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TEXAS CONNECTS WATERSHED PROTECTION AND EROSION THROUGH COMPOST

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Abstract: Erosion control is an important issue that the Texas Department of Transportation (TxDOT) must address on every construction and maintenance project. As topsoil sources have become depleted over the years, it has been observed that the most basic part of revegetation, a 4-inch topsoil seedbed, is actually soil with little or no organic material necessary to sustain plant growth. This has led to severe erosion on many projects. The consequences for failing to effectively control erosion are very costly. In addition to potential fines by the Environmental Protection Agency (EPA), repeated efforts to revegetate erosion-prone areas also increases the cost of projects. Erosion is costly and time-consuming from every aspect. If erosion occurs while the project is still under contract, the contractor must reapply topsoil, seed, fertilizer, and mulch and/or erosion control blankets. If erosion occurs on existing sections of highway, maintenance personnel are left to deal with the resulting problems which include re-working the soil and re-seeding, none of which they have the time or money to complete adequately.

TxDOT searched for an alternative method and quickly saw the benefits of utilizing compost as an erosion-control tool. The compost alternative, which is comparable in cost to the topsoil method, provides a more effective solution to the erosion problem by adding organic matter to poor soils as a soil amendment so that revegetation can occur. Erosion is avoided and TxDOT saves time and money that would have been expended for repeated topsoil applications where growth failed to occur.

In addition, highway construction practices have been viewed as potential contributors of nonpoint source pollution that is caused primarily by sediment runoff from improperly maintained or vegetated construction sites. Previous studies have shown that compost, a recycled material, can alleviate this problem by providing a barrier between rainfall and surface soil to dissipate the impact of rainfall and reduce erosion.

Project Objective

TxDOT partnered with the Texas Commission on Environmental Quality (TCEQ) to focus on the research, development and implementation of an effective compost program. Recycled material, in the form of compost, is used to prevent erosion and reduce maintenance requirements of the state's right of ways — thus providing environmental, economic and performance benefits. Using compost has resulted in solving regional environmental problems and receipt of the largest Clean Water Act grant ever awarded by the EPA.

Methodology

TxDOT has taken several initiatives to incorporate the compost program into the methods used in construction and maintenance. Through the combined efforts with the TCEQ, TxDOT has become one of the first state DOTs with official specifications regarding the use of compost. Special Specification Item 1027, *Furnishing and Placing Compost*, was approved in January 1998. (This specification has recently been revised and will appear as Standard Specification Item 161, *Compost* in the 2003-specification book.) In September of 2001, an additional compost specification was approved. Special Specification Item 1034, *Mulch/Compost Filter Berm for Erosion and Sedimentation Control* specifies filter berms made of compost and/or mulch. This alternative to traditional methods, such as silt fencing or hay bales, has proved to be extremely effective in filtering water runoff while still retaining sediment. Since every construction project must utilize a method to prevent silt from leaving the site with water runoff, this new technique allows districts to make even more use of compost.



Compost Filter Berm Installation



Berm after 3 weeks

Quite recently a new method has been utilized which takes the concept of the compost filter berm one step farther. *Temporary Erosion Control Devices* describes a compost tube or log which is made by blowing compost into a fabric mesh tube. This device, intended for use in low flow ditches and to intercept sheet flow, is quite

heavy; it does not need to be staked. This makes it an obvious choice for filtering sediment and trash away from newly constructed storm drains where stakes for silt fence cannot be installed or driven through concrete. And since the material is contained in the mesh fabric, the device can be easily moved to accommodate day to day construction work in specific areas. After the project is complete, the mesh is simply split open, and the compost is left on site to further amend the soil.



In addition to these specifications, TxDOT and TCEQ have worked together to coordinate numerous workshops and demonstrations for districts and contractors, whereby personnel can observe the effectiveness of the material over time. The workshops give an overview of the specification, the effectiveness of the material, the categories of compost outlined, and instruction on inspecting the material. The workshops and demonstrations have afforded TxDOT personnel, municipal personnel, and the contracting industry, a first-hand opportunity to observe the erosion control benefits of compost. As local municipalities see the potential TxDOT market for compost, they see that compost production can indeed be a viable alternative to landfilling this important organic resource, all of which are having a noticeable effect on the implementation of the program.

State of Texas Compost Incentive Program

The TCEQ has been working to establish methods to deal with water pollution issues in the Bosque/Leon River watershed in North Texas, an area that is highly populated with dairy farms. With 110,000 dairy cows generating approximately 440,000 cubic yards of manure each year, the previously used methods of land-applying manure have been overused and the nutrient runoff has caused severe downstream water pollution in the cities of Waco and Temple/Belton. Even though TCEQ had spent years trying to convince the dairy farmers to compost the waste, the fact remained that the area lacked a local market for compost and the cost for sending it to an outside market was cost prohibitive.

Through combined efforts from both the TCEQ and TxDOT, an EPA grant, known as the State of Texas Compost Incentive Program, was approved in September 2000. This program, the largest Clean Water Act grant awarded by the EPA, provides \$1 million dollars to be used as incentives to seven eligible TxDOT districts that fall within a 150-mile radius of the watershed. If districts use compost from the abundant resources available in the Bosque/Leon River watershed area, they qualify for a \$5/cubic yard rebate incentive that effectively covers freight costs. In exchange, TxDOT agreed to purchase a minimum of 200,000 cubic yards of composted dairy manure over a three-year period. Contractors are directed to purchase compost from one of seven approved suppliers in the affected watershed.

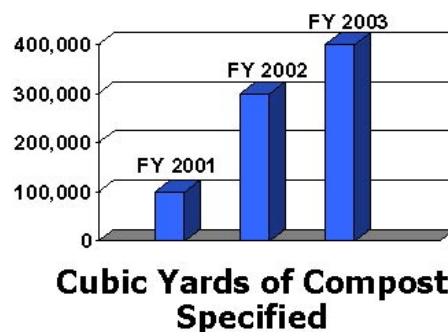
The incentive program has proved successful, exceeding all expectations. District support has been overwhelming. Several district engineers in the eligible districts have directed their staff to include compost on all construction projects involving the addition of topsoil. Seven compost suppliers are participating in the program, giving contractors more than one source for material, and contractors are pleased with the material, realizing that the benefits can save them time and money.

Summary of Findings and Their Implications

As workshops and demonstrations are completed, and quality results are seen from various demonstration projects, the use by districts continues to increase. Soon after the program began, TxDOT specified over 100,000 cubic yards of compost in FY 2001. In FY '02, that figure surpassed 300,000 cubic yards. And in FY '03, TxDOT specified over 411,000 cubic yards of compost.

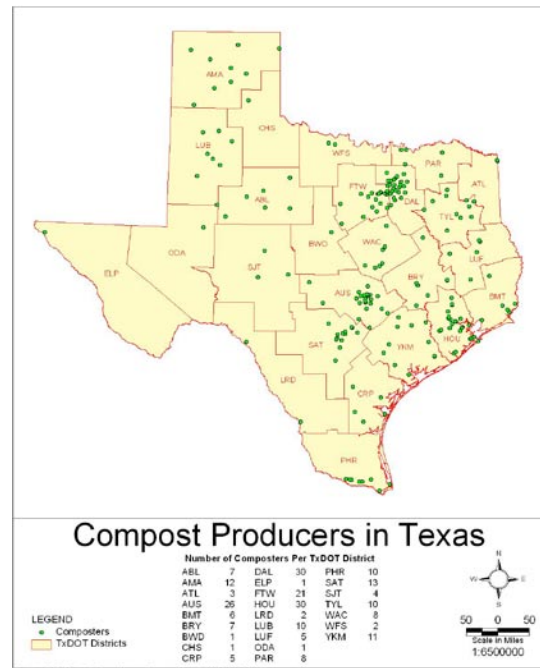
The economic impact of compost has affected both TxDOT and the compost industry. The economic benefits to TxDOT are many:

- Results show that a slope with compost application is much more likely to establish grass quickly and not erode.
- Because compost holds moisture, there is less need for vegetative watering thus saving money.



- TxDOT saves money immediately by being able to remove barricades and let the contractor proceed with the next phase of construction.
- Most projects involve at least a portion of the job that must be reseeded before TxDOT can accept it. Five percent of the project payment is held back until sufficient grass growth occurs. If erosion results because everything washed away, TxDOT pays the contractor to do it over again until vegetation is established.
- Future maintenance dollars are saved in avoidance. Those dollars can be spent on the road instead of on repairing slope failures in the future.

Thus, the cost effectiveness of using compost is seen in terms of the long-range impact and savings. Other intangible economic benefits are associated with clean water issues. The impetus of the EPA program is to clean up the impacted watershed upstream of Lake Waco. Through composting methods, the volume of raw manure produced by dairy farms in North Texas, is reduced by approximately 50 percent. Economic benefits lie in considering the price for cleaning the water of this heavily polluted drinking water source.



Implications for Future Policy Development

TxDOT and TCEQ have laid the groundwork for the use of compost well into the future. By establishing and demonstrating effective methods for application, and bringing together viable compost manufacturers and information to educate users about the qualities and benefits of compost, these organizations have paved the way for compost use in districts throughout the state as well as other state DOTs. This effort was most recently recognized with the American Association of State Highway and Transportation Officials (AASHTO) 2002 President's Award.

Before TxDOT's promotion and use of compost, many municipalities were "thinking" of getting into the compost business. TCEQ was doing its best to urge the cities to compost their organic waste instead of burying it in the landfills. But the municipalities had no large market for their products. Because of the TxDOT and TCEQ effort, several cities in Texas are now actively composting and selling their product for top dollar. By working together, TxDOT and TCEQ are helping to improve water quality, while at the same time establishing vegetation quickly, and reducing erosion on Texas highway projects.

Biographical Sketch: Barrie Cogburn began her career with the Texas Department of Transportation (TxDOT) in 1986 as the district landscape architect for the Austin District office. In 1994, she joined the Design Division of TxDOT where she coordinates landscape design and enhancement review for seven districts and manages the Keep Texas Beautiful, Governor's Community Achievement Awards Program.

Four years ago she began a partnership with the Texas Commission on Environmental Quality (TCEQ) to focus on the research, development and implementation of utilizing compost as an effective erosion control alternative in highway construction and maintenance. This partnership effort has resulted in one of the most progressive compost utilization programs in the country and includes the largest Clean Water Act grant ever awarded by the EPA. Most recently, the effort was awarded the 2002 American Association of State Highway and Transportation Officials President's Award.

Barrie received her bachelor of science in landscape architecture from Texas A&M University in 1983 and is a registered Landscape Architect. She is an active member of Executive Women in State Government and currently serves as Vice President. She is also a member of the Professional Advisory Committee for the Department of Landscape Architecture at Texas A&M University.

