



Research Need Statement 539

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| Date: | 7/13/18 |
| Need Statement Champion: | Paul Pilarski |
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| Idea Submitted by: | Paul Pilarski |
| Idea Originated from: | Ideascale |

Select Program:

X MnDOT OR Local Road Research Board (LRRB)

X Research OR Implementation

Need Statement Title:

Rebar Section Loss Tables

Need Statement: Describe the problem or the opportunity. Include background and objective.

MnDOT has seen substructures with concrete cover spalling and delamination from aging infrastructure exposed to deicing salts and leaking joints. Many of these bridges were built under design specifications that would not meet current reinforcement detailing and reinforcement area calculations. When bridge repairs are scheduled, it is unknown the level of reinforcement section loss should be assumed for analysis. Actual reinforcement section loss may not be measured until completion of concrete removals under contract work, at which point it is difficult to design strengthening or supplemental reinforcement additions without project delays, significant added cost and impact to service interruption. The research goal is to generate a guideline for reinforcement section losses to be assumed in face (stirrup) bars and underlying primary steel bars based on NDT methods such as visual examination, concrete sounding and repair history.

There are many papers on time to corrosion initiation but few guidelines on section loss to be assumed with a given reinforcement cover and concrete strength. Based on literature reviews conducted to date, it seems plausible to generate a reinforcement section loss guidance document based on input parameters of reinforcement size, spacing, concrete strength, and concrete cover. This research would promote the development of such guidelines or an excel-based tool to generate guidance.

Provide a summary of the potential benefits:

A rebar section loss table product would enable better bridge asset management and lower MnDOT risk at a period when MnDOT has limited funds to replace aging infrastructure. Spalling concrete can be the result of very minor amounts of section loss, and an understanding



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of section loss is required for bridge engineers to make educated analysis of bridge capacity under deteriorated conditions. The benefits of this research would include:

1. Uniformity in stated reinforcement section loss values communicated from field inspections (Currently inspector use guesswork by visual examination some distance from the actual rebar or hammer-sounding concrete to listen for delaminating concrete, but in either event no direct measurement of rebar section loss).
2. Better understanding of bridge element capacity by using section loss values
3. Improved use of tax dollars by right-sizing planned repairs

How does this project build upon previous research (include title or reference to a completed research effort)?

There are too many papers and relevant related research reports on steel reinforcement section loss and prediction to list. However, none of these efforts have resulted in guidance tables, let alone guidance tables specific to bridge construction elements MnDOT has the most concern with. The papers to date describe methods that one could use to determine reinforcement section loss. This research would involve performing a literature review of the various methods and implanting some of the methods to produce usable section loss guidance for MnDOT staff.

Provide names to consider for a technical advisory panel:

Paul Pilarski (TL), Dustin Thomas, Nick Haltvick, Julie Long, Jessica Duncan, Arielle Ehrlich