

Field Trials of Microbial Induced Desaturation (MID) Retreatment for Liquefaction Mitigation of Fine- grained Soils



Christchurch 2011 Earthquake.

MS Defense

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Abstract

Low-plasticity silts are susceptible to earthquake-induced liquefaction, posing significant risks to infrastructure and lifelines. Microbial-induced desaturation (MID) is an emerging ground improvement technique that mitigates liquefaction by reducing soil saturation through generation of nitrogen gas, which displaces pore water, thereby increasing the soil's cyclic resistance. This study discusses field-scale MID retreatment trials done at a liquefiable silt site in Portland, Oregon. The site was initially treated in 2019, and indicated resaturation after five years, motivating evaluation of MID retreatment feasibility and performance. Retreatment involved reinjecting MID solution into the previously treated zone and monitoring the soils saturation levels with in-situ moisture and electrical conductivity sensors and a seismic crosshole. Monitoring results indicated decreased volumetric water content, increased electrical conductivity, and reduced pressure wave velocities, demonstrating that MID retreatment effectively restores desaturation and enhances long-term liquefaction resistance.