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DEPARTMENT OF CIVIL AND RESOURCE ENGINEERING

TITLE OF THESIS:	EFFECT OF NEWLY CONSTRUCTED STRUCTURES ON EXISTING TUNNEL LININGS
TIME/DATE:	2:30 pm, Monday, September 16, 2019
PLACE:	Room 3107, The Mona Campbell Building, 1459 LeMarchant Street

EXAMINING COMMITTEE:

Dr. Mohamed Meguid, Department of Civil Engineering, McGill University (External Examiner)

Dr. Craig Lake, Department of Civil and Resource Engineering, Dalhousie University (Reader)

Dr. Nouman Ali, Department of Civil and Resource Engineering, Dalhousie University (Reader)

Dr. Zoheir Farhat, Department of Mechanical Engineering, Dalhousie University (Reader)

Dr. Hany El Naggar, Department of Civil and Resource Engineering, Dalhousie University (Supervisor)

DEPARTMENTAL REPRESENTATIVE:	Dr. Andrew Corkum, Department of Civil and Resource Engineering, Dalhousie University
CHAIR:	Dr. Marilyn Macdonald, PhD Defence Panel, Faculty of Graduate Studies

ABSTRACT

In densely populated areas, there is increasing construction of high-rise buildings adjacent to existing tunnels. The interactions involved are complex and unavoidable. Based on experience and field monitoring, many tunnel owners impose exclusion zones for construction close to their tunnels. This research studies the effect of a newly constructed building supported by a shallow foundation on a pre-existing tunnel. With the aid of the PLAXIS software, a detailed three-dimensional finite element analysis is used to conduct a parametric study showing the interaction between the burial location of the pre-existing tunnel and the new shallow foundation. The concrete lining is modelled by using the newly developed concrete model included in the PLAXIS user-defined library. The model considers the non-linearity of the material behaviour and the distinction between strength in tension and compression. The constitutive soil where the tunnel system is constructed is simulated by using a hardening soil model with small-strain stiffness, which accounts for increased stiffness at small strains. The construction of the tunnel is divided into several phases, where each phase is simulated with the advancement of the shield boring machine. Accordingly, new design guidelines can be developed for shallow foundations in close proximity to pre-existing tunnels.