# In-Place Recycling

#### Earth Day 2010 Steven Muncy, ARRA

#### There's No Place Like Home









# Recycle More Recycle More Efficiently

Recycled Materials To Maintain Current Level of Service









#### **Full-Depth Reclamation**



## What is FDR?

The full flexible pavement section and a predetermined portion of the underlying materials are uniformly crushed, pulverized or blended, resulting in a stabilized base course (SBC).



# The FDR Process

Primary Disciplines
 Pulverization
 Mechanical Stabilization
 Asphalt Stabilization
 Chemical Stabilization



# **Cold Recycling**



# **Types of Cold Recycling**



#### Cold In-Place Recycling (CIR)

#### Cold Central Plant Recycling (CCPR)



#### CIR – Multi-Unit Train



#### **Two-Unit Train**



# Single Unit Train

Small size for urban projects
Short turning radius



# CIR - Laydown

Cold In-place Recycling laydown is done with the same equipment and controls as other maintenance mixes.





Completed widening section after CIR

# Widening

Additional aggregate may be placed in the area to be widened.



## CIR –Widening



# Hot In-Place Recycling





Surface Recycling
Surface Repaying
Remixing

# Hot In-Place Recycling

- Treats surface to a depth of 1 inch or greater
- Allows several different surface treatments to be added during or after the HIR process
- Adds additional binder/modifier
- Adds additional hot mix asphalt
- Increase structural coefficient

#### **HIR Process**



# **HIR Heating**



#### **HIR Scarification**



#### **HIR Additives**



#### HIR Placement



### **Typical Surface Treatments**

Chip Seal
Slurry Seal
Micro-Surfacing
Cape Seal
Cold Mix Overlay
Hot Mix Overlay



## **In-Place Benefits**

- Conserves Energy
- Conserves Materials
- Improves Mix Characteristics
- Cracking Eliminated/Reduced
- Improves Geometrics
- Cost Effective
- Saves Time
- May Be Performed Under Traffic

#### **Candidates**

Airport Runways
County Roads
State & US Highways
Interstate Highways
City Streets



# **Project Selection**

- Material Properties Evaluation
- Existing Road Geometrics
- Life Cycle Cost Analysis
- Environmental Impact
- Structural Strength
- Pavement Condition
- Road History
- Traffic Study



# QA/QC Plan

- 1. Calibration of meters
- 2. Gradation
- 3. Recycling Additive
- 4. Smoothness
- 5. Moisture
- 6. Density
- 7. RAP Gradation
- 8. Depth of pulverization/milling







