HYDRAULIC & EROSION CONTROL
Product: GALVANIZED RENO MATTRESSES

Introduction and Problem

The small town of Wardensville, West Virginia, sits in the Appalachian Valley near the Virginia border. The town’s 120,000 gal/day wastewater treatment plant (WWTP), which houses two 3.4 acre lagoons, was damaged in 1985 when Hurricane Juan delivered the worst flooding in state history. Four additional storms added to the damage for this town of 300 and threatened the safety of the WWTP operations. After each flood, the dikes surrounding the lagoons had been repaired, but not with what were considered permanent fixes. Both the Federal Emergency Management Agency (FEMA) and the state issued directives to require more permanent protection of Wardensville’s WWTP.

After numerous small repairs and 25 years after Hurricane Juan, the town combined $1.6 million in funding from several sources to conduct a full-scale WWTP upgrade. As part of the site’s critical erosion control protection, Reno Mattresses from Maccaferri were specified.

Solution

Attempts had been previously made to increase the WWTP lagoon protection. For example, the town proposed to raise the dikes four feet in 2005, but the project stalled, in part, because more than 20,000 cubic yards of special fill would have been needed. Wardensville is situated in an archeologically sensitive zone, which places increased pressure on soil excavation care and limits the amount of replacement fill that can be harvested locally. An economical quantity of suitable fill just wasn’t located close enough.

The problem of available fill resources brought Gabions into consideration. Reno Mattresses, a type of Gabion, are durable, steel-mesh structures that lock rock into place to create flexible, but secure erosion controlling planes that allow for vegetation establishment.
Similar to riprap, which had been frequently installed on the slopes of the WWTP, Reno Mattresses provide a hard surface with pockets, allowing sediment and seed to become trapped, promoting vegetation. Unlike riprap, which is trucked in, Reno Mattresses utilize locally available stone. Water also flows through the Reno Mattress, so no additional structural elements are needed.

For Wardensville, this proved to be exactly what was needed for establishing economical, long-term erosion control and security for the lagoon dikes and for getting this project, 25 years in the making, in motion.

The decision was also in line with solutions utilized by the Army Corp of Engineers in the region’s floodwater zones. Gabions and Reno Mattresses have, in many cases, been used for their flexibility and use or reuse of local materials.

Per discussions with the contractor, Maccaferri was able to manufacture two special sizes of Reno Mattresses: 99’x6’x6” and 33’x6’x6”. The Reno Mattresses were easy to unroll, fill and lock into place quickly and with a minimum number of connections. This meant that special labor was not required. The Spenax pneumatic tool and Spenax rings helped make the installation smoother.

Six inches of topsoil was carved back from the dikes, the Reno Mattresses were placed, and a combination of manual and machine methods were used for the stone placement. Site topsoil was reused and applied; tall fescue seed was then applied with a tractor. With the Reno Mattresses protecting the upper slopes and crown of the dikes, Wardensville finally had a long-term design.

The strength of the Reno Mattresses rests in their double-twisted hexagonal mesh of steel wire, which is reinforced by selvedges of heavier wire running along the edges. The wire will not unravel, even if cut, which helps protect the baskets against vandalism or extreme, unplanned impacts. With the base section divided into compartments that restrict the movement of stone, which is filled on site, the structure holds strongly and vegetation settles in.

The Wardensville project has shown that sort of performance. Re-vegetation strategies were employed, and along the Reno Mattress protected slopes, grass has grown thickly. Vegetation is expected to grow beyond the Gabions, as it has at other sites. The Gabions will continue to function, exactly as designed.
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<thead>
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<th>TOWN OF WARDENSVILLE</th>
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<tr>
<td>Main Contractor</td>
<td>Snyder Environmental</td>
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<td>2,026 CUBIC YARDS OF GALVANIZED RENO MATTRESSES</td>
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