

## Legislative Council Panel on Housing

### Effectiveness of Quality Reform for Piling Works

#### Purpose

This paper aims to brief Members on the effectiveness of the quality reform and enhancement measures that have been implemented by the Hong Kong Housing Authority (HA) to improve the quality of piling works since 2000.

#### Background

2. Since the discovery of a series of piling problems in September 1999, the HA has taken resolute actions to enhance built quality on all fronts by launching 50 Quality Housing Initiatives in March 2000. In respect of piling works, we have immediately identified the core problems which would undermine piling quality, promptly implemented a set of quality reform and enhancement measures to improve piling quality, which cover ground investigation, foundation design, construction specification, contract arrangement, site supervision and acceptance of works upon completion. Since the implementation of these reform measures, we have completed 80 piling contracts. The reform measures have proven effective in assuring piling quality and boosting public confidence.

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##### *Key reform measures*

3. In gist, we have implemented the following key reform measures to strengthen control over the whole piling process since March 2000 –

- (a) ***Strengthening risk management*** by conducting more comprehensive ground investigations to minimise the risk of encountering unanticipated complex ground conditions (UCGC) and the associated variation in works. To avert the risks borne by contractors for encountering UCGC, design of foundation works<sup>1</sup> is undertaken by engineers from the Housing Department (HD) instead of contractors.

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<sup>1</sup> For foundation contracts in the past, the foundation was designed and built by the contractor on a lump-sum basis without reassessment of the actual quantities of works. For the present foundation contracts, the foundation is designed by HD engineer and payment to the contractor is assessed according to the actual quantities of works.

At the same time, the Foundation Advisory Panel<sup>2</sup> was set up to examine the risks involved in the foundation works at design stage for each project. The contract periods for contracts tendered after February 2000 were lengthened by one to three months, having regard to the improvement measures implemented and the individual project conditions, and to allow sufficient time for contractors to adapt to the new procedures. In addition, if liquidated damages are imposed on contractors for project delay as a result of their own problems, the amount of liquidated damages was suitably reduced to promote equitable risk-sharing between the HA and the contractors.

- (b) ***Strengthening site inspection and acceptance requirements of piling works*** by revising the specification in contracts to enhance process control on piling works and to ensure that all completed piles fully meet the contract requirements. We have deployed resident engineers to all piling sites to strengthen site supervision, and carried out more comprehensive quality control tests<sup>3</sup> for all large diameter bored piles. We have also employed testing contractors directly to conduct final pile acceptance tests to enhance their reliability.
- (c) ***Strengthening contractors' own capability in management & supervision*** by restricting subcontracting of principal piling activities to one layer. This aims at strengthening contractors' capability in supervising the works and controlling the performance of their piling subcontractors more effectively. To enhance the objectivity in assessing contractors' performance, the Piling Contractors Performance Assessment Scoring System (PilingPASS) has been implemented in all piling contracts (including those under construction at that time) since April 2005.
- (d) ***Reinforcing independent building control*** by establishing the Independent Checking Unit (ICU) since November 2000, which reports directly to the Director of Housing, to implement regulatory control and checking with the scope and procedures consistent with those adopted by the Buildings Department.

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<sup>2</sup> The chairman of the Foundation Advisory Panel is Assistant Director (Projects) of the HD and members include the Chief Geotechnical Engineer and three Chief Structural Engineers of the Department. The Panel was subsequently renamed as the Engineering Advisory Panel to cover other engineering works.

<sup>3</sup> The quality control tests to be carried out for all bored piles include: (a) Ultrasonic Echo Wave test to check the size and verticality of the bored hole as well as the bell-out at pile base; (b) Sonic Coring test to check the integrity of the concrete of pile; and (c) Interface Confirmatory Coring test to check the quality of the interface between the concrete at pile base and bedrock.

- (e) ***Strengthening the management of HA's list of Piling & Ground Investigation Contractors*** by establishing its own comprehensive lists of piling contractors and ground investigation contractors since 2000 and 2001 respectively. This is to tighten control over staff qualification, level of supervision, plant and equipment requirements for both types of contractors.
- (f) ***Fostering a partnering culture*** by conducting partnering workshops at the commencement stage of all piling contracts since August 2000. This aims at establishing a mechanism, via discussion, to resolve any future technical problems expeditiously in order to build mutual trust and collaboration with contractors.
- (g) ***Avoiding and resolving disputes*** by introducing the Dispute Resolution Advisor (DRAd) system in all new construction contracts (including piling works) for tenders returned after April 2004. This is to reinforce the partnering culture and rationalise dispute resolution procedures to avoid disputes and ensure that any dispute which may arise during construction would be resolved within the specified timeframe.

### ***Quality Assurance***

4. Since the launch of the above reform measures in March 2000, we have completed 80 piling contracts. With the strengthened site supervision, more comprehensive in-process checking and final pile acceptance tests, all these 80 contracts have fully complied with the specification and statutory requirements.

### ***Improvements in Other Crucial Aspects***

5. Of the above 80 completed piling contracts, 50 commenced after the launch of the quality reform. As they could fully adopt all the reform measures already implemented, noticeable improvements in the following crucial aspects have been observed in these 50 contracts apart from the assured piling quality -

- (a) ***Control on Variations and Budgets*** – More comprehensive ground investigations have effectively minimised variations in works during construction stage. Only one contract has marginally exceeded the contract sums among these 50 contracts.

- (b) ***Completion Time*** – Among the 28 contracts which commenced at the initial stage of the implementation of the reform measures, 9 contracts could not be completed on time due to delays in the works of the contractors. However, for the works that began after mid-2004, all 22 contracts were completed on time, in which 8 of them were even slightly ahead of schedule. This indicates that all parties involved could better manage the construction time after they have familiarised themselves with the operation of the reform measures.
- (c) ***Control on Subcontracting*** – All these 50 contracts have complied with the one-layer subcontracting restriction, and among them, 46 (over 90%) did not subcontract any of their principal piling activities. Hence, contractors can better control the progress of works and the piling quality.
- (d) ***Enhancing Contractors' Performance*** – By implementing PilingPASS, we could more effectively control the performance of contractors and facilitate their improvement. On the whole, the performance of contractors has consistently improved in all aspects as shown by the steadily improving score trend over the past few years.
- (e) ***Fostering a Partnering Culture, Avoiding and Resolving Disputes*** – Through conducting partnering workshops and implementing the DRAd system, we have built mutual trust with contractors to expeditiously resolve problems encountered during construction and avoided disputes. So far, no disputes have arisen for all completed piling contracts adopting the DRAd system.

## **Way Forward**

6. To improve the piling quality of public housing, we have taken resolute actions and launched various reform measures. Good progress and results have been achieved. The industry has recognized HA's practice and has performed to specified requirements as shown by the proven track record over the past nine years. As part of our drive to assure continuous improvement in built quality, we will continue to enhance the effectiveness of the quality reform and work in collaboration with stakeholders.

7. Members are invited to note the effectiveness of quality reform for piling works.