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Responsible Renewal. Reliable Results.

In-Place Recycling & Reclaiming Seminar with LIVE Demonstration

June 27-28, 2017

Champion Hosts:

CITY OF DICKINSON NORTH DAKOTA

STARK COUNTY ROAD DEPT.

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Cold In-Place Recycling

Dan Schellhammer, P.E.

In-Place Recycling & Reclaiming Seminar | Fargo, ND | June 27-28, 2017

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MIDSTATE RECLAMATION & TRUCKING
WHERE CUTTING EDGE IS COMMONPLACE

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

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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

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COLD MIX
-It's NOT hot mix!

Looks black and smooth

Coarse graded and sensitive

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Multi-Unit Cold In-Place Recycling Train

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Water Tanker

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Full Lane Width Mill

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Crusher – Pug Mill

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Pup (Oil Tanker)

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Pick-Up Machine with Paver

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Double Steel Drum Roller

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Rubber Tire Roller

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Single Unit Train

Photo Credit: Dunn Company

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Single Unit Train

Photo Credit: Dunn Company

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Cold Central Plant Recycling (CCPR)

Photo Credit: Coughlin Companies

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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

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Costs

- Many Scenarios, Many Options to Consider

- Attempt to Level the Playing Field

	Base HMA	CIR
MnDOT GE Factor	2.25	1.50
NCAT Structural Coefficients	0.44	0.40

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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

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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

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Best Practices: Project Selection and Construction

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Project Selection

- Structurally Sound
- Stable Subgrade
- Well Drained (No Cattails in the Ditch)

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Project Selection

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Project Selection

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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)

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Mix Design Tools

Photo Credit: American Engineering and Testing (AET)

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

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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)

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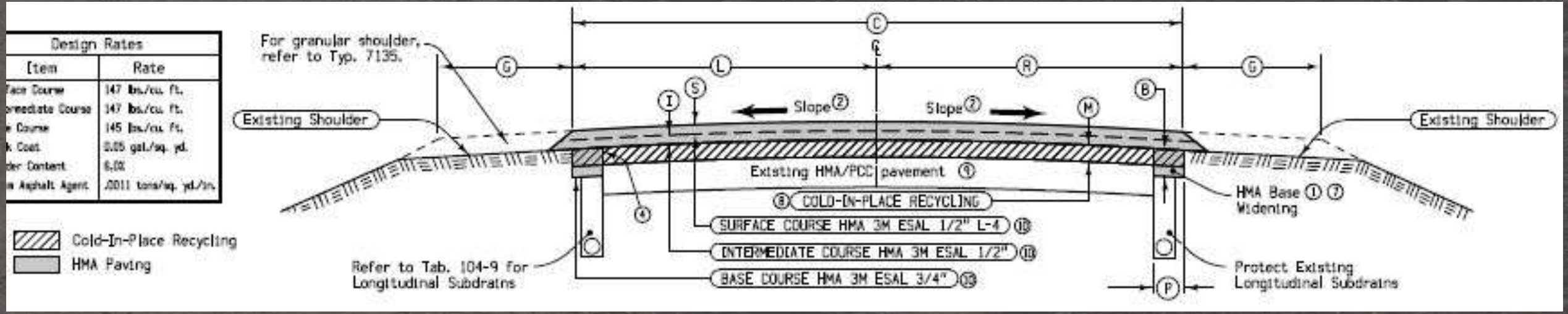
Roadway Widening



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

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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

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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

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Dimensional Restrictions

Height and Width

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

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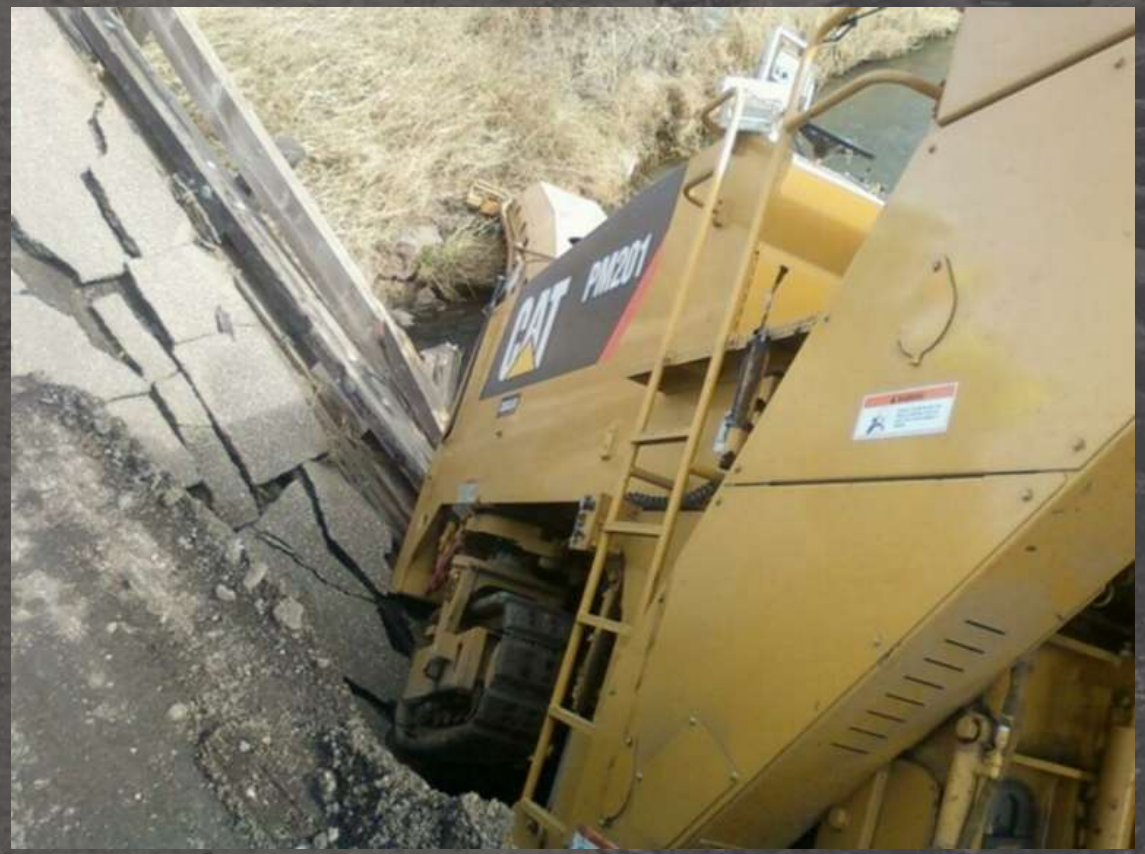
Load Restrictions

Weight of Mill



Posted Weight Limits

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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

Concrete Patches

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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

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Ambient Temperature and Sunlight

Temperature and Sunlight Effect:

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

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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

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CIR Safety

- Traffic
- Extremely Hot Oil (Foam)
- Respect the Equipment
- Have a Spill Plan

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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

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DANA, IOWA

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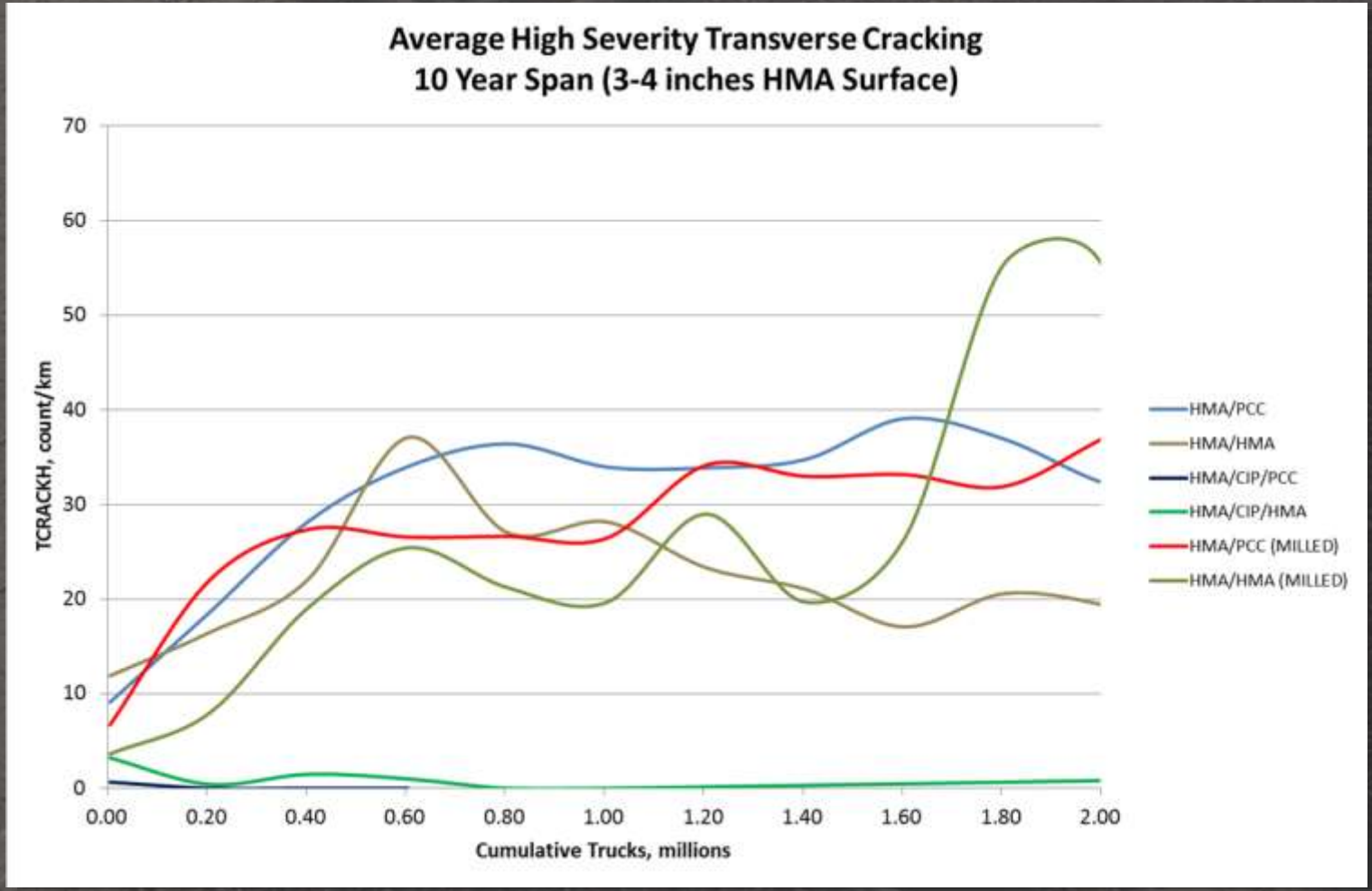
The Reason Iowa has a Robust CIR Program



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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)

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Questions?

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