

Transportation Research Record: Journal of the Transportation Research Board

Volume 2679, Issue 10

October 2025

Part 1 of 2

ISBN: 979-8-3313-2903-7

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.

Published by Sage Publications USA

Copyright© (2025) by Transportation Research Board of the National Academies
All rights reserved.

ISBN (Print) 979-8-3313-2903-7

Printed with permission by Curran Associates, Inc. (2026)

For permission requests, please contact sagepub.com/journals-permissions

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

Contents

Research Articles

Properties and Structural Contributions of Engineered Emulsion Stabilized Cold Recycled Materials Based on Mixture Composition Variation <i>Ebubechukwu Al-Ihekwaba, Eshan V. Dave, and Jo E. Sias</i>	1
Live Load Models for Ethiopian Highway Bridges using Truck Weigh-in-Motion Data <i>Abrham Gebre, Binyam Wesenseged, Yisihak Gebre, and Getu Segni</i>	21
Optimizing Heterogeneous Capacitated Vehicle Routing with Linformer and Multi-Relationship Decoding: A Deep Reinforcement Learning Approach <i>Shunlong Li, Evangelos I. Kaisar, Daehan Kwak, Bin Hu, and Dan Liu</i>	39
Performance Effects of the New Displaced Left Turn and Median U-Turn Combination Design <i>Stephen Osafo-Gyamfi, Amirarsalan Mehrara Molan, Hayden Edwards, William Rasdorf, Ali Hajbabaie, and Peter Yu</i>	61
Characterizing Mechanical Responses of Composite Pavements in Falling Weight Deflectometer Testing for Structural Condition Evaluation <i>Cheng Zhang, Seonghwan Cho, Bongsuk Park, Pablo Orosa, Jin Li, and John E. Haddock</i>	79
Efficacy of Marine Electrical Resistivity Surveys to Determine Maximum Scour Depth and Scour Infill <i>Andrew Gombac, Stacey Kulesza, and Abed Almikati</i>	94
Estimation of Passenger Car Equivalents on Basic Freeway Segments from Field-Observed Traffic Data <i>Ponlathep Lertworawanich, and Lily Elefteriadou</i>	108
Evaluation of the Impact of Superheavy Load Movements on Flexible Pavement <i>Zafrul Khan, Hyung S. Lee, Ahmad Alhasan, Jamie Greene, and Hadi Nabizadeh</i>	125
Factors Influencing Preferences for Electric Motorcycles Among Various Motorcycle Driver Profiles in Bangkok <i>Ornicha Anuchitchanchai, Patanapong Sanghatawatana, and Saksith Chalermpong</i>	144
Roundabout Capacity Survey Method Using Vehicle Trajectory Data and Gap Acceptance Cycles <i>Gyoungsoon Chun, Nagui M. Roupail, and Rahmi Akçelik</i>	156
Improving a Regional-Scale Hurricane Evacuation Traffic Simulation Framework for Digital Twin Creation <i>Yunpeng Han, Ruijie Bian, and Xiangyu Meng</i>	171
Inequity-Averse Pavement Maintenance and Rehabilitation Budget Allocation Incorporating Gini Index and Social Vulnerability <i>Md Al Amin, and Randy B Machemehl</i>	186
Leveraging Lego Serious Play [®] in Examining Practitioner Perspectives of Shared Spaces <i>Kasun Wijyaratna, and Cecilia da Rocha</i>	206
Long-Term Performance Evaluation of Recycled Concrete Aggregate as a Base Material in Flexible Pavements <i>M. Reza Pouranian, Ylan Beaudoin de Roca, Junsu Jeong, Ohhoon Kwon, and Charles Holzschuher</i>	218

Mechanically Stabilized Earth Walls with Intersecting Horizontal Obstruction <i>M. Asad Ahmad, and Antonio Bobet</i>	231
Multicycle Co-Coordination-Based Gating Strategy for Arterials' Side Streets in Urban Networks <i>Taraneh Ardalan, Denis Sarazhinsky, and Aleksandar Stevanovic</i>	248
Impact of COVID-19 on Experienced Service Reliability Gap and its Changes Over Time in Public Transport <i>Mostafa Shafaati, and Mahmoud Saffarzadeh</i>	267
Water/Ice/Snow Depth-Detection Technology on Road and Airport Runway Pavement Surface: Literature Review <i>Yuhao Chen, Jin Wu, Xiaoxia Lu, Dadi Lin, and Yiwen Wang</i>	296
Bidirectional Long Short-Term Memory Approach for Infrastructure Health Monitoring Using On-Board Vibration Response <i>Reza Riahi Samani, Alfredo Nunez Vicencio, and Bart De Schutter</i>	344
An Ecological Cement Mortar Produced by Using Nanosilica and High Content of Metallurgical Waste Slag: Rheological, Mechanical, and Chemical Durability Study <i>Vu To-Anh Phan, Hamza Mechakra, Khaled Bouali, Alena Pribulová, Brahim Safi, Djamila Aboutaleb, and Mohammed Saidi</i>	357
Co-Simulation in Intelligent Transportation Systems: A Survey Targeting Connected and Autonomous Vehicles <i>Sima Ashayer, Firas Elhag, Pengyuan Sun, and Mina Sartipi</i>	371
Deriving Capacity and Critical Density of Basic Freeway Segments <i>Siavash Shojaat, Justin Geistefeldt, and Alexandra Kondyli</i>	399
Field Experimentation Quantifying Rail Creep in a Curve on a Steep Grade: Influence of Train Weight, Travel Direction, Speed, and Consecutive Train Passes <i>Jose Gustavo Venancio da Silva Ramos, Marcus S. Dersch, Arthur de Oliveira Lima, and J. Riley Edwards</i>	411
Finite Element Analysis of Reinforced Concrete Bridge Piers Under Sequential Vehicle Impact and Seismic Loads: Case Study <i>Jinghui Jiang, and Andrew D. Sorensen</i>	430
HLCG: A Hierarchical Lane-Changing Gaming Decision Model for Heterogeneous Traffic Flow on Two-Lane Highways <i>Tianyi Wang, Chong He, Hao Li, Yixuan Li, Yiming Xu, Yangyang Wang, and Junfeng Jiao</i>	449
Injury Severity Analysis along Major Arterial Roads in Kentucky Using High-Resolution Weather Data <i>Tathagatha Khan, Kirolos Haleem, Arunabha Banerjee, and Bharat Kumar Pathivada</i>	470
Long-Term Performance Evaluation of Reinforced Embankment Test Sections Over Extremely, Soft Compressible Soil: A Case Study in Louisiana <i>Gavin P. Gautreau, Masoud Nobahar, Mark J. Morvant, and Amirhossein Rahimi</i>	487
Optimal Routing Strategies for Last-Mile Delivery with a Fleet of a Single Truck and Multiple Heterogeneous Robots <i>Yuseon Yun, Hyeong Suk Na, and Sang Jin Kweon</i>	506
Signal Reconstruction Method for Lateral Displacement Response of Long-Span Suspension Bridges <i>Lingfeng Luo, Libo Meng, Zhanghao Liu, Jingbo Liao, and Deshan Shan</i>	535
Analyzing Consumer Attitudes and Decisions about Established, Emerging, and Future Vehicle Technologies: Qualitative Evidence from the California Vehicle Survey <i>Justin Curtis, Mark Fowler, Eric Kapner, and Aniss Bahreinian</i>	551
Data Security and Privacy Regulation in the U.S.A: A 50-State Legislative Survey <i>Trayce Hockstad, Mizanur Rahman, Mashrur Chowdhury, Khandakar Ashrafi Akbar, Md Nahiyan Uddin, and Latifur Khan</i>	564

Do Words Matter? Autonomous, Self-Driving, or Driverless Vehicles—The Impact of Word Choice on Individual Perceptions <i>Vasileios Volakakis, Hoseb Abkarian, Nadim Hamad, and Hani S. Mahmassani</i>	575
Dynamic Road Boundary Detection Using Sparse 3D-LiDAR in Complex Road and Environmental Conditions <i>Akshay Gupta, Ayush Kishore, Pushpa Choudhary, and Manoranjan Parida</i>	593
Enhancing Road Maintenance Prioritization: Single Index Screening and Unified Pavement Assessment Metric Integration <i>Saroch Boonsiripant, Ponlathep Lertworawanich, Auckpath Sawangsuriya, and Kuljira Jinakub</i>	616
Examining Speed Selection and Driver Yielding Behavior Toward Pedestrians and Bicyclists at Roundabouts <i>Nischal Gupta, Matin Mohammadpour, Sunday Imosemi, Yazmin Dasgar, Gagan Gupta, Peter Savolainen, and Timothy J. Gates</i>	629
How Does Pavement Friction Affect Motorcycle Crashes? A Florida Analysis <i>Huiqing Lyu, Zhenyu Wang, Pei-Sung Lin, Qing Lu, Emmeth Duran, and Peter P. Hsu</i>	647
Influence of Foggy Weather on Drivers' Situation Awareness in the Takeover Process of Level 3 Automated Vehicles: A Functional Magnetic Resonance Imaging Study <i>Zijian Lin, Feng Chen, Dong Lin, Sheng Dong, Chen Li, and Guimin Su</i>	662
Long-Term Performance of Alkali–Silica Reactive Aggregates in a 63-Year-Old Bridge in Alaska <i>Jose F. Muñoz, Chandni Balachandran, Anant Shastry, and Richard S. Giessel</i>	675
Queue Length Before and After Conversion of a Conventional Intersection into an Alternative Intersection <i>Kay Fitzpatrick, Karen Dixon, and Seyedeh Maryam Mousavi</i>	687
Revisiting the Design Parameters Related to Stopping Sight Distance and Vertical Curve Length using Probabilistic Analyses <i>Megat-Usamah Megat-Johari, Nischal Gupta, Md Shakir Mahmud, Anshu Bamney, Hisham Jashami, Peter Savolainen, and Timothy J. Gates</i>	703
Safety and Mobility Impacts of Work Zone Lane and Shoulder Widths <i>Madhav V. Chitturi, Glenn Vorhes, Zhaoxiang He, Boris Claros, Xiao Qin, Andrea R. Bill, and David A. Noyce</i>	714
Effect of Pedestrians on Right-Turn Capacity under Heterogeneous Traffic Conditions <i>Gyoungsoon Chun, Seungmin Oh, and Kitae Jang</i>	731
Reducing Carbon Emissions from Transportation: Pathway Setting Strategy and Prediction Uncertainty Analysis <i>Ye Zhang, Guohua Song, and Dongli Meng</i>	751
Development of a Driver Safety Reward System Incorporating You Only Look Once (YOLO)-Based Traffic Violation Detection at Roundabouts under Highly Heterogeneous Traffic <i>Abhijnan Maji, Apeksha Shah, and Indrajit Ghosh</i>	774
Evaluation of a Low-Activity Nuclear Density Gauge for Acceptance Testing of Asphalt Pavements for Percent-Within-Limit and Averaging Specifications <i>Linus Dep, James Sawyer, Travis Cable, and Austin Futrell</i>	791
Load Rating of Cast-in-Place Reinforced Concrete Box Culverts: State-of-the-Art Review <i>Mohammad Mahdi Sabouri Ghannad, Hao Yuan, Mohsen Shahawy, and Zhiyong Liang</i>	807
Modeling Traffic Flow Mixed with Automated Vehicles Considering Dynamic Safety Distance <i>Heng Lin, Huajian Fang, Xuqing Wu, Dongyan Wu, and Junliang Zhao</i>	840
Relaxed Singly Constrained Static Traffic Assignment Model with Elastic Demand: Application to Telework and Urban Development Scenarios in Austin, Texas <i>Jake Robbennolt, Dale Robbennolt, and Stephen D. Boyles</i>	855

Designing Asphalt Concrete Mixtures Based on Balanced Mix Design Requirements Utilizing a Two-Step Approach <i>Hong Lang, Imad L. Al-Qadi, and Uthman Mohamed Ali</i>	870
Developing a Short-Term Aging Protocol for Warm Mix Asphalt Binders: A Study Integrating Laboratory and Field Findings <i>Farzad Yazdipناه, Muhammad Ahmad, Jamilla E. S. L. Teixeira, Mahdiah Khedmati, and Hamzeh F. Haghshenas</i>	888
Development of a Tribological Test for Measuring Asphalt Lubrication Characterization <i>Rui Wang, Runhua Zhang, and Hussain U. Bahia</i>	902
Investigation on the Influence of Basic Workability Parameters on the Mechanical Behavior and Gradient Structure of the Filling Layer <i>Wenxu Li, Youjun Xie, Kunlin Ma, Guangcheng Long, Ning Li, Haiyang Zhuang, and Hong Zhao</i>	915
Research on Typology of Metro Station Areas Based on Transit-Oriented Development Performance: With Beijing as a Case Study <i>Dandan Xu, Yang Bian, Xiaodong Zhang, Zhongyin Liu, and Ling Li</i>	930
Spatiotemporal Adaptive Hybrid Graph Convolutional Networks for Traffic Flow Forecasting <i>Peng Zhang, Zheheng Liu, and Yu Tang</i>	943
Impact of Port Recentralization on Efficiency of Chinese Coastal Listed Port Companies <i>Weiwei Huo, Wenming Shi, Shu-Ling (Peggy) Chen, and Wei Liu</i>	957
The Importance of Deadheads in Assessing the Travel Time Reliability of Buses: Case Study of Brisbane, Australia <i>Andrea Felea, Jasmine Sinclair, and Kasun Wijayarathna</i>	974
Development and Application a Method for the Quantification of Mobility Options <i>Franziska Henkel, and Carsten Sommer</i>	987
Examining the Effects of Biochar Characteristics on Early-Age Hydration and Fresh Properties of Cement Paste <i>In Kyu Jeon, Yong-Rak Kim, and Jeffrey W. Bullard</i>	1003
Impact of Metro Network Expansion on Housing Prices near Existing Stations: Evidence from Hangzhou, China <i>Ling Zhang, Yang Jin, Shuyuan Li, and Haizhen Wen</i>	1017
Introducing a New Solution for Network Level Pavement Structural Evaluation Using Traffic Speed Deflectometer Device (TSDD): A Case Study of Mississippi Department of Transportation <i>Mostafa Nakhaei, and Jim Poorbaugh</i>	1035
Research on the Template Load Values and Structural Stress Variation Laws of Secondary Lining Trolley Under Tunnel Pouring Conditions <i>Renjie Song, Yimin Wu, Zuoqiang Chi, Weicheng Ding, and Haiping Wu</i>	1049
Systematic Evaluation of the Effectiveness of Coating and Sealer Materials for Protecting Bridge Substructure Concrete Against Moisture and Chloride Ingress <i>Abhijit Mistri, Pravin Saraswatula, and Anol K. Mukhopadhyay</i>	1069
Toward Enhanced Resilience of Interdependent Critical Infrastructures: Robustness Analysis of a Multi-modal Public Transport Network Subject to Power Grid Failures with Integrated Travel Demand Data <i>Nicolas Da Silva Fradique, Angelo Furno, Emmanuel Vinot, Nicolas Retiere, Rémy Rigo-Mariani, and Loïc Bonnetain</i>	1085
A Machine Learning Framework for Clustering and Calibration of Roadway Performance Models with Application in the Large-Scale Traffic Assignment <i>Mohammad Amin Abedini, and Eric Miller</i>	1103

An Optimization Framework for Scaled-Up High-Speed Railway Dedicated Express Train Operation Plan 1126
Dongsheng Zhao, Peng Zhao, Pengcheng Wen, Bonan Zhang, and Shi Bo

Characterization of Aggregate Susceptibility to Polishing Using the Micro-Deval Test 1146
Khalil Alafeef, Tariq Sharaf, and Ala R. Abbas

Complex Shadow Removal in Pavement Imagery: Leveraging Diffusion Models for Advanced Solutions 1160
Tanner Wambui Muturi, Yaw Adu-Gyamfi, and David Kesse

Performances in Last-Mile Deliveries involving Cyclic Services of Shuttles and Cargo Bikes 1174
Byung Kwon Lee, Young Joo Kim, and Joyce M.W. Low

State-of-Knowledge in Modulus of Subgrade Reaction Testing with Associated Pavement Design Implications 1192
Jami Lynn Rushing, Isaac L. Howard, W. Jeremy Robinson, and Jeremiah M. Stache

Women and Gender in Transportation

From “What is Gender?” to “Not My Job”: Institutional Barriers and A Framework to Mainstream Gender 1210
in Transportation Planning
Seema Singh