In-Place Recycling & Reclaiming Seminar with LIVE Demonstration
June 27-28, 2017
Champion Hosts:
Cold In-Place Recycling

Dan Schellhammer, P.E.
Midstate Reclamation and Trucking

• Founded in 1984 by our CEO, Tom Johnson
• In 1991, Midstate brought the first reclaimer into the state of Minnesota
• Emphasis on asphalt recycling techniques (milling, reclaiming, SFDR, CIR, CCPR), soil stabilization, and heavy haul trucking
• Focus on technologies that do more, with less, and extend the life of pavement systems
• ARRA member since 1994
• Offices in Lakeville, MN and Spearfish, SD with a satellite office in Tioga, ND
• Perform work throughout the US
Overview

• Cold Mix (It is NOT hot mix)
• CIR Process
• Additives
• Economics
• Right Tool, Right Time, Right Place
• Best Practices: Project Selection and Construction
• Success and Failure
COLD MIX
-It’s NOT hot mix!

Looks black and smooth

Coarse graded and sensitive
Multi-Unit Cold In-Place Recycling Train
Water Tanker
Full Lane Width Mill
Crusher – Pug Mill
Pup (Oil Tanker)
Pick-Up Machine with Paver
Double Steel Drum Roller
Rubber Tire Roller
Single Unit Train
Photo Credit: Dunn Company
Additives

- Emulsion, 3% by Weight
  - Types: CSS-1H (IA/MN), HFMS-2S (IA/MN), Engineered (MN/IL)
- PG Graded Binder (Foam), 2% by Weight
  - Types: PG 49-34 (MN), PG 52-34 (IA/NE), PG 58-28 (NE), PG 64-22 (NE)
- Modify Cold Mix Performance by Adding Other Materials
  - Portland Cement
  - Quicklime/Hydrated Lime
  - Lime Slurry
  - Add Rock
Costs

• Many Scenarios, Many Options to Consider

• Attempt to Level the Playing Field

<table>
<thead>
<tr>
<th></th>
<th>Base HMA</th>
<th>CIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MnDOT GE Factor</td>
<td>2.25</td>
<td>1.50</td>
</tr>
<tr>
<td>NCAT Structural Coefficients</td>
<td>0.44</td>
<td>0.40</td>
</tr>
</tbody>
</table>
Costs – Base Course HMA vs. CIR Cold Mix

- Price of Installed Base Course HMA (Aggregate, Oil, Trucking, Placement, Traffic Control, QC, Temp Striping) by the TN

- Price of CIR (Aggregate, Oil, Trucking, Placement, Traffic Control, QC, Temp Striping) by the TN

• To the Spreadsheet We Go
Right Tool, Right Place, Right Time

- Save Money
- Save Time
- Extend the Life of Pavement
- Reduce Maintenance Costs
- Improve Ride
- Reduce Carbon Emissions
- Recycle and Re-Use
ARRA
Responsible Renewal. Reliable Results.

Best Practices: Project Selection and Construction
Project Selection

• Structurally Sound
• Stable Subgrade
• Well Drained (No Cattails in the Ditch)
Project Selection
Project Selection
Accurate Pavement Assessment

• Cores
• GPR
• Construction Records (chip seals, fabric, old asphalt mix design)
• Mix Design (medium/coarse gradation, 75 degree and 110 degree RAP)
Mix Design Tools
Photo Credit: American Engineering and Testing (AET)

- Gyratory Compactor
- IDT
- Wirtgen Foaming Machine
- Proctor
- Gradation
- Lab Crusher
- Experienced Lab
Depth of CIR

- 3 to 4 inches is the Sweet Spot, 5 inch max
- Less than 3 inches, Resistance to Reflective Cracking is Reduced
- 4 to 5 inches Increases the Size of the Windrow
- SFDR should be considered when going over 5 inches (Economy and Compaction)
Roadway Widening

- Safer Roadway
- Small Expense of Additional Oil
- Need Clean Shoulder and Adequate Clear Space for Widenings
- Beware of Poorly Built Shoulders
Profile and Cross Slope Corrections

- Condition of Existing Roadway
- Percent Improvement (Profile)
- 0.5% Cross Slope Corrections
- Alternatives
  - Wedge/Level with HMA
  - Profile Mill (3D Milling)
  - Consider use of other pavement rehab technique
Traffic Control

• Roads that are Closed and Only Open to Local Traffic are Safest
• Manage Time Lapse of Traffic on Fresh Mat
• Work Zone 2 Miles or Less
• Train Moves Against Traffic to Prevent Vehicles from Being Parked on New CIR Mat
• Pilot Car and Flaggers Needed if the Road Remains Open to Traffic
• Keep your Head on a Swivel
Dimensional Restrictions

Height and Width

- Overhead Power, Trees, Bridges, etc.
- Mailboxes
- Guardrail (horizontal and vertical)
- Ditch Slopes
- Level Up Shoulders
Load Restrictions

Weight of Mill

Posted Weight Limits
Patches (Base and Subgrade Repairs)

- A Great Way to Repair Isolated Subgrade Issues
- Hot Mix Patches are Preferred
- Concrete Patches Create:
  - Non-homogeneous mix
  - Bump in the Road
  - Reflective Crack at Patch Site
  - Increased SY Unit Price
Quality Control

• Establish a Rolling Pattern
• Perform Gradations and Compare Field RAP Size to Mix Design RAP Size
• Nuke Gauge
• Timely Reporting of Test Results
• Foaming Characteristics
• Monitor Moisture of the CIR Layer to Ensure Cure Prior to Surface Treatment
• Enforce Specifications
• Allow Input from Experienced Contractors
Temperature and Sunlight Effect:

- Oil Incorporation Rate
- Cure
- Mid-Day Changes
- Break of the Windrow
- Cold Mix Work Time
Curing of the Cold Mix

- Rolling Traffic is our Friend
- Self Healing
- Stop Signs
- Frequent Turning can Tear the Mat
- Limit Haul Routes
- Hot, Sunny Days will Accelerate Cure
- When the Water is Out, Cover It Up
- Do NOT Apply a Surface Treatment on a Mat that has not Cured Out
CIR Safety

• Traffic
• Extremely Hot Oil (Foam)
• Respect the Equipment
• Have a Spill Plan
Unique Applications

- Interstate
  - I-680 in Iowa outside of Council Bluffs, IA
- Airports
  - Bemidji, Fairmont
- CIR over Concrete
  - Throughout Iowa
- Suburban/Urban Areas
- Shoulders
  - Interstate
DANA, IOWA
The Reason Iowa has a Robust CIR Program

Average High Severity Transverse Cracking
10 Year Span (3-4 inches HMA Surface)
It Gets Even Better...

- Cost Savings
  - Roadway Maintenance
  - Smoother Ride
- Shorter Construction Durations than a Reconstruct
  - Safer for Traveling Public and Construction Workers
- Green
  - Recycle 100% of the Roadway
  - Reduced Environmental Impact (Mining of Virgin Aggregate and Lower CO2 Footprint)
Questions?

Dan Schellhammer, P.E.
Midstate Reclamation and Trucking
21955 Grenada Avenue
Lakeville, MN  55044
Email:  dans@midstatecompanies.com
Office:  952-985-5555
Mobile:  612-490-3835