

Research Need Statement 574

I. Need Statement Champions and Information

I.A. Need Statement Champion Information

I.A.1. First and Last Name of Research Champion: **Mao Yang**

I.A.2. Research Champion's Office: **MnDOT State Aid**

I.A.3. Research Champion's Phone Number: **651-234-7015**

I.A.4. Research Champion's Email: Mao.Yang@state.mn.us

I.B. Research Co-Champion

I.A.1. First and Last Name of Research Co-Champion: **Tara Olds**

I.A.2. Research Co-Champion's Office: **MnDOT State Aid**

I.A.3. Research Co-Champion's Phone Number: **651-366-3830**

I.A.4. Research Co-Champion's Email: Tara.Olds@state.mn.us

I.C. Research Needs Title (115 Characters): **Taconite as a lower cost alternative High Friction Surface Treatment to Calcined Bauxite for low volume roads in Minnesota**

I.D. Project Sponsor: Joint MnDOT and Local Road Research Board

II. Research Need Background and Description

II.A. Research Need Background

II.A.1. Describe the problem or opportunity. **High Friction Surface Treatment (HFST) involves the application of very high-quality aggregate to the pavement using a polymer binder to restore and/or maintain pavement friction at existing or potentially high crash areas. The higher pavement friction helps motorists maintain better control in both dry and wet driving conditions. Calcined bauxite has been given a preferred status relative to HFST usage by FHWA, but is imported, expensive, and energy-intensive to produce.**

High installation costs for HFST have inhibited use of this treatment. A recycled/byproduct alternative like Mesabi HFST aggregate may reduce costs yet still provide adequate or comparable field skid resistance performance.

II.A.2. If applicable, describe how this project will build on previous research.

HFST has been the subject of several FHWA safety initiatives including Every Day Counts in 2012.

II.A.3. If applicable, include the title/s or previous research.

**Evaluation of Laboratory Friction Performance of Aggregates for High Friction Surface Treatments, NCAT Report 17-01 **

https://safety.fhwa.dot.gov/roadway_dept/pavement_friction/high_friction/

II.A.4. What is the **objective** of the proposed research?

This study would evaluate whether Mesabi (taconite) friction aggregate can replace some or all of the calcined bauxite in HFST applications by

- **Evaluating the cost to install and maintain along with a comparison to standard HFST installations using calcined bauxite**
- **Monitoring performance**
- **Evaluating wear over time, including the effect of snow and ice maintenance operations (i.e. snow plowing)**
- **Evaluating bond strength**
- **Impacts on snow removal equipment**

This study should consider appropriate treatment installation alternatives including but not limited to:

- **Various adhesion methods, such as epoxy, asphalt binder, and microsurfacing**
- **Varying blends of Mesabi friction aggregate and calcined bauxite including 100% Mesabi friction aggregate and 100% calcined bauxite (for comparison)**
- **Appropriate gradation of aggregates**

III. Strategic Priorities, Benefits, and Expected Outcomes

Section III. is for MnDOT sponsored and co-sponsored projects only; all LRRB projects proceed to section IV.

III.A. MnDOT Strategic Priorities

Instructions: Briefly describe how the project aligns with the following MnDOT Research Strategic Priorities. Complete all that apply.

III.A.1. Innovation & Future Needs:

III.A.2. Advancing Equity:

III.A.3. Asset Management:

III.A.4. Safety: **Increase use of HFST by providing a less expensive alternative**

III.A.5 Climate Change & Environment: **Create a beneficial use of a mining by-product**

III.B. Expected Outcomes

Instructions: Check all expected direct outcomes of this research.

- New or improved technical standard, plan, or specification
- New or improved manual, handbook, guidelines, or training
- New or improved policy, rules, or regulations
- New or improved business practices, procedure, or process
- New or improved tool or equipment
- New or improved decision support tool, simulation, or model/algorithm (software)
- Evaluation of a new commercial product
- New or improved technical standard, plan, or specification
- Other. Please specify below:

Use of a Minnesota-sourced by-product to replace imported material

III.C. Expected Benefits

Instructions: Select all expected benefits that may be realized if the findings and recommendations from this research is adopted or implemented

III.C.1. Construction Savings **Cost savings from reduced materials**

III.C.2. Decrease Engineering/Administrative Costs Choose an item.

III.C.3. Environmental Aspects **Recycling**

III.C.4. MnDOT Policy Choose an item.

III.C.5. Lifecycle Choose an item.

III.C.6. Operations and Maintenance Savings Choose an item.

III.C.7. Reduce Risk Choose an item.

III.C.8. Reduce Road User Cost Choose an item.

III.C.9. Safety Reduction of crash frequency

III.C.10. Technology Choose an item.

III.C.11. Other, please describe below:

IV. Technical Advisory Panel

Instructions: Please list the name and affiliation of individuals to consider for the Technical Advisory Panel.

St. Louis County DPW

Itasca County DPW

MnDOT D1 or D2 Safety Engineer

MnDOT State Aid (CO, D1, and/or D2)

MnDOT Office of Traffic Engineering

MnDOT Metro Traffic Engineering

Your assigned Project Advisor is available to answer questions and provide guidance (assigned by the Office of Research & Innovation).

Your Project Advisor is: Beth Klemann (651)366-3771 beth.klemann@state.mn.us