

Sustainable Civil Infrastructures

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Sustainable Civil Infrastructures (SUCI) is a series of peer-reviewed books and proceedings based on the best studies on emerging research from all fields related to sustainable infrastructures and aiming at improving our well-being and day-to-day lives. The infrastructures we are building today will shape our lives tomorrow. The complex and diverse nature of the impacts due to weather extremes on transportation and civil infrastructures can be seen in our roadways, bridges, and buildings. Extreme summer temperatures, droughts, flash floods, and rising numbers of freeze-thaw cycles pose challenges for civil infrastructure and can endanger public safety. We constantly hear how civil infrastructures need constant attention, preservation, and upgrading. Such improvements and developments would obviously benefit from our desired book series that provide sustainable engineering materials and designs. The economic impact is huge and much research has been conducted worldwide. The future holds many opportunities, not only for researchers in a given country, but also for the worldwide field engineers who apply and implement these technologies. We believe that no approach can succeed if it does not unite the efforts of various engineering disciplines from all over the world under one umbrella to offer a beacon of modern solutions to the global infrastructure. Experts from the various engineering disciplines around the globe will participate in this series, including: Geotechnical, Geological, Geoscience, Petroleum, Structural, Transportation, Bridge, Infrastructure, Energy, Architectural, Chemical and Materials, and other related Engineering disciplines.

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Shanzhi Shu · Jinfeng Wang ·
Mena Souliman
Editors

Advances in Geotechnical Engineering & Geoenvironmental Engineering

Proceedings of the 6th GeoChina International
Conference on Civil & Transportation
Infrastructures: From Engineering
to Smart & Green Life Cycle
Solutions – Nanchang, China, 2021

 Springer

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ISSN 2366-3405

Sustainable Civil Infrastructures

ISBN 978-3-030-80141-0

<https://doi.org/10.1007/978-3-030-80142-7>

ISSN 2366-3413 (electronic)

ISBN 978-3-030-80142-7 (eBook)

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The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Introduction

This volume contains eight papers that were accepted and presented at the GeoChina 2021 International Conference on Civil Infrastructures Confronting Severe Weathers and Climate Changes: From Failure to Sustainability, held in Nanchang, China, September 18 to 19, 2021. It contains research data, discussions and conclusions focusing on a number of related geotechnical aspects of infrastructure. Topics include issues related to civil infrastructure such as temperature-induced lateral earth pressure on bridge abutment, subsidence of high-speed rail and expressway, application of recycled rubber mats, railway ballast evaluation, hurricane protection floodwall, tunnel portal stability, deep excavation case study and properties of contaminated soils. Various types of research were used in the various studies, including field measurements, numerical analyses and laboratory measurements. This findings and results should lead to more resilient infrastructure design, maintenance and management. It is anticipated that this volume will support practices regarding the optimal management and maintenance of civil infrastructures to support a more resilient environment for infrastructure users.

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About the Editors

Dr. Shanzhi Shu serves Senior Geotechnical Engineer supporting resolution of geotechnical challenges on Kiewit projects across North America and has been involved in numerous large-scale infrastructure development projects. He is a registered civil engineer in many states of USA and a registered geotechnical engineer in California. He completed his bachelor's degree and master's degree in engineering geology from Hebei Geo University and Jilin University, respectively, China, and doctoral degree in civil engineering from Washington State University in USA. He has about 30 years of both academic and industry experiences. He has authored, co-authored and edited about 30 journal and conference proceedings papers, book and technical reports. He currently also serves as a co-editor of International Journal of Geomechanics (ASCE).

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Mena Souliman, Ph.D., P.E., F. IRF. is an Associate Professor in civil engineering at the University of Texas at Tyler. He received his M.S. and Ph.D. from Arizona State University in civil, environmental and sustainable engineering focusing on pavement engineering. His 12 years of experience are concentrated on pavement materials design, fatigue endurance limit of asphalt mixtures, reclaimed asphalt pavement (RAP) mixtures, aggregate quality, field performance evaluation,

maintenance and rehabilitation techniques, pavement management systems, cement-treated bases, statistical analyses, modeling and computer applications in civil engineering.

Dr. Souliman has participated in several state and national projects during his current employment at the University of Texas at Tyler including “Documenting the Impact of Aggregate Quality on Hot Mix Asphalt (HMA) Performance, Texas Department of Transportation” for TxDOT, “Mechanistic and Economic Benefits of Fiber-Reinforced Overlay Asphalt Mixtures” for Forta Corporation as well as “Simplified Approach for Structural Evaluation of Flexible Pavements at the Network Level” which was funded by the US Department of Transportation via Tran-SET University Transportation Center.

Dr. Souliman has also participated in several state and national projects during his employment at Arizona State University and University of Nevada, Reno. He had previously worked as a postdoctoral scholar at University of Nevada, Reno, with the materials and transportation group. He had participated in several national research projects such as the FHWA Project titled “Analysis Procedures for Evaluating Superheavy Load Movement on Flexible Pavements” as well as Asphalt Research Consortium (ARC) projects including “Design System for HMA Containing a High Percentage of RAP Material.” Before that, he had worked at Arizona State University where he was the major contributor in the NCHRP 9-44A project entitled “Validating an Endurance Limit for HMA Pavements: Laboratory Experiment and Algorithm Development.”

Dr. Souliman has more than 100 technical publications, conference papers and reports in the fields of pavement and aggregate testing, characterization and field monitoring. He is the recipient of the lifetime International Road Federation Fellowship in 2009. In 2017, his research work on pavement engineering-related projects earned recognition as his college’s recipient of the Crystal Talon Award, sponsored by the Robert R. Muntz Library, recognizing outstanding scholarship and creativity of faculty from each college as determined by their dean. He also was awarded with the Crystal Quill award in 2018 by the University of Texas at Tyler for his research efforts and achievements.