

Case 33/2015

Issue: Shaft-grouted Pre-bored H pile using Shaft Friction

Recommendation: To accept the design principle of Steel H pile (305x305x223kg/m Grade S450J0) grouted in pre-bored holes (610mm 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 (specified in paragraph 3) on three trial piles (TP1, TP2 and TP3) for vertical load complying with the following criteria/ conditions:

- (1) The ultimate shaft grout friction in CDG shall not exceed $4.8 \times N$ with a maximum limit of SPT "N" value of 40 (i.e. 192kPa); and the frictional resistance should only be considered where the minimum SPT "N" is greater than 10;
- (2) A factor of safety (FOS) 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) 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;
- (5) Three trial piles, namely TP1, TP2 and TP3, will be load-tested. The first trial pile (TP1) with full length welded stiffeners will be tested to 3 times of the pile working load capacity to verify the empirical formula for the soil parameters. The second trial pile (TP2) and third trial pile (TP3) with an identical working pile details will be tested to 2 times of the working pile compression and tension capacity for performance test respectively and;
- (6) 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.

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

- (1) Sheet pile walls with toe grout curtain surrounding the subject site would be installed prior to commencement of trial piles and reaction piles;

- (2) An assessment report on completed TAM grouting works to confirm meeting the criteria specified for each pile should be submitted and found satisfactory by the Building Authority before carrying out the load test of the trial pile;
- (3) Trial pile for tension load test would be provided;
- (4) TP1 and TP3 should be carried out after the completion and satisfaction of loading test on TP2;
- (5) Shop welds for stiffener plates of TP1 (except for connections between two pile sections) under adequate supervision and examined by welding tests should be provided.