Session TH83

Using In-Place Recycling Technologies to address the needs of the Owner Agencies

FHWA and ARRA Advances 2014

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FHWA- Office of Asset Management, Pavement and Construction

March 5, 2014
Outline

- FHWA Initiatives/Advances for 2014
  - NHI, TCCC, EDC, Pocket Guides, BARM
- ARRA Initiatives/Advances for 2014
  - ARRA Guidelines
- Upcoming ARRA Meeting
  - August 5-7 Denver, CO, Regional and International Workshop on In-Place Asphalt Recycling
  - November 17-19 Baltimore, MD, Joint ARRA, ISSA, AEMA and PPRA Fall meeting
FHWA Recycling Policy – 3 E’s

- **ENGINEERING**
  - Use Good Engineering Design to Design to Assure Long-Life Pavements

- **ECONOMICS**
  - Use Life-Cycle Cost Analysis for Project Selection

- **ENVIRONMENT**
  - Consider Recycling First
  - Be Good Stewards of the Environment
Recycling Technologies

• RECYCLING
  • Reclaimed Asphalt Pavement/Shingles
  • Recycled Concrete Aggregate
  • In-Place Recycling

• REUSE
  • Fly Ash/Coal Ash
  • Tires
  • Shingles
  • Slags
  • Foundry Sand
FHWA Stakeholder Engagement

- Asphalt Mixture ETG
- Asphalt Binder ETG
- Warm Mix Asphalt TWG – Sunset
- Reclaimed Asphalt Pavement ETG – Sunset
- Pavement Sustainability ETG

Note: WMA and RAP ETG’s included in Asphalt Mixture ETG
September 2012
Sustainability ETG
Pavement Discussions

• Concrete Strategies for Sustainability
  – Mixture optimization
  – Darwin ME
  – Long-Life Designs
  – Surface Characteristics
  – RCA, Industrial By-Products, Two-Lift Paving

• Asphalt Strategies for Sustainability
  – WMA
  – RAP, RAS, RMA
  – Perpetual Pavement Thickness
  – In-Place Recycling
In-Place Recycling Program Technologies

Hot In-Place Recycling (HIR)
Cold Recycling (CR)
Full Depth Reclamation (FDR)
Hot In-Place Recycling (HIR)

• **Hot In-Place Recycling (HIR)** is a paving technique that sequential heating of the existing asphalt pavement followed by scarification or milling of the surface. Rejuvenating agents are added to the reclaimed mixture which is then repaved using conventional paving equipment. HIR is not a new technology as one of the first documented case of HIR recycling was reported **in the 1930’s**.

• HIR is intended to address surface distresses in the pavement and typically is limited to **the top 1.5 - 2 inches** of the existing pavement. In some conditions, HIR may be used up to 3 inches.

• HIR can be utilized in the rural or urban areas.

• HIR is a **accepted** pavement preventative maintenance technique.
HIR Advantages/Disadvantages

• **Advantages**
  - Eliminate surface distresses – cracking, moderate rutting, shoving, and raveling
  - Pavement gradation can be improved with the remixing operation
  - Minimal trucking costs
  - Pavement geometrics preserved or improved

• **Disadvantages**
  - Better results if pavement is fairly consistent
  - Need to be aware of crack sealant, rubber, and geotextiles in pavement
  - Thermoplastic striping should be pre-milled in advance of the operation
  - Large stone mixes not suitable candidate because of aggregate size
Cold Recycling (CR)

- **Cold Recycling (CR)** is a partial depth stabilization effort in which the asphalt existing pavement is milled up (without heat) and remixed with an additive and then repaved using conventional paving equipment. CR is not a new technology as one of the first documented case of CR recycling was reported in the **early 1900’s**.

- CR is intended to address surface distresses in the asphalt pavement and typically is limited to the top 3 - 5 inches of the existing pavement.

- CR Options include: **Cold In-Place (CIR)** or **Cold Central Plant Recycling (CCPR)** w/Surface Treatments or Overlay

- CR is accepted pavement preventative maintenance or a minor rehabilitation technique
CR Advantages/Disadvantages

• **Advantages**
  - Eliminate surface distresses – cracking, rutting, shoving, and raveling
  - Pavement gradation can be improved with the remixing operation.
  - Minimal trucking costs
  - Pavement geometrics preserved or improved

• **Disadvantages**
  - Better results if pavement is fairly consistent
  - Need to be aware of crack sealant, rubber, and geotextiles in pavement
  - Moisture content must be monitored
  - Application of a surface course is typically required
Full Depth Reclamation (FDR)

- **Full Depth Reclamation (FDR)** is a roadway rehabilitation technique in which the existing asphalt pavement and a predetermined portion of the underlying materials is pulverized. The reclaimed material is remixed with an additive and then repaved using conventional paving equipment. FDR is not a new technology as one of the first documented case of recycling was reported in the mid 1970’s.

- FDR extends the rehabilitation into the subbase/base for a couple of inches and is typically 6-12 inches (total) in depth. FDR is for severely deteriorated roadways where full reconstruction is not an option.

- FDR is a accepted pavement minor rehabilitation or reconstruction technique.
FDR Advantages/Disadvantages

• **Advantages**
  - Eliminate all surface distresses – cracking, rutting, shoving, and raveling
  - Pavement geometrics preserved or improved
  - Less Expensive than full reconstruction

• **Disadvantages**
  - Traffic Control is a requirement
  - Need to be aware of crack sealant, rubber, and geotextiles in pavement
  - Moisture content must be monitored
  - Application of a surface course is typically required.
  - Cure times of the new base is from 2 days to 2 weeks
Recycled Program Technologies
Guidance Documents

- **Basic Asphalt Recycling Manual -2001**
  (Currently being updated by FHWA and ARRA for release in 2014)

- **FHWA-NHI Training Course # 131050**
  (Asphalt Pavement In-Place Recycling Technologies)
  - Web Based Training
  - Instructor Lead Training (2-days)
  - Released 08/29/12
2014 BARM – Overview

• 17 Chapters. Introduction, Recycling and Reclaiming in Pavements, Project Evaluations, Cold Planning, HIR, CIR, and FDR sections that includes Project Analysis, Mix Design, Construction, Specifications and Inspection on each.

• Total Update/Revisions
Cold Planing- Cpt 4

• Cold Planing Construction
• Detail Project Analysis
• CP Equipment and Operations
• Preparation and Planning
• Main Pavement Milling
• Micro Milling
Cold Planing- Cpt 5

- Cold Planing Specifications and Inspections
- Specification Limits
- Inspection and Acceptance
HIR Detailed Project Analysis – Cpt 6, 7, 8, 9

• Pavement Assessment
• Materials Properties Assessment
• Constructability Assessment
• Simplified HIR Mix Designs
• Comprehensive HIR Mix Designs
• HIR Construction
• Common Equipment for Surface Recycling, Remixing, and Repaving
• Specifications and Acceptance
COLD RECYCLING (CIR and CCPR) Chpts 10-14

• Assessments
• Three E’s
• Structural Capacity
• Materials/Geometric
• Construction
• Mix Design
• Specifications and Acceptance
FDR Reclaiming – Chpts 15-17

- Project Analysis
- Mix Design
- Construction
- Specifications and Acceptance
2014 BARM New/Updated

• Coming by this Summer
• Review Participants include
  – Don Mathews
  – Todd Thomas
  – Steve Cross
  – Lee Gallivan
• 2014 Regional Conference in Denver
In-Place Recycling Construction – New Pocket Guides

Full Depth Reclamation  FHWA-HIF-13-036
Hot In-Place  FHWA-HIF-13-061
Cold In-Place  FHWA-HIF-13-062

Completed and Posted on FHWA, ARRA and National Center for Pvt. Preservation websites
New Pocket Guides

11
Pavement Preservation
Hot In-Place
Asphalt Recycling
Application Checklist

12
Pavement Preservation
Cold In-Place
Asphalt Recycling
Application Checklist

Full Depth Reclamation
Construction Checklist
ARRA Guidelines

• ARRA Recommendations for a Successful Project
• Become the Standard Across North America
• Satisfy the Vast Majority of ARRA Contractors, Product Suppliers and Equipment Manufactures
• Raise the Bar
  – Improve the Industry
  – Assist Owner Agencies to be more comfortable using them in getting the quality and performance they want
ARRA Guidelines

- Cold Planing
- Cold Recycling
- Full Depth Reclamation
- Hot In-Place Recycling (not yet)
Cold Planing (CP)

- CP101 - Recommended Construction Guidelines for Standard Cold Planing

- CP102 - Recommended Construction Guidelines for Micro Milling
Cold Recycling (CR)

- CR101 - Recommended Construction Guidelines for Cold In-place Recycling (CIR) Using Bituminous Recycling Agents
- CR102 - Recommended Construction Guidelines for Cold Central Plant Recycling (CCPR) Using Bituminous Recycling Agents
- CR201 - Recommended *Preconstruction Sampling* and Mix Design Guidelines for Cold Recycling Using Bituminous Recycling Agents
- CR301 - Recommended Quality Assurance Sampling and Testing Guidelines for Cold Recycling Using Bituminous Recycling Agents
• FDR101 - Recommended Construction Guidelines for Full Depth Reclamation (FDR) Using Bituminous Stabilization
• FDR102-Recommended Construction Guidelines for Full Depth Reclamation (FDR) Using Cementitious Stabilization
• FDR 103- Recommended Construction Guidelines for Full Depth Reclamation (FDR) Using Lime Stabilization
• FDR201- Recommended *Preconstruction Sampling* and Mix Design Guidelines for Full Depth Reclamation (FDR)
• FDR301- Recommended Quality Assurance Sampling and Testing Guidelines for Full Depth Reclamation
Timing and Implementation

- Guidelines Will be Posted to ARRA Website as Complete
- ARRA Considering:
  - Posted to ARRA Website for Download as a PDF by anyone.
  - Download as a Useable Word Document by ARRA Members or Owner Agencies
TCCC Web Based Training

- ARRA is assisting the Transportation Curriculum Coordination Council (TCCC) with the Development of Web Based Construction Inspector Training for:
  - CIR – Available
  - HIR – Planned for FY 2014
  - FDR – Planned for FY 2014
• TCCC Inspector Training for Cold In-Place Recycling (CIR) – WEB-BASED
  – 4 Hour Basic Training Level Class
  – Module 1 Introduction
  – Module 2 Full Production
  – Module 3 Post Production
FHWA-NHI-134114

- Access: 
  http://www.nhi.fhwa.dot.gov/training/course_search.aspx?tab=0&key=cold&typ=3&sf=0&course_no=134114
Regional and International Workshop on In-Place Asphalt Recycling- Denver, Colorado

• FHWA/ARRA/NCPP/TTI are hosting the national and international workshop, Discussion Topics
  – What do the decision makers need to call for IRT
  – Identification of the technology gaps and overcoming barriers that are preventing further use of IRT
  – Discussions on each of the IRT to include project selection, mixture and structural designs, performance and life cycle coast/benefits using IRT.
  – Mark your calendars - August 5-7, 2014
Thank you... For More Information...

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The secret of a good sermon/presentation is to have a good beginning and a good ending, and to have the two as close together as possible: