

# Research Need Statement 645

## I. Need Statement Champions and Information

### I.A. Need Statement Champion Information

- I.A.1. First and Last Name of Research Champion: **Bernard Izevbekhai**
- I.A.2. Research Champion's Office: **MnDOT Materials & Road Research**
- I.A.3. Research Champion's Phone Number: **651-366-5454**
- I.A.4. Research Champion's Email: [Bernard.izevbekhai@state.mn.us](mailto:Bernard.izevbekhai@state.mn.us)

### I.B. Research Co-Champion

- I.A.1. First and Last Name of Research Co-Champion:
- I.A.2. Research Co-Champion's Office:
- I.A.3. Research Co-Champion's Phone Number:
- I.A.4. Research Co-Champion's Email:

### I.C. Research Needs Title (115 Characters): **Assessment of Alternative Pozzolans for Use in Minnesota Concrete**

### I.D. Project Sponsor: **MnDOT Research Program**

## II. Research Need Background and Description

### II.A. Research Need Background

#### II.A.1. Describe the problem or opportunity.

As coal fired electricity generation is phased out, the availability of fly ash is declining and the need for sound evaluation of alternative pozzolans is escalating. The inclusion of pozzolans in concrete decreases the carbon footprint and global warming potential, helps reduce materials in landfills (when commercial or industrial byproducts are used), and greatly enhances the durability of concrete through reduced permeability. The need for alternative pozzolans is a growing concern around the world; it would be of great advantage for Minnesota to act proactively and identify potential alternatives sooner rather than later.

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

Regarding glass, ASTM recently published a new specification for ground glass pozzolan (ASTM C1866), which is significant in paving the way for use of glass in concrete. Additionally, the MPCA has identified glass as a priority material in need of new markets for recycling or reuse. Between the need for alternative pozzolans in concrete and the need for new markets for waste glass, it seems that a unique opportunity is afoot.

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

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

This project will investigate the performance of alternative pozzolans for use in Minnesota concrete. These alternative pozzolans could include ground glass, off-spec fly ash, or other natural pozzolans, as well as blends. Fresh and hardened properties including durability issues such as ASR and freeze-thaw would be investigated as well as information on the availability of each material, compositional and physical variability within Minnesota, and processing requirements.

### 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: The need for alternative pozzolans is a growing concern. This research will allow MN to act proactively in identifying potential alternatives.

III.A.2. Advancing Equity:

III.A.3. Asset Management:

III.A.4. Safety:

III.A.5 Climate Change & Environment: Inclusion of pozzolans in concrete decreases the carbon footprint and global warming potential, helps reduce materials in landfills (when commercial or industrial byproducts are used), and greatly enhances the durability of concrete through reduced permeability

#### 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
- Other. Please specify below:

### 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 **Improved quality of construction**

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

III.C.3. Environmental Aspects **Other environmental impact. Please describe below.**  
Use of alternative materials that decrease carbon footprint and global warming potential

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

III.C.5. Lifecycle **Products with longer lifespan**

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 Choose an item.

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.

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

Your Project Advisor is: Marcus Bekele, (651)366-3903, [marcus.bekele@state.mn.us](mailto:marcus.bekele@state.mn.us)