The Geo-Institute Engineering Geology and Site Characterization Technical Committee will live-stream the *session "Subsurface Investigation and Characterization of Bio-Based Ground Improvement"* on Monday, December 8, at 11 AM EST. The talks include:

***Talk #1:* Long-term monitoring of Microbially Induced Desaturation in Fine-grained Soils (Presented by Diane Moug, Ph.D., M.ASCE)**

Earthquake liquefaction hazards in silty soils are a critical problem in Portland, Oregon and other areas around the world. This is a particular problem for existing facilities founded upon silty liquefiable soil, for which there exists no cost-effective mitigation solution at the present time. Recent studies suggest that liquefaction mitigation using microbially-induced desaturation (MID) may provide the capability to do this. The objective of MID is to reduce earthquake-induced excess pore water pressure generation compared to saturated soil, and thereby reduce the potential for triggering liquefaction. This presentation will describe two field trials of MID for liquefaction mitigation performed at low-plasticity silt sites in Portland, OR in summer 2019. Monitoring at both sites indicated that liquefiable silts were successfully desaturated. Long-term monitoring at one site suggests that desaturation has sustained for over 4 years.

***Talk # 2*: Subsurface Investigations to Characterize the Spatial Distribution of Microbially Induced Desaturation (Presented by Aaron Gallant, Ph.D., P.E., M.ASCE)**

Microbially induced desaturation (MID) is a viable ground improvement method for liquefiable soils. During the treatment phase, a nutrient solution of calcium acetate and calcium acetate is injected into the subsurface. Native microbes are stimulated by the treatment solution to perform a denitrification reaction that consumes the substrates and produces nitrogen gas. The ability to characterize the spatial distribution of the treatment solution and gas is necessary for implementation of MID in engineering practice. This study details a field investigation at a site in Portland, Oregon that was treated with MID in 2019. The objective of the investigation was to characterize the current extent of MID. The investigation consisted of electrical resistivity tomography surveys, seismic pressure wave velocity surveys, and groundwater sampling. The estimated current extent of MID, five years after treatment, is presented. The study allows evaluation of these investigation techniques within the context of MID application in engineering practice.

***Talk # 3*: Field Assessment and Monitoring of Microbially Induced Carbonate Precipitation for Erosion Mitigation (presented by Brina Montoya, Ph.D., P.E., M.ASCE)**

Surficial application of microbially induced carbonate precipitation (MICP) has been demonstrated to reduce the erodibility of sandy soils. The results of a field trial on a coastal sandy slope will be presented. Various MICP treatment delivery systems were used, and in situ tests evaluated the distribution of the resulting cementation.

Erodibility was assessed using an in situ submerged jet erosion test (JET), the results of which correlated to the mass of precipitated carbonate. The MICP-treated slope was monitored over the course of a year, where it experienced a hurricane and snow events. The long-term monitoring demonstrated no change in cementation level over the year.

***Talk # 4*: Quality Assessment and Control during Field Applications of Microbially Induced Carbonate Precipitation for Soil Stabilization (presented by Leon van Paassen, Ph.D., M.ASCE)**

The potential of Microbial or Enzyme Induced Carbonate Precipitation (MICP/EICP) for soil stabilization has been demonstrated through several field trials. Ground stabilization through MICP typically involves injection (and extraction) of solutions containing bacteria, nutrients and/or chemical reagents, which induce a biochemical conversion in situ that results in the precipitation of calcium carbonate, which cements existing sand grains and increases strength and stiffness, while reducing porosity and permeability. During these field trials various methods have been used to assess process performance, including process parameters like flow rate, volumes, and concentrations of the injected fluids, chemical measurements in the extracted fluids such pH, electrical conductivity, and concentration of dissolved species (ammonium, ureum or calcium), non-destructive geophysical methods such as cross-hole shear wave velocity and geo-resistivity measurement or destructive assessment methods like cone penetration tests, or sampling and lab testing. Applicability, measuring principle and pros and cons of each of these test methods are presented.