GEO-INSTITUTE
Pittsburgh Chapter

THE ASCE PITTSBURGH SECTION
GEO-INSTITUTE CHAPTER PRESENTS

October 2016 Dinner Meeting
Ground Deformation Effects on Subsurface Pipelines and Infrastructure Systems

Presented By: *The 2016 Karl Terzaghi Lecturer: T.D. O'Rourke, Thomas R. Briggs Professor of Engineering Cornell University*

There are tens of millions of kilometers of pipelines worldwide used in water supplies, gas and liquid fuel delivery systems, electric power networks, and wastewater conveyance facilities. An overview of these critical infrastructure assets is provided. Soil-structure interaction affecting pipeline and underground conduit response to externally imposed ground deformation is examined, starting with stress transfer from soil to the circular surface of the pipe. Various models for soil-pipeline interaction are described, and a methodology is proposed for evaluating soil-pipeline interaction in granular soils for any direction of pipe movement at any depth. Suction-enhanced soil reaction to relative soil-pipe movement is discussed. Guidance is provided regarding soil-pipeline interaction modeling in which the pipeline is represented as a beam vs a three-dimensional shell. Large-scale laboratory testing and numerical modeling for the next generation hazard-resilient pipelines are described, and innovative ways of accommodating ground deformation are illustrated. Water supply system response to widespread liquefaction-induced ground deformation during the Canterbury Earthquake Sequence in New Zealand is evaluated with high density LiDAR and GIS analyses, and a methodology is presented for estimating pipeline damage as the combined response to liquefaction-induced differential settlement and lateral ground strain. The community impact of pipeline system performance is illustrated with respect to the role that the water supply plays in fire suppression in San Francisco.

Tom O'Rourke is the Thomas R. Briggs Professor of Engineering in the School of Civil and Environmental Engineering at Cornell University. His research interests cover geotechnical engineering, earthquake engineering, underground construction technologies, engineering for large, geographically distributed systems, and geographic information technologies and database management.

Date: **WEDNESDAY, OCTOBER 19, 2016**

Place: Engineers' Society of Western Pennsylvania
337 Fourth Avenue
Pittsburgh, PA 15222

Time: 6:00 PM Social Hour
7:00 PM Dinner
8:00 PM Presentation

PLEASE RSVP by contacting Mr. Alex Potter-Weight at APotter-Weight@menardgroupusa.com or by registering online at http://www.asce-pgh.org/.

Reservations received on or before 10/7/16:
$30 ASCE Pittsburgh Section Members
$40 Non-members
Students are Free

Reservations received between 10/8/16-10/12/16:
$35 ASCE Pittsburgh Section Members
$45 Non-members
Students are $10

Please select an entree:
Chicken Rubino
Lemon Sole Tambe
Tenderloin Beef Medallions
Vegetarian