

Foundation Works (Small Diameter Bored Piles)

In giving this approval of plans, I hereby impose the following conditions under item 6 in section 17(1) of the Buildings Ordinance:

- (a) Test installation of pile no.(s) *[please refer to approval letter for details]* should be carried out to verify the design assumptions and control parameters for the safe installation of piles. Prior to the commencement of test installation works, a test boring proposal giving details of the actual boring system to be used on site, operating mechanism of the drill bit, maximum volume of air supply and pressure to be applied in different soil and rock strata, minimum rate of advancement of drill bit, ground and piezometer monitoring arrangement, criteria for satisfactory performance of the boring operation, monitoring procedures for checking the rates of boring operation and any necessary precautionary measures to prevent excessive overbreak or ground loss and undue disturbance to sub-soil should be submitted for consideration. Monitoring of the ground settlement, ground water level and actual boring rate should be provided by site supervision staff from the Registered Structural Engineer's stream full time. The minimum qualifications and experience of the site supervision staff is to be the same as the Technically Competent Person of grade T3, as stipulated in the Code of Practice of Site Supervision 2009. Consent to the commencement and carrying out of the foundation works will not be given until the test boring proposal has been submitted and found satisfactory.

Upon satisfactory completion of test installation, the anticipated rates of advancement of boring operation in different soil and rock strata for the remaining working piles should be evaluated and included in a test installation report which shall be submitted to the Buildings Department for record before commencing to install any other piles. The Buildings Department should be notified of the time and date of the installation so that the test installation may be witnessed by a representative from the Department.

- (b) *Predrilling* – Predrilling at locations in close proximity of the piles should be carried out to better identify the quality of the founding material during construction of the piles and to confirm the appropriate founding levels. The number of predrill boreholes required should be such that the pile tip of every such pile should be within 5 m from a predrill borehole. The predrilling should be sunk to at least 5 m below the tentative founding level of the specified category in accordance with the Code of Practice for Foundations 2017. Standard penetration tests should be carried out at maximum interval of 2m along the predrilling holes from cut-off levels down to 5 m below the tentative founding levels of piles. The records of predrilling works and standard penetration tests should be submitted within 21 days upon completion of the predrilling works and tests.
- (c) Sampling and testing of steel reinforcing bars should be carried out in accordance with CS2:2012. Testing should be carried out by a laboratory* accredited under the Hong Kong Laboratory Accreditation Scheme (HOKLAS)^. Test results@ should be submitted within 60 days of the delivery of the steel reinforcing bars to the site%. The test reports should be appended with a statement signed by the

Registered Structural Engineer to confirm the following:

- (i) All steel reinforcing bars used for the construction and the test specimens covered by the test reports are in accordance with the types and grades of steel shown in the approved plans.
 - (ii) Sampling and testing of steel reinforcing bars used have been carried out in accordance with CS2:2012.
 - (iii) The acceptance criteria appropriate to each type and grade of steel reinforcing bars used have been complied with.
 - (iv) All steel reinforcing bars tests have been carried out by a laboratory* accredited under the HOKLAS^.
- (d) The requirements of sampling and testing of grout are as follows:-
- (i) For each grout mix one sample of grout shall be provided from each 10 batches of grout, or every 10 m³ from the amount of grout produced in a day, whichever is the lesser, to determine the crushing strength of the grout. Samples shall be provided not more than 1 hour after the grout has been mixed and shall be protected from weather before test cubes are made.
 - (ii) Compression testing of grout test cubes should be carried out in accordance with the methods specified in CS1:2010 using 100 mm size cubes. Testing should be carried out by a laboratory* accredited under the HOKLAS^. Test results[®] should be reported on a HOKLAS Endorsed Certificate and appended with a statement signed by the Registered Structural Engineer to confirm that the acceptance criteria set out in the Building (Construction) Regulation 59 have been complied with, and should be submitted within 21 days after testing.

2. The following conditions in respect of qualified supervision of works are imposed under item 6 in section 17(1) of the Buildings Ordinance:

- (a) Qualified site supervision of the sampling of cement grout and steel reinforcing bars and making and curing of test cubes by experienced and competent persons as defined in 2(b) and 2(c), should be provided to ensure that the works are carried out in accordance with the plans approved and that the required standards are complied with.
- (b) The Registered Structural Engineer should assign a quality control supervisor to supervise the works, determine the necessary frequency of inspection by the quality control supervisor which should not be less than once a week, and devise inspection check lists. The minimum qualifications and experience of the quality control supervisor is to be the same as the Technically Competent Person of grade T3 under the Registered Structural Engineer's stream, as stipulated in the Code of Practice for Site Supervision 2009.
- (c) The Registered General Building Contractor/Registered Specialist Contractor should assign a quality control co-ordinator to provide full time on site

supervision of the works and devise inspection check lists. The minimum qualifications and experience of the quality control co-ordinator is to be the same as the Technically Competent Person of grade T1 under the Registered General Building Contractor's/Registered Specialist Contractor's stream, as stipulated in the Code of Practice for Site Supervision 2009.

- (d) The names and qualifications of the supervisory personnel representing the Registered Structural Engineer and the Registered General Building Contractor/Registered Specialist Contractor respectively should be recorded in an inspection log book. The date, time, items inspected and inspection results should be clearly recorded in the log book. The log book should be kept on site for inspection by representatives of the Buildings Department.

3. Where steel reinforcing bar (rebar) products such as cut and bent rebars, reinforcement cages and the like are fabricated off-site in a prefabrication yard, the following conditions in respect of qualified supervision of off-site rebar prefabrication works (referred hereafter as "Prefabrication Works"⁺) are imposed under item 6 in section 17(1) of the Buildings Ordinance:

- (a) Qualified site supervision of the Prefabrication Works⁺, including sampling of steel reinforcing bars, by experienced and competent persons as defined in 2(b) and 2(c), should be provided to ensure that the works are carried out in accordance with the plans approved and that the required standards are complied with.
- (b) The names and qualifications of the supervisory personnel representing the Registered Structural Engineer and the Registered General Building Contractor/Registered Specialist Contractor respectively should be recorded in an inspection log book. The date, time, items inspected and inspection results should be clearly recorded in the log book. The log book should be kept in the prefabrication yard and a copy of it should be kept on site for inspection by representatives of the Buildings Department.

4. You are reminded that site supervision of the foundation works by a team of supervisors shall be provided each by the Authorized Person, the Registered Structural Engineer and the Registered Specialist Contractor in accordance with the Technical Memorandum for Supervision Plans 2009 and the Code of Practice for Site Supervision 2009 to ensure that the quality of the foundation works is up to standard and that the works are carried out in accordance with the plans approved and in such a manner as not to render inadequate the margin of safety of, or impair the stability of, or cause danger to any building, structure, land, street or services. Details of site supervision for the foundation works shall be included in the supervision plan and submitted prior to or at the time of application for consent to the commencement of the foundation works.

5. Under Building (Administration) Regulation 10, one set of foundation record plans and report together with the Form BA 14 stipulated in Building (Administration) Regulation 25 to certify the completion of the foundation works are required to be submitted. The record plans should include details of the characteristic features of the site and the identification, location, size, depth and level of each pile as constructed. The report should include, for each pile, the date of construction, the quality and quantity of materials used, the grouting records, the excavation and boring records (including the advancement rate of drill bit, air pressure used, volume of air supply/flushing medium), settlement and groundwater drawdown records, the

predrilling records and results of standard penetration tests on the sub-soil strata and should be accompanied by an assessment report with drawings of geological sections across site prepared based on the ground investigation and the predrilling.

6. Your attention is also drawn to PNAP APP-18, the Technical Memorandum for Supervision Plans 2009 and the Code of Practice for Site Supervision 2009 regarding the requirements on predrilling works.

7. Consent to the commencement and carrying out of the pile cap and superstructure works will not be given until the predrilling records and the testing records as specified in paragraphs 1(b) to 1(d) above, and the foundation record plans, report and Form BA14 specified in paragraph 5 above have been submitted and found satisfactory, and that the required proof tests have also been satisfactorily carried out by a laboratory* accredited under the HOKLAS^.

8. All significant signs of distress during the construction works should be reported promptly to the Buildings Department. Where the ground settlement reaches or exceeds the trigger value of the "Alarm Level" defined in the monitoring scheme, the Chief Highway Engineer/Research and Development, Highways Department (Attention: Land Surveyor/Geographic Information System, telephone number: 2762 3498, fax number: 2714 5290, email: lsgis.rnd@hyd.gov.hk) should be notified promptly together with the relevant details of the monitoring.

* A Directory of Accredited Laboratories in Hong Kong is obtainable from the Hong Kong Accreditation Service (HKAS) Executive, Innovation and Technology Commission.

A laboratory's accreditation for an individual test or calibration may be granted, modified or withdrawn at any time. Up-to-date information on accredited laboratories and their scopes of accreditation are available on the internet at the HKAS website at <http://www.itc.gov.hk/hkas/>.

^ Test to be carried out by a laboratory* accredited under the HOKLAS or by other laboratory accreditation bodies which have reached mutual recognition agreements/arrangements with the HOKLAS for the particular test concerned.

@ The test carried out by an accredited laboratory should be within its scope of accreditation. To ensure this, test results should be reported on a HOKLAS Endorsed Certificate or equivalent Certificate/Report issued from other laboratory accreditation bodies which have reached mutual recognition agreements/arrangements with the HOKLAS.

% The 'site' refers to the prefabrication yard for cases covered by paragraph 3 above.

+ Prefabrication Works refer to the fabrication works of steel rebar products, such as cut and bent rebars, reinforcement cages and the like, covered by this approval of plans carried out in the prefabrication yard.