



# Link Sewer Tunnels Singapore Effect of Tunnelling on Piled Foundations

Asia

## Description of Work

The Link Sewer project in Singapore at Kim Chuan form part of the multi-billion dollar Deep Tunnel Sewerage System in Singapore. The Kim Chuan Link Sewer contract involved a total of some 10 km of sewer lines of varying sizes from 0.3 to 3.0 metres in diameter constructed using both bored tunnel and pipe jacking techniques.

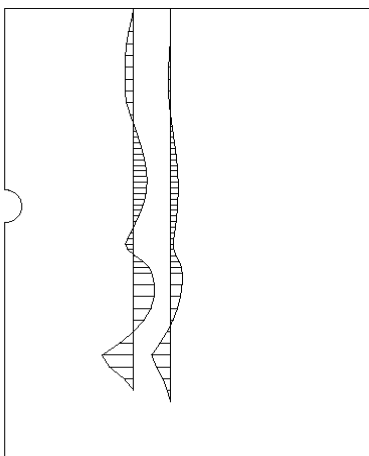
GCG (Asia) Ltd were commissioned to provide expert advice geotechnical support services to Public Works Department (PWD later CPG) of Singapore as part of the engineering design for the Link Sewer Project Package “C”. This work included the production of a geotechnical interpretative report, a tunneling options report, detailed settlement analyses and Contract Drawings and Sections associated with the main tunneling construction contract . The commision included regular visits to site and the provision of geotechnical advice at meetings with the Employer and various Statutory bodies.

GCG (Asia) were also commissioned to carry out numerical modelling to the predict ground movements caused by the tunnelling work and its potential effect on the existing adjacent foundations. Sensitivity analyses were also carried out to investigate the influence of the tunnel relaxation factor, soil stiffness and individual pile/pile group response on the induced lateral movement and bending moment of the existing piles. The modelling resulted in the recommendation of a safe working distance between the tunnel and the existing piled foundations and predictions relating to the maximum deformation/bending moment in adjacent pied foundations.

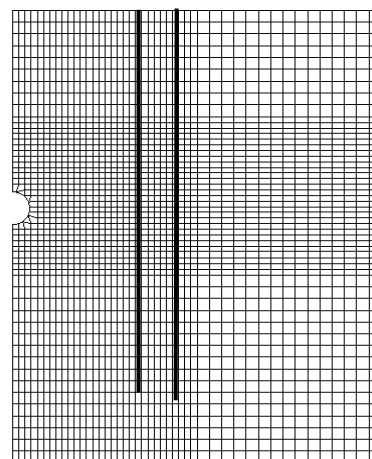
*Client:* PWD Consultants

*Dates:* 2001-2005

*Estimated Project Cost:*  
HK\$ 280 million



**Predicted bending moment of piles**



**FLAC modelling of the effect of tunnelling on piled foundations**