

RESEARCH SPOTLIGHT

Project Information

REPORT NAME: Slope Restoration on Urban Freeways

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PROJECT COST: \$476,941

COST SHARING: 20% MDOT, 80% FHWA through the SPR, Part II, Program

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Restoring roadside slopes with smarter planting strategies

Steep slopes along Michigan highways are difficult environments for vegetation to survive, often leading to failed plantings and ongoing maintenance costs. To help establish healthier, longer-lasting landscapes, the Michigan Department of Transportation (MDOT) evaluated plants and planting methods best suited for harsh roadside conditions. The research identified practical strategies for improving plant survival and reducing maintenance needs.

PROBLEM

Healthy roadside vegetation along Michigan's highways helps stabilize slopes and reduce weeds and erosion, while diverse plantings support pollinators and create a more visually appealing environment for drivers.

But growing and maintaining vegetation along the state's roads is challenging. Plants are exposed to compacted soils, heat reflected from pavement, snowplow activity and salt used during winter maintenance operations. Steep slopes add another challenge, because turfgrass can be difficult and potentially unsafe to mow.

While some planting approaches were believed to work better than others, MDOT recognized the need for research-based guidance on which plant species and establishment practices perform best in roadside environments. The [original research phase](#) concluded in 2021, but MDOT extended the project to continue collecting performance data from the established plots.



Researchers evaluated a variety of shrubs, ornamental grasses and perennial flowering plants on highway slopes along I-696 to identify vegetation best suited for Michigan's harsh roadside conditions.

RESEARCH

Researchers established two test plots on highway slopes along I-696 in the Detroit metro area to evaluate how site conditions affect roadside vegetation performance.

One site was located on a north-facing slope in Warren and the other on a south-facing slope in Roseville, allowing researchers to assess how sun exposure and other site conditions affected plant performance over time.

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“The study proved that the right plant selection and site preparation can make a big difference in long-term roadside performance, helping MDOT reduce maintenance needs while improving vegetation coverage.”

Yige Qu

Landscape Architecture Project
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Because tilling steep slopes requires additional equipment and labor resources, researchers wanted to determine whether compost alone could sustain healthy plant growth. The study compared compost amendments and soil tillage as preparation methods and tested a variety of shrubs, ornamental grasses and perennial flowering plants selected for their tolerance to drought, heat, salt exposure and poor soils.

Beginning in 2019, researchers monitored plant growth, survival, weed pressure and overall landscape performance over multiple growing seasons. Climate monitoring stations were also installed to evaluate how roadside environmental conditions affect long-term plant survival.

RESULTS

Compost amendments significantly improved plant establishment and survival. Plants grown in compost-amended soils performed better than those planted without compost. Soil tillage had relatively little effect on plant performance, suggesting that top-dressing with compost may provide the benefits plants need without tilling steep slopes.

Researchers also found that successful roadside plantings depend not only on soil preparation and plant selection, but also on early weed control. Dense planting

helped shade out weeds, creating more self-sustaining landscapes with fewer maintenance needs.

Plant performance varied considerably by vegetation type. Ornamental grasses generally struggled, with most species failing to establish lasting ground cover. Several herbaceous perennials performed much better. Two selections of *Amsonia* maintained high survival rates and dense ground cover, while daylilies also performed well but may need to be planted more densely to provide adequate cover.

Shrubs produced the most successful results overall. Species such as *Diervilla*, *Physocarpus* and *Cotoneaster* developed dense, self-sustaining stands and maintained extensive coverage on the slopes. *Cotoneaster* was especially vigorous, providing nearly complete ground cover throughout the monitoring period. In contrast, some species, including *Baptisia*, struggled to survive the challenging conditions.

The study also confirmed that roadside environments create unique microclimates. On-site climate data showed that the slopes were generally warmer than surrounding areas, likely because of heat from pavement and nearby traffic activity. However, north- and south-facing slopes did not differ enough to require separate plant recommendations.

VALUE

The study supports roadside planting practices that had previously relied largely on experience and observation. The findings give transportation agencies clearer guidance on which soil preparation methods and plant species are most likely to succeed in these harsh environments.

For future landscape and slope restoration projects, MDOT can use the findings to reinforce compost-based soil preparation practices, improve contractor guidance and select plants that provide long-term cover with lower maintenance needs.

The project also contributed to the development of a publicly available,

searchable plant selection database for roadside landscapes. Users can search plant species by characteristics such as height, sun exposure, flowering traits and performance to identify plants better suited to Michigan's roadside conditions.

Research Administration

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The final report is available online at

MDOTjboss.state.mi.us/TSSD/tssdResearchAdminDetails.htm?keyword=SPR-1767&checkBox=undefined.

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