ASCE National Captial Geo-Institute

Thursday, February 23th, 2023, 12:00 PM (EST)
Maggiano's Little Italy, McLean VA
1.0 Professional Development Hour (PDH)

STABILIZATION STUDIES FOR PROBLEMATIC SOILS: INNOVATIVE MATERIALS AND NEW PERSPECTIVES

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SPEAKER BIO

Dr. Anand J. Puppala currently serves as A. P. Wiley and Florence Chair of Zachry Civil and Environmental Engineering at Texas A&M University and is a Director of Center for Infrastructure Renewal (CIR) since 2019. He served as Associate Dean - Research in College of Engineering for 7+ years and was a Distinguished Scholar Professor of the Civil Engineering department at the University of Texas at Arlington (UTA) in Texas from September 1996 to August 2019. Dr. Puppala was the chair of Soil Mechanics section (AFS00) of the Transportation Research Board (TRB). He chaired ASCE's Geotechnical Institute's "Engineering Geology and Site Characterization" committee and TRB committee on 'Soil and Rock Instrumentation'. He is currently serving as a board of governor of ASCE-GI.

Dr Puppala has been conducting research on sustainable stabilization of expansive soils, combined sustainable and resiliency assessments of ground improvement works, use of recycled materials in geotechnical works, UAVs for infrastructure monitoring studies and proactive asset management studies, dam safety and embankments slope studies, and coastal infrastructure resilience studies. Dr. Puppala has been a recipient of several major research grants totaling over 30+ Millions of dollars from federal, state and local government agencies. Dr. Puppala is the director of NSF's Industry University Co-operative Research Center (IUCRC) site on Composites in Civil Infrastructure (CICI) at TAMU and the focus of this center is to bring out sustainability aspects of the research studies performed at the center. Dr. Puppala's research scholarly record included 500+ publications including 220+ Journals and he has also edited seven special publications. He has supervised 42 Doctoral and 52 Masters' thesis students and is currently advising 9 doctoral students and three postdoctoral fellows. Dr. Puppala is an editorial member for several major journals in Civil Engineering including ASCE Journal of Geotechnical and Geoenvironmental Engineering, ASTM Geotechnical Testing Journal and also edited

several books including seven ASCE Special Publications. He has given several keynote and invited talks all over the World including a prestigious ASCE GI Peck talk at 2020 GeoCongress Meeting held at Minneapolis, Minnesota.

ABSTRACT

Construction of pavements and other lightweight structures on expansive soils is a considerable cause of concern for transportation infrastructure practitioners around the USA. Pavement undergoes rutting, cracking, shoulder dropping, and differential heaving during its service life due to non-uniform moisture cycles, and consequently, the long-term durability of the structures is severely impacted. Among the available methods, stabilization using calcium-based stabilizers such as lime is one of the most used techniques, considering the ease of construction and low cost of virgin materials for building the transportation infrastructures. Stabilization of high plasticity index soils with lime results in the formation of pozzolanic reaction products, which binds the soil matrix and imparts the desired engineering soil properties. However, the pozzolanic reactions being a slow process, need considerable time before the final strength or stiffness is achieved. Furthermore, the application of calcium-based stabilizers is also a significant cause of concern for subgrade soils with high levels of soluble sulfates. Research team members under the supervision of Dr. Puppala at TAMU have been extensively working on developing novel treatment techniques to mitigate the above problems associated with traditional ground treatment techniques. The presentation highlights studies that show the application of novel co-additives such as Geopolymers and silica fines for novel stabilization methods. The presence of the silica phases, as well as Geopolymer, improves the engineering properties of interest, durability, and permanency of the soil treatment. Sustainable benefits of these methods provided mixed results, and this is expected as these are new materials in the commercial sector. Overall, the application of these new treatment techniques will be of immense help for transportation agencies, and their usage would also promote long-term sustainable benefits.