

**MUDDY RIVER, COOPER STREET BRIDGE**  
MOAPA VALLEY, NV, USA

**HYDRAULIC WORKS**

**Product:** Gabions, Gabion Mattress, MacTex® Non-woven Geotextiles

**Problem**

Moapa Valley in Nevada has had a history of flooding and severe storms since the early 1900's. Discharges over 8,000cfs (225m<sup>3</sup>/s) that cause damage to rail road structures are a common occurrence.

In 1938 the largest general flood for the Muddy River basin was recorded with peak discharges as high as 15,000cfs (425m<sup>3</sup>/s).

Aware of the ongoing flooding which had continued over the years, Clark County Regional Flood Control District and Clark County Public Works commenced a flood control plan.

**Solution**

Project engineering firm, GC Wallace Inc. (GCW), designed the Muddy River to Cooper Street Bridge rehabilitation project. This project was the first phase of a much larger plan for river widening to mitigate the flooding along the Muddy River.

The project entailed widening of the Muddy River as a flood control measure to contain the storm flows within the channel cross section and away from urban infrastructure which was affected when the river swelled during storm events. A pinch-point existed where the Muddy River flowed through low culverts beneath the Cooper Street crossing. In this location the flow accelerated, increasing the erosive shear forces on the channel banks and bed.

The Cooper Street Muddy River crossing was a low water crossing with the river going under the roadway through concrete box culverts during normal flow. During higher flows following heavy rain, the river flowed over the roadway, causing disruption.

The existing river was very narrow and lined with heavy vegetation which was cleared to enable the new armoured channel to be installed.

The channel lining selected depended upon the shear resistance required and the duration of the storm flows that would be expected over the design life of the works.

To the upstream of the bridge, a Gabion Mattress lined channel, 360ft (110m) long was detailed, which connected to a concrete lined channel to take the flow under the new bridge.

Client:

CLARK COUNTY REG. FLOOD CONTROL DISTRICT

Main contractor:

MEADOW VALLEY CONTRACTORS, LAS VEGAS NV

Designer:

G.C. WALLACE ENGINEERING, LAS VEGAS NV

Products used:

GABION, GABION MATTRESS, MACTEX® GEOTEXTILES

Date of construction

Aug 2015



Downstream view of the gabion mattress lined channel



Gabions being filled at cut-off walls



Downstream view of new bridge



Project plan view

The concrete channel transitioned from a trapezoidal section to a rectangular section at the bridge pinch-point, before returning to a trapezoidal channel over a length of around 1,500ft (450m). Gabion Mattresses continued the protection from this point, until traditional rip-rap took over the protection in the low-shear zones.

The Gabion Mattresses were placed over a layer of Type II gravel, which in turn was placed over a MacTex® N47.1A geotextile. The combination of the mattresses, gravel layer and the geotextile provide the overall protection system to the channel banks and bed. The gravel filtration layer is used in high-flow conditions and further reduces the interface velocities underneath the mattress protection. The lower this interface velocity (the residual velocity of the water flow in contact with the ground), the less erosion is caused.

The Gabion Mattresses used were engineered from 8x10 type double twist steel wire mesh. This mesh type is ideal for use in channelling and hydraulic works as the double twist mesh is flexible. It easily conforms to the channel profile and if there is any settlement or unexpected erosion beneath the mattress, it can settle into the new channel profile without cracking or rupturing, unlike other more rigid protection systems. The Gabion Mattress units are heavily galvanised with an additional polymer coating suitable for use in these high-flow physically aggressive environments.

Nearly 6,900cuy (5,275m<sup>3</sup>) of 1.5ft (450mm) thickness Gabion Mattresses were used for the channel linings and 1,300cuy (1,750m<sup>3</sup>) of 910mm thick gabions were used for the cutoff walls at the beginning and transition of the channel and the toe of riprap bank protection.

The new bridge structure was constructed approximately 20ft (6m) above the new concrete channel invert.

*Please note that not all products are available in all countries worldwide. Please contact your local Maccaferri technical office for details.*



Upstream view of new bridge



Flood of 19 October 2015 after completion of project

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