

# TTC AUDIT COMMITTEE REPORT NO.

**MEETING DATE:** July 15, 2010

**SUBJECT:** INTERNAL AUDIT CAPITAL REPORT – TESTING AND  
INSPECTION SERVICES – G85-225 & G85-225A

## **INFORMATION ITEM**

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### **RECOMMENDATION**

It is recommended that the Audit Committee receive for information the attached Internal Audit Capital Report.

### **BACKGROUND**

Internal Audit provides the Commission with independent evaluations of the efficiency and effectiveness of control systems, and operations. Internal Audit is also required to provide recommendations for improvement.

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Richard G. Beecroft  
Chief Auditor

July 15, 2010  
01-23

Attachment – Internal Audit Capital Report

## TORONTO TRANSIT COMMISSION

**TO** Dick Beecroft

**FROM** Christine Leach

**DATE** March 10, 2010

**SUBJECT** Internal Audit – Testing and Inspection Services – G85-225 & G85-225A

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### Summary

During Audit's review of quality control testing and inspection documentation for a scheduled capital audit, Audit noted an incident of non-compliance with the Canadian Standards Association (CSA) stated concrete compressive strength testing procedures. To assess the impact of this observation and extent of non-compliance, Audit reviewed 2008/09 test reports and related documentation for additional construction projects. While the majority of tests reviewed were found to be acceptable, additional incidents of deviation were noted, ie., 70 (6.8%) out of 1032 completed test reports reviewed.

TTC construction contracts state CSA procedures are to be followed. As such, deviation from these standards may result in early concrete deterioration and the need for restoration, as well as, may compromise the Commission's position and expose the TTC to undue risk of financial liability. Processes followed in response to reported incidents of concrete strength not meeting required specifications are inconsistent, and the trail of supporting documentation for corrective actions taken, in some cases, was incomplete. Lack of a penalty clause within contract documents, and failure to ensure contractors adhere to stipulated quality control expectations also minimizes the Commission's ability to pursue appropriate compensation from those contractors that provide concrete that does not meet required specifications, and do not perform concrete testing as required.

### Background

Testing and inspection services are provided by Davroc Testing Laboratories (G85-225) and D.B.A. Engineering Ltd. (G85-225A). Per contract terms and stipulations, these laboratories must be CSA certified, and are subject to visitation and inspection by TTC Quality Control staff at anytime, with or without prior notification. With respect to concrete compressive strength, both contracts stipulate that CSA standard test procedures are to be performed without deviation, unless otherwise directed.

### Audit Observations

*Compressive Strength Test Procedures:*

For each compressive strength test, CSA standards require that two concrete cylinders be tested at an age of 28 days. For the purpose of conforming to contract-specified strengths, cylinders are not to be tested out of this sequence.

Based on a review of 1032 completed concrete test reports available and on file within the TTC Quality Assurance section, Audit identified 70 (6.8%) incidents of non-compliance with CSA testing standards. Specifically, when the first cylinder broken at 28 days failed to meet minimum measures, the TTC deviated from the CSA testing standard and deferred the testing of the second "28 day" cylinder until 56 days. TTC contract specifications state the compressive strength required at 28 days, not 56 days. The nature of items for which non-compliance incidents were noted includes column caps, pole bases, walls, piers and slabs.

Discussions with representatives of both concrete testing service providers, and the Concrete Section within the Ministry of Transportation, suggest deviation from CSA testing procedures and performance of 56 day cylinder tests is not normal industry practice. While it is our understanding that staff within the Construction Department instructed TTC service providers to deviate from the CSA testing procedures and defer required concrete cylinder tests past the stipulated 28 days, documentation to support this TTC practice was not available.

TTC communication protocol and decision making processes followed in response to failed test results are inconsistent, and procedures for ensuring complete documentation of all further testing and corrective actions taken as a result have not been developed. For example, while immediate communication of failed 7 day "early indicator" cylinder tests from the service providers is required per the contracts, there is no stipulation that such results should be automatically forwarded and brought to the attention of appropriate design staff for effective and timely resolution. Also, there are no guidelines as to when core samples should be taken when cylinder test results are unacceptable. The correlation between core test results and adherence to age specific compressive strength requirements is diminished when concrete cores are sampled two to three months after the failed cylinder is broken. From our review and discussions, it was suggested that to ensure adherence to CSA and contractual compressive strength requirements for a given age, cores should be taken no more than two weeks after the age specific failure.

*Contractor Responsibilities:*

Contracts also state that the contractor is responsible for conducting inspections and tests in accordance with CSA standards, and that inspection or testing performed by the Commission's Representatives does not augment or relieve them of this responsibility. Nonetheless, contractors are not being held accountable for adhering to these terms as the Commission assumes primary responsibility for the performance and cost of testing, and TTC construction contracts do not include a penalty clause that financially penalizes a contractor for providing concrete product that does not meet specified requirements.

As outlined in TTC contracts, Commission Representatives may direct contractors to remove defective materials and completed work that fails to meet stipulated requirements. Since it

becomes increasingly less practical to remove concrete that doesn't meet specified requirements with the passage of time, decisions that deviate from CSA procedures and allow standardized testing to be deferred past 28 days may compromise the Commission's position and ability to remedy the situation. Failure to respond to significantly low 7 day test results also diminishes the value and purpose of performing these tests, as the option to remove concrete that doesn't meet required specifications at this earliest point becomes less practical as time is permitted to lapse.

*Administrative Matters:*

Audit noted that one of the Commission's concrete testing service providers is not providing sequentially numbered Concrete Cylinder Test Reports for each designated construction contract assignment, as required per contract terms. Both service providers are not recording all concrete test results in a spreadsheet database for monthly submission to the Commission as outlined in the service contracts. Consequently, Management can not be assured that the results of all concrete tests performed have been reported and acted upon as deemed necessary.

Recommendations

Management should:

- Ensure all concrete tests are performed in accordance with contract specifications, ie., CSA standards, by establishing and monitoring adherence to a standardized communication protocol and documentation procedures; and
- Ensure all service provider test result reports are received and accounted for by monitoring the adherence of both testing and inspection service providers to requirements for sequentially numbered test reports and summarized spread-sheet databases.

In addition, Management should consider:

- The inclusion of a penalty clause in all contracts to ensure effective recourse against contractors who fail to comply with contract terms and provide concrete product that does not meet specified requirements.



## TORONTO TRANSIT COMMISSION

**TO** Dick Beecroft  
**FROM** Tony Baik  
**DATE** June 28, 2010  
**SUBJECT** Audit of Testing and Inspection Services – G85-225 and G85-225A

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This is in response to the March 10, 2010 Internal Audit memo on Testing and Inspection Services – G85-225 and G85-225A.

The management is in agreement with the recommendations made in the report. Please find below the management responses to address audit findings:

### Recommendation #1

Management should ensure all concrete tests are performed in accordance with contract specifications, ie. CSA standards, by establishing and monitoring adherence to a standardized communication protocol and documentation procedures.

### Management Response #1

Management has taken immediate steps to ensure that all concrete compressive strength testing are carried out in accordance to the CSA standard. First, directive to carry out concrete compressive strength tests in accordance to the CSA standard was issued to the testing companies as soon as the management was made aware of discrepancy in October, 2009. Second, a follow up memo was issued to all field supervisory staff, directing them to conduct all concrete compressive strength tests in accordance to the CSA standard as an interim measure until a formal procedure is developed and implemented.

A formal procedure on conducting compressive strength test has been developed and the training of all field staff on the new procedure was completed in May 2010. The procedure establishes CSA compliant testing process and timely coordination of corrective actions with the designers for tests that fail to meet specified strength requirements.

Furthermore, management has undertaken a complete review of all incidents of concrete compressive strength tests not meeting the specified strength requirements with the designers to ensure that structural integrity were not compromised. The designers have confirmed their acceptance.

Recommendation #2

Management should ensure all service provider test results reports are received and accounted for by monitoring the adherence of both testing and inspection service providers to requirements for sequentially numbered test reports and summarized spread-sheet databases.

Management Response #2

Thorough review of contract expectations has been done with two companies currently providing the testing and inspection services to ensure that required service expectations are met. Furthermore, the current testing and inspection service contracts will be replaced with a new service contract in June, 2010.

The position of Superintendent of Construction Quality Assurance, responsible for the quality control of various construction activities, has recently been filled. The new testing and inspection contract will be managed more effectively as a part of quality assurance program currently being implemented in the section to ensure that all terms and conditions of the contract are strictly adhere to, including proper numbering of test reports and monthly summary reporting requirements to meet the service and quality expectations.

The audit report has also identified, for management's consideration, to include a penalty clause in all contracts to ensure effective recourse against contractors who fail to comply with contract terms and provide concrete products that does not meet specified requirement.

The current contract terms and conditions already include number of recourses against contractors who fail to comply with contract terms. The "Liquidated Damages" clause allows the Commission to seek compensation from the contractor for schedule delays caused by the contractor, including delays due to any re-work required as a result of supplying products and or services that does not meet the requirements. Additionally, contract change for credit may be issued for acceptance of substitute products and or services, as appropriate.

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