# Project Summary

Texas Department of Transportation

# 0-5309: Develop Guidance for Selecting and Cost-Effective Application of Temporary Erosion Control Methods

## Background

In order to maintain federal regulatory compliance and ensure that the most effective erosion control products are used on its construction and maintenance projects, the Texas Department of Transportation (TxDOT) bases material selection on an Approved Product List (APL). This APL is based on field performance of the products through a formal evaluation program at the TxDOT/Texas Transportation Institute (TTI) Hydraulics, Sedimentation, and Erosion Control Laboratory (HSECL). The two critical performance factors identified are:

- how well the product reduces sediment loss; and
- how well it establishes vegetation.

## What the Researchers Did

While sediment reduction and vegetation establishment are critical to erosion control performance, they do not consider longevity and materials cost. Furthermore, there are potentially less expensive erosion control techniques (crimped or tacked hay/straw, compost, slope tracking, mulch, and soil binders) that have not previously been included in the approval process. This project examined available performance and cost data of these non-manufactured techniques in terms of cost, sediment loss prevention, and vegetation establishment. This project also looked at the cost of current products on the APL in terms of costs for the material, installation, maintenance, repair, and effectiveness, and developed a cost-performance index (CPI). The objective of the overall effort was to provide guidance for selecting the most cost-effective erosion control materials and methods.

## What They Found

Longevity plays a role in product price. Typically, the products that offer the longest protection cost more than those offering short or temporary protection. Synthetic products are the most expensive, yet they offer long-term or permanent protection. Products with biodegradable netting tend to sell for a higher price among products with the same longevity. Mulch products compose the lowest price group.

Price does not always correlate to initial soil protection performance in slope erosion control. For example, blankets composed of natural products do not perform on clay soils as well as composite products despite their higher price. Environmental compatibility and soil protection performance have contradictive values in this case.


## Research Performed by:

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**Project Completed:**
8-31-06

This finding could indicate that permanent synthetic products may not justify their higher price on clay soils, as some permanent synthetic products did not pass the clay slope test at the HSECL. This failure may be caused by the fact that clay soils produce much less soil sediment than sandy soil surfaces or that some permanent synthetic products fail to protect the clay soil. This situation would indicate that end-users may not have to use the most expensive products for slope protection on clay soil. However, permanent synthetic products and mulch products perform well on sandy soil slopes.

Channel protection products are required to be more durable and last longer than slope products since they are used to protect vegetation from concentrated channel flows rather than sheet flows. As mentioned earlier, prices are affected by longevity, but research indicates there is a small difference in price, especially between permanent products and long-term products. Since the use of natural materials does not affect the price of channel protection products, this small variation indicates that performance is the primary factor (over environmental compatibility) for channel protection. Research indicates that channel protection products with longer longevity continue to offer performance protection at higher shear stresses.

In selecting an erosion control product, there are three levels of expectation:

1. soil loss will decrease by using more durable products;
2. more durable products are more expensive; and
3. expensive products are expected to perform better than inexpensive products.

The soil loss data could not satisfy expectations 1 and 3 although durability and price are positively correlated. This may be because the soil loss data do not reflect performance changes over time.

By applying the concept of product longevity to the soil loss data, this project calculated the lifetime product performance that estimates the total soil amount protected by the product over time. The lifetime performance shows a good correlation with price in both slope and channel products. It satisfies the concept that current market prices will represent product performance.

Many of the less expensive, non-manufactured erosion control techniques proved to be effective practices for sediment loss and vegetation establishment. Refer to the final project report for test results (0-5309-1).

## What This Means

The results of this project will provide TxDOT with specific information necessary to determine the cost-effectiveness of various erosion control products and methods (both old and new) which could result in a significant cost savings while improving compliance with federal storm water regulations.

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