2021 Initial Idea Development

2021-2022 NRRA Research and MnROAD Construction Development
(Updated Form – March 23, 2021)

Initial Proposal is for NRRA Executive Team to Approve for further development (keep to two pages)

Research Title:	Reclamation and Recycling Techniques to Achieve Perpetual Pavement Characteristics
NRRA Team(s):	Flexible/ Preventive Maintenance / Geotech / IC
Type of Effort:	**Research/Synthesis**
Developed By:	Subcommittee #3
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Research Funding Estimate:	$150,000 (include funding sources and partnership matches)
Research Years Expected:	**3 years**
Beneficial Partnerships:	

Number of Test Sections:	**Four on I-94 Mainline**
Instrumentation Effort:	**Moderate. Cell 4 and 15 would be instrumented and compared to Perpetual Pavement WisDOT/MnROAD Sections**
MnROAD Monitoring:	**MnROAD staff will cover routine monitoring and dynamic testing as did before)**

Research Objectives:

The objective of this project is to identify and apply the proper treatment for Stabilized Ful-Depth Reclamation (SFDR) test sections constructed at MnROAD in 2008. The proper treatment will extend the good performance and continue perpetual pavement behavior of MnROAD cells 2 and 3. MnROAD cells 4 and 15 need a deeper rehabilitation and have additional challenges from the original full-depth asphalt structure. It is proposed that cells 4 and 15 be designed and constructed to be a Perpetual Pavement (PP) achieved using reclamation and recycling techniques. The use of reclamation and recycling techniques to achieve perpetual pavements is gaining traction with agencies around the US due to the sustainability benefits of reclamation in addition to the sustainability benefits from a long-life pavement.

Historically, these sections at MnROAD have been used to promote benefits of reclamation and can continue to serve as an example of effective, long-lasting SFDR. The research will also address rehabilitation techniques for full-depth asphalt pavements using modern techniques and materials.

Specifically, the NRRA research contract is requested for this project to:

1. Develop solutions for FDR pavements after ≈15 years from construction - Preventive Maintenance and Rehabilitation
2. Develop layer coefficients or other design inputs for recycled / reclaimed layers
3. Develop solutions for full-depth asphalt pavement rehabilitation
4. Conduct structural analysis to characterize pavement responses and performance from a perpetual pavement design perspective.

MnROAD Sections:

MnROAD Mainline Cells 2 and 3 will have preventive maintenance treatments applied to preserve and extend the good performance of these cells. Each cell will be split into two sections of 250’ (Cells

221/321 and 222/322). Cell 221/321 will have a high quality (material and application) microsurface applied. Cell 222/322 will have a ½" micromill and a 1" Ultra-thin Bonded Wearing Course (UTBWC)

MnROAD Mainline Cell 4 needs a deeper repair. In-place materials will be improved to turn this section into another Recycled Perpetual Pavement. Work is needed to determine the depth and if flyash stabilized layer is in good condition or needs repair. Potentially, the existing bituminous layers will be milled off and used in a cold central plant mixture placed after the FDR flyash layer has been addressed.

MnROAD cell 15 has similar problems as cell 4 that resulted from the original full depth asphalt pavement construction in 1993. The rehabilitation of cell 15 will incorporate wicking fabric to remedy the issues associated with full depth asphalt pavements.
*Proposed design as of April 2021. Design and experiment details will be determined by the project Technical Advisory Panel.

NRRA Sustainability/Resiliency and or Intelligent Construction:

This project hits multiple components of the current NRRA emphases towards Sustainability and Intelligent Construction. Sustainability is directly address by utilizing in-place reclamation techniques to achieve long-lasting pavements. The 2008 SFDR work at MnROAD has already proven the potential benefits of utilizing reclamation to achieve a pavement that does not require major rehabilitation or reconstruction.

Cross-cutting Opportunities:

This project is a collaboration between the Flexible, Geotech, and Preventive Maintenance Teams.

Cells 4 and 15 will be instrumented and compared to a conventional PP section at MnROAD and two PP sections near Eau Claire, WI. The comparison will provide a comprehensive assessment of PP in the region and how recycling/reclamation can be used to achieve the same design strategies (see NRRA Flexible Subcom #3).

Implementation Plan:

This project has a national and regional implementation potential. Nationally, there has been interest in using these sections to develop AASHTO Design layer coefficients for reclaimed and recycled layers. Similar work has been done at other research facilities; however a larger dataset is still needed to validate and refine the efforts.

Regionally, there will also be a benefit from the layer coefficient development, but a greater impact will likely be noticed by the efforts to remedy full-depth asphalt pavements. The 2008 SFDR project at MnROAD also illuminated challenges that are still being faced with full-depth asphalt pavements (i.e., HMA over subgrade without granular base). The rehabilitation of Cell 4 and will 15 will continue the legacy of using SFDR sections at MnROAD to show best practices. Coordination with district engineers for their perspective and involvement will greatly enhance the impact value of this project.