
Symposium on "Advances in Water Resources Management"

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Innovative Urban Flood Control for Metropolitan Environment

Joseph H.W. Lee

Department of Civil Engineering, The University of Hong Kong, Hong Kong, China

H.W. Tang

College of Hydroelectric Engineering, Hohai University, Nanjing, China

M.T. Chow

Civil Engineering and Development Department, Hong Kong SAR Government,
Hong Kong, China

P.K. Chan and Y.F. Kan

Drainage Services Department, Hong Kong SAR Government, Hong Kong, China

C.P. Kuang

Department of Hydraulic Engineering, Tongji University, Shanghai, China

Abstract:

This project is about technological innovation in urban stormwater management and hydraulic engineering.

Flood protection in densely populated metropolitan districts in Hong Kong face difficult challenges. Significant flash floods resulting from intense rainstorms often inundate streets and shops, present hazards to citizens, and cause great disruption to traffic and economic services. The problem has also been accentuated in recent years by rapid urbanization, coastal reclamation, global climate change, and the rising public expectation for higher protection standards. The stormwater management is complex due to the large spatial and temporal variability of rainfall, tight space constraints, congested traffic conditions and underground utilities.

Two innovative schemes that protect densely populated metropolis from flooding are presented: the Yuen Long Bypass Floodway (YLBF) and the Tai Hang Tung Storage Scheme (THTSS).

The main technological innovations are as follows:

- 1) The YLBF protects the semi-rural Yuen Long town (population 341,000) from flooding by intercepting and diverting the fast flows of upstream rivers away from the town. Through

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advanced physical and mathematical hydraulic modeling of the complicated three-dimensional turbulent flows at supercritical-subcritical river flow junctions, unique diversion and hydraulic jet designs are developed: The YLBF design can simultaneously: (i) divert the required flow; (ii) convey maximum flood within acceptable flood levels; and (iii) optimize flow behaviour within extremely tight space constraints. The YLBF is also constructed as a “green and ecological river” with an engineered wetland that has greatly enhanced the environment of Yuen Long.

- 2) Development of a large-scale underground storm water detention scheme (THTSS) intercepting and temporarily storing the storm water in an underground storage tank beneath a public park in the heart of the city. The complex and sophisticated design of the overflow side weir system and the inlet and outlet structures ensures the correct timing of the spill over and temporary storage of excess storm water for all storm events.

The YLBF and THTSS are unique flood control schemes that have been successfully implemented in highly densely-populated metropolitan environment for the first time in China. Both schemes have been built with minimal public disruption, and won public acclaim. These schemes protect the citizens from flooding hazards, and ensure the smooth running of the economic and social services of our world city. They have brought about great social benefits and serve as useful reference for flood control in metropolitan environments worldwide.