

# MnROAD Future Overview (Phase-1 into Phase-II)

July 30, 2008  
TERRA Innovation Series  
MnROAD Open House



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# MnROAD Research Resources

MnROAD Technical Staff  
Safe/Accessible Work Zone  
Materials Availability  
Sensor Data

- ★ Data Collection Network
- ★ 4,600+ Sensors Installed
- ★ Static and Dynamic Data
- ★ Weather Data
- ★ Traffic Data

Lab Testing  
Performance Monitoring  
Oracle Database



# MnROAD Phase-I Reconstruction Efforts

## Phase-I Projects

- ★ "Taconite" Mesabi Hard Rock Asphalt & Concrete
- ★ Whitetopping
- ★ 5 inch Thin Concrete
- ★ Pervious Concrete
- ★ SuperPave Asphalt
- ★ Oil Gravel Surface
- ★ Strong Stone Base
- ★ Intelligent Compaction
- ★ Maintenance Treatments



# MnROAD Phase-I Accomplishments

## Seasonal Load Limits

- ★ Spring Restrictions / Winter Overloads

## Improved Design Methods

- ★ Mechanistic Empirical Designs

## Intelligent Compaction

## Low Temperature Cracking

## Whitetopping

## Initial Findings

- ★ Environment has a Greater Influence on Pavement Performance than Traditional Designs Predict
- ★ Current Concrete Designs are too Conservative

## Educational Achievements

(MnROAD Lessons Learned)



# MnROAD Research Partnerships

## Non-Pavement Research

- ★ Intelligent Transportation Systems (ITS)
- ★ Lane Marking
- ★ Arrow Boards – Message Signs
- ★ 60 inch Plastic Culverts
- ★ Roadside Vegetation Study
- ★ Michelin and Toyo Tire Demos
- ★ SRF Consultants (Sensor Evaluation)
- ★ University of Minnesota Human Factor Study (Nissan)
- ★ Homeland Security Evacuation “TIGER” Project



# Transportation Engineering & Road Research Alliance (TERRA)

Developed to:

- ★ Guide future pavement research investments
- ★ Share information, ideas, and research results
- ★ Develop relationships for expanded collaboration
- ★ Attract public, industry, and academic partners to contribute resources
- ★ Expand entrepreneurial use of MnROAD

# Transportation Engineering & Road Research Alliance (TERRA)

Aggregate and Ready Mix Association of Minnesota

American Concrete Pavement Association

Associated General Contractors of Minnesota

Caterpillar Global Paving

Concrete Paving Association of Minnesota

Iowa State University

Michigan Department of Transportation

Minnesota Asphalt Pavement Association

Minnesota Department of Transportation

Minnesota Local Road Research Board

Norwegian Public Roads Administration

Ready Mix Concrete Research and Education Foundation

United States Federal Highway Administration

SemMaterials

University of Minnesota

# Current Key National Research Areas

Key Research Areas	Description
Design Guide	Development and calibration for both new and rehabilitated pavements including investigations into low temperature cracking
Innovative Construction	Develop this technology for bound and unbound materials
Preventive Maintenance	Improve techniques and engineering knowledge about maintenance
Recycled Materials	Effective use through out the pavement structure
Rehabilitation	Improve techniques and engineering knowledge about rehabilitation
Surface Characteristics	Develop techniques for pavement noise, texture, friction, and ride
Non-Pavement Research	Continued support of research in intelligent transportation systems



# MnROAD Research + Construction Funding

## MnROAD Research Funding

### ★ 8 Pooled Fund Projects

- 17 States, FHWA, LRRB, Industry
- \$3.8 Million
- LRRB contributed (\$530,000)

### ★ 15 Minnesota Projects

- Mix of Industry, LRRB, Mn/DOT
- Continuing Partnership development

## MnROAD Reconstruction Funding

- ★ FHWA (SP&R) \$4.3 Million
- ★ Industry Partnerships > \$675,000 Cash & In-kind
- ★ State Road Construction \$1.0 Million



# 2007 Construction Efforts

## Acid Modified Binder Study

(FHWA - Innophos - MTE - WRI)

- ★ Study the effects of acid modification

## Fly Ash Study

(Bloom Consultants (DOE Grant), UofWI, MPCA, Innophos, MTE)

- ★ Study fly ash treated FDR, non-treated FDR, granular base

## Farm Equipment Study (pooled fund study)

(MN, LRRB, IL, IA, Industry consortium)

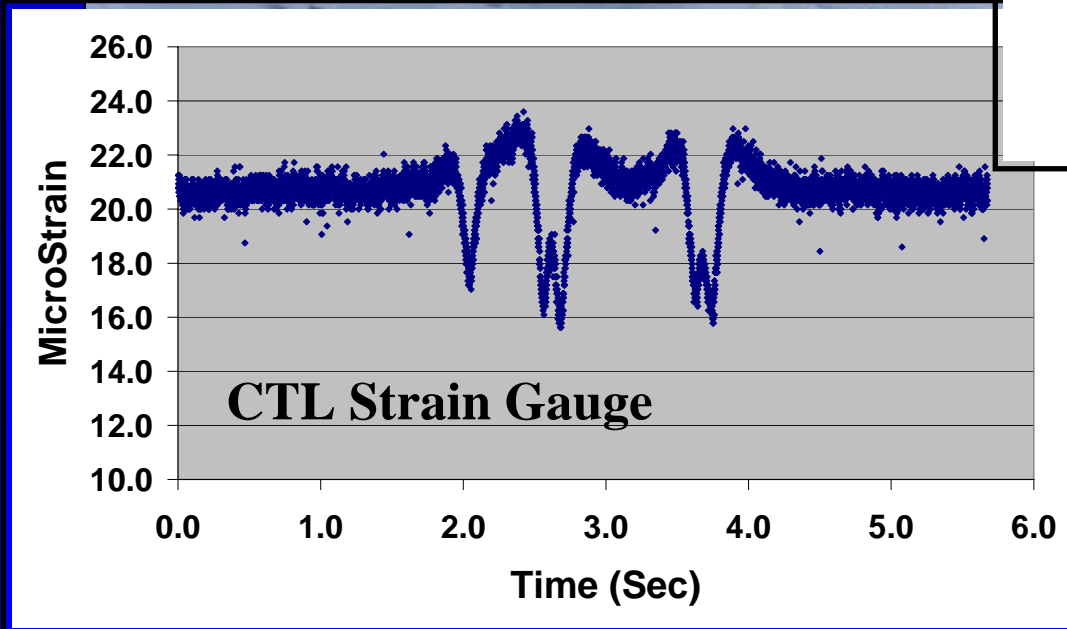
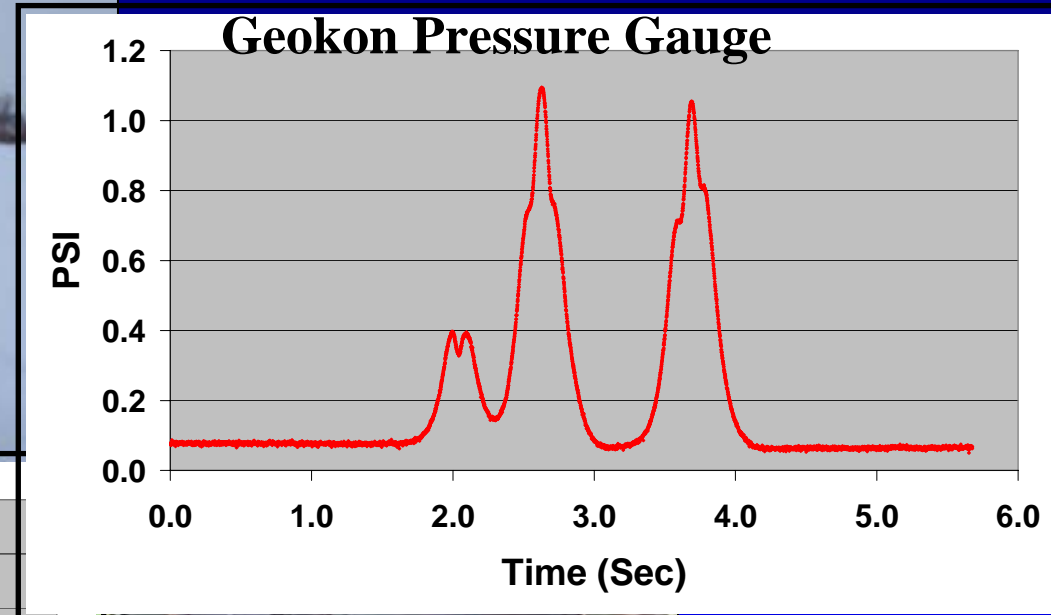
- ★ What effect does farm equipment have on our roadways
- ★ UofMN, Iowa State, UofIL

## PCC Surface Characteristics - Rehab (pooled fund study)

(Minnesota, Texas, IGGA, ACPA, FHWA)

- ★ Validate Purdue lab study
- ★ Determine best grinding method for ride, friction, noise, texture

# 2007 Farm Equipment Study



# 2008 Construction Update

Construction **April – October 2008**

- ★ ~\$2,100,000
- ★ ~\$875,000 Instrumentation
- ★ Mn/DOT Metro Inspection & D-3 Design
- ★ 16+2 Mainline Cells + E & W Transitions
- ★ 8 LVR Cells



# MnROAD 2008 Construction

(Pervious Studies)

Pervious PCC

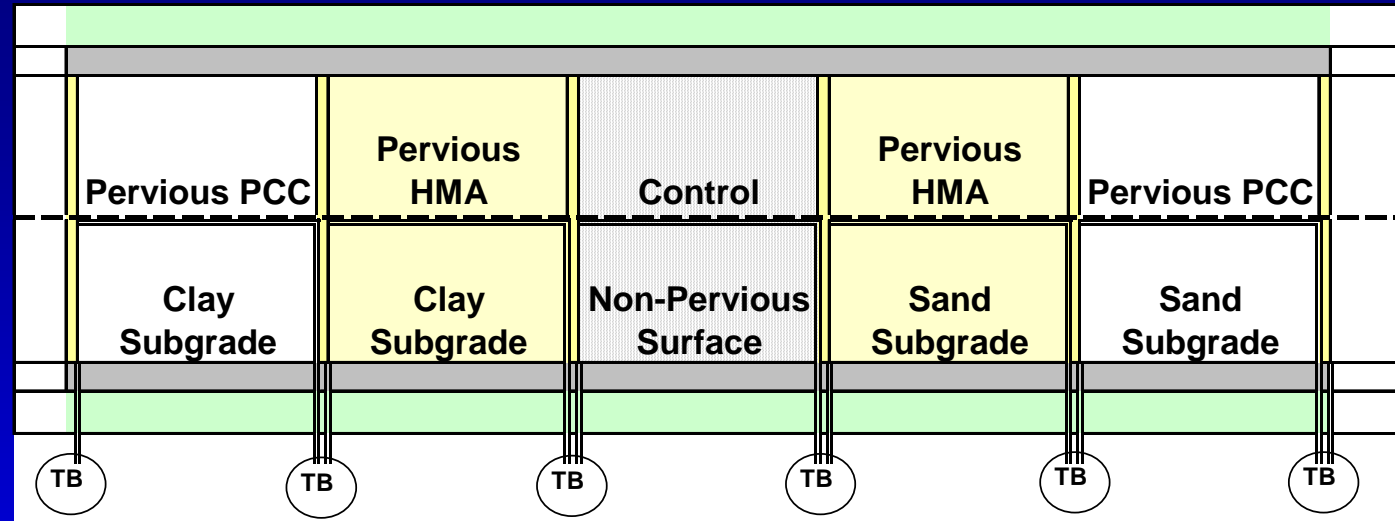
Pervious HMA

Pervious Concrete "Overlay"

★ CTRE Funded

Benefits

- ★ Pavement Durability
- ★ Maintenance Needs
- ★ Hydrologic function
- ★ Water Quality



# MnROAD 2008 Construction Pooled Fund Related Projects - Concrete

[www.pooledfund.org](http://www.pooledfund.org)

Search Keyword  
"MnROAD"

## Whitetopping/Concrete Overlay

(Minnesota, Texas, Missouri, Mississippi, New York, Pennsylvania)

- ★ Implement a national design for concrete overlays

## 60-Year Concrete

(Minnesota Single State)

- ★ Study the sensor response to a long life concrete pavement

## Unbonded Concrete Overlay

(Minnesota Single State)

- ★ Study performance of a Unbonded concrete overlay

## Thin Concrete

(Minnesota Single State)

- ★ How conservative are we with our concrete designs?

# MnROAD 2008 Construction

Pooled Fund Related Projects  
- Surface Characteristics -



## HMA Surface Characteristics

(Minnesota Single State, LRRB, FHWA)

- ★ What surface provides ride, texture, friction, noise

## PCC Surface Characteristics – Construction

(Minnesota Single State)

- ★ What surface provides ride, texture, friction, noise

## PCC Surface Characteristics – Rehabilitation

(Minnesota, Texas, IGGA, ACPA, FHWA)

- ★ Validate Purdue lab study
- ★ Determine best grinding method for ride, friction, noise, texture

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# MnROAD 2008 Construction

## - Pooled Fund Related Projects -

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## Composite Pavements

(California, Minnesota, LRRB, Washington, FHWA)

- ★ How to design and build composite pavements
- ★ 2009 SHRP-II Thermally Insulated Pavement study



## Recycled Unbound Materials

(Texas, Michigan, Minnesota, Ohio, California, Wisconsin)

- ★ Mechanistic design of recycled PCC and RAP materials

# MnROAD 2008 Construction

## Pooled Fund Related Projects

- Asphalt -

[www.pooledfund.org](http://www.pooledfund.org)

Search Keyword  
"MnROAD"

## Low Temperature Cracking Phase II

(CT, IA, ID, MN, ND, NY, WI, LRRB)

- ★ Implement a new LTC prediction test for mixtures

## Optimal Timing of Preventive Maintenance

(Maryland, Minnesota, Ohio, Texas, LRRB)

- ★ How pavements age and how to prevent aging

## Recycled Asphalt Pavements

(Minnesota Single State, LRRB)

- ★ How to more effectively manage RAP in our HMA mixes



# MnROAD 2008 Construction

## Partner Related Projects

### Natural Resource Research Institute "NRRI "

(NRRI , Minnesota)

- ★ "Taconite" Pavement Research
- ★ 4.75 Superpave HMA Mix
- ★ Large Stone Base



### SemMaterials

(SemMaterials, Minnesota)

- ★ Construction funded by SemMaterials
- ★ Research Shared Partnership
- ★ Full Depth Reclamation with emulsion stabilization
- ★ Develop Design and Construction Guidelines - Economic Analysis

2009 SHRP II Composite Pavements

2009 NCHRP Pre-cast Concrete

2009 Ethanol Co-Products

# MnROAD Future Becoming a Reality



- ★ National Facility
- ★ TERRA Partners
- ★ Advancing Innovation

MnROAD's next phase will have a positive impact on pavements and transportation

[WWW.MnROAD.DOT.STATE.MN.US](http://WWW.MnROAD.DOT.STATE.MN.US)