



Asia

# Business Financial Centre, Singapore Residential Tower 2 & Combined Services Tunnel

## Description of Work

Residential Tower 2 is a 66-storey tower with a podium supported on a piled raft directly adjacent to an existing piled service tunnel. The interaction between the two structure foundations governs the tower foundation design. The Singapore regulatory authority has imposed a stringent tunnel movement criterion due to the tower loading, which controls the project feasibility.

Meinhardt Singapore, the structural consultant of the project, commissioned GCG (Asia) Ltd to assess the tower foundation design and to estimate the potential tunnel movements. The ground conditions are 40 m thick soft clay overlying stiff Old Alluvium and Fort Canning Boulder Bed. GCG (Asia) advised on the ground investigation which included field downhole seismic P & S-wave logging tests and advanced laboratory tests on the soil small strain stiffness. GCG (Asia) has derived the soil design parameters for 3D Finite Element and Boundary Element analyses. The analyses have modelled the tower raft, the tunnel structure and all their supporting piles, allowing for a full raft-tunnel-pile-soil interaction. A non-linear stiffness from small strain constitutive model has modelled the stiff soil stress-strain behaviour.

The advanced 3D analyses better predict the structure movements and the mobilised pile geotechnical capacities. The Urban Redevelopment Authority Singapore has approved GCG's assessment, which is an important design milestone.

**Client:** Meinhardt (Singapore) Pte Ltd

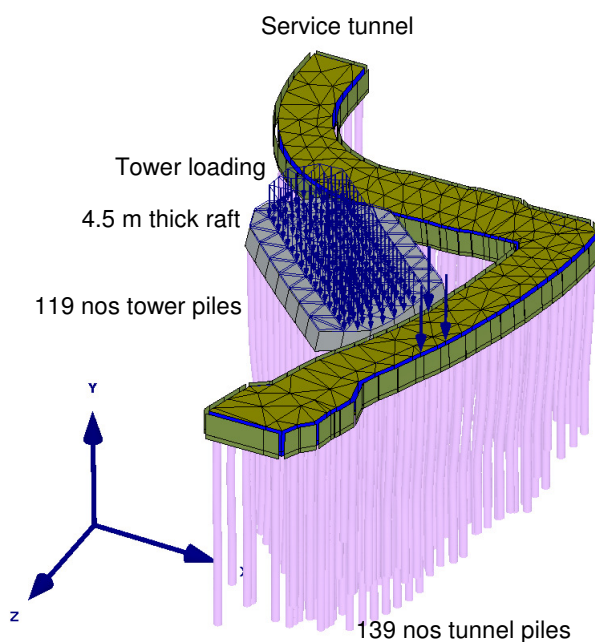
**Date:** 2008 - 2011

**Approximate**

**Project Cost:** Sin\$ 220 million



**Business Financial Centre, Singapore**



**3D Finite Element analysis**