Deep Excavation adjacent to MRTA Tunnels

**BACKGROUND:** A hotel tower was constructed with two basements using cast-in-situ diaphragm wall located 7.8m to 9.6m away from the southbound tunnel of the Mass Rapid Transit Authority. The specified total movement of tunnel induced by excavation must be less than 6.0mm. In order to meet the specified technical requirements for engineering work adjacent to the MRTA structure, control of lateral movement of diaphragm wall to minimum level is necessary.

**SUBSOIL CONDITIONS:**

- Top soil or fill: 0-2.0m
- Soft clay: 2.0-12.0m
- Medium stiff clay: 12.0-15.0m
- Stiff to very stiff clay: 15.0-19.5m
- Medium dense sand: 19.5-22.0m
- Very stiff clay: 22.0-42.5m
- Dense sand: 42.5-50.0m
- Hard clay/silty clay: 50.0-54.0m
- Dense to very dense sand: 54.0-66.0m

**CONSTRUCTION DETAILS:**

- 66 bored piles (1.5m diameter) and 7 barrettes (1.0x3.0m) embedded to –60.0m in dense sand layer.
- Diaphragm walls (0.8m thick, 20m deep) with two level of temporary bracing were used for general excavation to –10.5m.
- Soil improvement (5.5m wide 13.5m deep) with overlapping soil-cement columns (1.10m diameter) along the diaphragm wall adjacent to the tunnel to increase the passive resistance of the soil for basement excavation.
INSTRUMENTATION

- Two inclinometer tubes in the soil: between diaphragm wall trench and tunnel for monitoring the soil movement during diaphragm wall panel construction.
- Five inclinometer tubes in the wall
- Settlement points
- Convergent bolts on tunnel rings

MONITORING RESULTS

Excavation reached to the final depth of about –11.0m.

Exposed soil-cement columns below 2nd bracing layer.

Soil movement indicated by inclinometers during diaphragm wall panel construction.

Diaphragm wall movements with and without soil improvement (I-4 and I-5 respectively).