The Department of Civil and Environmental Engineering at the University of Houston presents...

CIVE 6111 Graduate Seminar

Decision Support Tool for Cost Estimating of Conventional and Accelerated Bridge Construction Methods

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2:45pm-3:45pm
Classroom Business Building (CBB) - Room 104
Zoom: https://uh-edu-cougarnet.zoom.us/j/94589160391

Abstract

Accelerated bridge construction (ABC) methods have been increasingly used for bridge rehabilitation and replacement projects in recent years. ABC methods use innovative planning, design, materials, and construction methods in a safe and cost-effective manner to reduce the onsite construction time. The main advantages of ABC method over conventional staged construction include reduced impact on traffic and mobility caused by onsite bridge construction, lane closures, and detours. Despite these advantages, ABC methods often require a higher initial cost and more planning, design coordination, and increased construction lead time. Decision makers need to accurately estimate total and life cycle costs of the two bridge construction methods to identify the most-cost effective method for different bridge construction projects. This presentation focuses on the development of a decision support tool (DST) for estimating the total and life cycle cost of conventional and accelerated bridge construction methods such as prefabricated elements, lateral slide, and self-propelled modular transporter. The DST is designed to provide DOT decision makers with much-needed support to generate accurate Rough Order of Magnitude cost estimate during the early project planning and engineering phases. The cost estimating DST was developed in six tasks that were designed to (1) collect historical cost data of various bridge projects constructed using both conventional staged construction and ABC methods; (2) create a database of all collected bridge cost data; (3) develop a construction cost module that enables DOT planners to develop rough order of magnitude estimates for each bridge construction method; (4) implement a road user cost module that estimates the cost to the travelling public resulting from detours and traffic delays during bridge construction; (5) develop a life cycle cost module that includes construction, road user, maintenance, and replacement costs; and (6) compare the construction, road user, and life cycle costs for each bridge construction method.

Bio

Khaled El-Rayes is a Professor of Construction Engineering and Management and Associate Head of the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign. El-Rayes has more than 30 years of professional experience in both academia and the construction industry. He taught numerous graduate and undergraduate construction engineering and management courses, and he was repeatedly selected in the “List of Teachers Ranked as Excellent by their Students” at the University of Illinois. He also served as PI and Co-PI on numerous research projects with budgets totaling more than $12 Million that were funded by the National Science Foundation, Illinois Department of Transportation, and National Center for Supercomputing Applications. The outcome of his research projects was published in more than 175 articles including more than 100 journal papers. The contributions of his research have also been recognized nationally and internationally, receiving many research awards including the “Best Conference Paper Award” from the ASCE Construction Research Congress in 2012, the “Best Journal Paper Award” in 2010 from the ASCE Journal of Construction Engineering and Management, and the “ASCE Thomas Fitch Rowland Prize” in 2007; the “NSF CAREER Award” from the National Science Foundation in 2003. El-Rayes supervised the research work of more than 30 Ph.D. students, including 22 former Ph.D. students who are currently holding faculty Positions in the University of Illinois, Purdue University, Columbia University, University of Colorado, US Air Force Institute of Technology, Florida International University, University of Santa Clara, University of Alexandria, Kuwait University, King Fahd University of Petroleum and Minerals, and King Saud University. El-Rayes served as the Secretary, Vice-Chair and Chair of the ASCE Construction Research Council, which is widely recognized as the premier national forum for Construction Engineering and Management research and it includes in its membership more than 200 professors and scholars.