

The Canadian
Geotechnical Society



La Société Canadienne
de Géotechnique

CGS Luncheon Presentation

A modern approach to the design of driven precast-prestressed concrete piles in Winnipeg

Presented by:
James Bartz, M.Sc., P.Eng.
Ph.D. Candidate, University of Manitoba

In the 1960's, allowable loads were tabulated in a Winnipeg by-law for driven precast-prestressed concrete hexagonal piles. These historical values were used successfully for decades and it is common in current local practice to consider these tabulated loads as the basis for limit states design. Therefore, there is a need to reconsider the methodology for the design of this pile type in Winnipeg by separately analyzing pile capacity and settlement. Static load test results from 1969 were analyzed with a modern, limit states design approach. A load-transfer model was calibrated and pile capacity and settlement were then calculated for the test site. The current practice based on tabulated working loads was found to be conservative. It is recommended that site specific analyses be performed to design this pile type and that the historical tabulated working loads are considered carefully for application in the limit states design approach.

James Bartz graduated with a Bachelor of Science in Civil Engineering from the University of Manitoba in 2012. He worked at KGS Group of Winnipeg, Manitoba from 2012 to 2015 and received his professional engineering designation in 2016. James then attended the University of Alberta and graduated with a Master of Science in Geotechnical Engineering in 2017. Currently, James is attending the University of Manitoba and is a Ph.D. Candidate in Civil Engineering. His current research activities are focused on the performance of deep foundations subject to ground settlement. James will be presenting the paper "A modern approach to the design of driven precast-prestressed concrete piles in Winnipeg" at the upcoming Canadian Geotechnical Conference in St. John's.

Date: Tuesday, October 8, 2019
Time: Lunch at 12:00 PM, Presentation at 12:20 PM
Location: Holiday Inn South, 1330 Pembina Highway
RSVP by: 12:00 PM, Thursday, October 3, 2019

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Preliminary deformation detection of high-fill sections along the Inuvik-Tuktoyaktuk Highway using UAV photogrammetry

Presented by:
Dylan Stafford, EIT
M.Sc. Student, University of Manitoba

The Inuvik-Tuktoyaktuk Highway (ITH) is a newly constructed highway in Northwest Territories, Canada in the continuous permafrost zone. The 137 km-long two-lane gravel surface road was constructed during winter using locally-available fill material with no cuts into the ground to minimize disturbance of the permafrost foundation. The embankment thicknesses were designed to provide insulation to the underlying permafrost as well as to maintain road geometry requirements. However, high-fill sections ranging from 5 to 12 m are susceptible to deformation in the form of settlements and slope movements. As part of an on-going research program studying the performance of embankments in Arctic regions, deformation of two high-fill sections along ITH were monitored using an unmanned aerial vehicle (UAV) and photogrammetric processing. Aerial images of the two sections were obtained in August 2017 and August 2018. Images were processed using structure-from-motion (SfM) software and the annual embankment deformations of each section were detected using two cloud comparison methods: cloud-to-mesh (C2M) and multiscale model-to-model cloud comparison (M3C2). C2M and M3C2 produced comparable results for both sections. This paper presents the detected deformations of the two sections, the challenges encountered during data acquisition and processing, and recommended best practices in using UAVs for monitoring deformations.

Dylan Stafford is an M.Sc. student in Geotechnical Engineering at the University of Manitoba, with his research focussed on infrastructure stability in permafrost areas. Dylan completed his B.Sc. in Civil Engineering at the University of Manitoba in 2017 and has been pursuing his M.Sc. since. Dylan will be continue researching infrastructure stability in permafrost areas in a Ph.D. program at the University of Manitoba starting next year. Dylan will be presenting the paper "Preliminary deformation detection of high-fill sections along the Inuvik-Tuktoyaktuk Highway using UAV photogrammetry" at the upcoming Canadian Geotechnical Conference in St. John's.

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