Summary of Decisions of the Structural Engineering Committee
SEC Meeting 1/2019 held on 15.1.2019

Case 4/2019

Issue: Shaft Grouted Large Diameter Bored Piles

Recommendation:

(1) To accept the rational design method for the design of large diameter bored piles using shaft grouted friction in soil:

(a) The ultimate shaft friction resistance in Completely Decomposed Granite (CDG) to be 4.5 x SPT-'N' but limited to 390kPa with a factor of safety of 3. (i.e. allowable shaft friction resistance in CDG to be 1.5 x SPT-'N' but limited to 130kPa.)

(b) The allowable pile capacity of shaft grouted friction for 2m diameter shaft grouted bored piles is 32,650kN for compression and 16,325kN for tension.

(c) The ultimate shaft friction capacity is subject to the satisfactory results of proof loading tests on two proposed trial piles (TP-01 & TP-02). Proof load test would be carried out by using eight numbers of working piles as reaction piles.

(2) To grant the modification to Building (Construction) Regulations 26(5)(a) to permit the spacing between centres of the proposed large diameter bored piles to be less than the minimum requirement of one pile perimeter but subject to a clear pile spacing of not less than 2m.

(3) To allow adopting acceptance criteria for loading test on trial piles which do not follow Code of Practice for Foundations 2017 as below:

(a) Maximum settlement at head of pile does not exceed the value:

$$\frac{PL}{AE} + \frac{D}{50}$$

where

P = 3.0 x allowable pile capacity (W) – Pile self-weight
L = pile length
A = cross sectional area of pile

E = equivalent young's modulus of pile
D = diameter of trial pile
W = allowable pile capacity (based on capacity derived from shaft friction)

(b) Residual settlement at the head of the pile does not exceed the value:

$$\frac{D}{50}$$

Reaction piles for the trial pile test shall be adopted as permanent working piles subject to satisfaction of movement criteria. The trial piles TP-01 & TP-02 will not be adopted as working piles.

Decision: Having noted the background information and arguments together with RSE's supervision and the following clarification/condition, members endorsed the recommendation on a case-by-case basis subject to the following additional conditions:

(1) The site supervision level enhanced by increasing the TCP T3 and T5 site supervision personnel and Directorate Site Supervisor (DSS) under the Registered Geotechnical Engineer's Stream shall be provided for the foundation works and the submission of regular site supervision reports is required to be prepared by The DSS and TCP T5 site supervision personnel under the RGE's Stream;

(2) Detailed procedures including pressure grouting method and post construction verification measures adopted for quality control of the bored pile construction should be submitted. A construction procedure manual should be lodged to BD for record after satisfactory completion of loading tests for the trial piles;

(3) Justification to demonstrate that the piles constructed would penetrate through subsoil layers of sufficient strength with SPT-'N' values not less than those adopted in the design should be provided. Contour plans showing the profiles of various subsoil strata should be prepared from the predrilling records and based on which, RSE should review and reassess the required penetration lengths of the piles in order to ascertain that the actual SPT values are not inferior to the design parameters adopted in the design. Additional pre-drilling boreholes should be instigated at

area where drastic changes of subsoil strata are observed. The assessment report shall be submitted to BD on or before the submission of the Form BA14 for certification of completion of the proposed piling work.

(4) A performance review report on the settlement behavior of the building structure shall be submitted for consideration prior to the application of Occupation Permit.