Technical Talk on "Full Displacement Pile and Cutter Soil Mixing Methods"

GEOTECHNICAL ENGINEERING TECHNICAL DIVISION

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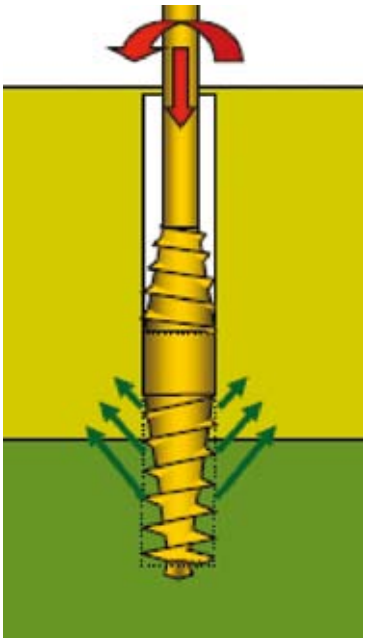
THE talk, held on 26 October 2010 at the Tan Sri Prof. Chin Fung Kee Auditorium, Wisma IEM, was presented by Engr. Franz-Wener Gerressen, Director of Method Development Department of BAUER. His talk covered the definition, advantages, applications and limitations of the "Full Displacement Pile (FDP)" and "Cutter Soil Mixing (CSM)" methods.

(i) CSM is a mixing tool which is very similar to the well-known trench cutter head. It is a combination of the cutter technology with the conventional soil mixing system, but with the cutter rotation around the horizontal axis unlike the conventional soil mixing system with rotation around the vertical axis.

The cutter is driven into the ground at a continuous rate and the soil matrix is broken up by the cutting wheels. Simultaneously, the bentonite-cement slurry is pumped through the nozzles installed between the wheels and mixed with the loosened soil intensively. The penetration speeds of the cutter and the fluid injection are coordinated to form a homogeneous and plastic soil mass.

Two modes of operation system were presented, *i.e.* the single phase system and the two phase system. In the single phase system, cement slurry is injected during the penetration and retraction process. For the two phase system, which is recommended at deeper depths and difficult and dry soil, bentonite slurry is injected during penetration while cement slurry is only injected during retraction. Various applications of CSM were elaborated, including cut off wall, basement retaining wall implanted with H beam, barrett pile foundation, access shaft and for slope stabilisation. The details of the equipment and machinery setup for operation and equipment components were also discussed.

(ii) FDP is a bored and cast in-situ concrete pile whereby the installation is done by advancing a displacement boring tool into the ground with a rotary drilling rig.



This technique is suitable for a wide spectrum of soil conditions ranging from sandy gravel, sand silt and clay, to organic soils, as long as the soil is displaceable with displacement tools. Through the displacement process, the volume of the surrounding soil is being displaced and compacted. This effect results in an improvement in shaft friction and base resistance (in relation to the nominal diameter). The advantages of this technique include less spoils created, low vibration drilling, high daily production and more economical design which can be achieved with the enhanced soil friction and toe bearing through the displacement steps.

The talk concluded with an interactive and vibrant Q&A session. ■