ACTIVITIES

2014 International & Western States In-Place Recycling Conference
Denver, Colorado
August 5-7, 2014

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Technical Director
Asphalt Recycling & Reclaiming Association
Definitions

Asphalt Recycling & Reclaiming Association www.ARRA.org

Industry Segments

- Cold Planing (CP)
- Hot In-place Recycling (HIR)
- Cold Recycling (CR)
  - Cold In-place Recycling (CIR)
  - Cold Central Plant Recycling (CCPR)
- Full Depth Reclamation (FDR)
Other’s Definitions

- **Hot In-Place Recycling (HIPR)**
- **Cold In-Place Recycling (CIPR)**
  - **Partial Depth CIPR**
    - Same as ARRA’s CIR
  - **Full Depth CIPR**
    - Same as ARRA’s FDR
Cold Planing

- Surface or grade preparation for other rehabilitation techniques
- Temporary driving surface
- Improving ride quality
- Fine & Micro-Milling
Hot In-place Recycling

HIR uses heat to soften the existing asphalt pavement, scarifies the pavement, adds rejuvenating agent and additives (if desired), relays and compacts the pavement in one continuous process.
Surface Recycling

Heating, reworking, rejuvenating and mixing the top 1-2 inches of existing asphalt pavement in preparation of wearing surface.
Surface Remixing

Heating, reworking, and rejuvenating the top 1 to 2 inches of an existing asphalt pavement, adding admixture or new aggregate, if desired, mixing the newly recycled mix in a mixing chamber, placing and compacting...
Surface Repaving

Heating, reworking, rejuvenating and mixing the top 1-2 inches of an asphalt pavement and simultaneously applying an overlay resulting in a single, thermally bonded layer.
Single & Multiple Pass

- One or more preheaters
- One or more heater scarification units
- Remove scarified pavement in one or more lifts
HIR Benefits

► Repairs distress
► Extends life
► Improves ride quality
► Eliminate need for a leveling course
► Improved bonding
► Environmentally friendly
► Cost savings
Types of Cold Recycling

► Cold Central Plant Recycling (CCPR)

► Cold In-Place Recycling (CIR)

► Also called partial depth cold in-place recycling
Cold Central Plant Recycling

A viable alternative when stockpiles of high quality RAP are available or when it is not possible to in-place recycle the pavement. May be used immediately or stockpiled
CIR Process Description

► Restricted to asphalt pavement & minor amounts of base
► Pulverizing existing pavement 2-5” depth
► Sizing of the reclaimed asphalt (RAP)
► Addition of recycling agent and additives
► Mixing all component materials
► Placement and compaction of mixture
► Placement of surface course
Multi-Unit CIR Train
Single Unit Trains
CR Advantages

- Conserves energy
- Conserves materials
- Improved mix characteristics
- Cracks eliminated/reduced
- Cost effective
- Saves time
- May be performed under traffic
Full Depth Reclamation (FDR)

A rehabilitation technique in which the full flexible pavement section and a pre-determined portion of the underlying materials are uniformly crushed, pulverized or blended, resulting in a stabilized base course.
Types of FDR

- Mechanical Stabilization
  - Pulverization
  - Corrective Aggregate/RAP

- Bituminous Stabilization
  - Foamed Asphalt
  - Emulsified Asphalt

- Chemical Stabilization
  - Cement
  - Lime
  - Fly Ash
FDR Construction
Add Stabilizing Agent = Stabilized Base

Cement Stabilization

Bituminous Stabilization

Lime Stabilization
Pavement Management

- Seal Coats
- Slurry Seals
- Hot In-Place Recycling (HIR)
- Cold Recycling (CIR & CCPR)
- Full Depth Reclamation (FDR)

Graph showing the deterioration of PSI over the years.
# Recycling & Reclaiming Strategies

<table>
<thead>
<tr>
<th>M&amp;R</th>
<th>Strategy</th>
<th>Method</th>
<th>CP</th>
<th>HIR</th>
<th>CR</th>
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*With HMA Overlay
PP = Pavement Preservation
How to Get a Good In-Place Recycling Project?

► Good Communication and Education
  ▪ Especially For Inexperienced Agencies

► Proper Site Selection
  ▪ Right Method, Right Road, Right Time

► Good Specifications

► Mix Design

► Experienced Contractor
Basic Asphalt Recycling Manual

2nd Edition

Chapters on:
- Preconstruction Activities (project selection)
- Mix Design
- Construction
- QA Sampling & Testing
- Available Late 2014
Education Resources

- Pavement Preservation Application Checklist Series
- Updated HIR & CIR, New FDR
- www.pavementpreservation.org
Training Resources

- **TCCC Inspector Training for Cold In-Place Recycling (CIR) Web Based FHWA-NHI-134114**
  - [http://www.nhi.fhwa.dot.gov/training/course_search.aspx?tab=0&key=coil&typ=3&sf=0&course_no=134114](http://www.nhi.fhwa.dot.gov/training/course_search.aspx?tab=0&key=coil&typ=3&sf=0&course_no=134114)
  - www.tccc.gov
  
- TCCC Inspector Training for HIR and FDR under development.
ARRA Best Practice
Recycling Guidelines

► 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.
ARRA Guidelines

- 100 Series - Recommended Construction Guidelines
- 200 Series - Recommended Mix Design Guidelines
- 300 Series - Recommended Quality Control Sampling and Testing Guidelines
- 400 Series – Recommended Project Selection Guidelines
### Status of ARRA Guidelines

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<tr>
<th>Series</th>
<th>Cold Planing</th>
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## Status of ARRA Guidelines

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## Results QA Testing CIR

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<td>Dry Tensile Strength</td>
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<td>$E^* \ 20 \ C, \ 1 \ Hz$</td>
<td>456,000 psi</td>
<td>355,000 psi</td>
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Thank You  www.ARRRA.org

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405-744-7200

Magnitude 3.0 Earthquakes

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ARRA Cold Planning