Strategic Implementation Through Cooperative Pavement Research
What is the National Road Research Alliance?

- Pooled fund (TPF-5 (341))
- Fulfill regional and national road research needs
- Foster innovation with member states, academia and industry
  - Best Utilize
    - Each Members Research Efforts
    - MnROAD Test Track
      - Direct Phase-III of MnROAD Construction
      - $3 million in MnDOT funding
- Develop innovative technologies
- Focus on implementation, technology transfer, and training into research projects from the ground up
National Road Research Alliance

Pooled Fund Project
- Phase-I (2016-2021)
- Expect a Phase-II

Membership
- Big States – 150K/year
- Small States – 75K/year
(based on more/less than MnDOT SPR $)

Associate Members
(Universities, Industry, Associations, Consultants)
- 2K/year

Current Funding
- ~5 million over the 5 years
Teams Interaction
• Meetings 1 hour month
• TAP meetings as needed

Projects Funded So Far:
• 8 Long Term Research Projects
• 8 Short Term State of Practice
• Implementation
• Technology Transfer

Open for additional partners
http://www.dot.state.mn.us/mnroad/nrra/index.html
# Short Term Research Technical Advisory Panels

SRF Consulting under contract - Ben Worel (MN is the TL)

<table>
<thead>
<tr>
<th>NRRA Team</th>
<th>Title</th>
<th>TAP Members (Updated Sept 18th)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flex</td>
<td>Tack Coats</td>
<td>Randy West (NCAT) Eshan Dave (UNH) Ed Johnson (MN) Zhanping You (MTU) Jill Thomas (MAPA) Dan Wegman (Braun)</td>
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<tr>
<td></td>
<td>Longitudinal Joint Construction Performance</td>
<td>Randy West (NCAT) Eshan Dave (UNH) Jim Trepanker (IL) Ed Johnson (MN) Zhanping You (MTU) Jill Thomas (MAPA)</td>
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<tr>
<td>Rigid</td>
<td>Design and Performance of Concrete Unbonded Overlays</td>
<td>Jim Wilde (MSU) Matt Zeller (CPAM) Zhanping You (MTU) Tom Burnham (MN) Charles Wienrank (IL) Maria Masten (MN)</td>
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<td>Repair of Joint Associated Distress Pavements</td>
<td>Mark Gawedzinski (IL) Matt Zeller (CPAM) John Roberts (IGGA) Gordy Bruhn (MN) Tom Burnham (MN) Maria Masten (MN)</td>
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<tr>
<td>Geo</td>
<td>Larger Subbase Materials</td>
<td>Sheila Beshears (IL) Dan Wegman (Braun) Terry Beaudry (MN) James Bittmann (MN) Ed Johnson (MN) Tim Andersen (MN)</td>
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<td>Subgrade Design for New and Reconstructed</td>
<td>Sheila Beshears (IL) Dan Wegman (Braun) Terry Beaudry (MN) Ed Johnson (MN) Chris Dillian (MN) Tim Andersen (MN)</td>
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<td>PM</td>
<td>Surface Characteristics of Diamond Ground PCC Surfaces</td>
<td>Robert Green (MI) John Roberts (IGGA) Zhanping You (MTU) Maria Masten (MN) Jim Wilde (MSU) Ed Johnson (MN)</td>
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<td>Pavement preservation approaches for lightly surfaced roadways</td>
<td>Mark Gawedzinski (IL) Kevin Kliethermes (FHWA) Dan Wegman (Braun) Eshan Dave (UNH) Zhanping You (MTU) Jim Wilde (MSU) Jerry Geib (MN)</td>
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## Long Term Research

### Technical Advisory Panels

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<tr>
<td>Flex</td>
<td>HMA Overlay of PCC &amp; Methods in Enhancing Compaction</td>
<td>University of New Hampshire: Finalized workplan - Expected Feb 1st</td>
<td>Shongtao Dai (MN), Randy West (NCAT), Charles Wienen (IL), Zhanping You (MTU), Kevin Kennedy (MI), Andy Cascione (Flint Hills), Barry Paye (WI), Tom Burnham (MN), Daniel Oesch (MO), Ed Johnson (MN), Chris Dulian (MN), John Garrity (MN), James Bittmann (MN), Jill Thomas (MAPA), Tim Andersen (MN), Cody Brand (MN), Jerry Geib (MN)</td>
</tr>
<tr>
<td>Cold Central Plant Recycling</td>
<td>American Engineering and Testing</td>
<td>Finalized workplan - Expected Feb 1st</td>
<td>Dave Van Deusen, Curt Turgeon (MN), Randy West (NCAT), Ed Johnson (MN), Andy Cascione (Flint Hills), Zhanping You (MTU), Barry Paye (WI), Terry Beaudry (MN)</td>
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<tr>
<td>Rigid</td>
<td>Fiber Reinforced Concrete Pavements</td>
<td>University of Minnesota Duluth: Contracted -1003325(wo56)</td>
<td>Tom Burnham (MN), Chris Dulian (MN), John Donahue (MO), Maria Masten (MN), Maria Masten (MN), Tim Andersen (MN), Matt Zeller (CPAM)</td>
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<td>Early Opening Strength to Traffic</td>
<td>University of Pittsburgh: 1003327 (wo3) - Expected Dec 2018</td>
<td>Bernard Izevbekhai (MN), James Krstulovich (IL), Matt Zeller (CPAM), Tom Burnham (MN), Jim Wilde (MSU), Maria Masten (MN), Maria Masten (MN), Maria Masten (MN)</td>
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<td>Optimizing the PCC Mix Components</td>
<td>Iowa State: Expect Dec Contract</td>
<td>Bernard Izevbekhai (MN), Tumer Akakin (ARM), Brett Trautman (MO), Curt Turgeon (MN), Matt Zeller (CPAM)</td>
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**Develop** <-> **Collaborate** <-> **Research** <-> **Implement** <-> **Sustain**
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<td>PM</td>
<td>Maintaining Poor Pavements</td>
<td>SRF Consulting Contracted 1029360</td>
<td>Jerry Geib (MN) Cody Brand (MnDOT D8) Ed Johnson (MN) Elliot Keyes (MN) James Bittmann (MN) Tim Andersen (MN) Robert Green (MI) Mark Gawedzinski (IL) Dan Wegman (Braun) Kevin Kliethermes (FHWA)</td>
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<tr>
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<td>Partial Depth Repair</td>
<td>Braun Intertec Finalized workplan - 1029497 Expect Dec 2018 Contract Start</td>
<td>Jerry Geib (MN) Tom Burnham (MN) Mark Gawedzinski (IL) John Roberts (IGGA) Maria Masten (MN) Gordy Bruhn (MN) Timo Saarenketo (RoadScanners) Eshan Dave (UNH)</td>
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NRRA Construction Efforts

• **2017 NRRA Supplied the Research to Support MnROAD Construction**
  - MnDOT Supplied Construction dollars
  - Flex – Rigid – Geo – PM test sections built

• **2018 Missouri Fiber Reinforced Compacted PCC**
  - NRRA and Missouri suppling the research dollars
  - Missouri Supplied the construction dollars
  - MnROAD staff assisted in the sensor installation
2018 National Request for Ideas

- New Test Sections
  - New Construction
  - Rehabilitation
  - Maintenance
  - NRRA or Other Interests

- Research Ideas
  - NRRA Funding
  - Ties other funding

MnROAD Website or
http://www.dot.state.mn.us/mnroad/newideas.html
NRRA teams prioritized ideas to be funded

• Each Teams ~$180,000 each
• Intelligent Construction Technology Team ~$480,000
• Contracts start in Spring 2019

• **Flexible Group**
  • Mix Rejuvenator Synthesis
  • Mix Rejuvenator Test Sections

• **Pavement Maintenance**
  • Synthesis in spray surface rejuvenators
  • Test sections with spray rejuvenators
  • Service life enhancement of substrates overlaid with thin overlays (UTBWC, chip seals, & microsurfacing)
  • Concrete Pavement Restoration (CPR) for Bonded Concrete Overlays of Asphalt (BCOA)

*Research Efforts*

Underlined = Long Term
No Underline = Tech Transfer
2019 NRRA Prioritized Ideas

- **Rigid**
  - Incorporate Joint Faulting Model Into BCOA-ME
  - Construction Report for Jointless FRC Roundabout in Minnesota
  - Engineered Dowel Bars combined with LTPP SPS-2 Determination of Causes for Cracking Over Dowel Bars

- **Intelligent Construction Technologies**
  - Levels 3-4 Intelligent Compaction Measurement Values for Soils Subgrade/Aggregate Subbase Compaction
  - Support Importing, Viewing and Analysis of Dielectric Constant Data in Veta
  - HD and VHD Seismic Approaches for Roadway Evaluation

- **GeoTechnical**
  - Mechanistic Load Restriction Decision Platform for Pavement Systems Prone to Moisture Variations
  - Environmental Impacts on the Performance of Pavement Foundation Layers
  - Permeability of Base Aggregate and Sand
  - Improve material inputs into mechanistic design properties for reclaimed HMA Roadways
MnROAD Partnership with NRRA member
October 2018 - Cargill and Hardrives

2 Mix Designs / 4 New Test Sections
- Control - 25% RAP Superpave (SPWEB540 / PG 58S-28)
- High RAP - 45% RAP Superpave (SPWEB540 / PG 58S-28 / Anova)
- Lab Testing / Long Term Monitoring

Example of successful partnership for both industry and the state
MnROAD NCAT Partnership Relationship

National Pavement Preservation Study
Development of a National Cracking Test

• Phase – 1
  ○ Ends 2018
  ○ PG = $120K/yr
  ○ CG = $210K/yr
  ○ March Sponsor Meeting

• Phase - 2
  ○ PG – MnDOT Lead
  ○ $50K/yr
  ○ CG – Alabama Lead
  ○ $100K/yr

• Operations
Pavement Preservation Northern Recycling
NRRA Partnership Opportunities

MnROAD / NCAT Pooled Fund

Looking to develop a northern recycling test sections to match work done in Alabama

Technical Advisory Panel

Looking for input and help to design and industry to help build these test sections
MnROAD and LTPP InfoPave
FHWA and i-Engineering

MnROAD Access
• Data
• Pictures
• Reports/Software

Ties to
• LTPP Data
• Westrack
• C-SHRP

MnROAD Website Soon!
TRB 2019
Technology Transfer Efforts

Research Pays Off Seminar Series
• Every 3rd Tuesday
• 10-11 am

NRRA
• Follow NRRA on Linkedin
• May 21-23 2019 Workshops
  • Tuesday - BIM Workshop
  • Wednesday - NRRA Workshop/MnROAD Tour
  • Thursday – Formal Conference

Newsletters
• Highlight Members
• Highlight NRRA Projects
• Highlight Emerging Technology

NCAT Partnership Meetings
• 2019 Spring (NCAT)
• 2019 Fall (Minnesota)
Discussion?

• Member Involvement
• Technical Items Needed – other ideas
• Future NRRA Opportunities
• Thoughts