BOTTOM RACK INTAKE FOR SUPERCRITICAL STORM FLOW DIVERSION ON STEEP URBAN CATCHMENT

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A major surface water drainage scheme is planned for urban flood control in Hong Kong. It involves the construction of a number of intakes to divert the storm flow from steep hillside streams above the urban areas into a deep tunnel system via vortex drop shafts. The supercritical storm flow is diverted through a unique space-saving bottom intake structure that consists of (i) a bottom rack; (ii) the bottom rack chamber and connection to the vortex inlet though a perpendicular link channel; and (iii) a spiral vortex inlet.

A comprehensive hydraulic model study has been conducted to study the complex three-dimensional flow in the bottom intake structure. It is found that the flow interception and stability are dependent on the approach channel slope, bottom rack length and inclination, and most importantly the geometry of the underlying rack chamber. The discharge coefficient of the bottom rack is about 0.4. The optimal design of the bottom rack structure is developed through theoretical considerations and heuristic model experiments.