

Tsuen Wan Station CC300 – WEST RAIL (KCRC)

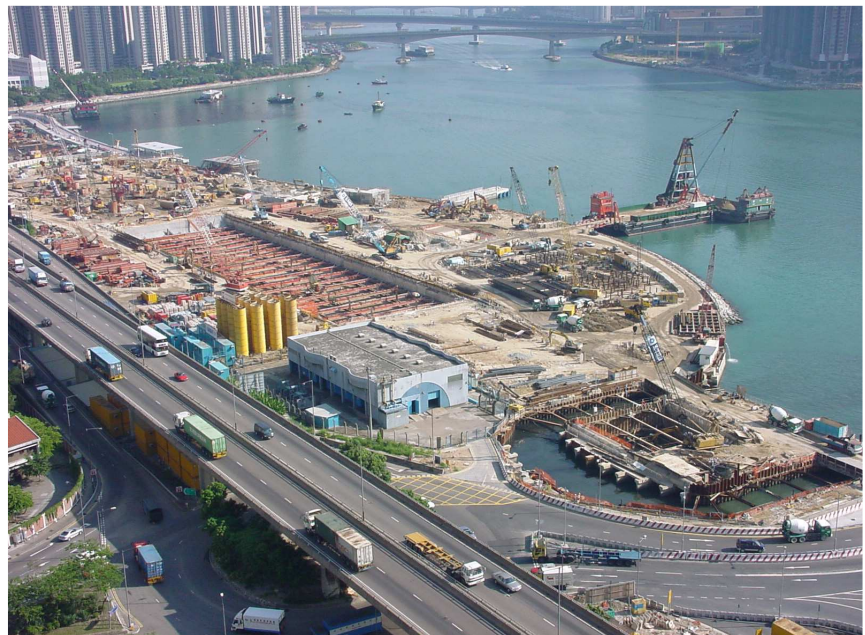
HONG KONG - CHINA

Monitoring of cut & cover station and tunnels built on reclaimed land adjacent to an elevated highway structure

Tsuen Wan Station is a large cut and cover structure built on newly reclaimed land and immediately adjacent to an elevated highway, the Tsuen Wan Bypass.

The deck of the Bypass is pre-stressed whilst the piled foundations of the piers are believed to have been driven to set above the rock head level. The deck of this structure is sensitive to loss of pre-stress from both lateral bending and differential vertical deformation.

Detailed analysis indicated that the structure is sensitive to 4 mm of differential vertical movement or 10 mm of lateral movement.



Tsuen Wan Station under construction

• The Monitoring System

3 CYCLOPS continuously measure these small movements on 300 prisms fixed on the Bypass. A secondary monitoring system consisting of tilt meters and manual survey points was also installed.

The site itself is monitored with 25 in-place inclinometers installed in the Diaphragm walls.



Installation of prism on the bypass



CYCLOPS at Tsuen Wan

• The Results

During construction of the diaphragm wall a negligible settlement or displacement of the piers was measured. Deck deflections of more than 20 mm due to traffic loading were observed as were expansion and contraction of the deck with temperature.

CYCLOPS were themselves subject to daily movements automatically corrected by fixed reference prisms mounted on inverted pendulums.

OWNER :	KCRC
MAIN CONTRACTOR :	PENTA – OCEAN – KIER JV
CONSULTANT :	OVE ARUP & PARTNERS
PROJECT DURATION :	1999 - 2003
SCOPE OF WORKS :	
<ul style="list-style-type: none"> • Real time monitoring of an elevated highway (3 CYCLOPS, 300 prisms). • 4 Inverted pendulums with prism targets for CYCLOPS references. • 30 in-place tiltmeters on bypass and 25 in-place inclinometers in D-walls. And vibrating wire piezometers • Precise levelling. • Alarm, data management and reporting. 	