LCQ9: Hung Hom Station Extension under Shatin to Central Link project

Following is a question by Hon Tanya Chan and a written reply by the Secretary for Transport and Housing, Mr Frank Chan Fan, in the Legislative Council today (May 22):

Question:

According to the holistic assessment strategy regarding the platform slabs and diaphragm walls of the Hung Hom Station Extension works under the Shatin to Central Link project (the assessment strategy) proposed by the MTR Corporation Limited (MTRCL) and accepted by the Government, the assessment should be conducted in three stages. The concrete opening-up work conducted under the second stage serves two purposes: (A) to carry out physical investigations by opening up the concrete at locations without complete documentations, so as to verify the as-constructed conditions of the connections between the platform slabs and diaphragm walls of the Hung Hom Station Extension, and the relevant work involves opening-up of the concrete for investigations at 24 locations of the platform slabs of the East West Corridor (EWC); (B) in view that some reinforcement bars (rebars) are suspected to have been cut short, MTRCL needs to open up some of the connections between the platform slabs and diaphragm walls for detailed inspection and use non-destructive tests to verify the workmanship of the coupler connections. MTRCL will, based on random sampling results, open up 28 locations respectively of the platform slabs of the EWC and those of the North South Corridor (NSC), i.e. 56 locations in total, to expose at least 168 rebars or couplers for inspection. MTRCL had since December 10 of last year conducted tests on the couplers (the first-round tests) but suspended the tests due to deviations between the test results and the actual conditions. MTRCL subsequently used the enhanced test procedures to re-do the tests (the second-round tests). The Highways Department uploaded all the test results involving a total of 225 locations to the relevant website on the 29th of last month. In this connection, will the Government inform this Council:

(1) whether it knows the following details of each of the aforesaid 225 testing locations (set out by (i) and (ii)):
(i) whether it was located at EWC or NSC;
(ii) the purpose(s) of the opening-up investigation is/are (A), (B), or both (A) and (B);
(iii) the specific location;
(iv) the result of the first-round tests (if conducted); and
(v) the result of the second-round tests;

(2) whether it knows, for purpose A of the opening-up investigation, the minimum number of rebars or couplers that MTRCL was required to test under the assessment strategy, and the actual number tested; if the latter is smaller than the former, the reasons for that and the impact of such

situation on the relevant conclusions; for purpose B of the opening-up investigation, the number of rebars or couplers tested by MTRCL; if the number is smaller than 168 as originally planned, the reasons for that;

(3) given that out of the 191 samples for which the tests on the embedded length of the threaded rebars inside the couplers had been completed, 39 were regarded as not meeting the requirements, of the maximum percentages of the coupler population with improper connections (estimated under a 95 per cent confidence level) inferred on the basis of the statistical method used in Table 6.3 of the assessment strategy;

(4) given that the tests were not successfully completed at 34 of the 225 testing locations due to various reasons, of the follow-up actions that the Government will request MTRCL to take, e.g. whether MTRCL will cut and remove the rebars with couplers connected for measuring the actual embedded length of the threaded rebars inside the couplers; and

(5) as paragraph 6.4.22 of the assessment strategy has pointed out that if defective coupler connections are found in the tests, a greater sample size, in terms of the number of testing locations, may be considered, whether the Government will request MTRCL to do so; if so, of the details; if not, the reasons for that?

Reply:

President,

My reply to the five parts of the Hon Tanya Chan's question is as follow:

(1) The MTR Corporation Limited (MTRCL) completed on April 29, 2019 the Phased Array Ultrasonic Test (PAUT) and the opening-up investigation in the second stage of the holistic assessment strategy for the Hung Hom Station (HUH) Extension under the Shatin to Central Link (SCL) project (the assessment strategy). The layout plan of the platform slabs of East West Line (EWL) and North South Line (NSL) for HUH Extension, the locations of couplers tested, and all the past and latest test results are available at the Highways Department (HyD)'s website for the SCL project (www.hyd.gov.hk/en/road_and_railway/railway_projects/scl/index.html) for reference by the public. A total of 225 test locations are involved in Tables 1 to 3 on the HyD's website, which correspond to 152 test locations involving couplers with embedded length not less than 37 millimeters; 39 test locations involving couplers with embedded length less than 37mm; and 34 locations where completion of test is unsuccessful, which include seven locations with improper connection to couplers or connection of rebars by lapping that could be determined by mere visual inspection and therefore without any need to carry out measurement by device.

In response to the request by the Hon Chan, the details of the test results are attached at Annex.

(2), (3) and (5) The first purpose of the opening up in the second stage of

the assessment strategy is to carry out physical investigations by opening up the concrete at connections between the platform slabs and diaphragm walls of the HUH Extension with gaps in construction documentation, so as to verify the as-constructed conditions of these areas. This involves at least 24 locations at the platform slabs of the EWL. Eighteen out of 24 locations had been inspected on site. Due to obstruction of existing structures, the remaining six locations could not be verified by the opening-up. Upon further review of records, the MTRCL managed to retrieve the concerned site photos and verify the as-constructed conditions of these six locations.

The second purpose of the opening up in the second stage of the assessment strategy is that, in view of the allegations on the cutting-short of steel bars, the MTRCL needs to open up certain connections between the platform slabs and diaphragm walls for detailed inspection, and to conduct non-destructive tests for verification of the conditions of the coupler connections, the locations of which are randomly sampled by statistical methods. Based on the advice from the expert team from the Department of Statistics and Actuarial Science of the University of Hong Kong, the MTRCL opened up 28 random locations each at connections between the platform slabs and diaphragm walls of the EWL and the NSL, i.e. 56 locations in total with at least 168 rebars/couplers exposed; and made use of PAUT for measurement of the embedded length. There are currently 169 samples with successful test results.

Table 6.3 of the assessment strategy of the MTRCL is to illustrate the relationship between the number of failures in the samples and the maximum failure rate in the population based on statistical inference (estimated under a 95 per cent confidence level). "Failure" means that individual couplers and rebars are not installed according to the technical specification. The overall integrity of the platform slabs and diaphragm walls has to be ascertained based on the result of detailed structural analysis in the third stage of the assessment strategy.

As the number of samples obtained in the second stage of the assessment strategy has already exceeded the original target of 168, the MTRCL can proceed with the assessment in third stage and the MTRCL does not need to further increase the number of PAUT samples.

In the third stage, the MTRCL will consolidate the test results of the first two stages, including the as-constructed details of the platforms, works quality information, and the technical data provided by the coupler supplier; and conduct a detailed structural assessment of the HUH Extension to determine the overall structural integrity of the works, and whether remedial works is required. The MTRCL launched the third stage of the assessment strategy and planned to complete it by the end of June this year.

(4) The signals or readings of the PAUT could be unclear under some situations making the tests and measurement unsuccessful. These situations include uneven end face or damage of the threaded steel bars, insufficient area for the operation of the device due to site constraints, etc. In addition, the MTRCL does not need to take measurement and test if upon opening up of concrete, improper connection to couplers or connection of

rebars by lapping can be determined by mere visual inspection. Of the 225 test locations under the second stage, 34 locations are under the above situations that render completion of the tests unsuccessful. As the number of PAUT samples has already exceeded the number originally planned, MTRCL will determine the overall structural integrity of the platform slabs and diaphragm walls of the EWL and NSL in the third stage of the assessment strategy.