The Donald M. Burmister Lecture

Department of Civil Engineering and Engineering Mechanics
Columbia University

Infusing Sustainability into Civil Engineering Design: Value Proposition for Society and Engineering Practice

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December 10, 2013 (3:00-4:00 PM)
Davis Auditorium, Schapiro Center

This presentation provides an overview of the need for sustainability awareness in societal decision-making in the context of the availability of energy and natural resources in a rapidly changing world, with an emphasis on construction in transportation geotechnics. Examples are provided where recycled materials and high-volume industrial byproducts are used to promote more sustainable transportation infrastructure that has lower long-term cost, greater service life, and lower energy consumption and greenhouse gas emissions. Life-cycle analysis tools embedded in a software application for rating sustainable infrastructure are used to make practical assessments. The presentation illustrates how the engineer can infuse sustainability into design, providing value to society and the client.

About The Speaker: Dr. Craig H. Benson is an international expert in environmental engineering and science, a Distinguished Professor of Engineering, and a member of the US National Academy of Engineering. Dr. Benson serves as Director of Sustainability Research and Education and Co-Director of the Office of Sustainability at the University of Wisconsin-Madison (UW-Madison). He is also Chair of the Departments of Civil and Environmental Engineering and Geological Engineering. Dr. Benson has a BS from Lehigh University and MSE and PhD degrees from the University of Texas at Austin, all in Civil Engineering with an emphasis in geotechnical, geoenvironmental, and geological engineering.

Dr. Benson has been conducting experimental and analytical research related to protection of the environment for nearly three decades, with a primary focus on sustainable infrastructure; beneficial use of industrial byproducts; and environmental containment of solid, hazardous, radioactive, and mining wastes. His research includes laboratory studies, large-scale field experiments, and computer modeling. His recent research has focused on incorporating recycled materials and industrial byproducts into infrastructure to enhance sustainability through reductions in energy consumption, greenhouse gas emissions, and natural resource consumption. He emphasizes using quantitative metrics to assess sustainability using tools such as life cycle analysis (LCA). In the Office of Sustainability, Dr. Benson is responsible for coordinating all sustainability related education on the UW-Madison campus and for facilitating the interdisciplinary sustainability research enterprise across the UW-Madison campus.

Dr. Benson has received several awards for his work, including the Ralph Peck Award, the Huber Research Prize, the Alfred Noble Prize, and the Croes (twice), Middlebrooks, Collingwood, and Casagrande Awards from the American Society of Civil Engineers and the Award of Merit and the Best Practical Paper Award from ASTM International. Dr. Benson is a former Editor-in-Chief of the *Journal of Geotechnical and Geoenvironmental Engineering*. He currently serves as Vice President and President Elect of the ASCE Geo-Institute (GI) Board of Governors and is Vice Chair of the Executive Committee of ASTM Committee D18 on Soil and Rock. Dr. Benson is a member of the Academy of Distinguished Alumni at the University of Texas at Austin.

The late Prof. Donald M. Burmister (1895-1981) is one of the pioneers in the field of Soil Mechanics and Geotechnical Engineering. He established the Soils Laboratory at Columbia University in 1933. He was a faculty member for 34 years before retiring in 1963. During his tenure at Columbia University, he investigated earthworks and foundations for over 400 projects. Most notably among these were the Brookhaven National Laboratory, the Throgs Neck, Tappan Zee and Verrazano Narrows Bridges, the First New York World Fairs at Flushing Meadows, and the reconstruction of the White House in 1950. He has developed several soil testing methods and his soil classification system is still widely used. He also contributed to the first use of digital computer in conjunction with his theory of the layered pavement system.