The Geo-Institute **Deep Foundations Technical Committee** will live-stream on Friday, December 8, at 2 PM EST. The topics include:

"Underpinning 324 Building: Supporting Hanford Nuclear Site Remediation Efforts"

Mamoun Laraki, P.E., M.ASCE

The U.S. Department of Energy (DOE) Hanford Site had a multi-decade career of supporting America's defense system during World War II and the Cold War. A multi-reactor site, DOE Hanford produced plutonium for atomic weapons as well as steam for generating electricity. In addition, a network of non-nuclear facilities was built and utilized to support the research and development process, like 324 Building. Due to the extremely inefficient process of making plutonium, massive amounts of liquid and solid byproduct were generated and ultimately stored on site. In 1989, after closing its doors to plutonium production, the DOE, Environmental Protection Agency (EPA), and Washington State Department of Ecology took on a challenging, legally binding accord to clean up the Hanford Site.

As part of the final clean-up project within the 300 Area, Nicholson was contracted to design and construct an underpinning micropile system to support the excavation efforts directly underneath the 324 Building "B-Cell" structure to facilitate the complete removal of the contaminated soils directly beneath the structure. The work was completed in complex and challenging conditions that required an airtight drilling system, two layers of clothing, a hood with a Powered Air Purifying Respirator, the use of long reach tools, and continuous radiological monitoring.

This case study will address the design, construction, and challenges encountered with underpinning a structure within a highly sensitive category II nuclear environment.

"Constructing a Stormwater Storage Facility in a Glacial Valley Using CMGC Project Delivery"

Lola Moussey, P.E. and **Joe Welna**, P.E.

The Minnesota Department of Transportation (MnDOT) evaluated several concepts to minimize flooding at a low point of Trunk Highway 35W (TH35W) south of downtown Minneapolis. A deep stormwater storage facility (SSF) with lift station was selected and carried through final design. Given the restricted project footprint, and being directly adjacent to an active interstate, open excavation construction methods were not feasible, so circular cells composed of diaphragm walls (d-walls) were utilized as the structure walls and also to facilitate mass excavation of soil within the cells. The footprint of the SSF is located near the edge of a glacial erosional channel which contains glacial alluvial deposits including cobbles and

boulders. Understanding the ground conditions was critical in assessing constructability and determining the cost to complete the project. Multiple phases of geotechnical investigation were conducted including geophysics (Multichannel Analysis of Surface Waves), borings (mud-rotary and rotosonic), and pump testing.

This information supported the development of a geotechnical data report (GDR) and a geotechnical interpretive report (GIR) which were part of the project contract documents. Obstructions (including cobbles and boulders) were encountered at some of the borings conducted and therefore were anticipated to be encountered during construction. To minimize contingency carried in the Contractor's bid, it was decided by the Owner that the Contractor should assume no obstructions during d-wall construction, and obstructions encountered during construction would be paid using a project risk pool. The funds in the risk pool would be informed by the GDR and GIR. Obstructions were encountered during d-wall construction which impacted production and schedule. Methods of identifying, tracking, and paying for obstructions were agreed upon by the team prior to construction. The cells of the structure were successfully completed in 2022 with final completion of the SSF anticipated for the summer of 2023.

"Testing Methods for Geotechnical and Structural Evaluations of Auger-cast Piles and Drilled Shafts Deep Foundations," ***Mohamad Hussein,*** *P.E.,* M.ASCE

Auger-cast piles and drilled shafts are deep foundations commonly used to support all types of structures in various geotechnical and geologic conditions. They are designed to structurally and geotechnically resist combinations of loads to limit settlement. Testing is an integral part of the design and construction process for verification, quality control, and quality assurance. This presentation covers modern testing methods for assessments of geotechnical load bearing capacity and structural integrity. It includes bi-directional static load testing (BDLT), dynamic load testing (DLT), low-strain integrity testing (P.I.T.), Cross-hole Sonic Logging (CSL), Thermal Integrity Profiling (T.I.P.), and others. Basic principles, capabilities and limitations of each method are discussed and illustrated with data from actual projects.