Meeting of the Committee on Geological and Geotechnical Engineering

October 1

11 AM to 3:30 PM EDT

Virtual Meeting

https://nasem.zoom.us/j/97716205223?pwd=T3BUTlVRYTBIVkRBOUVNWDBMbjZlQT09

The National Academies of

SCIENCES • ENGINEERING • MEDICINE

https://nasem.zoom.us/j/97716205223?pwd=T3BUTlVRYTBIVkRBOUVNWDBMbjZlQT09

Committee on Geological and Geotechnical Engineering
Board on Earth Sciences and Resources
National Academies of Sciences, Engineering, and Medicine

October 1, 2020
11:00 – 3:30 PM Eastern
OPEN SESSION—to be held remotely
Incorporating Geo-professional Input into Improved Infrastructure Decision Making

Session Objective: Identify issues to which COGGE can respond and determine COGGE's next steps

The Committee on Geological and Geotechnical Engineering (COGGE) provides a forum for discussion among academic and professional groups, government agencies, and private industry to enhance geological and geotechnical engineering research, practice, and dissemination of information. COGGE's fall meeting will focus the nature of interactions between decision makers in the private and public sectors and geo-professionals (i.e., engineers and geoscientists who characterize or engineer with or in earth materials). Participants in the meeting will discuss how geo-related input might be successfully requested and provided to inform decisions related to, for example, geologic hazards and risks, mitigation options, geo-related delays or cost overruns, and lifecycle fiscal and performance management. The goal is to better understand how non-geo professionals seek, value, and use geo-related services and information (e.g., site characterization, risk-informed analysis), and how geo-professionals effectively communicate that information to decision makers (e.g., facility owners, contractors, project investors, and insurance companies) and can become active participants in engineering design of resilient infrastructure systems. The future role of COGGE in improving interactions between geo-professionals and decision makers will be considered.

11:00 **Introductions, description of session objectives**
Martin McCann, Chair, COGGE

Note: We are using polling questions to gather input from participants in real time. When prompted, please go to https://pollev.com/erice109 to respond.

11:15 **The infrastructure owner/manager perspective**
Andrew Linard, *Director of Water Engineering, Los Angeles Department of Water and Power.*

11:45 **When Geo-professionals influence decision makers: an engineer's perspective**
Eric Halpin, *Retired Deputy Dam and Levee Safety Officer, Headquarters, U.S . Army Corps of Engineers, Currently President of Halpin Consulting LLC*

12:15 Break

12:35 **Informing the underwriter**
Harold Magistrale, Staff Vice President, Principal Research Scientist, FM Global

1:05 **The policy and economic perspective**
Richard Geddes, Founding Director, Cornell Program in Infrastructure Policy, Cornell University

1:35: Break

1:55 **Panel discussion with speakers**
Moderator: Craig Davis, COGGE member

2:55 Group Discussion
Moderator: Martin McCann, COGGE chair

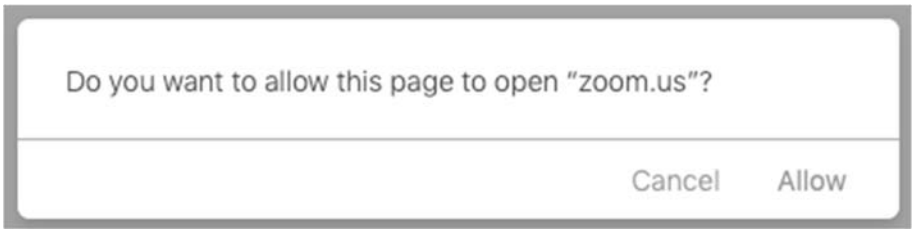
3:30 Open session adjourns

Zoom Connection Information

To Join Using a Web Use this Link:

https://nasem.zoom.us/j/97716205223?pwd=T3BUTlVRYTBIVkRBOUVNWDBMbjZlQT09

Depending on your default web browser, you may be prompted to open Zoom.



To Join via Phone

1. On your phone, dial the teleconferencing number provided in your invite.
2. Enter the meeting ID number when prompted using your dialpad.

Note: If you have already joined the meeting via computer, you will have the option to enter your 2-digit participant ID to be associated with your computer. If you have not joined on your computer, simply press # again when prompted to enter in your participant ID.

Dial(for higher quality, dial a number based on your current location):
US: +1 301 715 8592 or +1 646 518 9805 or +1 646 558 8656 or +1 651 372 8299 or +1 312 626 6799 or +1 470 250 9358 or +1 213 338 8477 or +1 253 215 8782 or +1 602 753 0140 or +1 669 219 2599 or +1 669 900 6833 or +1 720 928 9299 or +1 971 247 1195
Webinar ID: 977 1620 5223
Passcode: 611560
International numbers available: https://nasem.zoom.us/u/aegppgv5KT

Committee on Geological and Geotechnical Engineering

Statement of Task

The Committee on Geological and Geotechnical Engineering (COGGE) is the focal point within the Board on Earth Sciences and Resources for scientific, technical, and public-policy issues pertaining to the engineering applications of Earth Sciences. The committee's scope encompasses Earth processes and materials, including the mechanics of rock and soil, and focuses on safe and responsible human development, risk assessment, and mitigation of natural and anthropogenic hazards. The committee organizes and oversees studies:

1) to identify, investigate, and report on questions related to geological and geotechnical engineering to government, industry, academia, and the public;
2) to provide scientific and technical information to inform public policy on geological and geotechnical engineering issues;
3) to identify new technologies and potential applications; and
4) to promote the acquisition and dissemination of knowledge.

In addition, the committee provides a forum for discussion among academic and professional groups, government agencies, and private industry to enhance national and international cooperation and exchange of information.

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

COMMITTEE ON GEOLOGICAL AND GEOTECHNICAL ENGINEERING

2020 MEMBERSHIP

Terms expire 12/31 of the year indicated

Martin McCann, Chair (2020)
Adjunct Professor
Civil & Environmental Engineering
Stanford University
Menlo Park, CA

Pedro Arduino (2022)
Associate Dean for Infrastructure
University of Washington
Seattle, WA

Scott Anderson (2020)
Principal Geotechnical Engineer
BCG Engineering
Golden, CO

Craig A. Davis (2022)
Professional Consultant
C A Davis Engineering
Santa Clarita, CA

Jami Dwyer (2022)
Senior Mining Engineer
Barr Engineering Co.
Elko, NV

William H. Hansmire (2020)
Senior Vice President
WSP USA
Los Angeles, CA

W. Allen Marr, Jr. (2020)
Founder & CEO
Geocomp Corporation
Acton, MA

James K. Mitchell (2019)
University Distinguished Professor Emeritus
Virginia Tech
Blacksburg, VA

Ellen M. Rathje (2020)
Warren S. Bellows Centennial Professor
The University of Texas at Austin
Department of Civil, Architectural, and
Environmental Engineering
Austin, TX

John Stamatakos (2022)
Institute Scientist
Southwest Research Institute
Rockville, MD

National Academies Staff

Sammantha L. Magsino
Senior Program Officer
smagsino@nas.edu

Elleni Giorgis
Program Assistant
egiorgis@nas.edu

COMMITTEE ON GEOLOGICAL AND GEOTECHNICAL ENGINEERING

2020 Committee Member Biographies

MARTIN W. MCCANN (chair) is president of Jack R. Benjamin and Associates, Inc. and is also a consulting professor of civil and environmental engineering at Stanford University. At Stanford, he is a former chair of the National Performance of Dams Program, which created a national network to report dam safety incidents and to archive this information for use by the geotechnical and seismic engineering communities. Dr. McCann's professional background and research have focused on probabilistic hazards analysis including hydrologic events, risk assessment, reliability and uncertainty analysis, and systems analysis. He has been a consultant to several government and private sector groups in the U.S. and abroad and has served on three NRC committees including the Committee on Integrating Dam and Levee Safety and Community Resilience. Dr. McCann received a B.S. in civil engineering from Villanova University and an M.S. in structural engineering and a Ph.D. in civil engineering from Stanford University.

SCOTT A. ANDERSON is a principal geotechnical engineer at BGC Engineering in Golden Colorado. He has wide ranging geotechnical design and construction experience in the transportation, water resources, mining, and pipeline industries. His experience includes earthwork—retaining structures, foundation design and construction, and ground modification techniques. He is experienced in remote sensing, geophysical and drilling site characterization, and the determination of soil and rock properties and design parameters. He has provided oversight and review of design and construction as well as contributed to research and deployment of training and new technology in many areas of practice. Prior to joining BGC Engineering, Dr. Anderson was the Geotechnical Services Team Leader for the Federal Highway Administration (FHWA) Resource Center from 2008 to 2017; and prior to that, he held geotechnical leadership roles for the Federal Lands Highway Division of FHWA for 6 years. He was awarded the FHWA Engineer of the Year in 2014, he was the recipient of the K.B. Woods Award in 2016 from the Transportation Research Board for contribution to the design and construction of transportation facilities, and he served as the 2017 Jahns Distinguished Lecturer for the Association of Engineering Geologists and the Geological Society of America. Dr. Anderson holds a B.A. and M.S. in engineering geology from the University of Colorado, Boulder and Colorado State University, respectively. He received an M.S. and Ph.D. in civil engineering from the University of California, Berkeley.

PEDRO ARDUINO joined the geotechnical group in the University of Washington's Department of Civil and Environmental Engineering (UW DCEE) in 1997. His primary research interests are in computational geomechanics with emphasis in constitutive modeling of soils, finite element analysis, meshless techniques, soil structure interaction, and hazard analysis. Much of his current research is in the area of landslide and debris flow simulation, soil-structure interaction, and performance-based earthquake engineering. He has conducted research for the National Science Foundation, the Pacific Earthquake Engineering Research (PEER) Center, and the Washington State Department of Transportation (WSDOT). Dr. Arduino held the Ray Bowen Professorship for Innovation in Engineering Education from 2003 - 2007 and received the Outstanding Teaching Award from the UW DCEE in 2009. Dr. Arduino was a visiting professor at the Universidad Nacional de Córdoba, Argentina in 2004 and 2008 and at the Universidad de los Andes in Colombia also in 2008. He is a member of the ASCE EM Inelasticity and ER Earth and Retaining Structures committees and served on the editorial board of the *Journal of Geotechnical and Geo-environmental Engineering*. Dr. Arduino is a member of Geotechnical Extreme Events Reconnaissance Association and was part of the reconnaissance teams that visited Chile after the 2010 Maule earthquake, Japan after the 2011 Tohoku earthquake, and Mexico after 2017 Morelos-Puebla Mexico earthquake. He has also served as a consultant to private firms and government agencies in the U.S. and abroad. He earned his B.S.C.E.

from the Universidad Nacional de Cordoba, his M.S.C.E. from the University of Puerto Rico, and his Ph.D. from the Georgia Institute of Technology.

JAMI G. DWYER is a licensed professional engineer with 27 years of experience in the mining industry specializing in rock mechanics, blasting, operational efficiency, health and safety, maintenance strategies, mine design, and mine planning. Most recently, she was recruited by Barr Engineering to assist with business development in the mining sector for their Engineering and Design Business Unit. Previous to that, Mrs. Dwyer worked for Barrick Gold Corporation for nearly 11 years where she served in a variety of roles including management of engineering, maintenance, and mine operations departments. While with Barrick, she was also selected to lead a special interdisciplinary project team to develop software applications leveraging big data, machine learning, advanced analytics, and predictive analytics to predict failures of mining equipment components. Mrs. Dwyer spent 15 years employed by the National Institute for Occupational Safety and Health Office of Mine Safety and Health Research in Spokane, Washington, where she led and developed several rock mechanics research projects related to innovative geotechnical monitoring technologies, blast damage assessments, and evaluation of ground support. She was also instrumental in developing early versions of software to locate and analyze mine seismicity and rock bursts in deep underground hard rock mines. Mrs. Dwyer has served on the board of directors for the American Rock Mechanics Association and is a past chair of the Society of Mining, Metallurgy, and Exploration's Mining & Exploration Division's Executive Committee. She holds B.S. degrees in applied computer science and mining Engineering from Montana Technological University, and an M.S. degree in mining engineering from the University of Missouri-Rolla.

CRAIG A. DAVIS is a professional consultant on geotechnical, earthquake, and lifeline infrastructure system resilience engineering. During his 31.5 year career at the Los Angeles Department of Water and Power (LADWP) he worked as the departmental chief resilience officer, resilience program manager, seismic manager, geotechnical engineering manager and trunk line design manager. Dr. Davis developed a comprehensive LA water system resilience program and is involved in creating policy for improving infrastructure systems to threats and hazards. He has investigated and evaluated numerous dams and tunnels, managed several multimillion dollar projects, and implemented unique and innovative designs while aiding the development of new technologies and their applications. Dr. Davis served on the National Earthquake Hazards Reduction Program (NEHRP) Advisory Committee on Earthquake Hazards Reduction (ACEHR) for 6 years. He is the founding executive committee chairperson for the ASCE Infrastructure Resilience Division. Dr. Davis was honored with the ASCE's 2016 Le Val Lund Practice Award for Lifeline Risk Reduction. Dr. Davis has published over 125 technical papers and also organized and coordinated numerous international workshops and symposiums on geotechnical engineering and lifeline system resilience. Dr. Davis is a California licensed civil and geotechnical engineer and received a B.S. in Civil Engineering from the California Polytechnic State University in San Louis Obispo, an M.S. in civil engineering with emphasis in structural earthquake engineering from the University of Southern California, and a Ph.D. in civil engineering with emphasis in geotechnical earthquake engineering from the University of Southern California.

WILLIAM H. HANSMIRE (NAE) is a senior vice president in WSP's Geotechnical and Tunneling Technical Excellence Center in Los Angeles with expertise in project management, and geotechnical and tunnel engineering. His 40-year career has encompassed roadway, heavy rail, transit, water, and wastewater projects—mostly tunnels. He is the underground design manager for the Los Angeles Metro Regional Connector Transit Corridor Project—a 2-mile tunnel with 3 underground transit stations connecting two existing light rail lines in the heart of downtown Los Angeles. He holds a B.S. degree in civil engineering from the University of Nebraska-Lincoln, M.S. and Ph.D. degrees in civil engineering from the University of Illinois at Urbana-Champaign, and is a licensed professional engineer in several states. He is an

emeritus member of the TRB Committee on Tunnels and Underground Structures and a member of ASCE (fellow) and the NAE.

W. ALLEN MARR, JR. (NAE) is the founder and chief executive officer of Geocomp Corporation, one of the United States' foremost providers of real-time, web-based performance monitoring of civil engineering structures. Among his technical contributions during his 45-year professional career are the development of techniques for monitoring the stability, movement, and pressure in earthwork projects using sensors, wireless communications, automated analysis, and visualization of data. By applying these techniques, Dr. Marr enabled full-scale construction projects to be built more safely and efficiently and at a lower cost. Dr. Marr and his Geocomp colleagues also developed and use the concept of Active Risk Management to help clients identify and proactively manage risks associated with construction and operation of infrastructure. Over the past 30 years, he has consulted on a number of major projects in the United States and abroad including Boston's Central Artery Tunnel, Dulles International Airport, the new World Trade Center, and projects in The Netherlands, Japan, Venezuela, and Korea. He was elected to the National Academy of Engineering for his innovative applications of numerical methods, risk analysis, advanced laboratory techniques, and field instrumentation to geotechnical engineering and construction. In 2018 he serves as president of the ASCE's Academy of GeoProfessionals. Dr. Marr received a B.S. degree in civil engineering from the University of California at Davis and M.S. and Ph.D. degrees in civil engineering from the Massachusetts Institute of Technology.

JAMES K. MITCHELL (NAS/NAE) is a University Distinguished Professor Emeritus at Virginia Tech. Prior to joining Virginia Tech in 1994, he served on the faculty at the University of California, Berkeley, where he held the Edward G. Cahill and John R. Cahill Chair in the Department of Civil and Environmental Engineering until the time of his retirement in 1993. His primary research activities focused on experimental and analytical studies of soil behavior related to geotechnical problems, admixture stabilization of soils, and soil improvement and ground reinforcement, among other topics. He has authored more than 400 publications, including the graduate level text and geotechnical reference *Fundamentals of Soil Behavior*. A licensed civil engineer and geotechnical engineer in California and professional engineer in Virginia, Dr. Mitchell has served as chairman or officer for numerous national and international organizations including chairman of the U.S. National Committee for the International Society for Soil Mechanics and Foundation Engineering. His awards include the Norman Medal, the Walter L. Huber Research Prize, the Terzaghi Lecture Award and the Outstanding Projects and Leaders Award from the American Society of Civil Engineers, and the NASA Medal for Exceptional Scientific Achievement. He was elected to the National Academy of Engineering in 1976 and to the National Academy of Sciences in 1998. Dr. Mitchell received a B.C.E. degree from Rensselaer Polytechnic Institute, and S.M. and Sc.D. degrees in civil engineering from the Massachusetts Institute of Technology.

ELLEN M. RATHJE is the Warren S. Bellows Centennial Professor in the Department of Civil, Architectural, and Environmental Engineering at the University of Texas at Austin (UT) and senior research scientist at the UT Bureau of Economic Geology. Her expertise is in the areas of seismic site response analysis, engineering seismology, seismic slope stability, field reconnaissance after earthquakes, and remote sensing of geotechnical phenomena. Dr. Rathje is a founding member of the Geotechnical Extreme Events Reconnaissance (GEER) Association, and she was a member of the board of directors of the Earthquake Engineering Research Institute from 2010-2013. She is the principal investigator for the DesignSafe-CI.org cyberinfrastructure for the NSF-funded Natural Hazards Engineering Research Infrastructure and co-PI for the Center for Integrated Seismicity Research at the Bureau of Economic Geology. She has been honored with various research awards including the 2018 William B. Joyner Lecture Award from the Seismological Society of America and the Earthquake

Engineering Research Institute and the 2010 Huber Research Prize from the American Society of Civil Engineers (ASCE). She was named a fellow of the ASCE in 2016. She received her B.S. degree in civil engineering from Cornell University in 1993 and her M.S. and Ph.D. degrees in civil engineering from the University of California at Berkeley in 1994 and 1997, respectively.

JOHN STAMATAKOS is a geologist and geophysicist with extensive domestic and international research experience. His areas of expertise include structural geology, earthquake seismology, tectonics, paleomagnetism, and exploration geophysics. He is currently an institute scientist at Southwest Research Institute (SwRI). During his 25-year tenure at SwRI, he has provided technical support for seismic hazard assessments of critical nuclear facilities, principally in support of U.S. Nuclear Regulatory Commission (NRC) programs. He also supported technical and research activities on a variety of other natural hazard assessments including fault displacements, tsunamis, volcanoes, tornadoes, and other severe storms, floods, and landslides. Dr. Stamatakos has also served as an NRC expert witness in the Atomic Safety Licensing Board's adjudicatory process hearings on volcanic and seismic contentions for several NRC licensing actions. He is currently a member of the participatory peer review panel for the seismic hazard re-evaluation of Spanish nuclear power plants. Dr. Stamatakos is past associate editor of the Geological Society of America Bulletin and EOS and has served as a regular reviewer of papers for many leading scientific journals. Dr. Stamatakos earned his B.A. in geology from Franklin and Marshall College, and his M.S. and Ph.D. from Lehigh University in geology and geophysics. He also completed a two-year post-doctorate study at the Eidgenössische Technische Hochschule, Institut für Geophysik in Zürich, Switzerland and a three-year research and faculty position at the University of Michigan.

Speaker Biographies

Richard Geddes is Professor in the Department of Policy Analysis and Management (PAM) at Cornell University and a core faculty member with the Cornell Institute for Public Affairs (CIPA). Rick is Founding Director of the Cornell Program in Infrastructure Policy, or CPIP. He is a Visiting Scholar at the American Enterprise Institute and a Research Fellow with the Mineta Transportation Institute at San Jose State University. Rick's publications have appeared in leading academic journals including the American Economic Review, Journal of Regulatory Economics, Journal of Legal Studies, Journal of Law & Economics, and Journal of Law, Economics, and Organization, among many others. He is author of the 2011 AEI book entitled, The Road to Renewal: Private Investment in U.S. Transportation Infrastructure. He teaches courses at Cornell on infrastructure policy, corporate governance, microeconomics, and the regulation of industry. Rick holds MA and Ph.D. degrees in economics from the University of Chicago, and a BS in economics and finance from Towson State University.

Eric Halpin brings 40 years' experience in dam, levee, geotechnical, and risk engineering, recently as an independent consultant, but most significantly in the U.S. Army Corps of Engineers, where he led the agency Dam and Levee Safety Programs as well as the National Levee Safety program. Mr. Halpin earned his B.S. and M.S. in Civil engineering from Clemson University and Oklahoma State University, respectively. He is a licensed Professional Engineer in Georgia.

Andrew L. Linard, Director of Water Engineering & Technical Services for the Los Angeles Department of Water and Power, Water System. A 29-year employee of the Department, Mr. Linard has an extensive background in civil, structural, and pipeline design. In addition, Mr. Linard has held a number of increasingly-responsible management positions in the Department's Water Distribution, Water Engineering & Technical Services, and Water Quality Divisions. As Manager of Distribution Engineering for the Water Distribution Division, Mr. Linard was responsible for the infrastructure replacement program for the Department's 7500 miles of pipeline and appurtenances. As the Assistant Director of the Department's Water Engineering & Technical Services Division, Mr. Linard was responsible for managing the civil, structural, geotechnical, electrical, and mechanical design as well as materials testing and survey support for the $750M annual Water System Capital Improvement Program. As Director of the Department's Water Quality Division, Mr. Linard was responsible for the Water System's accredited water quality laboratory and overall regulatory compliance. A former Naval Reserve Civil Engineer Corps officer, his experience includes service as an instructor at the Civil Engineer Corps Officer School in Port Hueneme, CA and contingency engineering support during a wartime deployment with the Thirtieth Naval Construction Regiment in Iraq's Al Anbar Province. Mr. Linard was a first responder to the 1994 Northridge earthquake and has overseen the Water System's Dam Safety Program, reservoir surveillance activities, and various seismic improvement programs. He previously served as the Logistics Chief and Planning Chief in the Water System's incident command organization. Mr. Linard is a California licensed Civil Engineer and received a B.S. from the Ohio State University.

Harold Magistrale is a Principal Research Scientist and technical team leader for geological sciences research at FM Global, where he is responsible for the worldwide earthquake risk zone maps that guide underwriting and field engineering decisions. Prior to joining FM Global eleven years ago, he was an Adjunct Professor at San Diego State University where he researched southern California faults, earthquakes, and crustal structure. Harold has a B.S. in Earth Sciences from U.C. Santa Cruz, a Ph.D. in Geophysics from Caltech, and a J.D. from the University of San Diego School of Law.