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Geotechnical Aspects of Soft Ground Tunnelling in Urban Area

Zaw Zaw Aye

Seafco Public Company, Limited, Bangkok, Thailand, zaw@seafco.co.th

ABSTRACT

This paper presents some geotechnical aspects of tunnel construction in soft ground highlighting the M.R.T Chaloem Ratchamongkhon Line, the first underground mass transit system project of Bangkok. Emphasis is made on the methods adopted in prediction of excavation and tunneling induced ground movement and building damage risk-assessment carried out for the Contract No. 1. The measured ground and associated movement of the buildings and structures were within predicted values. All deep excavation works and tunneling were successfully completed without any significant damages to the adjacent buildings and structures. .

PROJECT OVERVIEW

The M.R.T Chaloem Ratchamongkhon Line is the first underground mass transit system project in Bangkok developed by the Mass Rapid Transit Authority (MRTA) of Thailand. Total length of the underground structure is 21.5km, comprises of 16 km of twin single-track bored-tunnel, a total of 4 km long 18 cut- and-cover stations, a twin 1.5km long cut-and-cover approach tunnel to Depot and other associated structures. The project was commenced in late 1996 and opened for the public in 2004. The Contract No. 1, Underground Structure South - southern portion of this initial

system comprising 9 km of twin 6m outside diameter bored tunnels, nine underground stations and cut-and-cover depot approach tunnel, was awarded to the Joint Venture BCKT consisting of Bilfinger + Berger Bauaktiengesellschaft, Ch Karnchang Public Company Limited, Kumagai Gumi Company Limited and Tokyu Construction Company Limited. Figure 1 shows the full length of the Contract No. 1 in simple schematic layout.

One of the major challenges of the Contract No. 1 was the need of stacked-alignment for a major portion of twin bored-tunnel underneath Rama IV road, one of the busiest roads of Bangkok, which called for a stacked configuration at 3 stations, Lumpini, Si Lom and Sam Yan. This requirement led the contractor to design and construct the deepest underground