



# Project Summary

Texas Department of Transportation

## 0-5330: Synthesis of New Methods and Techniques for Developing Sustainable Roadside Landscapes

### *Background*

Urban centers such as Houston, Dallas-Fort Worth, San Antonio, and Austin will continue to lead the nation in population growth. At the same time, water resources and air quality attainment levels are being stressed and will continue to concern city and state agencies. Many local, state, and federal agencies, as well as the private sector, have similar concerns about the protection and conservation of natural resources and are implementing new methods and approaches to achieve successful landscape development while conserving water and energy.

Environmentally beneficial landscape development entails utilizing techniques that complement and enhance the local environment while minimizing the adverse effects of development. Specifically, this includes using regionally native plants and employing landscaping practices and technologies that conserve water and energy inputs, and also reduce pollution. The maintenance of the right-of-way landscape is often constrained by state budgets. The ideal landscape planting for the highway roadside is one in which plant materials reach a state of maturity with minimal maintenance, with only an overall minimal long-term management scheme.

Several Texas Department of Transportation (TxDOT) districts have developed innovative landscape efforts focused on establishing sustainable landscapes that require little if any supplemental water and utilize no chemical fertilizers. The concept behind this approach is that as land use intensifies, surface water runoff increases and the soil's ability to absorb runoff decreases. Intensified land use is a common situation in the urban environment and highlights the need for creative alternatives that can help reduce water runoff and increase groundwater infiltration. These objectives can be accomplished by utilizing the fundamental environmental processes that are the basis for self-sustaining and self-sufficient plant communities which flourish on their own outside the right-of-way. The Austin District first attempted this approach in 1993. Since then the Houston District has advanced this technique and greatly improved its success rate by experimenting with major soil modifications as part of the large-scale highway plantings and vegetation re-establishment on construction projects.

### *What the Researchers Did*

This project investigated alternative management practices by the public and private sectors for possible application to urban landscape projects for TxDOT, identifying the issues resulting in successful and less-than-successful low-energy landscaping projects. The research team conducted a thorough investigation into current technologies, processes, and products that may be suitable for use in establishing improved vegetation through soil restoration.

### *Research Performed by:*

Texas A&M University - Kingsville (TAMUK)  
Texas Transportation Institute (TTI),  
The Texas A&M University System

### **Research Supervisor:**

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### **Project Completed:**

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Other departments of transportation (DOTs), commercial developers, corporate campuses, and agencies have employed environmentally friendly practices suited for the development of large-scale projects. Practices, products, and procedures were identified that were most likely to result in successful roadside landscape development while recognizing and providing for the general diversity required by the vast climatic and vegetative ranges found in Texas.

## *What They Found*

The major factors for the achievement of successful roadside landscape do appear to be similar to those established for agricultural production operations. Soils must have moisture retention capabilities, the ability to slowly release nutrients, some erosion control, and the ability to protect nearby water supplies — but in the case of the roadside landscape, vistas must also be aesthetically pleasing. With some reasonable progress in all of these categories, it appears that a successful and sustainable roadside landscape is very achievable. The addition of organic amendments offers advantages in the form of slower, timed-release nutrients over synthetic quick-release fertilizers or amendments. Organic amendments can present less risk for runoff pollution and over-fertilization of new plants. However, many of the amendments and techniques examined, while successful in small projects, do not appear to be practical for large-scale roadside landscapes.

## *What This Means*

TxDOT project managers are actively seeking and implementing more sustainable and less energy-intensive landscapes through organic amendments and soil conditioning techniques. A major problem encountered in large-scale utilization of organic amendments is the quantity and packaging of the products. Many of the products have proven beneficial and desirable for use on the highly disturbed right-of-way soils; however, the small size of distribution packaging of many products precludes their practical use in the large scale of roadside projects.

As with many other DOTs, TxDOT has discovered that sustainable landscapes are becoming a necessity. TxDOT already has used almost 2 million cubic yards of compost in its construction and maintenance activities over the last several years. Other organic amendments and additives may need to have the same demonstration and implementation evaluations as compost materials have had for the past several years. The Houston, Dallas, and Austin Districts have implemented many of the organic amendment techniques with success. Questions and concerns remain in terms of the longevity of applications and actual reduction of cost associated with the maintenance of the amended landscaped area.

### *For More Information:*

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