

## Renovation of Drainage Channel using Incomat® concrete mattresses – Kaohsiung county, Taiwan



*Finished channel shortly after completion*

### Situation:

Taiwan's south is characterised by a marine tropical climate with seasonal heavy rainfall. The heavy rainfall, in combination with the densely populated area of Kaohsiung County, requires an efficient and reliable rain water drainage system.

The existing system of open rain water drainage channels urgently required renovation due to damage of the existing concrete lining to the slopes and berms, as well as subsequent erosion to the damaged sections. The Local Authorities asked for efficient solutions which were ecologically friendly and incorporated minimal new construction materials. Additionally, the main objective was to improve the aesthetics of the erosion protection along the open channels.

### Solution:

The solution for this demanding project has been provided by Ginseng Engineering, the local partner of HUESKER, in cooperation with the designer Homeway Consult. The solution was an erosion



*Finished channel at high water level just after the Morakot Typhoon hit Taiwan*

protection system manufactured from **Incomat®** concrete mattresses. The **Incomat®** concrete mattress is a double layer woven fabric which can be sewn into panels to fit the site requirements. The resulting **Incomat®** panels are filled with concrete.

### Construction:

The existing slopes of the drainage channel are cleared of debris and the soil is re-graded and compacted. After placing the panels, the **Incomat®** mattress is filled with concrete and thus forms a precisely defined permeable concrete layer.

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For this particular project two different kinds of **Incomat®** have been used. The lower part of the slope has to frequently cope with rising and falling water levels associated with storm surges. Consequently, an appropriate **Incomat®** with filter points and a maximum thickness of 220 mm has been used. The filter points allow the water to flow through the **Incomat®** which enables the relief of porewater pressure in the backfill, associated with the fluctuating water levels. For the upper part of the slope, an open structured **Incomat®** Crib with a maximum thickness of 200 mm has been used. **Incomat®** Crib has a grid like structure with openings which can be vegetated. In this project the mattress was underlain by an additional vegetation supporting layer. As can be seen **Incomat®** Crib provides an aesthetically pleasing finish which blends perfectly into the surrounding environment.



**Incomat®** concrete mattresses have proven to be the ideal material for this project. **Incomat®** provides a cost effective, ecological solution which is simple and quick to install. The advantages that **Incomat®** provided were confirmed by the the Water Resource Bureau of Kaohsiung County, who were the project client.

After just one year, following completion of the first phase of the project, the Morakot Typhoon hit Taiwan in August 2009. The typhoon brought heavy rain fall causing the water table in the drainage channel to rise to its maximum. Even under these extreme climatic conditions the **Incomat®** erosion protection system performed extremely well.



Project location: Shin-Lung Stream, Jen-Wu Hsien, Kaohsiung County, Taiwan

Project owner: Water Resource Bureau, Kaohsiung County

Designer: Homeway Consultant Co.

Contractor: Xie-Shun-Xin Engineering Co. Ltd.

Construction time: Dec. 2007 - July 2008

Products: **Incomat®** FP 220  
**Incomat®** Crib 10.200

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