Report on an evening talk entitled "Ground treatment for double railway track in Northern part of Peninsular Malaysia"

By Ir. Chua Chai Guan

An evening talk entitled "Ground treatment for high speed railway track in Northern part of Peninsular Malaysia" was delivered by Ir. Lee Pier Tien at Tan Sri Ir. Prof. Chin Fung Kee Auditorium on 8 November of 2011. It was attended by about 60 participants.

Ir. Lee first gave an overall picture of the double railway track project by introducing the project location, total length, general cross section, statement of needs and the construction program. He shared that the subsoil typically consisted of various types of soil ranging from soft alluvium deposits to dense residual soil. The thickness of the soft alluvium deposits varies from 15m to 20m with undrained shear strength of 10kPa to 15kPa for the first 3m.

Ir. Lee went further to the details by revealing that the geometrical tolerance of railway track was generally very stringent, especially at high operating speeds. Thus, the foundation of embankment was required to meet the criteria of differential settlement of not more than 10 mm over a chord length of 10m and settlement of not more than 25mm within 6 months after completion. In addition, dynamic effect checks were required for the subgrade of railway track in order to prevent excessive deformation and failures resulting from repetitive axle loads. Ground treatment techniques employed were excavation & replacement (E&R), prefabricated vertical drain (PVD), temporary surcharge, basal reinforcement, stone column and piled embankment. The choice of ground treatment was mainly governed by the technicality compliance and cost consideration, as well as the availability of the treatment techniques.

Some of the highlights were the foundation design at transition areas and the use of sand drain for ground improvement works at low head room areas. Piled embankment with different lengths at transition area was designed to mitigate differential settlement problem between bridge abutment (founded on rigid foundation where settlement is negligible) and embankment area (on no pile area where settlement could be substantial), see Figure 1. The said sand drains were installed using traditional borehole drilling machines. Ir. Lee was satisfied with the performances of these two special designs as the subsequent monitoring results showed that the resultant settlement met the criteria.

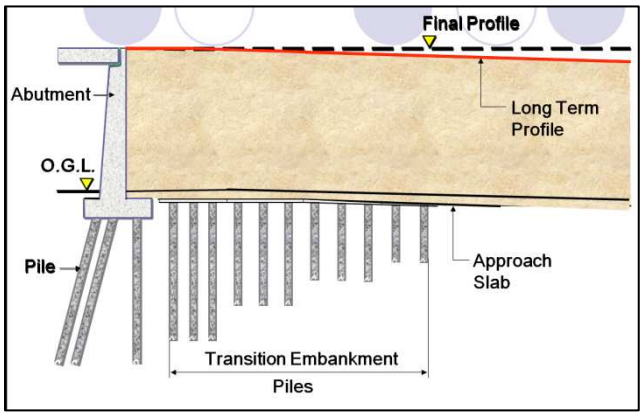

Figure 1: Typical pile configuration at transitional area

Ir. Lee emphasised that the supervision of construction and monitoring on the performance of ground treatment foundation were important as the proposed railway track was built next to an existing live track. Extra care was necessary to ensure the safety of the existing live track. For instance, risk assessment and contingency plan must be in place prior to the commencement of construction works. Displacement markers were frequently used to monitor the lateral movement of the constructed embankment and Matsuo stability diagram was employed as a construction control of embankment on soft ground, see Figure 2.

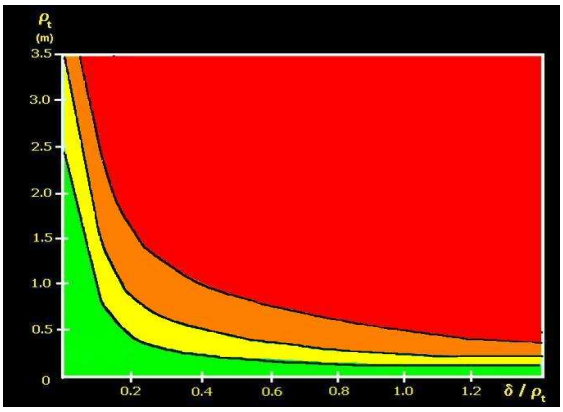

Figure 2: Matsuo diagram for construction control of embankment on soft ground

There was active exchange of opinions between the speaker and audiences during Q&A session. At the end, the speaker, Ir. Lee was thanked with big applause from audiences and presented with a token of appreciation by the organiser.