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LRRB
LOCAL ROAD RESEARCH BOARD

TECHNICAL SUMMARY

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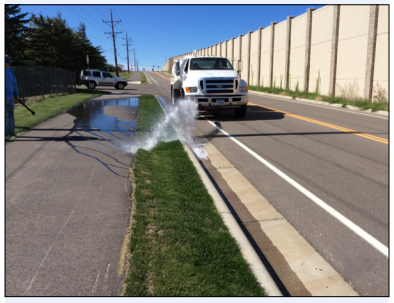
LRRB PROJECT COST:
$168,974



Researchers tested several nozzles that would apply water more effectively to new turfgrass.

DEPARTMENT OF TRANSPORTATION
OFFICE OF RESEARCH & INNOVATION

Improving Roadside Turfgrass Establishment

Researchers tested five new irrigation methods for watering new installations of salt-tolerant turfgrass. They determined best methods and also developed an instructional course for contractors and guidance for homeowners to promote successful turfgrass installations.

What Was the Need?

Statewide, there are more than 24,000 acres of turfgrass planted along interstate highway medians, roadway slopes, street terraces and other roadside areas. Minnesota transportation agencies work to maintain extensive turfgrass plantings in often harsh growing conditions such as heat, drought and exposure to salts from winter road maintenance. Years of turfgrass research by Minnesota transportation agencies and the University of Minnesota's Turfgrass Science team have resulted in the development of new seed mixtures that are more salt-tolerant than the common, primarily Kentucky bluegrass turfgrass mixtures.

However, installations of the new salt-tolerant mixes have not been as successful as expected. Many factors affect new turfgrass plots, such as poor soil preparation, weather, lack of nutrients and improper watering. Researchers' investigations showed a primary cause of installation failures was irrigation methods that could not sufficiently support new turfgrass establishment. The new installations of primarily salt-tolerant fine fescues require a different early watering regimen than the methods used for previous Kentucky bluegrass turfgrass mixes. Replanting turfgrass can cost between $150 and $530 per acre for seeds, plus labor costs. Sod can cost nearly $20,000 per acre. Finding the right irrigation methods for the new turfgrass species would save money and time.

Minnesota's transportation agencies wanted to learn appropriate early irrigation regimens for new turfgrass to ensure seed and sod installations receive the best care and develop into healthy, resilient expanses of salt-tolerant turfgrass.

What Was Our Goal?

The primary goal of this Local Road Research Board project was to develop effective and economical methods of watering new turfgrass installations and to increase their successful establishment. To that end, researchers sought to evaluate alternative methods of turfgrass watering, compare the effectiveness of new methods to current practices, and develop training for turfgrass installers and guidance for homeowners living near new turfgrass plots.

What Did We Do?

Researchers designed five new watering systems and tested them at four roadside sites. A fifth nonroadside site at the University of Minnesota Turfgrass Research, Outreach and Education Center was selected to determine the effects of slope.

The four roadside research sites consisted of individual plots that ranged in size from 75 to 150 square feet. At each site, six irrigation methods were tested for 60 days. Six treatments were tested on both sodded and seeded plots at each site: drip irrigation tape spaced at 12 inches placed at the soil surface (1) or 0.5 inch below (2), drip irrigation tape spaced at 18 inches placed at the soil surface (3) or 0.5 inch below (4), an overhead irrigation system (5) and an unirrigated control (6).

continued

"Establishing salt-resistant roadside turfgrass requires an effective watering program. As labor and equipment can be sidetracked regardless of plant water needs, a computerized irrigation program overcomes this problem."

—Dwayne Stenlund,
Erosion Control Specialist, MnDOT Office of Erosion Control and Stormwater Management

"We showed that an easily installed drip irrigation system can effectively support the establishment of salt-tolerant fine fescue turfgrasses. In addition, this system uses less water than less effective truck watering practices and can be reused."

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

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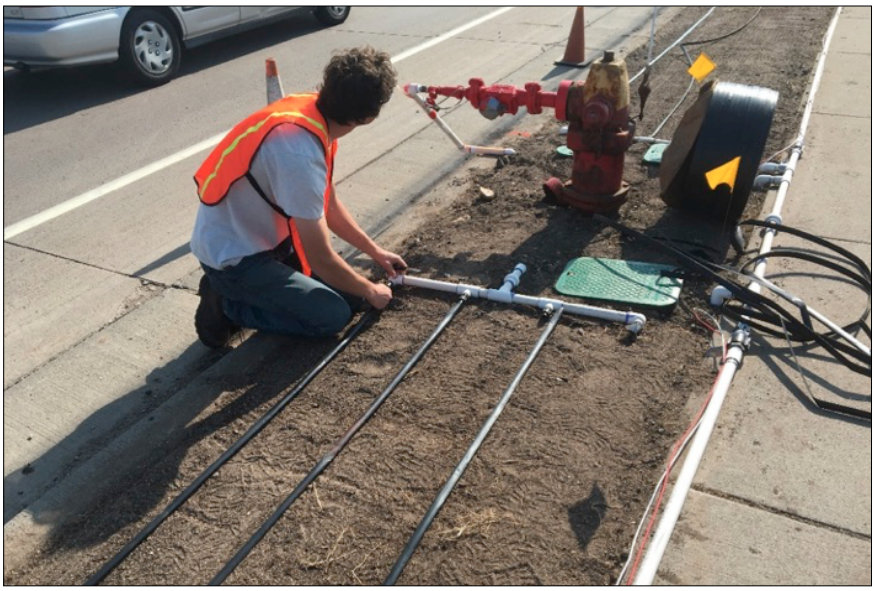

Drip irrigation systems were installed on turfgrass test plots on several boulevards with fire hydrants as the water source. The systems included connectors, valve controllers and timers attached to the hydrant.

To these approaches, researchers used water from city fire hydrants at three locations; a nearby golf course supplied water at the final location. Researchers designed hydrant connections and controlled valve systems feeding either drip lines or PVC piping installed on the test plots.

Researchers determined the effectiveness of the test systems by collecting data on water used, irrigation efficiency and uniformity, turf establishment, quality and rooting characteristics. They calculated system costs to compare to usual truck watering methods. In addition to the roadside evaluations, researchers tested several different water truck nozzles that could more effectively water new installations to provide better options for those areas not close to a fire hydrant.

Results from the research project and previous roadside turfgrass projects were used to develop an online course for turfgrass installers. As of October 2019, 68 people had registered to take the 11-module course. In addition, researchers produced online guidance for homeowners living near new turfgrass installations.

What Did We Learn?

Test results indicated that the ideal approach for watering new roadside turfgrass is a nonpermanent, programmable drip irrigation system supplied by a fire hydrant. However, irrigation supply is not limited to a hydrant source as the system is adaptable to gravity or other pressure-fed water supply. For seed or sod, 18-inch drip irrigation tape laid above the installation is recommended. It can be removed and possibly reused, and it uses less water than water truck watering.

If this system is not viable, the Niece Equipment fan nozzle and the pancake adjustable nozzle for water trucks show promise in efficiently irrigating roadsides.

What's Next?

This project showed robust technical proof of concept, testing the scientific side of turfgrass establishment. The next step involves the technical side of implementation: substantial changes to specifications and procedures used by Minnesota's transportation agencies. This step will involve additional research.

This Technical Summary pertains to Report 2020-03, "Expanding the Success of Salt-Tolerant Roadside Turfgrasses Through Innovation and Education," published February 2020. The full report can be accessed at mndot.gov/research/reports/2020/202003.pdf.