MnROAD "Information" - Future Direction

Ben Worel

SHRP2 R26 Workshop for the Preservation of High-Traffic-Volume Roadways
September 3 - 5, 2014

Presentation Outline

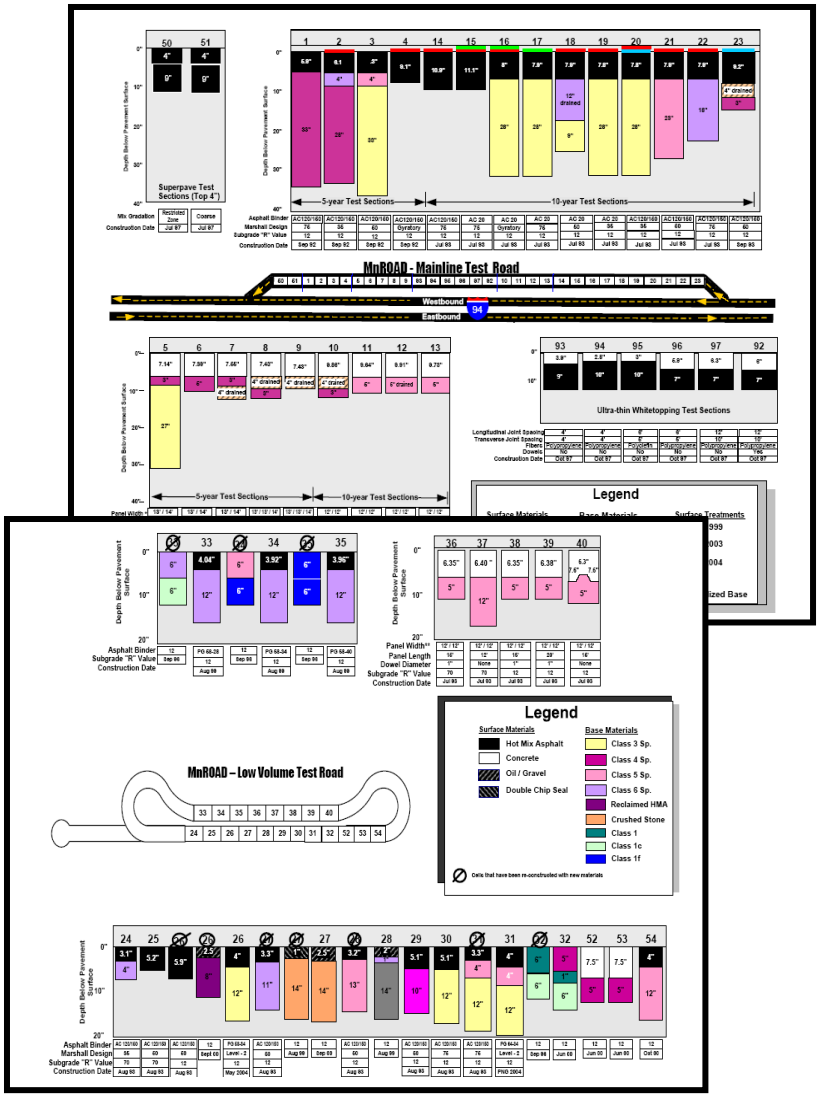
- MnROAD Background for the Tour
- Phase-III Development

MnROAD Original Construction

- **History**
  - Original Funding ($25 million)
  - Original Construction (1992-1993)
  - 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




MnROAD
Office of Materials and Road Research
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.
MINNESOTA DEPARTMENT OF TRANSPORTATION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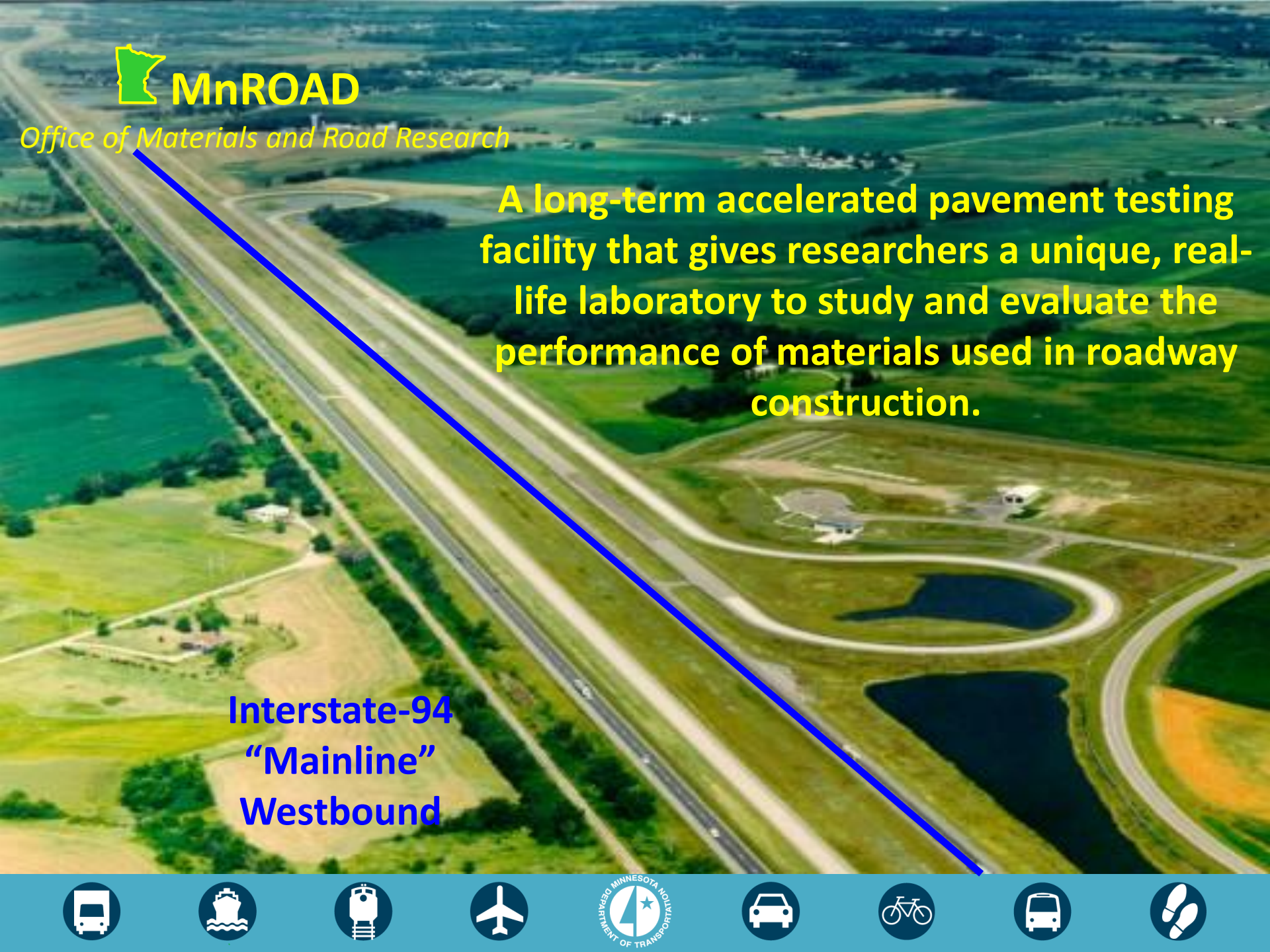
Existing I-94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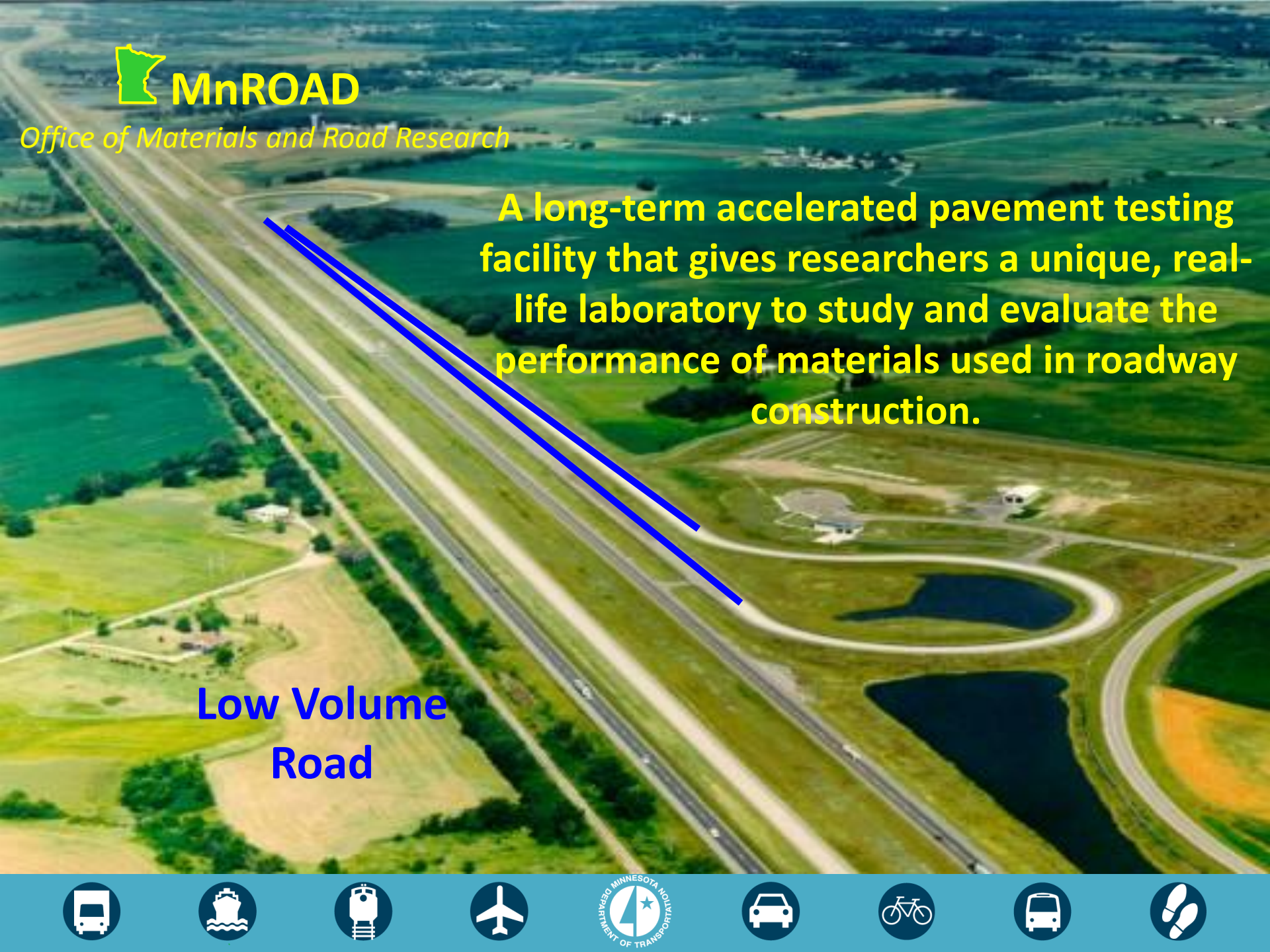
Interstate-94
"Mainline"
Westbound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Low Volume Road

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

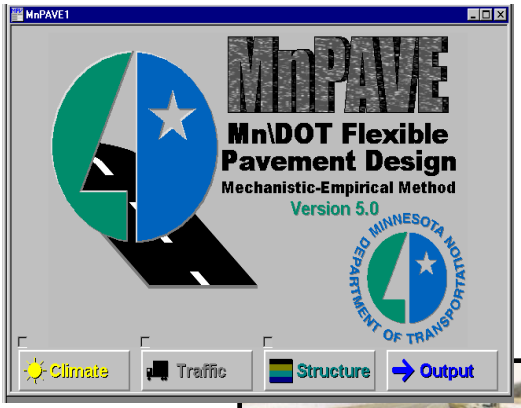
- **Research project development and support**
- **Partnerships**
- **Construction coordination**
- **Sensors (9,000+ installed)**
  - Static (Environmental)
  - Dynamic (Traffic Loading)
  - Install - Maintain
- **Traffic loadings**
  - LVR 80K Truck
  - ML Traffic Switches
- **Performance monitoring**

MnROAD Data

- **Oracle Database**
  - Over 1 Billion rows
- **Public Data**
  - Online & Custom Data Requests
    - Test cell parameters
    - Monitoring/Performance
    - Lab testing results
    - Sensors (except sensors)

MnROAD Phase-I (1994-2006) Benefits

Saves 33 million Annually
(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

Similar Savings to Phase-I
(Currently being developed)
(Savings from 2016-2026)

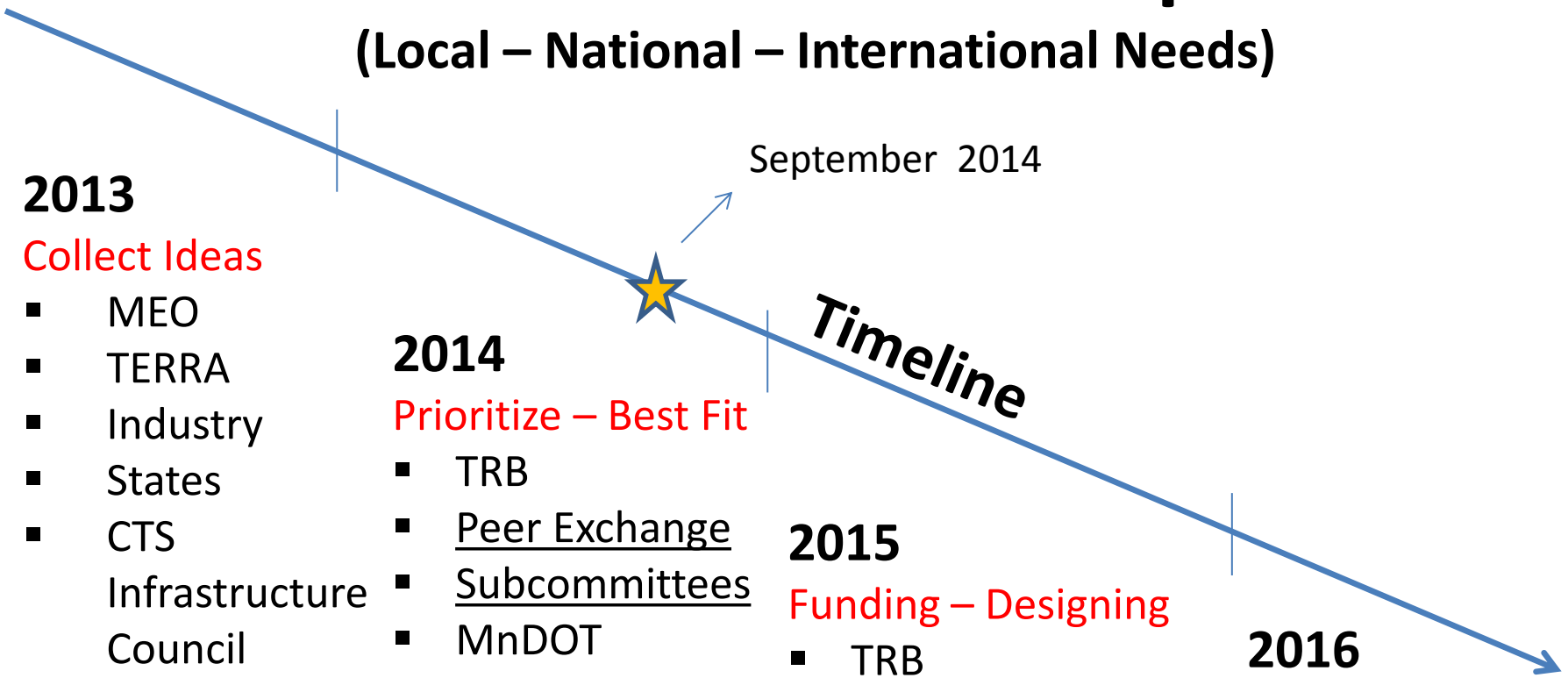
- **Low Temperature Cracking Test**
- **Improved Diamond Grind**
- **Stabilized Full Depth Reclamation**
- **Whitetopping**
- **Timing of Preventative Maintenance**
- **Importance of Drainage**
- **Recycled Unbound Bases**
- **Implements of Husbandry**

MnROAD Future Phase-III

- **2016 Construction**
- **National Test Facility**
- **Funding Sources** (Research, Construction, Operations)
  - Agency Pooled Funds
  - Partnerships
  - MnDOT
  - Local Road Research Board (LRRB)
- **Projects**
  - Focus on 12-15 projects
  - Cells availability
  - LVR, Mainline, Bypass?, other roadways?

MnROAD Customer Inputs

(Local – National – International Needs)



September 2014

2013

Collect Ideas

- MEO
- TERRA
- Industry
- States
- CTS Infrastructure Council

2014

Prioritize – Best Fit

- TRB
- Peer Exchange
- Subcommittees
- MnDOT
- Pooled Fund Development

2015

Funding – Designing

- TRB
- Pooled Fund Refinement
- Subcommittees
- Designs

2016

Letting

Construction

Research

2016 – 2021?

Phase-III

MnROAD Focus Areas

- **Efforts must concentrate on cost-effectively improving the performance (life) of our pavements.**
  - Currently MnDOT like other agencies have a number of roadways in “poor” condition and 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.
- **Efforts with a large return on investment will be given a higher priority.**
  - Each project will be analyzed separately to determine its effectiveness potential.

General and Base Priorities

- **Lightly Surfaced Roadways**
  - HMA and PCC
  - FDR Stabilization
- **Dual (Driving and Passing) Roadways Design**
  - PCC driving lane – HMA passing lane for rehabilitation?
- **Cross walk markings**
- **Shoulder Alternatives / Preservation**
- **Base Studies**
  - Drainability
  - Recycled Materials
  - Large stone recycled Base
- **Trench Repairs**
  - FHWA study that might need test sections maybe before 2016

Flexible Priorities – 1/2

- **Design, construction, and evaluation of HMA Overlays**
  - (Peer - Illinois, MN, Indiana, Texas, Washington, Maine)
  - MnROAD Old concrete WB Lanes / Thickness / Rubblize
  - Thin HMA Overlays
- **Asphalt Mixture Characteristics (Performance Testing)**
  - High Recycled Mixes (Peer Exchange)
- **Full Depth Reclamation**
- **Longitudinal Joint Construction (Peer Exchange)**
  - Tough to do at MnROAD for new construction

Flexible Priorities – 2/2

- **Performance of asphalts modified with engine oil**
  - FHWA and Industry
- **Performance of warm mix pavements designed and constructed with asphalt foam manifolds (Peer Exchange)**
- **Central plant-mixed bituminous**
  - Industry Interests

Concrete Priorities – 1/2

- **Rehabilitation**
  - Major Concrete Panel Repairs - advancement in repairs and tools for estimating – state of practice - Ultra high early patching performance
  - Rehab of Thin Concrete (Peer Exchange)
- **Design Factors**
  - Anchor Study – Develop a test that matches the force a concrete paver especially related to concrete overlays on existing HMA and PCC pavements. Inspector test.
  - Dowel Configurations – are they needed in unbonded overlays
  - Panel Size - 6x6 panels for new construction?
  - Unbonded 20-year Designs

Concrete Priorities – 2/2

- **Concrete Materials**
  - Recycled Materials in Concrete (Peer Exchange)
  - Solutions to Joint Deterioration (Peer Exchange) – already a pooled fund - Effectiveness of concrete sealers to protect joints
  - Colored Concrete - Use in the pavement lanes – VDOT efforts
  - Does diamond grinding accelerate the damage if the roadway has ASR susceptible aggregates – MnROAD has 6 aggregate types in 6 sections on the LVR loops.
- **Timing of Curing**
  - Scaling issues for both low w/c and ready mixes
- **Whitetopping Phase-II Design Tool Improvements**

Pavement Preservation

- **HMA Optimal timing and selection of PP treatments**
  - Indiana, Texas, California, Michigan, Washington, and FHWA
  - Partnership with NCAT
  - Low and high traffic volume roads in Minnesota and Alabama
  - Use of the MnROAD and NCAT test tracks

National Center for Asphalt Technology NCAT at AUBURN UNIVERSITY

Minnesota Department of Transportation

- **Pavement preservation for lightly surfaced roadways**
- **Effects of pavement performance with rejuvenators**
- **Pavement preservation for shoulders**

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

Future Actions

- **Develop and Finalize need statements**
- **Defined Pooled Funds (**September 2014)
  - Pavement Preservation Pooled Fund
    - NCAT Partnership
    - North / South Test Track Installations
    - Other Low and High Volume Road Installations
  - Top Flexible Ideas
    - Ties to NCAT
    - One Large Effort or singular pooled funds
  - Top Rigid Ideas
    - One Large Effort or singular pooled funds

MnROAD Tour

Handouts in your packet

- **Bus Schedules**
  - Leave at 11:30 back at 4:30
- **Tour**
  - Mainline and LVR
  - One change for the stops (Cell-37 not Cell 8-9 Diamond Grinding)
- **MnROAD Equipment Demo + Project Poster Sessions**
- **Pavement Preservation Contractor Equipment**

MnROAD
Thoughts / Participation

- Name _____
- Problem
  - _
  - _
  - _
- Product
  - _
  - _
  - _

Thank You

Ben Worel

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We all have a stake in A TO B