

Case Study – TriNet[®] Recyclex[®] Shoreline Solution

Introduction

For nearly 30 years, residents of Altus, OK had discussed upgrading and modernizing the reservoir that had served as the emergency water supply for both the Town of Altus and the Altus Air Force Base since 1910. In May of 2023, their visions started becoming reality as construction commenced. The reservoir (see Figure 1) holds 140 surface acres (56.7 ha) of water, which is approximately 45.6 million gallons $(1.73_E^8 L)$. With approximately 2 miles of shoreline that encounters frequent wave action, a permanent, low-maintenance erosion control solution was required.



Figure 1: Aerial photo of the Altus Reservoir prior to construction (source: AltusOk.gov).

Project Scope

The purpose of the Altus Reservoir project was to transform the area into a city park and create a focal point for the city. The park would also serve as an easy access point for fishermen and outdoor enthusiasts to launch boats and canoes (see Figure 2).



Figure 2: Artist's rendering of the vision for the Altus Reservoir Project (source: www.AltusOK.gov).

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Challenges

In its role as an emergency water supply, the reservoir's waterline had to be precisely maintained. The risk of wave-action erosion near the reservoir's shoreline necessitated quick, effective establishment of vegetation. Engineers sought a design that would withstand the erosive forces and be both low-maintenance and aesthetically pleasing. This was especially important at the transition points of the Best Management Practices (BMPs).

The Plan: Selection of Turf Reinforcement Mat (TRM) and Hard Armor Solution

Originally, the project engineer had specified a nylonbased turf reinforcement mat (TRM) to provide slope protection above the hard armor installation at the reservoir's waterline. However, nylon-based TRMs have a specific gravity of less than 1 and float in water. The poly (Recyclex[®]) fibers used in American Excelsior Company's TriNet[®] Recyclex[®] TRM (see Figures 3 and 4) have a specific gravity of greater than 1 and do not float. Crimped Recyclex fibers also interlock with one another and to the soil which creates an intimate connection with the subgrade, allowing for ease of establishing root reinforcement through the TRM.

TriNet Recyclex fibers are made from 100% postconsumer recycled poly goods (i.e., soda bottles), and approximately 18 bottles are diverted from landfills for every pound produced. After comparing the nylonbased TRM to the poly-based TriNet Recyclex, it was determined that the features and benefits of TriNet Recyclex exceeded the project's design requirements while at the same time providing significant cost savings over the other TRM.

An appropriate hard armor solution would provide wave action protection at the waterline and serve as a drivable surface for launching boats and canoes. Flexamat[®], a Motz Enterprises (Cincinnati, OH) product composed of a concrete block-integrated geogrid, fulfilled these requirements.



Figure 3: Three-dimensional rendering of TriNet Recyclex.



Figure 4: Close-up image of TriNet Recyclex.

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Executing the Plan

Proper installation of specified BMPs is key to the success of any project. The following steps highlight some of the key installation processes specific to this project.

Step 1: Site Grading and Preparation

First, the entire area of the Altus Reservoir lake (west of the reservoir's dam) was drained, and the bottom was cleared and re-graded. Then, the shoreline was graded in preparation for the TriNet Recyclex TRM and hard armor installations (see Figures 5 and 6).



Figure 5: Southwest-facing view of the Altus Reservoir lake's shoreline after being drained and re-graded.



Figure 6: East-facing view of the Altus Reservoir lake's shoreline after being drained and re-graded.

Step 2: Hard Armor Installation

After the area had been inspected to ensure that satisfactory grading conditions were present, the Flexamat was rolled out and anchored to the subgrade with 18" rebar staples (see Figures 7 and 8).



Figure 7: East-facing view of Flexamat hard armor installation after anchoring.



Figure 8: Southwest-facing view of Flexamat hard armor installation after anchoring.

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Step 3: Vegetated Soil Fill Installation with TriNet Recyclex

TriNet Recyclex was chosen to provide root reinforcement for the overlying Bermuda sod on the slopes above the Flexamat hard armor. After the area had been inspected to ensure that satisfactory grading conditions were present, TriNet Recyclex was rolled out horizontally across the width of the slope, trenched in under the Flexamat at the shoreline, and anchored to the subgrade with sod staples (see Figures 9 and 10). Either two or three 8.0 ft (2.4 m) roll widths of TriNet Recyclex were used to fully cover the shoreline slope areas; rolls were overlapped 6" on all sides, and each overlap was secured with a row of sod staples. Soil filling the TRM and installing Bermuda sod on top followed (see Figures 11 and 12). Finally, the entire installation was watered to spur vegetative root growth as quickly as possible.



Figure 9: East-facing view of TriNet Recyclex after being anchored to the subgrade.



Figure 10: West-facing view of TriNet Recyclex after being anchored to the subgrade.



Figure 11: Soil infill installed on top of the TriNet Recyclex.



Figure 12: In-progress Bermuda sod installation on top of the soil-filled TriNet Recyclex.

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Results

The vegetated soil fill TRM and hard armor solution provided a clean, finished look to the reservoir's shoreline (see Figures 13 and 14) that will protect the area against erosive forces for years to come.



Figure 13: Southwest-facing view of the vegetated TriNet Recyclex TRM-Flexamat installation on the Altus Reservoir lake's shoreline.



Figure 14: East-facing view of the vegetated TriNet Recyclex TRM-Flexamat installation on the Altus Reservoir lake's shoreline.

Next Steps

City personnel will routinely maintain the site, and areas behind the shoreline will be continually improved with the addition of park infrastructure.

A special thank you goes out to Triangular Silt Dike Company (Luther, OK) for being instrumental in this project's design and BMP supply elements along with the project engineers and laborers for making the installation a success. Contact American Excelsior Company regarding questions about this article or for more information at: ccs@americanexcelsior.com.

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