



Asia

Orchard Turn Development Singapore Investigation into Stability of Barrette Panel Excavations

Description of Work

Orchard Turn is a large retail and commercial development constructed adjacent to and spanning over the Orchard Road MRT station in Singapore. The new development has a deep basement which has a diaphragm cut-off and retaining wall around the perimeter and a number of barrettes which form the foundations for the tower blocks constructed over the development. The diaphragm wall and barrettes were constructed by Bachy Soletance. Although there were no problems constructing the diaphragm wall, during excavation of a group of barrettes in the middle of the site there were four cases where the sides of the barrette excavation collapsed. Bachy Soletanche retained GCG (Asia) to assist in investigating the cause of the collapses and to recommend remedial measures.

The investigation revealed unusually high groundwater pressures in the area of the collapses with evidence of artesian pressure at the rock head 40 m below ground. The high groundwater pressure was unexpected because the adjacent underground station included permanent dewatering which should have resulted in a general reduction in the groundwater level in this area. The ground at the site is completely decomposed granite (CDG) and in the area of the collapses the CDG has a very high silt content with negligible cohesion. As a result of the high silt content the ground has a low permeability and as such the bentonite filter cake developed relatively slowly. The combination of high groundwater pressure and slow filter cake build up resulted in instability of the walls of the excavation. The remedial measure adopted by Bachy Soletance comprised the installation of well points around the perimeter of each barrette panel. The remaining panels were constructed without further collapses.

Client: Bachy Soletance

Date: August 2007

