National Pavement Preservation Research Initiative
Content

• Introduction to NCAT Pavement Test Track
• NCAT pavement preservation research
• Introduction to MnROAD research program
• MnROAD pavement preservation research
• MnROAD+NCAT national preservation study.
NCAT Pavement Test Track

9.9 million ESALs
NCAT Research Sponsors


Private Sector Sponsors
- Cargill Deicing Technology
- Kraton Polymers
- Modified Asphalt Solutions
- Oldcastle Materials
- Polycon Manufacturing
- Seneca Petroleum
- Shell Sulfur Solutions
- Trinidad Lake Asphalt

FHWA
Implemented NCAT Findings

• Innovation in mix design methodologies
  – Coarse vs fine vs lower NMAS (thin overlay) mixes
  – Reduced gyration level compactive efforts

• Optimized use of constituent materials
  – Neat vs standard vs GTR vs high polymer modification
  – Reduced aggregate quality construction/performance

• Promote innovative new technologies
  – Short, mid, and long term performance of WMA
  – Virgin vs high(er) RAP (& RAS) pavements/structures.
Implemented NCAT Findings

• Mechanistic-Empirical pavement design
  – Need for local calibrations to reduce overdesign
  – Contribution of alternative mixes/materials

• Empirical pavement design
  – Recalibration/update of AASHO layer coefficients
  – Contribution of porous friction course (PFC) surfaces.
Track Preservation Sections (+)
Pavement Preservation

- Chip Seal x 7
- Control x 2
- Crack Seal x 1
- Fog Seal x 1
- Micro Surface x 6
- Thin Overlay x 8
- 25 Sections
Pavement Preservation

- Prevention
- Rehabilitation
- Reconstruction

Life Extending Benefit
Pavement Preservation
Pavement Preservation
Outbound Cracking Thru 7/24/14

- Virgin Mix PG76-22 from 2003 Track
- Virgin Mix PG67-22
- 54% RAP BR PG67-22
- 19% RAS BR PG67-22
Subgrade Moisture Contents
NCAT Preservation Summary

- Crack sealing appears to be beneficial in all cases
- Differences between route/seal and blow/band
- Scrub seal appears to exhibit crack seal benefit
- Preservation treatments reduce subgrade moisture
- Durability of micro surface in accelerated traffic
- Objective life extending benefit curves expected
- “Final” results presented at 2015 Track Conference.
2015 Pavement Test Track Conference

March 3-5, 2015
The Hotel at Auburn University and Dixon Conference Center
Auburn, Alabama

- WMA & High RAP/RAS/GTR Mixes
- Optimized Structural Design
- Pavement Preservation
- Implementation

Official registration information will soon be available at www.ncat.us
Preservation Group (PG15) Study

- Continue monitoring ‘12 sections (Track & 159)
- Capture entire life extending benefit curve(s)
- Build new sections on higher ADT roadway
- Partnership with MnROAD for nationwide scope.
Higher ADT Off-Track Preservation

- US-280 3 miles to east?
- 17,000 ADT, >10 years old
- Westbound outside lane
- Tenth mile sections
- Duplicate Lee Road 159
- $\text{CCPR}_{F,E}$, $\text{CIR}_{F,E}$, and HIR
- High BR thin overlays.
Future Partnering of MnROAD and NCAT

Ben Worel
Rocky Mountain West Pavement Preservation Partnership Meeting
October 9, 2014

We all have a stake in AB
MnROAD Original Construction

• History
  – Original Funding ($25 million)
  – Open to Traffic (1994)

• Major Experiments
  – Phase I (1994-2006)
  – Phase II (2007-present)
  – Phase III (planning for 2016)

• Layout and Designs
  – Mainline / Low Volume
  – Asphalt / Concrete / Aggregate
  – 3,5,10 Year Designs
A long-term accelerated pavement testing facility that gives researchers a unique, real-life laboratory to study and evaluate the performance of materials used in roadway construction.
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MnROAD Traffic Loadings

**Low Volume Road**
MnROAD 5-axle Semi
80,000 Inside Lane = 5 days/week
Outside Lane Environmental
PCC ~ 300,000 ESALs
HMA ~ 200,000 ESALs

**Interstate Mainline**
I-94 WB Public Traffic
29,700 AADT -- 13% HCAADT
PCC = ~ 1.2 Million ESALs/year
HMA = ~ 0.8 Million ESALs/year
MnROAD Operations

• Research project development and support
• Partnerships
• Construction coordination
• Sensors (9,000+ installed)
  – Static (Environmental)
  – Dynamic (Traffic Loading)
  – Install - Maintain
• Traffic loadings
  – LVR 80K Truck
  – ML Traffic Switches
• Performance monitoring
• Database (20 years data)
MnROAD Phase-I (1994-2006) Benefits

Saves 33 million Annually
BC ~ 9/1
(Savings from 2006-2018)

• Seasonal Load Limits
  – Spring Restrictions / Winter Overloads
• Improved Design Methods
  – Flexible & Rigid Updated Designs
  • Environment Drives Pavement Performance
  • Current Designs are too Conservative

• Sealing Pavement / Shoulder Joints
MnROAD Phase-II (2007-2016) Benefits

- Low Temperature Cracking Test
- Stabilized Full Depth Reclamation
- Concrete Overlays
  - Whitetopping and Unbonded
- Importance of Drainage
- Recycled Unbound Bases
- Implements of Husbandry
MnROAD Pavement Preservation

- 1998 Crack Sealing / Route and Seal
- 1999-2003 MicroSurfacing Experiment
- 2006 Flexible MicroSurfacing
- Diamond Grinding (pooled fund)
- Timing of Preventative Maintenance (pooled fund)
- Lightly Surfaced Roadways / Chip Seals
- 2011 Flexible Microsurfacing
- 2013 Thin Concrete Repairs Techniques
- 2014 High Volume Chip Seal
MnROAD Phase-III Development
(Local – National – International)

2013
Collect Ideas
- MEO
- TERRA
- Industry
- States
- CTS
- Infrastructure Council

2014
Prioritize – Best Fit
- TRB
- Peer Exchange
- Subcommittees
- MnDOT
- Pooled Fund Development
- R-26 Conf.

2015
Funding – Designing
- TRB
- Pooled Fund Refinement
- Subcommittees
- Designs

2016
Letting Construction Research

2016 – 2021?
Phase-III
Agency Directed Focus Areas

• Concentrate on cost-effectively improving pavement performance
  • Currently MnDOT like other agencies have a number of roadways in “poor” condition
  • Not enough funding to solve the problem.
  • The right fit may not always be the best fix.

• We need to concentrate our efforts on new methods and materials
  • New technologies with the capabilities of making great leaps forward are encouraged.
  • We must bold.

• Some research is more easily implemented than others
  • Our efforts should improve field performance and make work more effective for office, lab, and field personnel.

• Large return on investment will be given a higher priority
  • Each project will be analyzed separately to determine its effectiveness potential.
MnDOT and NCAT Partnership

• Partnership to Advance Research and Implementation
• National Effort to Validate Pavement Performance
• Knowledgeable Technical Staff
• Established Test Tracks
• Building on Successful Research and Implementation
• Pavement Preservation
• Asphalt Pavement Advancements
Pooled Fund Development

• **Pavement Preservation Pooled Fund**
  – NCAT Partnership
  – NCAT and MnROAD Facilities
  – North / South Offsite Low/High Volume Installations
  – Possible Tie to FHWA Efforts

• **2016 MnROAD Test Track Pooled Fund – Phase III**
  – Use existing ideas developed so far for proposal
    • LVR – Mainline – Old Concrete Westbound
  – Agencies once they join - select research to pursue

• **2015 NCAT Test Track Pooled Fund (Alabama)**
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- FP2
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- Discussion -

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