## 2nd Transportation and Development Institute Congress

(T&DI 2014)

Orlando, Florida, USA 8-11 June 2014

**Editors:** 

**Amiy Varma** 

Geoffrey D. Gosling

ISBN: 978-1-63266-976-6

#### **Table of Contents**

### **Highway Pavements: Design, Materials, and Construction**

#### **Asphalt Pavement**

Open-graded Aggregate Base (OGAB) Controlling Subsurface Moisture Regime and Structural Stability from MnROAD Instrumentation Data  Yuanjie Xiao, Erol Tutumluer, and W. James Wilde	1
Volumetric Properties of Superpave Mixtures with Reclaimed Asphalt Pavement Nassim Sabhafer and M. Hossain	14
Estimate of Resilient Modulus of Graded Aggregate Base in Flexible Pavement Sung-Hee Kim, Jidong Yang, and Samuel Beadles	24
Correlation of Semi-circular Bending and Beam Fatigue Fracture Properties of Asphalt Concrete Using Non-Contact Camera and Crosshead Movement Shadi Saadeh, Hamed Hakimelahi, and John Harvey	39
Asphalt Mixtures I	
Accelerated Life Modeling of Superpave Mixtures C. Manandhar, M. Hossain, P. Nelson, and C. Hobson	49
Asphalt Pavement Analyzer Sensitivity to Specimen Preparation Procedures and Testing Parameters  John F. Rushing, Jesse D. Doyle, and Mariely Mejías-Santiago	59
Performance Evaluation of Low Volume Flexible Pavements - A Case Study N. R. Avinash, H. N. Vinay, D. Prasad, S. V. Dinesh, and J. K. Dattatreya	69
Rigid Pavement	
A Test Method to Measure the Freeze Thaw Durability of Fresh Concrete Using Overpressure  M. Tyler Ley and Bradden Tabb	79
Effect of Localized Friction Changes in the Layer Interface on Formation of Y-Cracks in CRCPs  A. F. Momeni, K. A. Riding, and D. Peric	88
Local Calibration of Rigid Pavement Cracking Model in the New Mechanistic- Empirical Pavement Design Guide using Bootstrapping Syed W. Haider, Wouter C. Brink, and Neeraj Buch	100
Rigid Pavement and Evaluation	
Prevention and Mitigation of ASR in Median Barriers with Varying Degrees of	111

Damage R. A. Deschenes Jr., C. D. Murray, and W. M. Hale	
Issues Related to Pavement Rehabilitation Design Options in the New Mechanistic- Empirical Pavement Design Guide  Syed W. Haider, Wouter C. Brink, Neeraj Buch, and Karim Chatti	121
Highway Materials	
Red Bus Lane Treatment Evaluation Steven P. Scalici, William Carry Sr., Eric Donnell, Zoltan Rado, and Martin R. Hartmann	<b>132</b> n
Effect of Installation Parameters on Performance of Hot-Poured Crack Sealants	142
Pranshoo Solanki, Hasan Ozer, Seyed Saleh Yousefi, and Imad L. Al-Qadi	
Clogging Potential of Recycled Concrete in Road Drainage Zachary Behring, BooHyun Nam, Jinyoung Kim, Manoj Chopra, and John Shoucair	153
Effects of Aggregate Mineralogy on the Thermal Expansion Behavior of Concrete  Kazi Tasneem, Sung-Hee Kim, Jinyoung Kim, Boo Hyun Nam, and Youngjoo Park	163
Contemporary Pavement Issues	
Condition Assessment Using Ride Quality  A. L. Simpson, G. R. Rada, B. A. Visintine, J. L. Groeger, and N. Saadatmand	173
Pavement ME Design Distress Modeling for Oklahoma  Kelvin C. P. Wang, Qiang Joshua Li, Stephen A. Cross, and Jeff Dean	183
Traffic Loading Spectra Characterization for Pavement ME Design in A Production Environment Qiang Joshua Li, Kelvin C. P. Wang, Cheng Chen, Vu Nguyen, and Zhongjie "Doc" Zha	<b>197</b>
Asphalt Mixtures II	9
Laboratory and Field Toughening Characteristics of Fiber Reinforced Hot-Mix Asphalt Mixtures  Byung Sik Ohm, Ji Young Choi, Booil Kim, and Pyeong Jun Yoo	208
Assessing the Rut Performance of Warm Mixes in North Dakota N. Suleiman and S. Mandal	221
Evaluation of Foam-based Warm Mix Asphalt Modified with Nano-sized Hydrated Lime Using Multiple Creep and Recovery Tests  Aboelkasim Diab and Zhanping You	230
Comparison of Performance Properties of Terminal Blend Tire Rubber and Polymer Modified Asphalt Mixtures  Alireza Zeinali, Phillip B. Blankenship, and Kamyar C. Mahboub	239

Effects of Existing Condition and Overlay Property on Asphalt Overlay Design and Performance  Hao Wang and Jiao Nie	249
Rolling Wheel Deflectometer for Pavement Evaluation Paul W. Wilke	259
Evaluation of Long-Term Pavement Performance Based on New Mexico LTPP SPS5 Data  Umme Amina Mannan and Rafiqul A. Tarefder	269
Image-Based Modeling of the Dynamic Complex Modulus Test for Asphalt Concrete  Hao Ying, Mostafa A. Elseifi, Louay N. Mohammad, and Marwa Hassan	280
SMA Mixtures with Modified Asphalt and Treated Aggregates Goutham Sarang, Lekha B. M., Monisha M., and Ravi Shankar A. U.	290
Transportation Operations and Safety	
Roundabout Design Considerations	
Analysis of Fuel Consumption and Emissions at Roundabout with Slip Lane, Using SIDRA and Validation by MOVES Simulation  Majed Al-Ghandour	300
A Decision Analysis Tool: Experimental Analysis of Roundabout Slip Lanes under Unbalanced Traffic Volumes  Majed Al-Ghandour	311
Safety Performance and Risk Management for Highways	
Safety Performance Functions for Florida's Freeways  J. Lu, K. Haleem, A. Gan, and P. Alluri	321
Roadway Safety Evaluation	
Wrong-Way Driving Incidents on Central Florida Toll Road Network, Phase-1 Study: An Investigation into the Extent of this Problem?  John H. Rogers, Haitham Al-Deek, and Adrian Sandt	332
Safety Experience of Young Drivers in Comparison to Experienced Drivers  Sunanda Dissanayake and Niranga Amarasingha	344
Improving Safety at Unsignalized Rural Intersections in Kansas Alireza Shams and Sunanda Dissanayake	356
Microscopic Analysis for Accident Data at Railroad Grade Crossings J. C. Medina, S. Shen, and R. F. Benekohal	366

#### **Design Parameters for Signalized Intersections**

Investigation the Effect of Heavy Vehicles on Capacity of Signalized Intersection Based on Bayes' Theorem  K. Ghasemlou, A. Topal, S. Tanyel, M. M. Aydin, and A. A. Kazemi Afshar	ns 376
Field Evaluation of a SynchroGreen Adaptive Signal System J. So, A. Stevanovic, E. Posadas, and R. Awwad	388
INTQ: A Mesoscopic Simulation to Analyze Intermittent Queues in Work Zones Hani Ramezani and Rahim F. Benekohal	400
Analyzing Pedestrian Behavior during Exclusive Pedestrian Phases for Improved Intersection Signal Timing  J. C. Medina, E. G. Lo, and R. F. Benekohal	410
Modern Highway Design, Construction, and Operations	
Guidelines for Mobility-based Work Zone Performance Specifications Shawn J. Larson, Mitsuru Saito, and Grant G. Schultz	420
Easing Congestion with Pedestrian Crossing at Midblock  Md. Shoaib Chowdhury	430
Analysis of Pedestrian Safety	
Funding Road Safety Programs and Projects in Bangladesh  Md. Shoaib Chowdhury	437
Analysis of Factors Influencing Pedestrian Injury Severity in Pedestrian- Vehicle Crashes  Yinan Zheng	448
Pedestrian Safety at Signalized Intersections Priyanka Alluri, Albert Gan, and Kirolos Haleem	458
Highway Safety Analysis	
Creating a Case Study to Teach Systematic Safety Analysis Using SafetyAnalyst Peter C. Kelly, Mitsuru Saito, and Grant G. Schultz	467
GIS Framework for Hierarchical Bayesian based Crash Data Analysis Grant G. Schultz, Clancy W. Black, and Mitsuru Saito	477
Exploration of Fractal Characteristics in Crash Data K. Haleem, A. Gan, and P. Alluri	487

# Cross-cutting Themes: Advanced Technologies, Infrastructure Systems, Intermodal Transportation, Planning, and Development

**Advanced Technologies for Transportation Applications** 

	Automated Joint Faulting Measurement Using 3D Pavement Texture Data at 1 mr Resolution	m 498
	Kelvin Wang, Lin Li, and Joshua Q. Li	
	Hydroplaning Risk Evaluation of Highway Pavements based on IMU and 1 mm 3D Texture Data Kelvin C. P. Wang, Wenting Luo, and Joshua Q. Li	511
	A Case Study: Geotechnical Instrumentation for Automated People Mover Tunnel at the World's Busiest Airport Vissu Dokka, W. Allen Marr, Kathy Masters, and Subash Kuchikulla	523
	nalysis of Transportation Infrastructure Damages and Fees Due to verweight Trucks	
	Simulation Modeling of Dynamic Response of Vehicles to Different Types of Speed Control Humps  Ali Abdi Kordani, Amirarsalan Mehrara Molan, Saeed Monajjem, and Eazaz Sadeghvaziri	533
A	dvancements in Infrastructure Management	
	Automatic Crack Detection by Multi-Seeding Fusion on 1mm Resolution 3D  Pavement Images  Bo Peng, Kelvin C. P. Wang, and Cheng Chen	543
	Use of Cellphone Application to Measure Pavement Roughness  Shahidul Islam, William G. Buttlar, Roberto G. Aldunate, and William R. Vavrik	553
	Pavement Condition Monitoring of Ultra-Thin Unbonded Concrete Overlay Using Fiber Reinforced Polymer Packaged Fiber Bragg Grating Sensors  Ying Huang, Leonard Palek, Robert Strommen, and Ben Worel	564
1	Advances in 3D modeling of Existing Subsurface Utilities  Carlo Pilia and James H. Anspach	574
G	eometric Design Considerations	
	Technology Transfer Centre Activities for Developing Transportation Engineering Professionals - A Case of Botswana Adewole Simon Oladele	584
	New Formulas of Side Friction Factor Based on Three-Dimensional Model in Horizontal Curves for Various Vehicles  Ali Abdi Kordani, Amirarsalan Mehrara Molan, and Saeed Monajjem	592
Fi	nance, Construction, and Operation of Infrastructure Systems	
1	Assessing the Financial Feasibility of Availability Payment PPP Projects  Goran Mladenovic and Cesar Queiroz	602
	Estimation of Highway Project Duration at the Planning Stage and Analysis of Risk Factors Leading To Time Overrun  Sidra Kaleem, Muhammad Irfan, and Hamza F. Gabriel	612

Case Studies in Urban Development	
Building Stakeholders Consensus in Transportation Projects via Multi-Criteria Decision Analysis Methods Dima Jawad and Leila El Sayed	627
Using the Transportation Performance Index to Understand the Impact of Regional Plans  Sue McNeil, Farzana Atique, Ryan Burke, and Susanne Trimbath	641
Resiliency and Reliability of Transportation Infrastructure	
Transportation Infrastructure Resiliency Guidelines for the Port Authority of New York & New Jersey  Susanne DesRoches and Scott Murrell	649
Assessment of Transportation System Reliability at Link-, Corridor- and Area- level	659
Srinivas S. Pulugurtha and Venkata R. Duddu	
Transportation Infrastructure Performance	
Performance Measurement for Transportation Infrastructure: The Paradigm for Transportation Planning in the 21 <sup>st</sup> Century  David S. Heller	669
Creating a Climate Zone Map for Mechanistic Empirical Pavement Designs N. Bandara, S. Henson, and K. Klieber	682
Performance of Ultra-Thin Bituminous Overlays Haritha Musty and Mustaque Hossain	692
Pavement Noise Analysis of Pavement Preservation Techniques in New Jersey  John Hencken, Edwin Haas III, Michael Tulanowski, and Thomas Bennert	702
Technology Transfer in Transportation Engineering	
Delivering Transportation Projects In A Digital World  Danny L. Kahler	711
Sensitivity of Reinforcement Learning Agents to Aggregated Sensor Data in Congested Traffic Networks  J. C. Medina and R. F. Benekohal	719

#### **Rail and Transit**

#### **Transit and the Behavior of Regional Transportation Systems**

The Emirates Air Line Cable Car an Innovative, Urban Transportation System	727
Alfred Fruehwirth and Johannes Winter	

The LYMMO BRT 15 Years Later Brian Pessaro and Martin Catala	737
High Speed Rail Another Look Herbert S. Levinson and John Allen	747
Rail and Transit Performance Analysis	
Performance Indicators for Rail Transport System in Nigeria.  Joyce O. Onatere, Christopher Nwagboso, and Panagiotis Georgakis	753
Optimizing Ultrasonic Rail Defect Inspection to Improve Transportation Safety and Efficiency X. Liu, C. T. Dick, and M. R. Saat	765
Enhancing and Providing Safety in Transit Facility Design Using Pedestrian Simulation  Steven P. Scalici and Han Pham	775
Buses as Probe Vehicles for Travel Time Data Collection on Urban Arterials Srinivas S. Pulugurtha, Ravi K. Puvvala, Rahul C. Pinnamaneni, Venkata R. Duddu, and Najaf	<b>785</b> Pooya
Evaluating the Performance of Innovative Intersections in Potential Transit Oriented Development Environments Ivana Tasic and Milan Zlatkovic	794
Aviation	
Airfield Pavement Design	
D-Cracking Rehabilitation at Kansas City International Jason Fuehne and Chris Decker	804
Correlation between Subgrade Reaction Modulus and CBR for Airport Pavement Subgrades K. Tuleubekov and D. R. Brill	813
Airfield Planning and Safety Considerations	
Least Cost Solution for "Short-Haul" Fights from Regional Airports to Dallas/Fort Worth International Airport (DFW) Ziaur Rahman, Stephen P. Mattingly, and Saty D. Satyamurti	823
Airfield Master Plan for McMurdo Station, Antarctica R. G. Thuma, D. R. Gregory, and R. Haehnel	836
Challenges and Recommendations for Secondary and Small Airports in the Presence of Low-Cost Carriers, Based on Case Studies in California Senanu Ashiabor and Wenbin Wei	846
Industry Best Practice for Airport Construction Safety and Phasing Plans	856

-	_			'	۰
"	•	υ	υ	•	۱

Joshua J. Horst and Patrick S. Murray

#### **Sustainability and Construction of Airfield Pavements**

<b>Key Components for the Effective Management of Airport Assets</b> David K. Hein	869
Funding Airport Ground Access Projects: Two Case Studies Geoffrey D. Gosling	882
Case Studies for Airfield Construction	
Case Study: Applying New Airport Design Standards	894
Angela Franklin and J. Gregory Huntley	