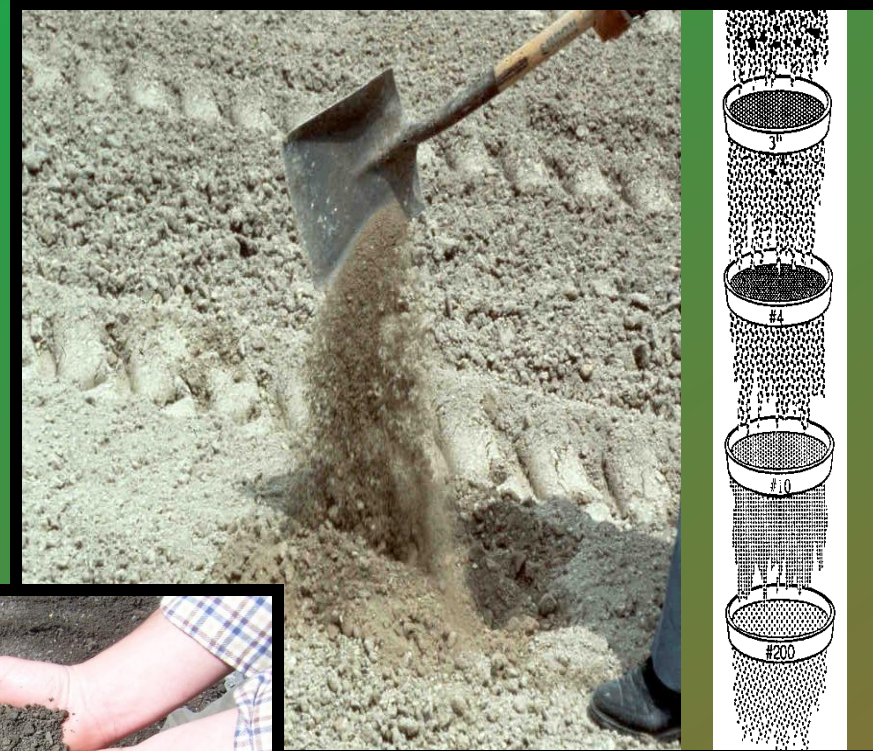
- **Unconfined Compressive Strength Testing**
 - Used by most State DOT's
 - Simple and quick procedure
 - 7-day strengths ranging from 300 psi to 400 psi (2.1 MPa to 2.8 MPa) are generally recommended
 - Proven support under heavy traffic conditions
 - Proven durability in both wet/dry and freeze/thaw environments



Balance Between Strength and Performance



Quality Control



Gradation

Reclaimed Pulverized Base Material





Quality Control



Check Spread Rate





2008/08/13



2008/08/13



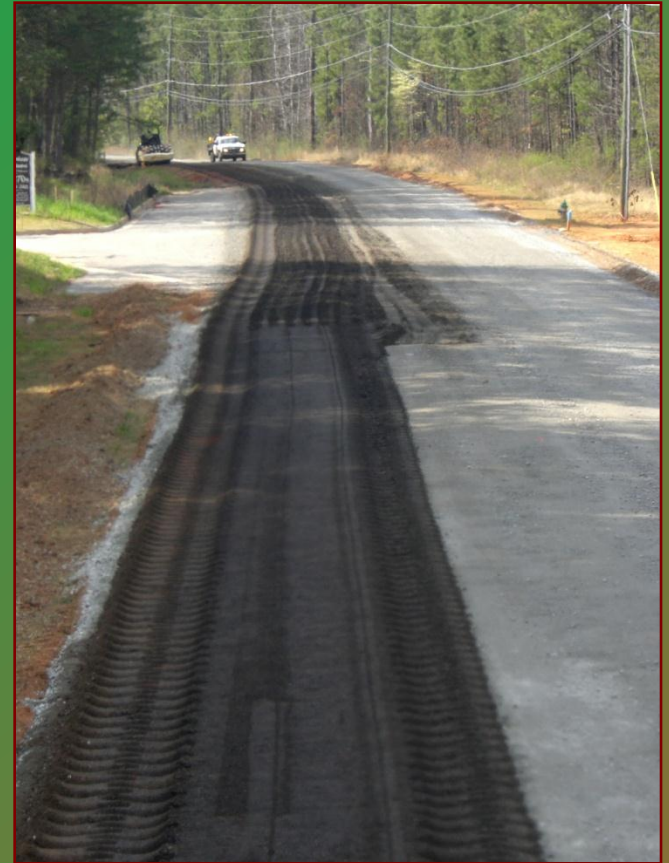
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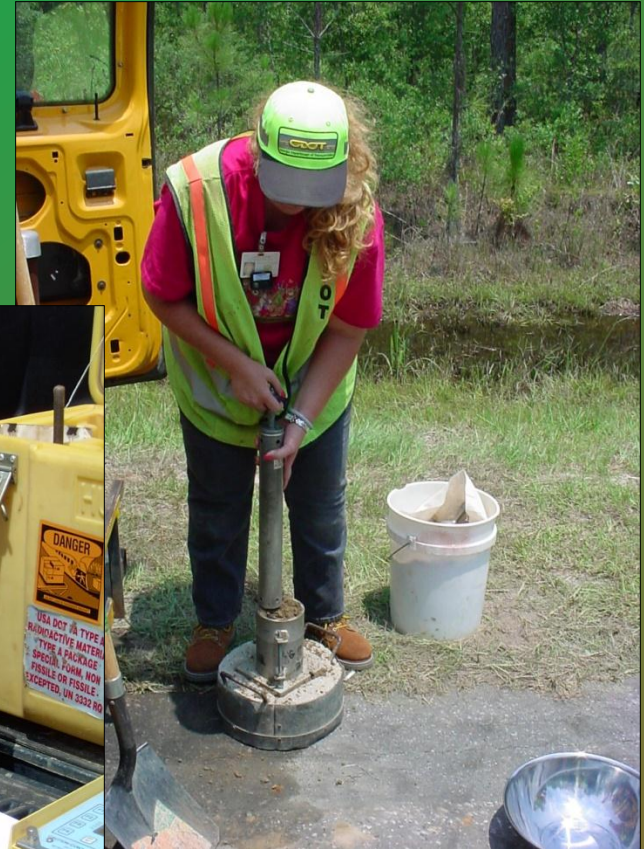
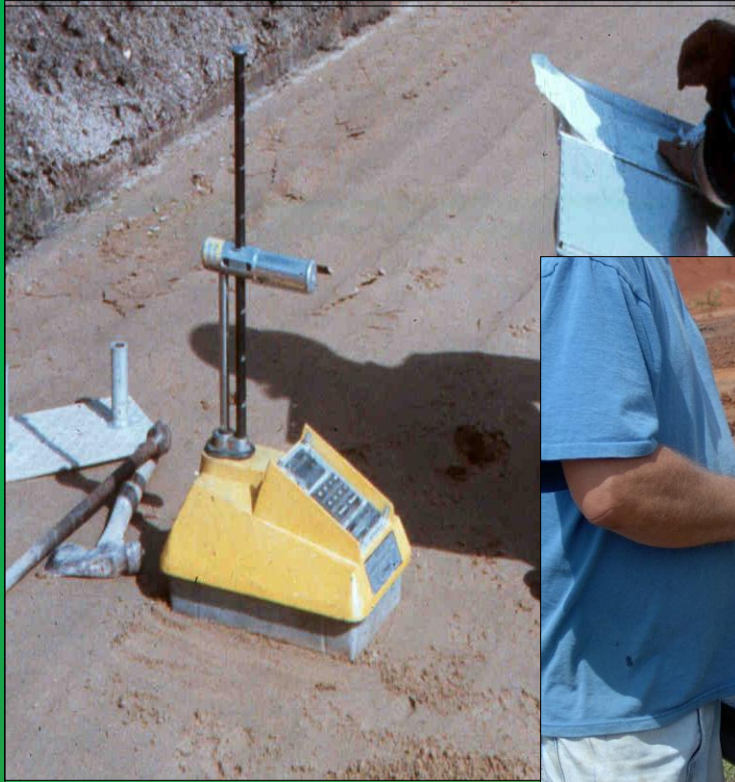
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Quality Control

- Yield
 - +/- 1.0% Liquid
 - +/- 5.0% Granular
 - Length, width, depth vs. gallons/tons used
- Depth +/- 1"

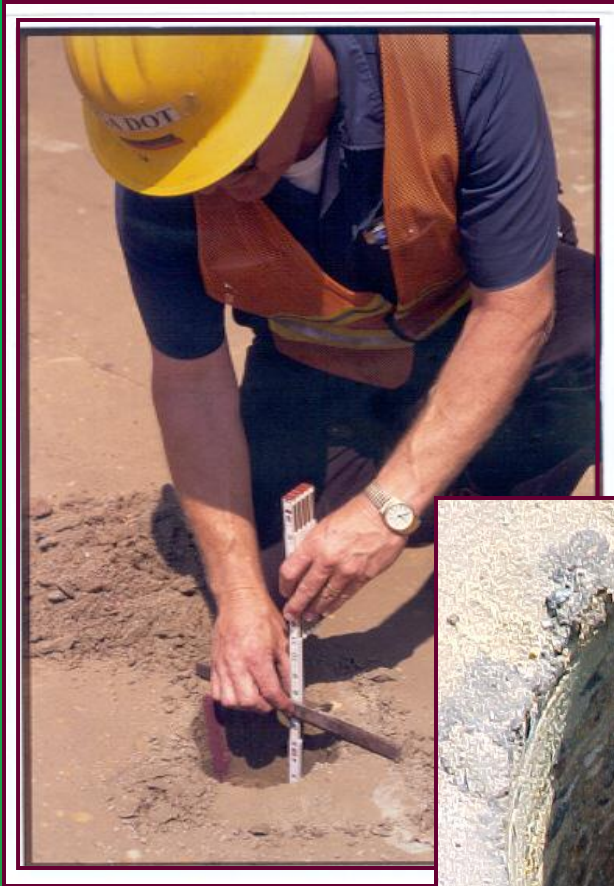


Quality Control



Density / Moisture

Quality Control



Thickness



Cement Content
(Phenolphthalein)

Quality Control



Stability

Line & Grade



Summary of Time Limits

- **Begin compaction within 45 minutes after all FDR ingredients mixed together in-place**
 - **All compaction operations completed within 2 hours**
- **All base construction operations completed within 4 hours**

Safety Considerations

- **Properly fitted respirators to combat airborne dust generated from spreading dry products**
- **Safety glasses, protective clothing and high-top boots to prevent employee eye or skin contact with materials**
- **Utilities**
- **Traffic Control**
- **Property Owners**

Utility Locates



Utility Conflicts

- Manholes
- Gas Lines
- Water Lines
- Power Lines
- Overheads



Temporary Centerline



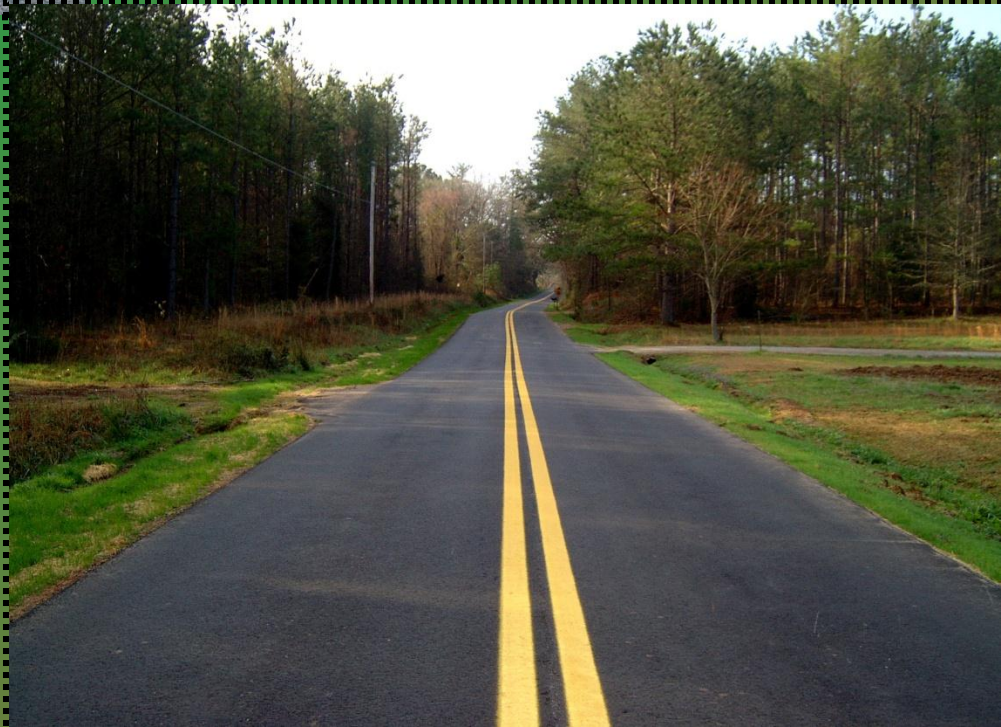
Allow To Cure Under Traffic



Don't Remove
and
Replace It

RECYCLE IT!

**Full Depth
Reclamation
(FDR)**



Construction Guidelines

Committee
Recommended Construction Guidelines
For
Full Depth Reclamation (FDR)
Using Bituminous Stabilization
FDR101

Last Revised 2/22/2012
3/21/2012



NOTICE

It is not intended or recommended that these guidelines be used verbatim within a specification. Owner Agencies should use them to help establish their particular project specification. Owner agencies should understand that all geographical areas and pavement rehabilitation/preservation projects are unique and the availability of materials and equipment may vary as well. ARRA assumes no liability for utilization of these guidelines by any Individual or Entity. Contact ARRA for answers to questions and for a list of ARRA member Contractors and Suppliers.

Asphalt Recycling and Reclaiming Association
#3 Church Circle, PMB 250
Annapolis, MD 21401
(410) 267-0023
www.ARRA.org

Committee
Recommended Construction Guidelines
For
Full Depth Reclamation (FDR)
Using Cementitious Stabilization
FDR102

Last Revised 2/22/2012
3/21/2012



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Committee
Recommended Construction Guidelines
For
Full Depth Reclamation (FDR)
Using Lime Stabilization
FDR103

Last Revised 2/22/2012
3/21/2012



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www.ARRA.org

Kimbel Stokes

The Miller Group, Inc.

Atlanta, Georgia

770 968 9100

kimbel.stokes@millergroup.ca

www.millergroupusa.com

