

MSE STRUCTURE SUPPORTS HIGHWAY LOS ALAMOS, NEW MEXICO, USA

SOIL REINFORCEMENT RETAINING WALLS

Product: Terramesh®, Gabions, Reno Mattresses®, Gabion Mats®, Paralink®

Problem

The Cerro Grande fire of 2000 destroyed vegetation which resulted in dramatic increases in stormwater run-off in the canyons surrounding Los Alamos; only 2% of the watershed area was not burned. The increased flows through Pueblo Canyon were carried by an 86" diameter storm drain which transported the flow beneath Diamond Drive. Hydraulic modeling indicated that under these increased flows, a 1 in 100 year storm would **overtop** Diamond Drive, which stands some 140' above the invert of the storm drain. It was calculated that a 12' diameter tunnel would be required to accommodate these flows. In addition, debris basins, silt traps, culverts, and channelling works would be necessary to control the flows. Mechanically Stabilized Earth (MSE) and retaining structures would be constructed to retain and reinstate highways washed out during storm events.



Detail of Paralink® sandwiched beneath Terramesh® unit (unfilled)

Solution

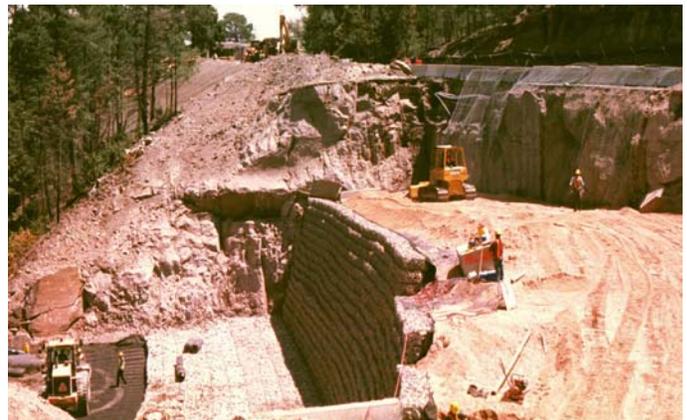
URS Corporation designed the solutions with assistance from Maccaferri's technical department. The project consisted of;

Three MSE and Gabion structures: Max. 36' high MSE structures using Paralink® and Terramesh® soil reinforcement geogrids, with a 9' high gabion wall above, supporting North Road

Retaining walls: Terraced gabion walls of 30' total height (12', 12' and 6') supporting Diamond Drive.

Channeling works and sediment / debris traps: Gabions, Gabion mats® and wire enclosed rip-rap were used to form drop structures and channel linings to control the flow and prevent sediment and debris from damaging downstream structures.

The MSE structures incorporated different varieties of geogrid within the design; Terramesh®, a steel woven wire mesh geogrid used as secondary reinforcement; and Paralink®, a polyester geogrid with a tough polypropylene protective sheathing used as primary reinforcement. Paralink® strengths of up to 55,000 lb/ft (800 kN/m) were used on this project. Structural backfill was compacted in layers upon the reinforcing geogrids as the embankment was constructed.



Compacting structural backfill onto the Paralink® and Terramesh®

Client:

LOS ALAMOS COUNTY, NM

Main contractor:

TWIN MOUNTAIN INC. ALBUQUERQUE, NM

Designer:

URS CORPORATION INC.

Product used:

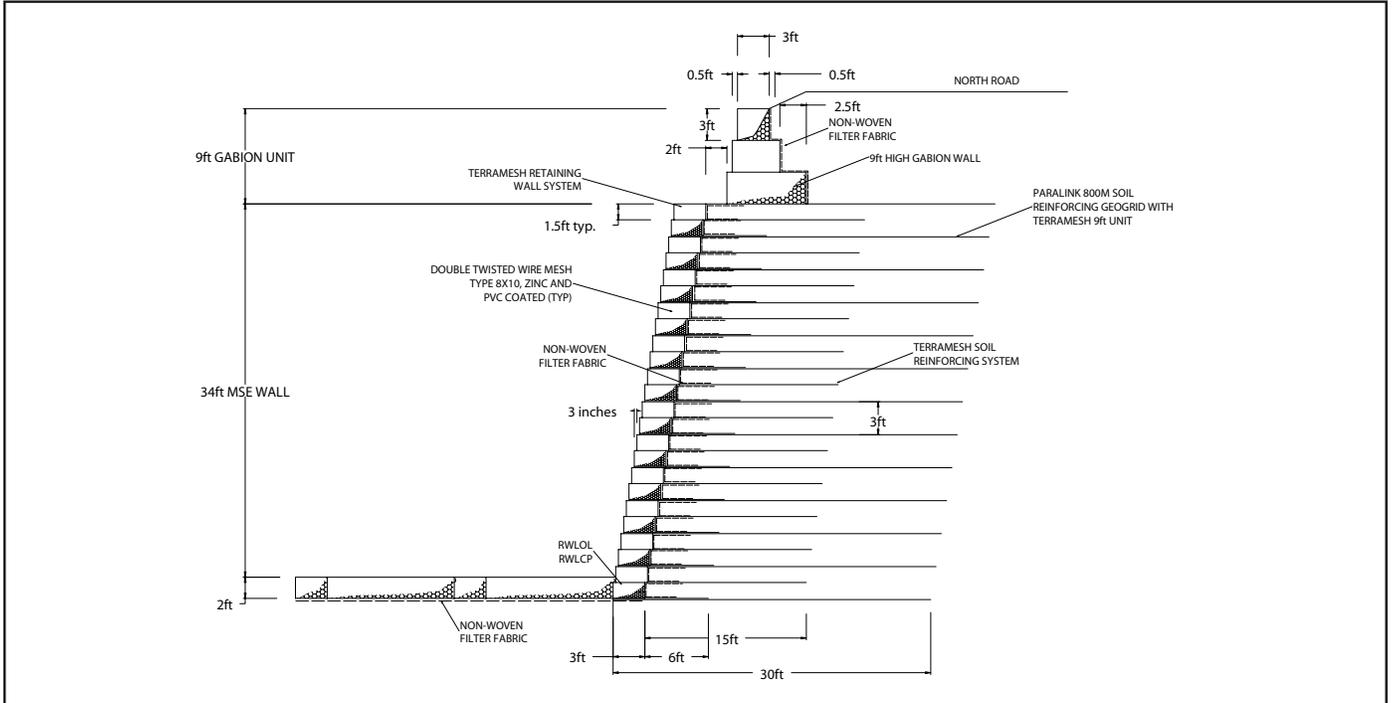
TERRAMESH®, GABIONS, GABION MATS®
RENO MATTRESS®, PARALINK®, MACTEX®

Date of building:

MAY - NOVEMBER 2003



Gabion and Gabion mat® revetment, and debris basin



Typical cross section through MSE structure using 56,000 lb/ft Paralink®

The MSE structures not only retained North Road, but also provided erosion control and training works for the river channel at the foot of the structures. Terramesh® structures can accommodate large differential settlements without sustaining damage. This is a crucial capability in channeling works, where erosion can cause settlement.

In August 2003, during construction, a storm event brought large amounts of debris downstream including trees and rocks measuring up to 5 feet in diameter. Following this event, areas of the channel lining protection were 'shotcreted' to offer additional impact protection from debris.



36' high MSE structure supporting North Road

The debris basins utilized 6' high gabion weirs with concrete crests to contain the debris. These basins were lined with Gabion mats® which offer very high water flow shear resistance. It is estimated that the Pueblo Canyon debris basin will fill at a rate of 1600 tons of debris per year, and the North Road basin at 200 t/yr. A maintenance commitment has been implemented to empty the traps periodically.

This project illustrates the destructive power of water, and the extreme conditions that can be caused when forest fires destroy vegetation. As vegetation re-establishes itself within the canyons, the storm water flows will decrease. However, due to the growing conditions in Pueblo Canyon, complete revegetation is forecasted to take at least 50 years.



Example of debris (on top of Gabion Mat®) following storm

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