

Enhanced Procedures for the Phased Array Ultrasonic Test for Verification Works at Hung Hom Station Extension

The non-destructive verification works for the coupler-threaded bars installed in the platform slabs of the Hung Hom Station Extension under the Shatin to Central Link project will resume tomorrow (15 March 2019), based on enhanced procedures in accordance with the testing methodology agreed with the Government.

Starting from December last year, the verification works of the Hung Hom Station Extension are being carried out in three phases in accordance with the holistic proposal agreed by the Government, its Expert Adviser Team and our external engineering consultants. Stage 1, which involves the compiling and checking of design amendment drawings against construction records, has been completed. For the Stage 2 non-destructive tests, the Corporation temporarily suspended Phased Array Ultrasonic Test ("PAUT") in late January when some discrepancies were found between the results of PAUT and the actual measurement of the engagement of the steel bars inside the couplers. Since then, a detailed review has been carried out in consultation with experts and laboratories on the test procedures and preparation works on-site to improve the accuracy of the testing.

The following improvement measures will be adopted after taking into account the advice of relevant experts and government departments, who looked into the possible reasons behind the discrepancies:

- (i) Measurements for each steel bar/coupler will be conducted on-site by two, instead of one, qualified technicians with an appropriate counter-checking mechanism to minimise possible deviations arising from human factor; when the difference between the measurement results by the two technicians are within 2 millimetres, the results are considered as valid and the mean of the two measurements will be taken as the on-site result;
- (ii) The results obtained on-site will be further reviewed and validated in the laboratory by a third qualified technician to decide if the measurement results are acceptable or the test should be conducted again;
- (iii) Enhanced training and additional calibration tools will be provided for the on-site operators and other supporting personnel to ensure the surface of the steel bars to be tested is grinded and prepared to achieve the best possible profile for testing.

Under the enhanced testing procedures, the allowable tolerance in the measurement results remains at 3 millimetres.

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While the project team has endeavoured to improve the procedures, measurement signals or readings could still be unclear due to certain limitations, for example, uneven end face or damage of the threaded steel bar, insufficient area for the probe to operate due to site constraints. If signals or readings are found to be unclear, the related section of steel bars and couplers may be removed for further verification if necessary. All data and information gathered will be taken into consideration in the Stage 3 comprehensive assessment on structural integrity and safety.

To ensure that the enhanced test procedures can achieve a higher level of accuracy, the revised PAUT has been put through repeated trials in laboratories and on-site, and validated by experts engaged by the Corporation under supervision by Government departments on-site. Validation revealed that the results derived from the enhanced PAUT procedures and the actual embedded lengths of the steel bars were all within the 3-millimetre allowable tolerance.

A submission containing the validation report and elaboration of the enhanced testing procedures was made to the Government on 8 March. After discussion with the Government, a final submission was made on 13 March and was accepted by the Government today (14 March). The project team will resume the non-destructive tests in a cautious and prudent manner based on the enhanced procedures. The Corporation will use the enhanced test procedures to re-do the measurement of all of the exposed couplers which have been tested previously, as well as other couplers which have yet to be tested.

Safety has always been a top priority for the Corporation. The Corporation will continue to work with the Government to take forward the verification works. Upon the completion of the Stage 2 verification works, all the data and information collected will be considered in Stage 3 of the holistic study, when a comprehensive assessment will be made on the safety and structural integrity of the structures at the Hung Hom Extension.

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MTR has extensive end-to-end railway expertise with more than 40 years of railway projects experience from design to planning and construction through to commissioning, maintenance and operations. Going beyond railway delivery and operation, MTR also creates and manages dynamic communities around its network through seamless integration of rail, commercial and property development.

With more than 40,000 dedicated staff*, MTR carries over 12 million passenger journeys worldwide every weekday in Hong Kong, the United Kingdom, Sweden, Australia and the Mainland of China. MTR strives to grow and connect communities for a better future.

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*includes our subsidiaries and associates in Hong Kong and worldwide

Photo Captions:

1. Enhanced test procedures: For verification works at Hung Hom Station Extension, the test surface of the steel bars is grinded more smoothly and prepared to achieve the best possible profile for testing (Photo 1), and additional calibration tools for the test surface are provided to on-site technicians and supporting personnel (Photo 2). Measurements will be conducted on-site by two qualified technicians respectively with an appropriate counter-checking mechanism (Photo 3). (Photos from simulated test procedures)



(Photo 1)



(Photo 2)



(Photo 3)