

Assessment of Performance of Completed Drainage Works Against Designed Performance for Kai Tak Transfer Scheme

Executive Summary

Kai Tak Transfer Scheme (KTTS) is the first drainage tunnel system in Hong Kong and forms an integral part of the West Kowloon Drainage Improvement – Phase 2 works for solving the flooding problem in Mong Kok. KTTS consists of 1.43km long circular tunnel of 4.4m diameter with 6 shafts and 450m long box culvert from Waterloo Road near Hereford Road to the existing Kai Tak Nullah in San Po Kong. KTTS is designed to intercept and transfer about 60% of upstream stormwater flow from the existing decked nullah underneath Waterloo Road in Kowloon Tong to Kai Tak Nullah in San Po Kong.

Physical model test was conducted in the detailed design stage to study the hydraulic behavior of the interception structure of KTTS. A range of discharge from Waterloo Road culvert with values ranging from $5\text{m}^3/\text{s}$ to $65\text{m}^3/\text{s}$ had been tested. Experiment results showed that the flow in the interception structure was highly turbulent and improvement by mean of adding splitter wall, stilling blocks, air vents were constructed accordingly. The result also determined the ultimate discharge capacity under a 50-year return period rainstorm was $40\text{m}^3/\text{s}$. For low flow situation, the flow diverted into the KTTS by the interception structure was about 60-75 percent of the upstream flow.

Flow monitoring was carried out in the wet season from 2007 to 2012, except 2009. As advised by Professor Joseph H W Lee of HKU that the maximum flow diverted from Waterloo Road culvert was only about $5\text{m}^3/\text{s}$ in 2007, it was impossible to conduct useful analysis. As such, a screening criterion of $7.5\text{m}^3/\text{s}$ from Waterloo Road culvert was fixed for selection of rainfall events in the aforementioned flow monitoring period.

Rainfall events on 7 June 2008, 16 June 2011 and 28 June 2011 were selected for analysis. The maximum flows on these dates were $14.88\text{m}^3/\text{s}$, $10.15\text{m}^3/\text{s}$ and $8.84\text{m}^3/\text{s}$ respectively. Flow balance check between the upstream and downstream flows showed consistency. The analysis results showed that despite relatively low flow and small sampling size of the flow data, the percentage of interception by the interception structure was close to the design criterion of 60%.

To conclude, the interception structure was considered capable to divert about 60% of the inflow from Waterloo Road culvert into KTTS as per design. The performance of the scheme is considered satisfactory and no improvement to the structure is considered necessary at this stage.