

5 April 2012

All Piling Contractors
All Professional Engineers
All Qualified Site Supervisors

cc Main Contractors and other interested parties
(See Distribution List)

MINISTRY OF MANPOWER (MOM) & BUILDING AND CONSTRUCTION AUTHORITY (BCA) JOINT CIRCULAR - LOAD TESTING ON PILES

We have seen an increasing trend in the use of larger diameter bored piles in Singapore. This has resulted in the need to increase the load used to test the piles. It is not uncommon to conduct 3,000 tonnes pile load tests utilising the concrete-blocks Kentledge method. At such load, in terms of magnitude and the large number of concrete-blocks needed, the design and installation of Kentledge structure would need special attention. In addition, greater care and consideration will be required during the various stages of the pile testing, ie. planning, setting up, testing and removal phases. It is also noted that the setting-up and dismantling of concrete-blocks Kentledge structure is not only time consuming but is also labour intensive. The storage and transportation of large numbers of concrete-blocks are also costly. Such method of testing piles is not only unproductive but also poses higher level of safety risk to workers.

2. With the increased risks associated with large concrete-blocks Kentledge designs, alternative pile load testing methods should be considered. Such methods include “built-in load cell” test, or using tension piles or ground anchors or steel-plate Kentledge as a reaction. For example, the deployment of “built-in load cell” pile testing is more productive as it requires less manpower to set up and dismantle. Although they may cost more, piling contractors who can show a 20% productivity improvement by using such alternative methods can consider applying for the BCA Productivity Improvement Project (PIP) fund to help defray costs when using such alternative methods. Please note that the adoption of these methods shall comply with the relevant codes of practice such as SS CP4:2003.

Lessons Learnt from Kentledge Failure Incident

3. On 16 Jan 2011, during a pile load test at a construction worksite, the steel structural frame supporting a Kentledge structure tilted, causing the concrete blocks to fall beyond the worksite boundary onto a public road. Fortunately, no one was injured in the incident. The incident resulted in the closure for several days of the affected road in order for the blocks to be removed safely. Investigations revealed that the failure of the Kentledge structure was mainly due to inadequacies in the design of the foundation supporting the Kentledge structure.

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Requirement under WSH (Construction) and WSH (RM) Regulations

4. We wish to remind all piling contractors of the legal requirements under the Workplace Safety and Health (WSH) (Construction) and WSH (Risk Management) Regulations :
- a. The testing of piles in a worksite shall be conducted under the direct supervision of a designated person¹.
 - b. Effective measures shall be taken to warn persons not to approach the pile test area in a worksite. No person shall be allowed to approach a pile test area in a worksite while the process of increasing or decreasing test loading is being carried out unless under the specific instruction of the designated person.
 - c. It shall be the duty of the designated person to take, so far as is reasonably practicable, such measures as are necessary to ascertain that the pile testing system in a worksite is in a stable condition and is safe for approach.
 - d. Risk Assessment shall be conducted to address the safety and health risks posed to any person who may be affected by the pile load testing activities in the workplace, and the risks identified shall be eliminated through reasonably practicable steps.
 - e. Where it is not reasonably practicable to eliminate the risk referred to in paragraph (d), reasonably practicable measures to minimise risk, and safe work procedures to control the risk, shall be implemented.

Guidelines for Pile Load Test Using Kentledge Method

5. To guide the industry in Kentledge Method, in Feb 2011, BCA and MOM together with LTA, HDB, ACES, IES, SCAL, and major piling specialist builders formed a Workgroup to draft the “Guidelines for Pile Load Test Using Kentledge Method in Singapore”, under the chairmanship of Geotechnical Society of Singapore (GEOSS). The Guidelines, published in Sep 2011, cover recommendations on safety factor for allowable bearing capacity for Kentledge foundation, minimum distance from neighbouring structures, differential settlements of Kentledge base, height to width aspects ratio of the Kentledge setup, site supervision by competent staff, instrumentation and monitoring of the Kentledge setup. BCA and MOM will like to urge all the stakeholders of the construction industry to adopt the Guidelines for pile load test carried out using Kentledge method. You can access the Guidelines from GEOSS website (www.geoss.sg), under Activities page -> Publication tab. Alternatively, the direct weblink is :

[http://www.geoss.sg/documents/publication/\(GEOSS\)%20-%20Guidelines%20on%20Good%20Practices%20for%20Pile%20Load%20Test.pdf](http://www.geoss.sg/documents/publication/(GEOSS)%20-%20Guidelines%20on%20Good%20Practices%20for%20Pile%20Load%20Test.pdf)

¹ “designated person” means a competent person appointed in writing by —

- an occupier of a worksite;
- an employer of persons carrying out work in a worksite; or
- a principal who gives direction to persons on the work carried out by those persons in the worksite, to perform any task or duty prescribed under these Regulations in connection with the worksite;

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6. Should you need further information, please contact:
- MOM at 6438 5122 for information on workplace safety and health.
 - BCA at 1800-3425222 for matter relating to building control.

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