U.S. Department of Transportation
Federal Highway Administration

FHWA Pavement Sustainability Initiatives

Virginia Pavement Recycling Conference

John Bukowski
Materials Team Leader
Federal Highway Administration

Current Program Framework

- Evaluation/Assessment of Existing Techniques
- Establishment and Coordination of a Sustainable Pavements Technical Working Group (TWG)
- Development of Reference Documents on Sustainable Pavements and Materials
- Technology Transfer and Deployment

Today ……..

Focus on Recycling …….

The FHWA policy on recycling/re-use:

- **Recycling/reuse can offer engineering, economic and environmental benefits.**
- **Recycled materials should get first consideration in materials selection.**
- **Use of recycled materials should include an initial review of engineering, cost, and environmental suitability.**
- **Restrictions that prohibit the use of recycled materials without technical basis should be removed from specifications.**

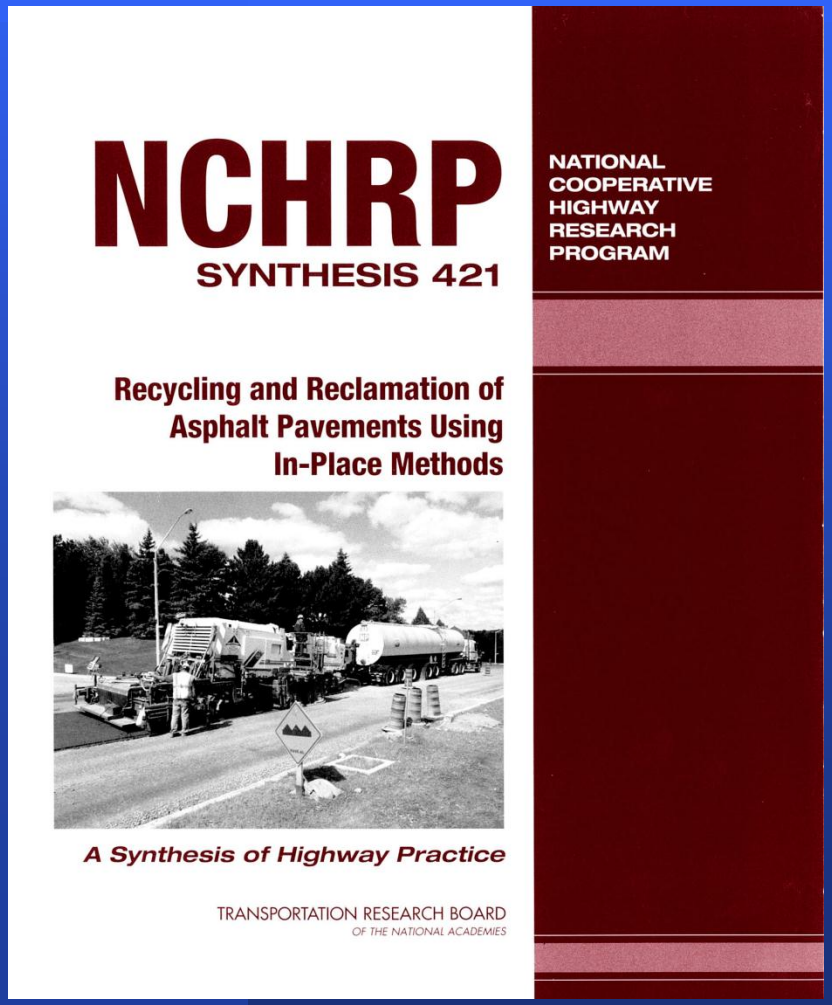
In-Place Recycling Technologies

Hot In-Place Recycling (HIR)

Cold In-Place Recycling (CIR)

Full Depth Reclamation (FDR)

In-Place Recycling Synthesis



45 States surveyed

- 34 experience w/ HIR & CIR
- 33 experience w/ FDR

Needs:

- Well defined terms
- Guidance on selection
- Lab procedures
- Emulsion grades
- Compaction criteria
- Structural coefficients
- Quantifiable benefits/ performance

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Recycled Program Technologies (HIR,CR,FDR)

- Hot In-Place Recycling (HIR) is a paving technique that principally recycles the top 2 inches of asphalt pavement.
- Cold Recycling (CR) is a asphalt pavement rehabilitation technique that typically consists of rehabilitating 2-6 inches of the existing pavement. CR Options include:
  - Cold In-Place (CIR) or
  - Cold Central Plant Recycling (CCPR)
  - w/Surface Overlay

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Recycled Program Technologies (HIR,CR,FDR)

- Full Depth Reclamation (FDR) is a technique that extends the rehabilitation into the subbase/base typically 12 inches.
  - FDR is for severely deteriorated roadways
  - w/Surface Overlay

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.**
  - **Large stone mixes not suitable candidate because of aggregate size.**

CR Advantages/Disadvantages

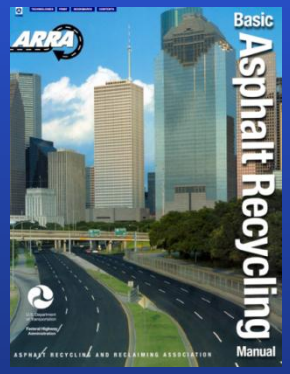
- **Advantages**
  - **- Eliminate surface distresses – cracking, rutting, shoving, and raveling.**
  - **- Pavement gradation can be improved with the remixing operation.**
  - **- Minimal trucking costs.**
  - **- Pavement geometrics preserved or improved.**
- **Disadvantages**
  - **- Better results 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 wearing course is typically required.**

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 wearing 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 (BARM) dated 2001.**
- **Basic Asphalt Recycling Manual (Currently being updated by FHWA and ARRA for release in 2013)**
- **FHWA-NHI Training Course # 131050 (Asphalt Pavement In-Place Recycling Technologies)**
  - **Web Based Training**
  - **Instructor Lead Training (2-days)**
  - **Released 08/29/12**



NHI
NATIONAL HIGHWAY INSTITUTE

NCHRP 09-51: Material Properties of Cold In-Place Recycled and Full-Depth Reclamation Asphalt Concrete for Pavement Design

Project Objective

"Propose material properties and associated test methods and distress models for predicting the performance of pavement layers prepared with CIR of AC and FDR of AC with aggregate base and minimal amounts of subgrade material using asphalt-based materials."

Focus on:

- **In situ structural properties under field-cured conditions**
- **Material property inputs for MEPDG/DARWin-ME**
- **Distress models for MEPDG/DARWin-ME**

Project Team

University of Maryland – College Park (Charles Schwartz/PI)

Virginia Center for Transportation Innovation and Research (Brian Diefenderfer/Co-PI)

Wirtgen America (Mike Marshall)

Colas Solutions (Todd Thomas)

Recycling Benefits

- Reduced costs ✓
- Reduction in User Delays ✓
- Shorter Construction Periods ✓
- Mitigation or elimination of existing pavement distresses ✓
- Improved roadway performance ✓
- No disturbance of subgrade (except FDR) ✓
- Preservation of the environment (reduced landfilling) ✓

National Legislation: Moving Ahead for Progress in the 21st Century (MAP-21)

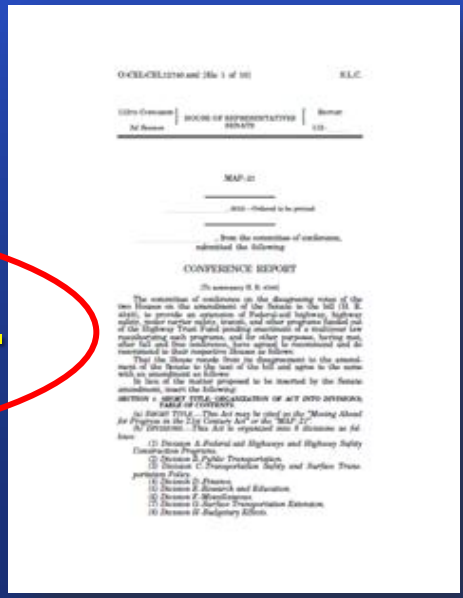
President signed into law P.L 112-141, *Moving Ahead for Progress in the Twenty First Century* (MAP-21), on July 6, 2012. MAP-21 extended SAFETEA-LU for the remainder of FY 2012, with new provisions for FY 2013 and FY 2014 beginning on October 1, 2012.

- SAFETEA-LU expired on 9/30/09

Moving Ahead for Progress in the 21st Century (MAP-21)

- **SEC. 1304. INNOVATIVE PROJECT DELIVERY METHODS**
  - **Sub SEC. (3) INNOVATIVE PROJECT DELIVERY**

Permits State Agencies to use 100% Federal Funding, for various innovative project delivery methods including In-place recycling technologies.



MAP-21

CONFERENCE REPORT

Upcoming Events Recycled/Reclaimed Materials and Recycled Programs

- **Industrial Resources Council -** Annual Conference, Indianapolis, IN., November 28-29, 2012; Go to: www.industrialresourcescouncil.org

- **National Asphalt Pavement Association -** 21st Century Asphalt Pavements Conference: Value, Quality, and Performance, December 5-6, 2012, Salt Lake City, UT.; Go to: www.asphaltpavement.org/21stcentury

Upcoming Events Recycled/Reclaimed Materials and Recycled Programs

- **Transportation Research Board (TRB)** Annual Conference, Washington DC, January 13-17, 2013, TRB 92nd Annual Meeting: Go to: www.trb.org/Main/Home.aspx

- **6th Rubber Modified Asphalt (RMA)** Conference, Tempe, AZ., October 15-17, 2013: Go to:
  www.rubberpavements.org

- **6th Asphalt Shingles Recycling (ASR)** Annual Conference, Denver. CO., November 7-8, 2013; Go to:
  www.shinglerecycling.org/content/home

Conclusion

Agencies have increased efforts to promote recycling and low-energy, environmentally friendly construction methods.

As we face today's challenges of higher material & construction costs and deteriorating roadway conditions, we need to assess and modernize our approach to maintaining and managing our highway investments.

Conclusion – Continued

- In-Place Recycling of Hot Mix Asphalt Pavement is a cost effective proven technology that is underutilized by State and local governments in the United States.

- The last 35 years have seen a dramatic improvement in asphalt recycling and reclaiming equipment, and In-Place Recycling has developed into a feasible and economic alternative to traditional maintenance and rehabilitation alternatives.

Thank you…

For More Information…

Victor (Lee) Gallivan, PE

Recycled Material Program Manager

Victor.Gallivan@dot.gov

Ph: 317-226-7493

Cl: 317-605-4704