EROSION CONTROL
Product: MacMat R

The spring of 2011 was the wettest in 117 years of record in the Ohio River watershed. This rare flooding event damaged the Evansville, Indiana Levee System leading to 3000 feet of wave wash erosion of the levee embankment. Maccaferri worked with the U.S. Army Corps of Engineers to develop a vegetative solution utilizing MacMat R that would replace the original riprap design.

Problem
Flooding began in portions of the Ohio River basin as early as February 2011, and extended through May of the same year. The excessively wet pattern caused numerous flood events on faster responding tributaries, while building two primary flood peaks along the slower responding mainstem Ohio River. The Ohio River first crested in March, then began rising again in April before cresting again in early May.

Evansville Levee System was damaged along the Ohio River and Pigeon Creek resulting from flood events during the Spring of 2011. The Evansville Levee incurred approximately 3000 feet of wave wash erosion of the levee embankment along most of the riverfront of Knight Township (Ohio River) Section from Sta. 382+53 to 417+14 and two flap gates suffered internal structural damage at the Delaware Pump Station.

Client:
U.S. ARMY CORPS OF ENGINEERS (USACE)

Main Contractor:

Designer:
MORLEY AND ASSOCIATES INC

Products used:
MACMAT R

Date of Construction:
NOVEMBER 2011
Solution
To counter balance the eroded area the original proposal was to excavate a foot below the wave wash zone and bench, and re-compact low permeability soils back into the levee in this area. This was intended to reestablish the as-built levee to a 3.0H:1.0V slope in the lower portion and place a 6-inch granular bedding under about 12-18 inches of riprap for a 4 ft vertical area. This would also involve a toe trench to be filled with riprap to support the upper riprap placement.

With the most recent flood event being higher than the proposed repair zone, USACE wanted to look at alternate technical proposals using unconventional products for use in the permanent repair of levee and extend this protection to within 2 feet of the top of the levee. The idea was to reduce or even eliminate riprap in the current contract.

Morley and Associates Inc, was awarded the design contract for the Knight Township Levee Wave Wash repair project. While working closely with Morley and USACE, Maccaferri proposed several alternative solutions for vegetative slope protection.

The project design engineers and USACE selected a solution using MacMat R that could provide an effective cost-benefit and provide conditions for reestablishing vegetation on the riverside levee slope. The three-dimensional polymer matrix of MacMat R protects the seed and root system while the steel wire mesh reinforces the slope fascia and protect against shallow surficial slope failure. Figure 4 shows the selected alternative using MacMat R.

Product Spotlight - MacMat R
MacMat R is a reinforced geomat made from a three-dimensional matrix of UV stabilized, non-degradable synthetic fibers, heat bonded at the junction, and extruded on a hexagonal double-twisted wire mesh (see figure 5). The reinforcing hexagonal double-twisted steel wire mesh exceeds the mechanical characteristics outlined in ASTM A975. The steel wire used in manufacturing mesh is heavily galvanized and also polymer coated for greater protection.
MacMat R is commonly used on soil slopes exposed to hydraulic erosion. MacMat R mitigate the soil surface erosion by:

- Providing immediate protection of exposed areas from direct effects of wind and rainfall impact
- Protecting seeded topsoil from washing out before vegetation has established
- Creating an environment that enhances the growth of vegetation through the mat
- Reinforcing the root system of plants, further binding the soil surface and increasing shear resistance of the surface
- Reducing the velocity and volume of run-off flow by increasing water percolation into the soil

The overall design has met the project requirements of wave wash protection and vegetation reestablishment. The photo below illustrates how the levee riverside bank has reestablished the natural look and complete recovery of the levee slope. This indicates that a solution that provides both slope protection and natural look is a successful alternative for applications like this.