

# RESEARCH SPOTLIGHT

## Project Information

**REPORT NAME:** Slope Restoration on Urban Freeways

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**TOTAL COST:** \$436,661

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

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## New standards foster successful roadside plantings

Green spaces planted along urban highways provide several environmental, safety and economic benefits. However, steep terrain, poor soil condition and an extreme roadside climate can make it difficult for most plants to survive. By testing and tracking different soil improvement strategies and dozens of plant types over several years, the Michigan Department of Transportation (MDOT) developed a process for planting on slopes and a list of plant species suitable for Michigan roadsides that are environmentally advantageous, cost-effective and lower-maintenance.

### PROBLEM

In Michigan's Metro Detroit region, the sloped areas adjacent to the freeways pose a variety of environmental and safety challenges. While it's typical to plant grass seed in these areas, established turf requires frequent mowing and maintenance. Getting the necessary equipment to the sites in high-volume, fast-moving traffic can be difficult, and the steep terrain onsite can pose a hazard to maintenance crews and motorists since mowers can flip and potentially send workers and heavy machinery onto the roadway. In addition, turf has a short root system and is susceptible to washout and erosion, which can cause sediment and pollutants to travel



Once established, diverse plantings along sloped freeway roadsides can reduce runoff and erosion with little maintenance.

into waterways, potentially violating state laws and resulting in severe fines and other penalties for MDOT.

Replacing the grass with diverse plant species will improve air quality, stabilize the slope, decrease the need for mowing, encourage pollinator activity and reduce driver fatigue. However, poor soil conditions,

*“When properly prepared and planted, these roadside areas can actually serve to reduce pollution and soil erosion while increasing safety for drivers and MDOT maintenance crews.”*

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higher temperatures and wind speeds, vehicle emissions and other urban stressors can make it hard for plants to grow and thrive near the roadway. By systematically exploring alternatives for improving planting conditions and choosing adaptable plant species, MDOT sought to develop a tried-and-tested process for creating attractive and low-maintenance spaces that can reduce erosion and mitigate pollution while decreasing the risk to workers.

## **RESEARCH**

After reviewing the published literature related to urban landscaping challenges and solutions, investigators devised a plan for assessing different soil improvement strategies. Previous studies suggested that the addition of compost can mitigate poor roadside soils and improve plant establishment on roadsides. Moreover, tilling the soil – or breaking up the ground – can reduce soil compaction and further improve soil conditions. The researchers hypothesized that compost and tillage would improve plant establishment and combining the two treatments would provide even more benefits. The team also compiled a list of ornamental plants, shrubs and other perennials that could possibly withstand conditions along Michigan’s freeways.

Testing began in fall 2018 at two sloped roadside locations along Interstate 696 near

Detroit. The research team divided each site into separate plots to evaluate how composting, tilling, doing both and doing neither affected the survival rates of 32 types of plants. Researchers also applied a pre-emergent chemical to each of the plots to inhibit weed growth.

Over the course of two years, the team collected rainfall measurements and temperature readings and continually evaluated the growth, health and development of the surviving plants. Soil sampling provided insight into the types and amounts of nutrients present and available to the plants, as well as the density of the soil in each plot.

## **RESULTS**

As the researchers had expected, the plots that had been treated with compost were more hospitable, with lower acidity levels that resulted in taller plants and greater ground coverage. The team was surprised, however, to discover that tilling the sites prior to planting made relatively little difference in the plants’ growth. Plant choice also proved to be a critical factor: shrubs generally survived best, while some herbaceous perennials and grasses were noted for consistently faring poorly.

Through their tests, the team developed a new manual to guide plant selection and site preparation practices, as well as a list of varieties that can be grown reliably along sloped roadsides.

## **VALUE**

The researchers noted that future research studies could investigate whether chemical fertilizers can be applied to achieve the same results as compost, and what effect the direction of the slope face has on plant growth and survival.

With new plant selection guidelines and site preparation and installation standards in hand, MDOT is better positioned to systematically increase the value of its sloped freeway roadsides. Moreover, less time and

money spent on mowing and maintaining these sloped green spaces means urban roadsides will be more sustainable, offer more environmental benefits and increase safety for maintenance crews and motorists alike.

## **Research Administration**

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