NOTICE OF UNIVERSITY ORAL

GEODESY AND GEOMATICS ENGINEERING

Master of Science in Engineering

Christopher Gairns

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Head Hall – ADI Studio (C-level)

Board of Examiners:
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DEVELOPMENT OF A SEMI-AUTOMATED SYSTEM FOR STRUCTURAL DEFORMATION MONITORING USING A RELFLECTORLESS TOTAL STATION

ABSTRACT

The failure of a large structure could have severe consequences. For this reason, early detection of possible structural damage is critical. This stimulates the need for a reliable methodology for routine structural deformation monitoring. Large, above-ground oil storage tanks are examples of structures that must be routinely surveyed to monitor their stability and overall integrity. Presented here is the research and development of a methodology and software system to perform semi-automated deformation monitoring of such tanks. The new system, SCAN, will greatly improve upon the current, drastically outdated monitoring scheme with the implementation of a robotic total station with reflectorless laser technology. SCAN, has been interfaced with an existing deformation monitoring software system, ALERT, developed at the Canadian Centre for Geodetic Engineering at the University of New Brunswick. The full functionality and reliability of this system were tested by simulating an oil tank with a large water tank of comparable dimensions. The results from this field test indicate the ALERT SCAN system greatly increases surveying efficiency by reducing the time required to collect entire tank data from two weeks (with three persons) to one half-day (with one person). The system is also a reliable method to perform semi-automated data collection as the precision of the system was tested to be less than one millimetre between two separate survey campaigns. Based on this system, research has continued into more a more sophisticated, adaptable version of SCAN that would have the potential to perform automated deformation monitoring to most any structure.

Faculty Members and Graduate Students are invited to attend this presentation.