

Case 32/2018

Issue: Mini-pile grouted in pre-bored holes with post-pressurized grout to take vertical load

Recommendation: To accept the design principle of mini-pile (5 Nos. of Y50 Grade 500B) grouted in pre-bored holes (323mm diameter) with post pressurized grout in Completely Decomposed Granite (CDG) to enhance shaft friction for resisting vertical load, subject to the satisfactory verification by static loading tests on the two trial piles (TP1 and TP2) complying with the acceptance criteria and the following criteria/conditions:

- (1) The ultimate shaft grouted friction in CDG shall not exceed $4.8 \times N$ with a maximum limit of SPT "N" value of 40 (i.e. 192kPa);
- (2) A factor of safety of 3 will be adopted for calculating the allowable shaft friction;
- (3) A detailed quality assurance proposal on grouting works shall be submitted. It shall specify the quality assurance measures adopted in controlling grout pressure, volume and time;
- (4) Trial pressurized grouting will also be carried out during the installation of trial piles. A performance review report of trial pressurized grouting shall be submitted to the satisfaction of the Building Authority upon completion of the trial piles installation;
- (5) For each grout mix, one sample of grout shall be provided from each 10 batches of grout, or every 10m^3 from the amount of grout produce in a day, whichever is the smaller, to determine the crushing strength of the grout. Sample shall be provided not more than 1 hour after the grout has been mixed;
- (6) One trial pile TP2 will be load-tested to 3 times of the working pile capacity; and the other trial pile TP 1 will be load-tested to 2 times of the working pile capacity. The trial piles TP1 and TP2 will be used as working piles;
- (7) A performance review report of trial pile tests shall be

submitted to the satisfaction of the Building Authority upon completion of the static loading tests;

- (8) The minimum cover of the shaft grouted mini-pile should be 50mm and the minimum spacing between the shaft grouted mini-piles should not less than the length of its perimeter. ($3.14 \times 323 = 1017\text{mm}$ adopted.); and
- (9) Site supervision level under RSE's Stream of SSP should be enhanced by increasing the RSE's T5 supervision to Full Time supervision during the post pressurized grouting works.

Decision:

Having noted the background information and arguments together with RSE's supervision and the following clarification/condition, members endorsed the recommendation.

- (1) The site supervision level shall be enhanced by increasing the RSE's T5 and RSC's T4 supervision to full-time supervision during the post-pressurized grouting works; and
- (2) both TP1 & TP2 shall be tested to 3 times of the adopted allowable pile capacity. Trial pile load test for TP1 shall follow that of TP2, i.e. 3 cycles.