# **Tran-SET 2022**

Proceedings of the Tran-SET Conference 2022

San Antonio, Texas, USA 31 August - 2 September 2022

### **Editors:**

Samer Dessouky Heena Dhasmana Marwa Hassan Louay Mohammad

ISBN: 978-1-7138-6369-4

#### Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2022) by American Society of Civil Engineers All rights reserved.

Printed with permission by Curran Associates, Inc. (2023)

For permission requests, please contact American Society of Civil Engineers at the address below.

American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 USA

Phone: (800) 548-2723 Fax: (703) 295-6333

www.asce.org

#### Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400

Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com Tran-SET 2022 v

## **Contents**

## Asphalt Materials

Evaluation of Moisture Susceptibility and Chemistry of Recovered	
Asphalt Binders	.1
Wionammad Najmush Sakib Oyan, Zamu Hossam, and Wostara Elsem	
Identification of Low Density Polyethylene, High Density Polyethylene, and	
Polypropylene in Asphalt Binder with a Handheld FTIR Spectrometer	.9
Md. Reazul Islam and Nazimuddin M. Wasiuddin	
Prediction of Performance of Asphalt Overlays Using Decision Tree  Algorithm	6
Elise Mansour, Momen R. Mousa, and Marwa Hassan	·U
Rheological, Chemical, and Water Resistance Properties of Asphalt	
Binders Modified with Selected Warm Mix Additives2	25
Mohammad Najmush Sakib Oyan and Zahid Hossain	
Cement Concrete	
Development of Ultra-High-Performance Engineered Cementitious	
Composites for 3D Printing Applications	5
Daniel Game, Ilerioluwa Giwa, Hassan Ahmed, Hassan Noorvand, Gabriel Arce,	
Marwa M. Hassan, and Ali Kazemian	
Direct Shear and Direct Tension Bond Assessment between Ultra-High	
Performance Concrete and Normal Strength Concrete4	5
William K. Toledo, Seyedsaleh Mousavinezhad,	
Gregory J. Gonzales, and Craig M. Newtson	
Effect of Portland Limestone Cement (Type IL) Combined with Bagasse	
Ash on the Compressive Strength and Setting Time of Engineered	
Cementitious Composites	6
Samuel Guidroz, Hassan Noorvand, Omar Omar,	
Sujata Subedi, and Marwa Hassan	
Effect of Using Calcium Lactate with Bacillus Pseudofirmus Bacteria on	
Self-Healing Efficiency of Bacterial Concrete	7
Omar Omar, Hassan Noorvand, Marwa Hassan, Sujata Subedi,	
Jose Milla, and Tyson Rupnow	

Effects of Supplementary Cementitious Materials on the Long-Term
Durability Properties of Concrete
Marwa Hassan, and Alan Meadors
Transmit Transmit, and Transmit Transmi
<b>Evaluation of Engineered Cementitious Composites (ECC) Reinforced with</b>
Cellulose Nanocrystals85
Andrea Gavilanes, Hassan Noorvand, Sujata Subedi, and Marwa Hassan
Stress Response Model for Engineered Cementitious Composites
Ultrathin Whitetopping (ECC-UTW)93
Ricardo Hungria, Hassan Noorvand, Marwa Hassan, and Heena Dhasmana
Toward 3D-Printable Engineered Cementitious Composites: Mix
Design Proportioning, Flowability, and Mechanical Performance102
Muhammad Saeed Zafar, Amir Bakshi, and Maryam Hojati
Construction
Adoption of E-Ticketing Technology in Highway Construction:
Roadblocks and Recommendations115
Karthik Subramanya, Sharareh Kermanshachi, Apurva Pamidimukkala,
and Karthikeyan Loganathan
E-Ticketing in Highway Construction: Reasons for Delayed Implementation125
Karthik Subramanya, Sharareh Kermanshachi, Apurva Pamidimukkala,
and Karthikeyan Loganathan
Impact of Construction Workers' Physical Health and Respiratory
Issues in Hot Weather: A Pilot Study135
Sanjgna Karthick, Sharareh Kermanshachi, and Karthikeyan Loganathan
Predicting the Retroreflectivity Degradation of Thermoplastic Pavement
Markings with Genetic Algorithm146
Ipshit I. Idris, Momen R. Mousa, Marwa Hassan, and Heena Dhasmana
<b>Utilizing E-Ticketing to Increase Productivity and Minimize Shortage of</b>
Inspectors
Karthik Subramanya, Sharareh Kermanshachi, Apurva Pamidimukkala, and Karthikeyan Loganathan
Geotechnical
Calibrations of the Innovative S <sub>3</sub> F Sensor for Shear Stress
Measurements in Soil
Hussein Alqrinawi, Hai Lin, and Shengli Chen

Use of Rice Husk Ash and Hydrated Lime as Stabilizing Agents for
Poor Subgrade Soils and Embankments
Tares Tarrium and Hossam Zamu
ITS
Traffic Signal Recognition Using End-to-End Deep Learning
Pavements
A Rapid In Situ Test Method for the Determination of Oxidative
Field Aging Using a Handheld FTIR Spectrometer
Md. Reazul Islam, Delmar Salomon, and Nazimuddin M. Wasiuddin
<b>Mechanical Properties of Ultra-High-Performance Concrete</b>
Containing Natural Pozzolan and Metakaolin200
Seyedsaleh Mousavinezhad, Gregory J. Gonzales, William K. Toledo,
Judit M. Garcia, and Craig M. Newtson
Structural Health Assessment of Pavement Sections in the Southern
Central States Using FWD Parameters209
Nitish R. Bastola, Mena I. Souliman, and Samer Dessouky
Safety
Benefits of E-Ticketing in Highway Construction and Its Future Integration219
Karthik Subramanya, Sharareh Kermanshachi, Apurva Pamidimukkala,
and Karthikeyan Loganathan
Development of Strategies to Improve Disaster Preparedness
and Mitigation in Construction of Mines
Apurva Pamidimukkala, Sharareh Kermanshachi, and Nikhitha Adepu
Effect of Cold Temperatures on Health and Safety of Construction Workers237
Sanjgna Karthick, Sharareh Kermanshachi, and Karthikeyan Loganathan
<b>Evaluation of Operational Challenges in Highway Construction</b>
Material Delivery
Karthik Subramanya, Sharareh Kermanshachi, Apurva Pamidimukkala, and Karthikeyan Loganathan
and Kartinkeyan Loganathan
Occupational Fatigue and Physical Health of Construction
Workers in Extreme Hot Weather259
Sanjgna Karthick, Sharareh Kermanshachi, and Karthikeyan Loganathan

Tran-SET 2022 viii

#### Structural

Climate Change Impacts on Reinforced Concrete Deterioration for Texas	
Highway Bridges	270
Ao Du and Jiannan Cai	
Cone Penetration Test (CPT) Based Liquefaction Hazard Investigation	
in Mississippi County of Northeast Arkansas	280
Mahat Rupesh, Hasan Md. Ariful, and Hossain Zahid	
<b>Determining Causes of Coal Mine Hazards: Prevention and Construction</b>	
Measures	289
Nikhitha Adepu, Sharareh Kermanshachi, and Apurva Pamidimukkala	
Studying Steel Fiber Reinforcement for 3D Printed Elements and Structures	299
Hassan Ahmed, Ilerioluwa Giwa, Daniel E. Game, Marc Hebert,	
Hassan Noorvand, Gabriel A. Arce, Marwa Hassan, and Ali Kazemian	
Case Study of Modulus of Deformation of Railway Earthworks by Static	
Plate Load Test	310
Md. Al-Amin and Zahid Hossain	
Fresh and Hardened Properties of Potassium Hydroxide Activated	
Metakaolin and Fly Ash-Based Geopolymer Mortars	320
Ruwa Abufarsakh, Hassan Noorvand, Gabriel Arce,	
Marwa Hassan, and Sujata Subedi	
Spatial Variability Effects of Wall Erosion on Assessment of Reinforced	
Concrete Sanitary Sewer Pipes (RCSSPs)	330
Moein Ebrahimi and Himan Hoiat Jalali	