Civil Research Information Session 2017

For more information on…

U of M URA: Google University of Manitoba URA and visit the U of M website.

NSERC USRA: Google NSERC USRA and visit the NSERC website.

Either Award: Contact Sheila Lapinski in E1-284 or at sheila.smith@umanitoba.ca

1. Dr. Tricia Stadnyk: Hydrology, Tricia.Stadnyk@umanitoba.ca, E1-308.

a) Changing trends in pan-arctic discharge: analysis of observed trends in historical (1964-present) pan-arctic discharge that will be used as the basis for assessing future trends, simulated by the Arctic-HYPE hydrological model forced by global climate model scenarios.

b) Water supply projections for the Nelson River basin: assess the range in projected streamflow from various hydrological models under future climates from present day to the 2100s. The goal is to predict long-term water quantity for hydroelectric development and regulation in the Nelson River for Manitoba Hydro.

c) Integrated Water Management: assess Manitoba Hydro's regulation practices under future climate conditions using a water management model (WEAP). The goal is to develop practical parametric rule curves as the next generation of reservoir operation policies for the major control points in the Nelson system.

2. Dr. Pooneh Maghoul, Geotechnical, Pooneh.Maghoul@umanitoba.ca, E1-432.

a) Thermal Piles in Cold Region: Geothermal energy is energy extracted from the heat stored in the ground. The goal of this research is to study the load capacity of a thermal pile in cold region under thermal and mechanical loadings.

b) Soil-Pipeline Interaction in Landslide Zones: Buried pipeline infrastructures are a pre-eminent part of the gas and oil transportation across the country and their integrity has an important impact on the strength of Canada's economy. This research aims to study the effect of pore water pressure and the degree of saturation on the soil-pipeline interaction to present some guidelines to improve the soil-pipeline practice.

3. Dr. Ahmed Shalaby, Transportation, Ahmed.Shalaby@umanitoba.ca, E1-332.

Project no. 1: Nondestructive testing of the City of Winnipeg regional street network (Client: City of Winnipeg) The student will assist a team that will use the University of Manitoba instrumented vehicle (Falling Weight Deflectometer) to measure deflection of road sections. Five City of Winnipeg projects will be tested both before and after rehabilitation. The analysis of FWD data and ground penetrating radar data will provide useful insights for infrastructure renewal projects. This work involves several field visits within the City of Winnipeg to collect data, inspect works, and to monitor construction progress. Students interested in field work, surveying and data collection and analysis will find this project both interesting and challenging.

Project no. 2: Pavement Smoothness Specifications (joint project with Manitoba Infrastructure and City of Winnipeg)

Pavement profile and smoothness data is routinely collected using a laser profile mounted on a vehicle travelling at highway speed. This project aims to develop construction acceptance specifications based on smoothness. First a set of measurements will be collected and used to bench mark quality of construction. The student will analyze the impact of road features such as utility openings, grade, and intersections on smoothness. Familiarity with numerical methods and MATLAB will be helpful.

Project no. 3: Characterizing cold-mix pothole patching materials

Cold-mix asphalt is regularly used to fill potholes and to patch pavements. The project aims to characterize the materials used by Manitoba Infrastructure and the City of Winnipeg for this purpose. Four different mixes will be tested and compared. The laboratory tests will be performed in the Pavement Research Laboratory and include stiffness, workability, volumetric properties, and bond. The student will participate in laboratory tests and in field

evaluation of the materials in a side-by-side experimental section. Interest in laboratory testing of materials is an asset for this work.

4. Dr. Qiuyan Yuan, Environmental, Qiuyan.Yuan@umanitoba.ca, E3-375.
a) Recycling drywall waste as bulking agent for composting.
5. Dr. James Blatz, Geotechnical, James.Blatz@umanitoba.ca, E1-328.
a) Evaluating the behavior of steel piles for bridge abutments.
b) Development of new soil property maps for the City of Winnipeg.
6. Dr. Jan Oleszkiewicz, Environmental, Jan.Oleszkiewicz@umanitoba.ca, E1-312.
7. Dr. Jonathan Regehr, Transportation, Jonathan.Regehr@umanitoba.ca, E1-310.
a) Proactive monitoring and management of the wheel-rail interface for improved freight rail performance: Over the last 50 years, exponential growth in North American freight demand has motivated rail companies to improve productivity by adopting heavier rail cars, operating longer trains, and increasing network capacity. Heavier and more frequent axle loads impose greater rail contact stresses and necessitate expensive and carefully planned maintenance. In particular, the rail industry recognizes the benefits of proactive rail maintenance programs. This research analyzes freight rail performance trends using industry-standard metrics to assess the outcomes of preventive rail grinding programs.
b) Design of a traffic data visualization tool: Traffic data are common inputs for innumerable transportation engineering decisions. These data describe the magnitude of vehicles using a roadway system and their temporal, spatial, and vehicle classification characteristics. This research involves evaluating and testing existing tools used to visualize traffic data characteristics for use by practicing engineers and the public.

We hope you learned something. Sorry for the wall of text - UMES Academic Advocacy