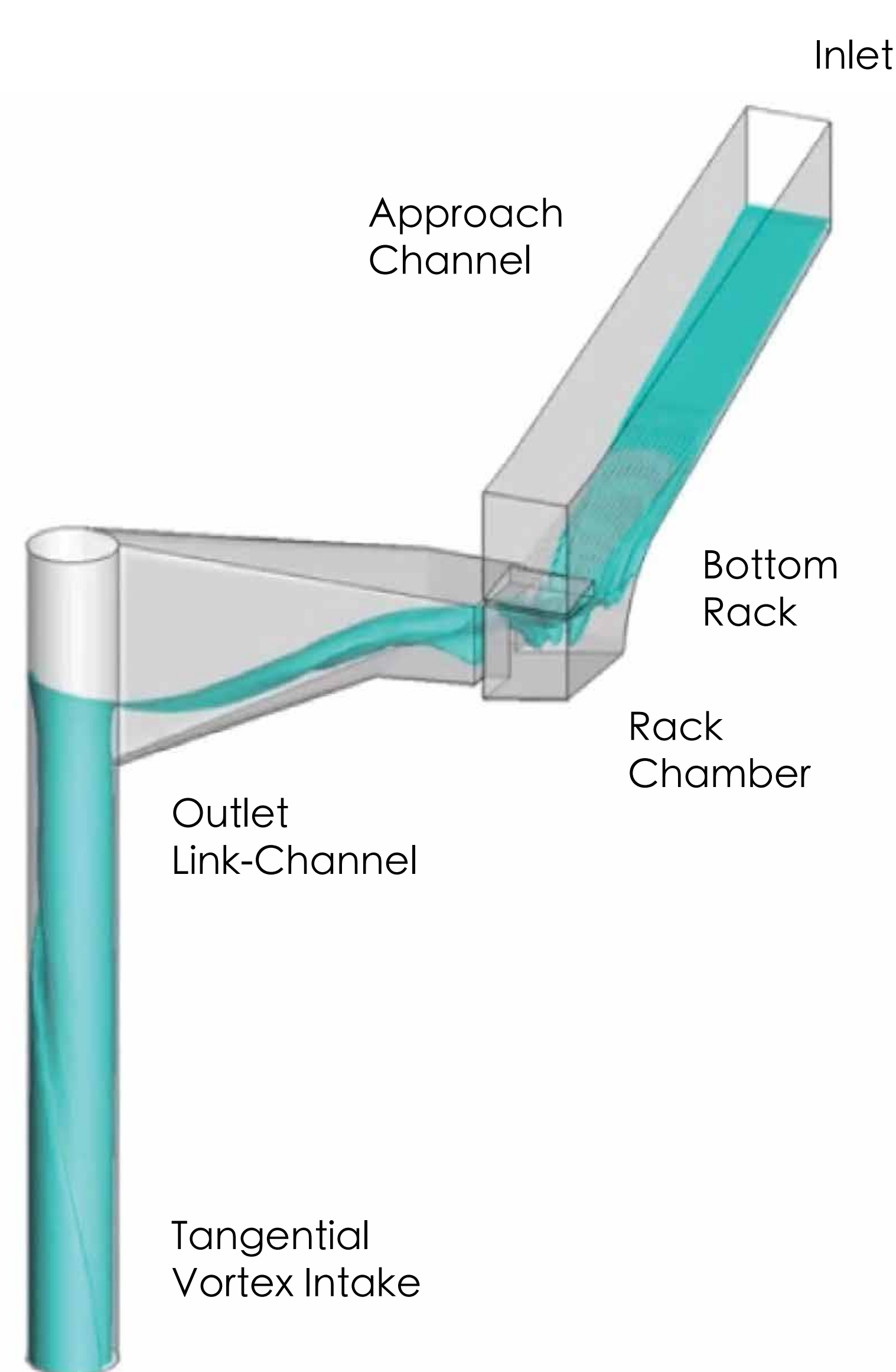




CONSTRUCTION INDUSTRY COUNCIL 建造業議會



Main Tunnel: 10.5 km
Diameter: 6.25 to 7.25 m
34 Intake Structures
Adits between intakes and tunnel: 8 km

First Prize of Construction Sustainability

The Hong Kong University of Science and Technology
Drainage Services Department
Black & Veatch Hong Kong Ltd.
Black & Veatch Ltd. (UK)

Supercritical Vortex Intakes for Urban Stormwater Management

Over the past decades, rapid urbanization and global climate change have resulted in significant increase in flood risks in urban areas of Hong Kong. In early 2000s, Drainage Services Department proposed an innovative “Upstream Interception” scheme, namely The Hong Kong West Drainage Tunnel (HKWDT) to improve the flood protection standard for areas around Causeway Bay, Admiralty, Central and Sheung Wan with a view to relieving the flood risks thereon.

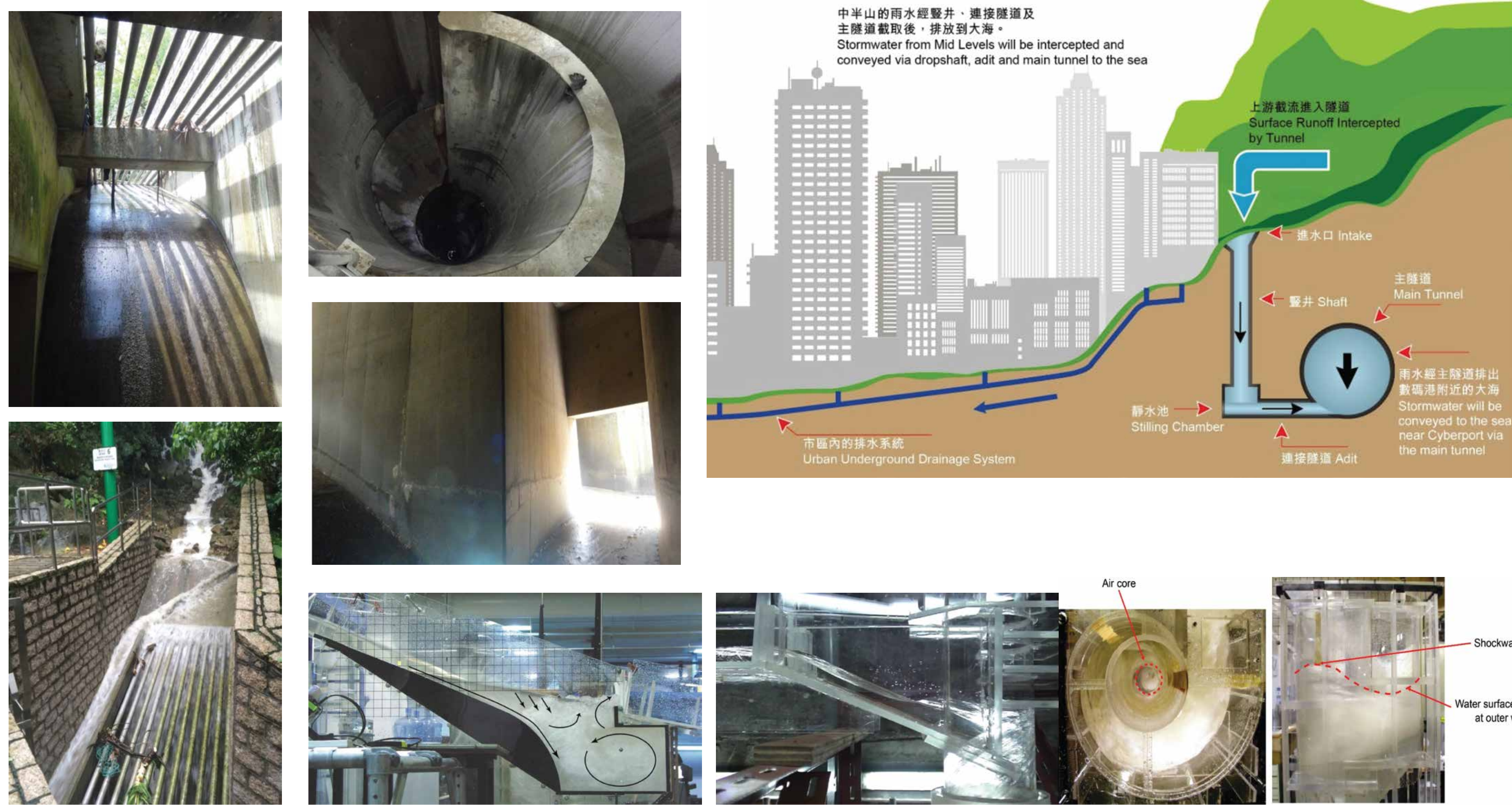
With thorough planning and investigation supported by experimental and theoretical research, HKWDT was successfully completed in 2012. The engineering challenge was how to effectively intercept and transfer the high speed supercritical flow from the steep natural watercourses located in densely populated Mid-Levels district to the drainage tunnel located some 100 m below ground. The breakthrough was the development of a compact bottom rack and vortex intake system that could effectively intercept the supercritical flow in the midst of a range of residential blocks including some premium properties. Through the system, a supercritical flow of up to 18 cubic metres per second can be stably decelerated and diverted, with efficient energy dissipation, and conveyed smoothly from high elevation down to the deep drainage tunnel for discharge to Cyberport.

Since the commissioning of HKWDT, the vortex intake system has been put to the test on many severe rainfall occasions, and has successfully protected the downhill urban areas of Hong Kong Island from flooding. This project was developed through the long-term collaboration among academia, industry and Government with a common goal to benefit the community. This system has set a global standard for reference and has been adopted in many critical hydraulic infrastructure designs internationally.

急流漩渦進水口都市防洪設計

過去數十年，受維港兩岸急速發展和全球氣候變化的影響，香港市區的水浸風險明顯增加。渠務署於二千年初提出一項前瞻性的“上游截流”計劃，透過建造「港島西雨水排放隧道」工程，大幅改善銅鑼灣、金鐘、中環和上環一帶的防洪能力，從而緩減港島市中心的水浸風險。

港島西雨水排放隧道工程透過謹慎籌劃、反覆研究與實驗，於2012年完滿建成。這項工程最具挑戰是如何在陡峭及高度密集的港島半山，有效地截取高速的山澗徑流至位於深入地下100米的雨水隧道。關鍵是團隊研發出在狹窄的空間建造精細的漩渦式進水口系統，這設計能有效地把山上疾衝高達每秒18立方米的激流截取，經漩渦式進水口降低流速從而消耗部分能量，暢順地把徑流由高處帶入雨水隧道，引至數碼港排放。



港島西雨水排放隧道自運作以來已經歷多場暴雨，驗證漩渦式進水口能充分發揮其效能，穩定地截取從山上流下的高速徑流，成功保護港島市中心免受水浸威脅。此精密而創新的設計是學術界、工程界和政府以造福社會作為共同目標所達致的合作成果。漩渦式進水口系統設計亦在國際上奠定了一個新標準，廣泛被採用於多項重要的水力工程。

Project Video

