

# Research Need Statement 612

## I. Need Statement Champions and Information

### I.A. Need Statement Champion Information

I.A.1. First and Last Name of Research Champion: **Curt Turgeon**

I.A.2. Research Champion's Office: **MnDOT Office of Materials and Road Research**

I.A.3. Research Champion's Phone Number: **651-366-5535**

I.A.4. Research Champion's Email: **curt.turgeon@state.mn.us**

### I.B. Research Co-Champion

I.A.1. First and Last Name of Research Co-Champion: **Bernard Izevbekhai**

I.A.2. Research Co-Champion's Office: **MnDOT Office of Materials and Road Research**

I.A.3. Research Co-Champion's Phone Number: **651-366-5454**

I.A.4. Research Co-Champion's Email: **bernard.izevbekhai@state.mn.us**

### I.C. Research Needs Title (115 Characters): **Benefits of Preventive Maintenance**

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.

Preventive maintenance of Portland cement concrete pavements is characterized by very low-cost interventions early (within the first 5 to 7 years) in the performance history. These low-cost investments appear to result in a cost-effective increase in service life.

Reliability analysis on Minnesota's unbonded concrete overlays indicate an early window (up to 7 years after construction) within which period certain early preventive maintenance activities could be performed. However there is no comparative quantitative evaluation of service life extension resulting from early preventive interventions, those with late interventions, and those without interventions to determine the relationship between preventive maintenance activities and measurable life extensions.

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

FHWA research finds that projects focused on the end-of-service life may redirect funds from rehabilitation projects that could optimize overall system durability. MnDOT has sponsored research (Remaining Asset Service Life, Phase 1) to look at how to best manage the highway network and guide investment via maintenance and construction activities. Remaining Asset Service Life, Phase 2 is underway to evaluate the proposed metrics from Phase 1 but there is limited information on the impacts of maintenance activities on service life.

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

Marasteanu, M, et al. [Remaining Asset Service Life, Phase 1](#) (MnDOT, 2018)

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

The proposed project should evaluate service life extension of Portland cement concrete pavements as a result of various maintenance activities and schedules used by MnDOT and other Minnesota (City and County) public works agencies.

Determine expected benefits of various maintenance activities based on the pavement conditions at different life cycle stages. Benefits to be considered include, but are not limited to:

- Increased life expectancy
- Increased intervals between required maintenance
- Improved pavement condition
- Improved pavement ride (reduced roughness)

The goal is to develop a tool (i.e. decision tree, matrix) to be used by planners, designers, pavement engineers, and public works managers to guide the selection of appropriate, cost-effective maintenance actions for Portland cement concrete pavements. Included in the maintenance strategy may be a preventive maintenance activity involving the right intervention at the right time on the right pavement.

### III. Strategic Priorities, Benefits, and Expected Outcomes

**Section III. This 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:

**A culture of preventive maintenance may further the MnDOT mission to build, operate, and maintain a safe, accessible, efficient, and reliable multimodal transportation system that connects people to destinations and markets throughout the state, regionally and around the world in an equitable manner for all Minnesotans.**

##### III.A.3. Asset Management:

**This initiative seeks to maximize the asset value of the road network through a well- informed strategy on preventive maintenance. It is hypothesized that the influence of preventive maintenance will increase the overall remaining service life of the network at minimal cost.**

##### III.A.4. Safety:

**Certain preventive maintenance initiatives such as chip seal and diamond grinding increase skid resistance and thus improve safety as a by-product.**

##### III.A.5 Climate Change & Environment:

#### 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:

**An objective toll that can be incorporated in the Pavement Investment Evaluator (Formerly Pavement investment Guide) being developed by OMRR.**

### 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 Choose an item.

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

III.C.3. Environmental Aspects Choose an item.

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

III.C.5. Lifecycle Other lifecycle impacted.

**Allow selection of appropriate pavement maintenance activities to extend/maintain pavement life in a cost efficient manner**

III.C.6. Operations and Maintenance Savings Other operation and maintenance savings.  
**Operational and maintenance cost will be reduced when the right preventive maintenance is performed. Such activities will increase the average interval between maintenance activities and reduce the overall life cycle cost of pavements in the network.**

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

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

III.C.9. Safety Other safety benefit.

**Some preventative maintenance fixes, such as diamond grinding and chip seal, increase skid resistance. If these treatments are found to also improve service life, there is the added benefit of safety improvements due to improved traction.**

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.

Bernard Igbafen Izevbekhai - MnDOT OMRR (Technical Liaison)

Curtis Turgeon - MnDOT OMRR

Dave Janisch - MnDOT OMRR

Jerry Geib - MnDOT OMRR

Representative from Office of Maintenance

Charlie Kremer- MnDOT D7 Materials Engineer

Michael Vrtis - MnDOT OMRR

City/County Engineers

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 Email: [beth.klemann@state.mn.us](mailto:beth.klemann@state.mn.us)