



## TECHNICAL SUMMARY

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\$193,677



Because of its poor salt tolerance, Kentucky bluegrass has failed at many roadside sites in Minnesota.



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# Establishment and Care of Salt-Tolerant Grass on Roadsides

## What Was the Need?

Minnesota has more than 24,000 acres of green, grassy roadsides, ranging from street terraces to Interstate highway medians. These roadside environments have many stressors, including heat, drought, insects, weeds, traffic and salt.

MnDOT has traditionally used Kentucky bluegrass for turfgrass, but its poor salt tolerance has resulted in many failed installations. Seed and sod research begun in 2009 produced MNST-12, a salt-tolerant grass mix of mostly fine fescues. By 2013, however, many roadside installations of MNST planted under MnDOT's standard turf care protocols had failed and the reasons were unclear.

Replacing an acre of failed sod costs up to \$25,000. MnDOT needed to learn why the turf failed and find the right methods to establish and care for salt-tolerant grass.

## What Was Our Goal?

Researchers sought to assess installations of MNST seed and sod across the state to determine the planting and care practices that resulted in successful establishment or in failure. They also wanted to identify best practices for salt-tolerant turf establishment and care.

## What Did We Do?

The study had two phases. In the first phase, researchers identified 16 roadside sites located throughout the state with salt-tolerant turf that had failed or performed poorly. They assessed these sites from July 2013 through 2014, and gathered detailed information about the sites from MnDOT, landscape contractors, sod producers and weather data sites. Information included date and time of installation, sod or seed used, temperature and precipitation at installation, and irrigation and mowing protocols. At each site, researchers also took measurements of ground cover, salinity, temperature, moisture content, surface hardness and depth of soil to top of curb. Soil samples were tested for pH, available phosphorus and organic matter.

Beyond variations in soil moisture, it was unclear whether any other soil aspect promoted the success or failure of site turf. Homeowners at various locations suggested that installation date and supplemental irrigation might have influenced a site's success.

In the second phase of the study, investigators identified the best management practices for MNST by examining three factors that could influence turf performance:

- **Use of soil amendments during establishment.** Researchers examined the effects on MNST performance of seven types of soil amendments, from slow-release fertilizers to various composts, used in trial plots.
- **Timing of seed and sod installations.** Subsections of large trial plots at St. Paul and Blaine, Minnesota, were seeded or sodded monthly starting May 1 through Nov. 1. The watering regimens followed MnDOT's 2014 specifications.

*Research into the high failure rate of roadside salt-tolerant grass installations has led to new timing and watering protocols for the establishment and care of roadside turfgrass formulated to withstand the salts of winter deicing.*

*“The [highway] construction critical path for program delivery rarely includes a biological requirement for establishing vegetation. For salt-tolerant fescue grasses, planting dates and irrigation regimens matter.”*

—**Dwayne Stenlund**,  
Erosion Control Specialist,  
MnDOT Office of  
Environmental  
Stewardship

*“Basing irrigation approaches on evapotranspiration could reduce water consumption and, ultimately, the cost of establishing areas by sod.”*

—**Eric Watkins**,  
Professor, University  
of Minnesota Department  
of Horticultural Science

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This automatic rain shelter carefully controls the irrigation of test areas, moving to protect the trial areas when it senses rain and moving away from the trial plots when rain ends.

- **Post-installation watering regimens.** Researchers planted sod plots of MNST and Kentucky bluegrass in a controlled outdoor area using an automatic sheltering system that protected the test areas when it rained. Irrigation was carefully controlled to test seven watering regimens. Researchers studied turf cover, root growth and shear strength of grasses at the sites.

### What Did We Learn?

Soil amendment treatments had little effect on turfgrass performance, whether the plots were seeded or sodded.

MNST planted as seed cannot tolerate the heat and frequent drought conditions of Minnesota’s summers during establishment. Seeding should therefore only occur in August and September. Sod may be laid between May and November, provided there is adequate irrigation.

MNST differs biologically from Kentucky bluegrass and has different watering needs. Root development occurs more slowly and requires a longer period of irrigation during establishment, thriving with moisture replacement between 60 and 100 percent of the evapotranspiration rate. With adequate water, MNST establishes well.

MNST should not be mown until roots are established several inches into the soil profile. Drought-stressed turf should not be mown.

### What’s Next?

Revisions to MnDOT’s specifications and guidelines are needed. In addition, MnDOT will need to adjust its previous recommendations for watering MNST-12 sod to ensure a successful installation. Further, guidelines for designers and inspectors must be updated. MNST is a different grass community than Kentucky bluegrass-dominated sods: The perception of what “success” looks like must be changed, and this change can be best accomplished through images. New methods of irrigation will need to be devised and implemented. Providing water only as the plant needs it could result in considerable savings in water and labor over time. Additional studies related to best management practices are pending.

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*This Technical Summary pertains to the LRRB-produced Report 2017-31, “Best Management Practices for Establishment of Salt-Tolerant Grasses on Roadsides,” published July 2017. The full report can be accessed at [mndot.gov/research/reports/2017/201731.pdf](http://mndot.gov/research/reports/2017/201731.pdf).*