

Research Need Statement 610

I. Need Statement Champions and Information

I.A. Need Statement Champion Information

I.A.1. First and Last Name of Research Champion: **Ken Graeve**

I.A.2. Research Champion's Office: **MnDOT Office of Environmental Stewardship**

I.A.3. Research Champion's Phone Number: **651-366-3613**

I.A.4. Research Champion's Email: **Kenneth.Graeve@state.mn.us**

I.B. Research Co-Champion

I.A.1. First and Last Name of Research Co-Champion: **Warren Tuel**

I.A.2. Research Co-Champion's Office: **MnDOT Office of Environmental Stewardship**

I.A.3. Research Co-Champion's Phone Number: **651-366-3624**

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

I.C. Research Needs Title (115 Characters): **Comparison of Compost and Proprietary Soil Amendments for Vegetation Establishment**

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.

On construction sites with poor and/or limited quantity of topsoil resources, site managers are often tasked with improving soil quality in order to promote vegetation establishment. The most common method, outside of importing topsoil, is to amend the existing on site soils with either organic compost or proprietary soil amendments. Good sources of compost are not always available in the vicinity of construction sites in Minnesota which makes proprietary soil amendments a cost-effective alternative. The purpose of this research is to determine the best ratios and mixing methods for both compost and proprietary soil amendments.

The research aims to determine better options to efficiently establish vegetation on poor soils with better vegetative density and allow sites to fulfill their NPDES Permit requirements sooner.

The ultimate goal is to reduce costs for site inspection activities as well as reduce the need for corrective actions resulting from inspections. Better and healthier stands of vegetation may also need less post-construction maintenance of erosion damage.

MnDOT conducted internal analyses on a number of proprietary soil amendment products to determine germination rates and biomass production for a variety of different plant species commonly used in MNDOT seed mixes.

II.A.2. If applicable, describe how this project will build on previous research. Previous research by MnDOT and LRRB has considered the establishment of salt-tolerant grasses on roadways, development of watering methods/schedules, and selection of suitable species and cultivars. Many of these studies considered the effects of soil amendments on the success but did not compare different types of amendments or appropriate mixing ratios/techniques.

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

In Progress Research

Project title: Optimizing Compost Application Rates for Vegetation Health, Maximal Stormwater Infiltration, & Runoff Quality
North Carolina DOT (August 1, 2018 – July 31, 2021)
<https://trid.trb.org/View/1530118>

Completed Research

Use of Compost for Permanent Vegetation Establishment and Erosion Control
Maryland DOT and University of Maryland (2019)
<https://rosap.ntl.bts.gov/view/dot/42005>

Best Management Practices for Establishment of Salt-Tolerant Grasses on Roadsides
MnDOT and U of M (2017)
<http://dot.state.mn.us/research/reports/2017/201731.pdf>

II.A.4. What is the **objective** of the proposed research?
The research would examine the germination viability of vegetation with soil amendments and percent ground cover over time in comparison with control plots.

Various soil amendments should be considered including, but not limited to:

- Organic compost of different types and sources
- Proprietary soil amendments of different types and sources
- Varying soil types representative of those typically encountered in the revegetation of highway projects with an emphasis on soils prone to poor revegetation success

The research should also consider variables such as, but not limited to:

- Mixing ratios
- Mixing techniques
- Cost of materials, equipment, and labor

The research should develop a tool (i.e. matrix or decision tree) that can be used by highway engineers, environmental staff, contractors, and others to determine appropriate soil amendment options. Guidance and/or training on the use of the tool should also be included.

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: **Maintenance costs could be reduced with successful establishment of healthy roadside vegetation.**

III.A.4. Safety:

III.A.5 Climate Change & Environment: **Better establishment of vegetation allows construction sites to be closed more efficiently, reduces the need for NPDES Permit inspections, and reduces the potential for enforcement actions.**

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:

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 Other engineering or administrative cost. Please specify.

Decreased time to establish vegetation on sites with poor soils would allow projects to fulfill their NPDES Permit sooner. Earlier establishment of vegetation would reduce post-construction inspections and administrative tasks associated with permit compliance.

III.C.3. Environmental Aspects Water Pollution

Greater vegetative growth vigor and root development could promote infiltration and reduce potential impact to surface waters and potentially reduce demand on storm water management infrastructure.

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

III.C.5. Lifecycle Choose an item.

III.C.6. Operations and Maintenance Savings Other operation and maintenance savings.
Improved vegetation establishment reduces future erosion potential and reduces need for maintenance.

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.

Dwayne Stenlund

Warren Tuel

MPCA representative

MnDOT District construction staff

City and County staff

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