

## HAPPY VALLEY UNDERGROUND STORMWATER STORAGE SCHEME (HVUSSS), HONG KONG



### Location:

Happy Valley, located in the Wan Chai District of Hong Kong, is a cultural, economic and entertainment center for the city.

### Purpose of Hong Kong's Happy Valley project:

The low-lying Happy Valley area witnesses frequent flooding during heavy rains. The area particularly witnessed extreme flooding in April 2006, August 2006 and June 2008. The stormwater storage tank will alleviate flooding in the area by accommodating a 50-year flood event. Without this project it is estimated that more than 70,000 residents and also more than 2,000 shops will be exposed to a very high risk of flooding.

Upgrades to the existing drainage pipeline system were not sustainable. They presented challenges, including the threat of future weather events and the disruption of construction in the space-starved city. The drainage services department (DSD) of Hong Kong responded with an innovative underground storage solution.

### Environmental and Sustainable Design Considerations:

DSD was striving for a sustainable solution for the flooding problem in Happy Valley.

The concept of underground storage tank with a moveable weir is a new approach to alleviate flooding problems. With our sustainable moveable crest weir system, the size of the storage tank can be minimized. As a result, the construction cost and construction time will also be cut to a reasonable level.

Adjustable Weir System is one of the key design considerations that have been taken into account in the planning and design of the HVUSSS to enhance sustainability and environmental protection.

Project Details	
<b>Project</b>	Happy Valley Underground Stormwater Storage Scheme
<b>Owner</b>	Drainage Services Department (DSD)
<b>Engineering Contractor</b>	Chun Wo Construction and Engineering Company
<b>Contract No.</b>	DC/2012/03
<b>Consultant</b>	Black & Veatch

Adjustable Weir Penstock Details	
<b>Penstock Size</b>	3000 x 2000 mm & 1500 x 1500 mm
<b>Quantity</b>	12 nos & 1 no. respectively
<b>Manufacturer</b>	JASH Engineering Ltd.
<b>Operation</b>	Electrically actuated
<b>MOC</b>	Stainless Steel AISI 316
<b>Client name</b>	ATAL Engineering Ltd, HK



## Role of Jash Adjustable Weir Penstocks at the Happy Valley Site:

The innovative Jash Adjustable Weir Penstocks are facilitated with real-time SCADA-controlled system, that prevent pre-mature or belated filling of the tank, thereby maximizing the effectiveness of the flood storage capacity and allowing a smaller design tank volume. This allows the tank to be invoked at the most optimal time.

As a result, the required tank volume was reduced by 25%, from 80,000 m<sup>3</sup> to 60,000 m<sup>3</sup>. Together with the shallow-depth design, not only this one-third of the stored storm-water could be discharged by gravity, the amount of excavation works was also greatly reduced.



Underground Storage Tank having Capacity 60,000 m<sup>3</sup>.



Gates during installation at site.

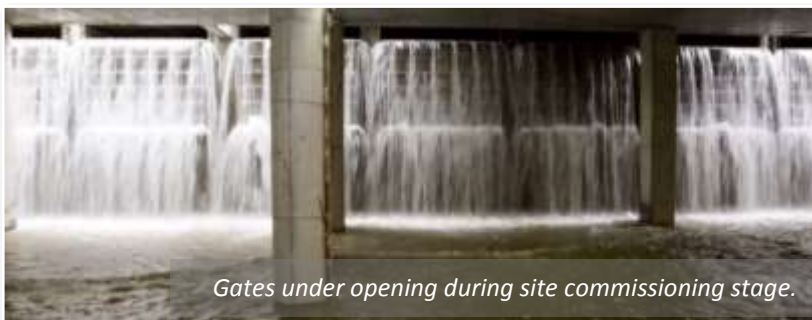
## Engineering Specialty of the Jash Adjustable Weir Penstocks:

As per the DSD specification requirement, these penstocks should be designed such that flow of water should not be obstructed by any part of gate. To meet this requirement Jash has innovatively designed these penstocks such that the tandem operating shafts are coming outside the opening area of the gate.



Gates after installation at site.

During the design of the penstocks, it was observed that the walls between adjacent penstocks was narrow resulting in to the operating arrangement (actuator / gearbox) of weir penstock hitting the operating arrangement mounted on adjacent weir gate. Our design team came out with the solution of providing the actuator drive from the center of the penstock and power transferred to the gearboxes with the help of connecting shaft.



Gates under opening during site commissioning stage.

In order to achieve longer sealing life, Jash has offered these penstocks with HARSATM rigid sealing system on sides and top. This unique integral seal / seat system is certified for 25,000 cycle operation in abrasive condition and reduces the possibility of future seal change. This sealing system offers longevity and necessitates precision in installation to achieve specified leakage criteria.

These Adjustable Weir Penstocks were installed in 2014.

For more details about Happy Valley Stormwater Storage Scheme please follow the link given hereunder:

<https://www.youtube.com/watch?v=Me1T7xDSS1c> (DSD, HK), <https://www.youtube.com/watch?v=q2Unq2cSVGc> (BV, HK)

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