

DURABLE GABION RETAINING STRUCTURE FALLS ROAD, BALTIMORE, MD, USA

RIVER BANK PROTECTION

Product: Gabions

Problem

In June 1972, Tropical Storm Agnes came ashore along the Florida Panhandle. As it moved slowly up the eastern United States it gained strength to become a Category 1 hurricane. The 1000 mile wide depression stalled over eastern Pennsylvania. The extreme rainfall quickly caused peak watercourse discharges in excess of 100 year events, which have still not been exceeded. Water run-off was made worse as the ground had already been saturated by rain in the weeks before the hurricane.

Falls Road in Baltimore, MD runs parallel to I83 - Jones Falls Expressway. In one location, Falls Road had been washed-out by the swollen river flowing adjacent to it. A robust, economic and free-draining retaining structure was required to reinstate the highway, and protect it for the future. The structure would also have to direct the river around a curve.

Solution

City of Baltimore engineers and Maccaferri Inc, designed a gabion retaining structure with a maximum height of 27ft. (8.2m). Maccaferri double twisted woven steel wire mesh gabion baskets form permeable, monolithic and flexible structures. The woven mesh allows these gabions to accommodate large differential settlements without rupturing or unzipping. Although the gabion wall could accept these large settlements, the highway above could not. Therefore the gabion wall was designed with a 3ft (0.9m) thick mass concrete foundation.

As the wall was to be in close proximity to the water course, PVC coated gabion units were specified (In 1974, the PVC offered by Maccaferri Inc. was black in color).

Specialist gabion installation contractor Gabion Construction Inc., began the installation by diverting the river to construct the concrete foundation. This project also saw the use of early geotextiles placed behind the gabion structure. The woven polypropylene textile was used to limit wash out of fine material from behind the gabion wall.

Installation of the gabions proceeded at an average rate of 16 CUY (12m³) per man per day.

Client:

CITY OF BALTIMORE

Main contractor:

GABION CONSTRUCTION INC., MD

Designer:

CITY OF BALTIMORE

Products used:

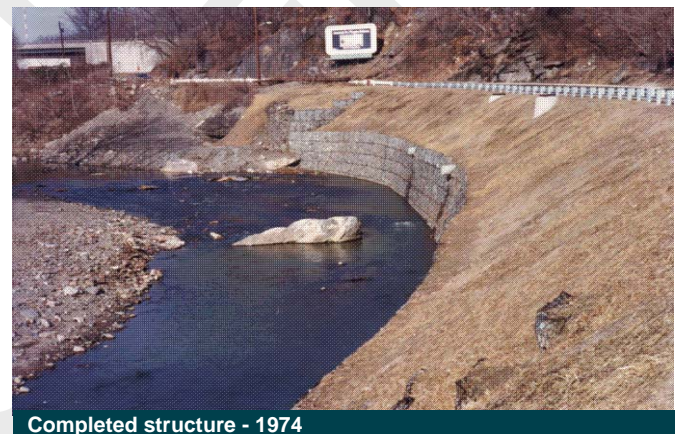
GABIONS

Date of construction

JULY-SEPTEMBER 1974



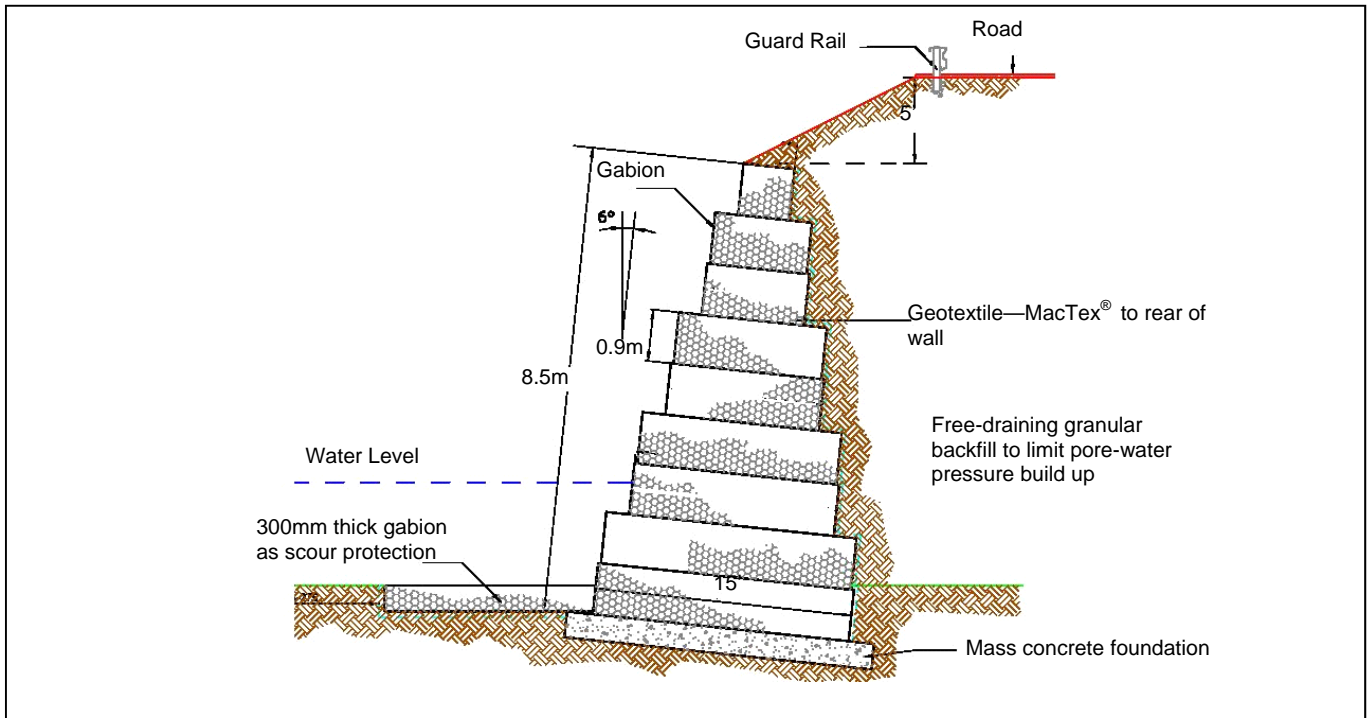
Before construction - 1974



Completed structure - 1974



Completed structure - 1985



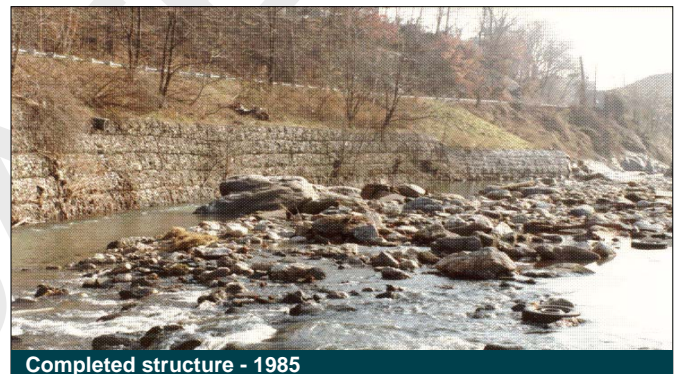
Typical cross section

During construction in 1974, roadway drain pipes were punched through the face of the gabion wall to outfall into the watercourse. The woven gabions were easily shaped on-site to accommodate these pipes.

Gabion units were installed as an anti-scour 'apron' at the toe of the retaining wall to prevent erosion undermining the wall.

In 2004, 30 years later, Maccaferri revisited the gabion retaining wall. Samples of the PVC coated mesh were taken. Laboratory tests were carried out on the zinc coating left on the steel under the PVC, and the residual properties of the PVC after 30 years of UV and abrasion exposure.

The results were excellent. Only 35% of the initial properties of the PVC had been lost, and the amount of zinc remaining was still superior to the minimum requirement of the project specification. By comparing the 35% loss in PVC properties to recent reference results from accelerated heat aging laboratory tests, the structure has a life expectancy of around 60 years.



Completed structure - 1985



Completed structure - 2004

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