BANK PROTECTION WORKS IN RIVER GANGA AT BUDGE BUDGE KOLKATA, WEST BENGAL, INDIA

Longitudinal Protection

Problem

The Cheviot Group of Companies, (Caledium Jute mill) is located along the River Hooghly, at Budge Budge, Kolkata.

Tidal Bore is a phenomenon which occurs in the estuary zone near sea where the river mouth opening is funnelled into shallow and narrow river sections. Budge Budge is one such location where it occurs.

The intense turbulence and the hydraulic jump, caused as result of the tidal bore had led to damage of the compound wall of the jute mill.

To mitigate this problem, Cheviot Group proposed bank protection works. The anti erosion works were being implemented in a 100 m stretch along the Ganga river along the compound wall of jute mill that was identified as highly affected zone. Construction during the tidal bore is highly challenging and nearly impossible. Maximum height of the tidal bore observed was around 2 m and velocity was 7-10 m/s. Tidal Bore occurs once or twice in a month and extends for a period of 2-6 days, occurring once each day.

Solution

It was important to carryout the construction planning so that the system sustained all the worst loading conditions. The design thickness calculation of the system shall sustain the load imparted from tidal bore and this was to be done during the construction phase. Hence the focus was particularly on embankment protection system using geosystems. The height of the embankment to be protected was approx 6 m and slope 1V:2H. The thickness of system was analysed and considered as approx 3 m.

Geotextile bag (MacBags) filled with sand are commonly adopted as solution for river hydraulics problems. These bags are preferably produced from woven polyester geotextile material. Here, sack gabions lined with geotextile material containment system were filled with dry sand and placed in position. These were used for preparation of foundation base for the structures.

The anti-erosion works carried out during 2014 got submerged under water during the occurrence of the tidal bore. The erosion measures constructed with MacBags, Sack Gabions, DT Mesh Netting, Gabion Mat-tress survived the tidal bore and protected the banks. After the occurrence of the last tidal bore consider-able amount of silt deposit was noted.

Client: Cheviot Company Ltd

Designer / Consultant: Maccaferri Environmental Solutions Pvt Ltd

Contractor: Maccaferri Environmental Solutions Pvt I td

Products used (Qty.)

- MacBag	1.5X0.74-4450no 1X0.7- 15500no
- Sack Gabion	1.5mX0.74m- 4,450 no
- ParaLink	500 sqm
- DT Mesh	1475 sqm
- MacTex N	2250 sqm
- Gabion	4x1x1-200 no 3x2x0.5-180 no

Date of construction: 09/2014 - 12/2014



Photo 1: Existing damaged compound wall



Photo 2: Occurrence of the tidal bore





Photo 3: MacBags placed on the slope





Photo 5: Placement of the gabion mattress



Photo 6: Arranged MacBags



Photo 7: System blend with atmosphere

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