

# Case History: Application of Concrete Mat “TACOM Mat”

Project Title	Environmental Improvement of Shing Mun River – Stage 2
Construction Period	February 2005 – May 2005 (Concrete Mat Installation Period)
Client	Civil Engineering and Development Department
Main Contractor	China Harbour Engineering Company (Group)
Material Supplier	G and E Company Limited.
Product Quantity	1,800 m <sup>2</sup> of TACOM Mat Style Standard Type 150H



## The Introduction

Shing Mun River and its associated nullahs have been polluted by various sources, leading to its classification as a “priority river”. The objective of this project was to treat sediments in order to reduce odour, sediment volume, pollution and toxicity to upgrade the conditions of the river, for future use for recreational activities.

While bio-remediation treatment of over 190,000 m<sup>2</sup> of soft surface sediments and dredging of over 170,000 m<sup>3</sup> of contaminated riverbed material are major tasks, a flexible paving to river embankment toe is needed to discourage the sedimentation and build up of debris. As the tidal level of Shing Mun River varies significantly, the difficult in underwater construction becomes a challenge. An effective and reliable method is sought. A concrete lining was subsequently designed to be placed over existing rip-rap which traps debris and obstructs proper flow.

## The Solution

Concrete mat “TACOM Mat” was recommended. The material is a fabric form of lightweight and strong double layered synthetic fabric in which concrete or cement mortar can be injected of a pre-determined thickness to achieve a concrete structure. TACOM mat has enabled simplicity of work, short program and small section progress with no special equipment and skill needed, all underwater.

## The Concrete Mat System

The system was custom fabricated into panel of 20 m x 3 m according to shop drawings worked out from survey data to fit actual site topography. A uniform 150 mm thickness and shrinkage were properly controlled. Special seams and

diaphragms were factory made to match concreting pressure. Four grouting inlets were prepared for each panel to ensure full grouting. The concrete lining on the northern side is about 280 m long while that on the south is about 320 m long, a total of 25 panels were supplied.



## The Installation

The installation of TACOM MAT is relatively straight forward. Each panel was placed at their location with the upper edge straightened by a bar which is tightened to anchor. The whole panel was temporarily positioned by using a bamboo stick. A special mix has been devised for grouting. Because of site constrain, concrete mix has to be delivered by Bobcat to a portable hopper/pump assembly. A series of pipes were deployed to inject grout through panel outlets. The technique was to fill up one compartment from bottom to top completely before moving to the next outlet. One panel must be completed on the same day. It is important to have TACOM Mat fully grouted. Panels were connected by tie wiring. Movement of the next panel must be allowed during grouting of the adjacent panel which often shrinks when it reached 150 mm thick. The difficulty lied in the lack of underwater visibility and the coordination of withdrawing pipe and grouting speed. In a number of occasions, extra concrete mix was needed to touch up on void space.



## The Materials

TACOM Mat Style Standard Type 150H was selected primarily because of its site precision and fast delivery lead time. The concrete mat is specially designed and manufactured by Taiyo Kogyo Corporation, Japan. Polyester woven fabric was the base fabric material which has tensile strength of 1,470 N / 3 cm in both warp and weft direction. The delivery lead time was 4 weeks including the preparation of shop drawings.

## The Conclusion

While this was basically a practical approach, the overall perception was unsightful. This was partly the lack of proper interfacing with the embankment. The two type of material seems to have gone out of hand. Another drawback was the existence of large boulders outcrop which make laying and grouting impossible without their removal. The overall appearance could have therefore been more neat and tidy. Nevertheless, the purpose of a coverage has been achieved.