

Construction Research Congress 2020



Safety, Workforce, and Education

- >> Selected Papers from the Construction Research Congress 2020
- >> Construction Research and Innovation to Transform Society
- >> Tempe, Arizona | March 8–10, 2020



EDITED BY Mounir El Asmar, Ph.D.;
David Grau, Ph.D.; and

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CONSTRUCTION
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CONSTRUCTION RESEARCH CONGRESS 2020

Safety, Workforce, and Education

SELECTED PAPERS FROM THE CONSTRUCTION
RESEARCH CONGRESS 2020

March 8–10, 2020
Tempe, Arizona

SPONSORED BY

Arizona State University
Construction Research Council
Construction Institute of the
American Society of Civil Engineers

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Pingbo Tang, Ph.D.



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Preface

The Construction Research Congress (CRC) 2020 Organizing Committee, Arizona State University (ASU), the Construction Research Council, and the Construction Institute of the American Society of Civil Engineers (ASCE) are all pleased to present the CRC 2020 Proceedings. CRC is one of the prime international conferences in the area of construction engineering and management; it is held every two years, providing one university the privilege to serve and host our peers from around the globe to facilitate an interactive exchange of ideas and research findings. CRC 2020 was hosted by Arizona State University (ASU) and its Del E. Webb School of Construction, in Tempe, Arizona, on March 8-10, 2020. Tempe is in the Phoenix metropolitan area, the fifth most populous city in the United States. It is home to the flagship campus of ASU, the nation's largest university by enrolment.

The theme for this conference is “*Construction Research and Innovation to Transform Society*.” As the built environment, including civil, industrial, building, and cyber infrastructure, evolves to support sustainable and resilient communities of the future, the construction industry will need to evolve. New infrastructure system developments are already transforming society in terms of safety, health, economics, and quality of life. A global network of construction stakeholders gathered at this event to share the state-of-the-art in research and practice for tackling the challenges of the 21st-century construction industry. This premier conference also provided an opportunity to inspire the next generation of construction leaders, emphasizing an interdisciplinary approach to research and innovation.

The Conference Proceedings contain a record number of 481 peer-reviewed technical papers, which stemmed from almost 900 abstract submissions. All submissions went through a two-step review process with a minimum of two external reviewers per paper, by a scientific committee of more than 500 international construction experts. The work

was presented at the conference in a variety of formats including short talks and posters. The resulting proceedings are divided into four volumes according to the following areas:

- Volume 1: Infrastructure Systems and Sustainability (101 papers)
- Volume 2: Computer Applications in Construction (143 papers)
- Volume 3: Safety, Workforce, and Education (90 papers)
- Volume 4: Project Management and Controls, Materials, and Contracts (147 papers)

On behalf of the Organizing Committee, ASU, the Construction Research Council and the ASCE Construction Institute, I hope you enjoy these CRC 2020 proceedings documenting our intellectually-stimulating conference.

Mounir El Asmar, Ph.D.

Conference Chair

Arizona State University

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