

## PROJECT DESCRIPTION

Boldwing Continuum Architects Inc.

Vancouver, Canada

Boldwing Continuum Architects Inc. has contracted Itasca Consulting Group to perform a liquefaction analysis and evaluate several soil improvement designs for the Langdale Ferry Terminal Project in Vancouver, Canada.

The terminal sits on a deltaic granular deposit prone to liquefaction. The new expansion of the ferry terminal has to be designed in compliance with the 2017 Canadian Building Code, which requires the analysis of 11 different earthquake time histories. The most challenging requirement is to design the ground improvement to limit any lateral soil spreading within 100-150 mm.

This project is ongoing. The solutions under investigation consist of earthquake drains and jet grouting shear wall panels.



## ITASCA'S ROLE

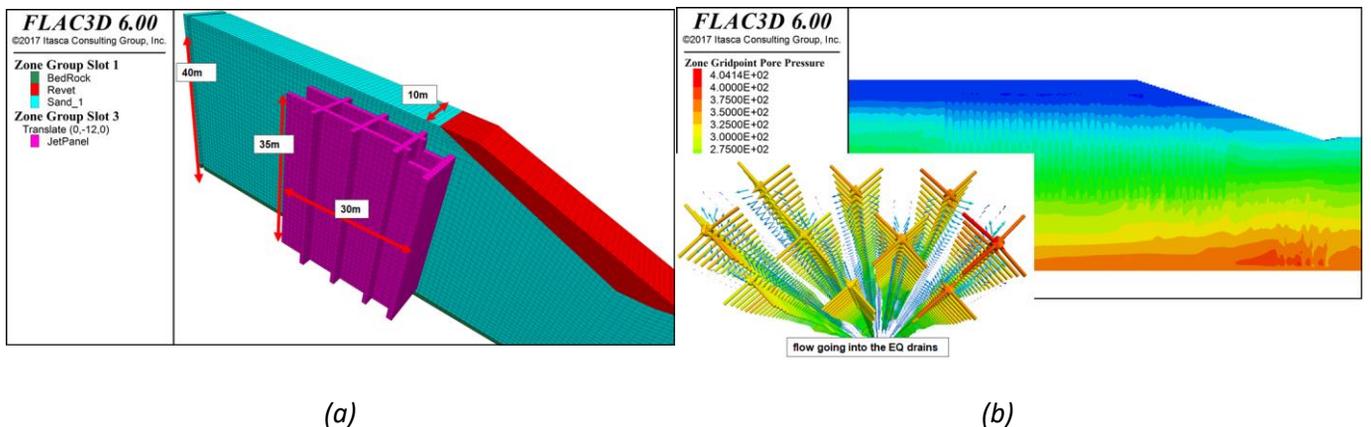
Itasca has been contracted to investigate the feasibility of different ground improvement technologies to mitigate the liquefaction hazard and limit lateral soil spreading.

Itasca has planned and interpreted the soil investigation using empirical correlations based on Seismic Cone Penetration (SCP) tests, generated the mandated suite of 11 ground motions using response spectrum matching techniques, and applied advanced fluid-dynamic coupled numerical models to evaluate and optimize the designs.

Three solutions are currently under investigation: a) Jet grouting cells, b) earthquake drains, and c) a combination of jet grouting walls and earthquake drains.

## PROJECT RESULTS

The numerical analysis indicates that there is no significant difference between the three grid sizes investigated. Therefore, the conservative 7 m by 7 m grid proposed by the contractor was approved by the owner, resulting in both cost savings and reduced construction time.



FLAC3D models of soil improvement showing (a) jet grouting cells and (b) earthquake drains.