

CULVERT AND SLOPE PROTECTION WASHINGTON COUNTY, MARYLAND, USA

CULVERTS

Product: Gabions and MacMat® R

Problem

For nearly 100 years after its completion in 1828, the C & O Canal carried goods and travelers between Washington DC and Cumberland in Western Maryland.

Today the C & O Canal National Park manages and maintains the 184.5 mile canal.

In January 1996, flood waters and snow melt carried by the adjacent Potomac River, caused extensive flooding along most of the C & O Canal. Around the historic culverts 183 and 184, the flooding eroded the surrounding banks, washing away trees and vegetation and exposed the bare soil. The headwalls were deteriorating, and a solution was needed to retain the highway and maintain the visual appearance of the stone wall.

Solution

C & O Canal engineers designed a solution with the assistance of Maccaferri, to control the water flow through the area. The solution consisted of;

- Gabion wing wall retaining structures to guide the channel flow through the culvert
- Gabion revetment works above the culvert as it passed beneath the highway
- Gabion channel training works to reduce erosion where the flow changed direction

Maccaferri double twist mesh gabions offer significant advantages over other more traditional solutions;

- Cost effective to install requiring non-specialized labor and equipment
- Free draining, thereby limiting the build up of pore water pressure
- Able to revegetate and become part of the landscape
- High capacity erosion protection
- Flexible enough to accommodate large differential settlements if necessary

Client:

C & O CANAL NATIONAL PARK

Main contractor:

C & O CANAL NATIONAL PARK CONSTRUCTION CREWS

Consultant:

C & O CANAL ENGINEERING DEPARTMENT

Product used:

GABIONS, MACMAT® R8P

Date of building:

NOVEMBER 1997



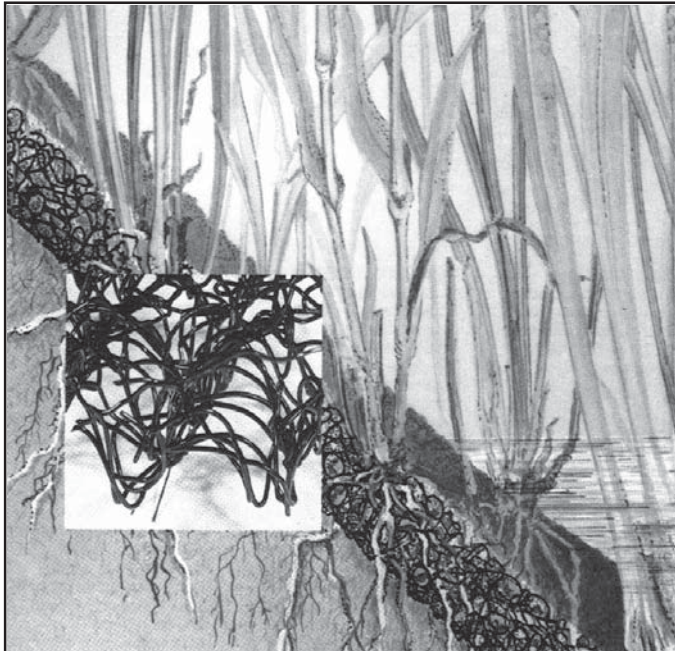
Excavation of existing rubble wall, ready to receive gabions



Gabion headwall and MacMat® R installed



Gabion training works and MacMat® R TRM installed



Typical cross section showing vegetation growth through MacMat® R

A geotextile was placed behind the gabions to prevent the wash-out of fine materials through the gabions under flow conditions. This is good engineering practice when using gabions in water environments.

Where erosion of the channel banks had exposed bare soil, a high performance non-degradable Turf Reinforcement Mat (TRM) was selected to protect the banks and provide an environment for rapid re-vegetation. The flooding had proved that the vegetation alone was not sufficient to protect the channel banks, as it had been washed away. A biodegradable mat was therefore not acceptable.

Maccaferri MacMat® R was chosen to meet this demanding application as its steel woven mesh reinforcement enhances the shear resistance of the TRM.

The photos taken in 2003 show the wealth of vegetation that has established within the TRM on the banks of the channel. The shear resistance of the channel has been substantially improved by the presence of the TRM.

The historic culvert has been protected for the future enjoyment of visitors to the C & O Canal National Park.



Gabions used successfully for culvert repair works



Revegetation established in MacMat® R next to gabion training works



Vegetation established on channel banks

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