Contents

Infrastructure Management and Operations

Optimal Management and Decision Systems

Applying Bayesian Networks to Assess Vulnerability of Critical Transportation Infrastructure ................................................................. 1
M. K. Jha

Impacts of Condition Assessment Variability on Lifecycle Costs ........................................ 7
K. L. Sanford Bernhardt and S. McNeil

Dynamic Programming Based Maintenance and Replacement Optimization for Bridge Decks Using History-Dependent Deterioration Models ........................................ 13
C.-A. Robelin and S. M. Madanat

Performance Prediction

Condition and Reliability Prediction Models Using the Weibull Probability Distribution ................................................................. 19
M. N. Grussing, D. R. Uzarski, and L. R. Marrano

Chih-Yuan Chu and Pablo L. Durango-Cohen

Incorporating Unobserved Heterogeneity in Pavement Deterioration Modeling .......... 31
Feng Hong and Jorge A. Prozzi

Feasibility Study for Gray Theory Based Pavement Smoothness Prediction Models ...... 37
Qiang Li, Kelvin C. P. Wang, Robert P. Elliott, Kevin D. Hall, and Yanjun Qiu

Automated Asset Management

Automated Tracking System for Inventory of Roadway Signs ........................................ 43
Kelvin C. P. Wang, Zhiqiong Hou, and Weiguo Gong

Scheduling Bridge and Highway Inspection/Test Activities with QUALITIME .......... 49
Mireille Battikha

Realtime Image Processing Algorithms for the Detection of Road and Environmental Conditions ................................................................. 55
James G. Haran, John Dillenburg, and Peter Nelson
Applications of Advanced Technology in Transportation

Optimal Spatial Sampling of Infrastructure Condition .....................................................61
Rabi G. Mishalani and Liying Gong

Project Evaluation and Selection Optimization

Application of Shackle’s Model for Highway Project Evaluation under Uncertainty.....67
Zongzhi Li and Kumares C. Sinha

A Stochastic Optimization Model for Highway Project Selection and Programming
under Budget Uncertainty .................................................................................................74
Zongzhi Li and Murat Puyan

Optimizing Facility Component Maintenance, Repair, and Restoration Investment
Strategies Using Financial ROI Metrics and Consequence Analysis..........................81
M. N. Grussing, D. R. Uzarski, and L. R. Marrano

A Fuzzy Multiple Objective Mixed Integer Programming Approach for Carrier
Selection and Freight Volume Allocation with Revenue Based Discount Schemes ........87
Chuanxu Wang

Materials and Testing

A Non-Contact System to Detect and Quantify Segregation in Hot Mix Asphalt
Pavements .........................................................................................................................93
Edgar de León and Gerardo W. Flintsch

Comparative Analysis of Using Laboratory Testing and Nondestructive Testing to
Obtain Subgrade Resilient Moduli .................................................................................99
Jianming Ling, Runhua Guo, and Jie Yuan

Characterization of Hamburg Wheel Tracking Device Testing Results ...................105
Runhua Guo and Jorge Prozzi

Analysis of Simulated Variation in Dielectric Properties of Reinforced
Concrete Systems .............................................................................................................111
K. Belli, S. Wadia-Fascetti, and C. Rappaport

Rail Operation, Object Tracking, and Quality Control

Investigation on the Vibration Effect Induced by Rail Transit System on Urban
Environment ...................................................................................................................117
Xiangbai Zhang and Daisy Le Cao

Real-Time Three-Dimensional Object Detection and Tracking in Transportation.......123

The Case Study of TQC Controlling in Logistics Project Management ...................129
Jie Wu and Qiuyuan Peng

Determination of Safe Distance between Railway Out-of-Gauge Goods
and Structure on Straight Lines ....................................................................................135
Mei Han, Boling Han, Liang Pang, and Yanhui Han
Applications of Advanced Technology in Transportation

Algorithms of the Container Feeding Form between Railway Container Junction Station and Railway Container Transaction Station ................................................................. 141
Yong Yin, Qiyang Peng, Haifeng Yan, and Xuecai Xu

Operation and Data Collection

Evaluation on Route Guidance System and Its Application ........................................ 147
Mei-ping Yun, Jain Sun, and Xiao-guang Yang

Portable Non-Intrusive Traffic Data Collection in Variable Roadside Environments ................................................................. 153
Lloyd J. French and Millie S. French

Visualization of Bus Schedule Adherence Using GIS........................................ 159
Dan Yu, Santosh Mishra, and Jie Lin

Using Transit Vehicles to Measure Freeway Traffic Conditions .................................... 165
B. Coifman and S. Kim

Intensity of Lane Changing at a Freeway Ramp Weave Section .................................... 171
Ghulam H. Bham

Pavement Condition and Construction

Construction Quality Effects on Pavement Asset Preservation and Valuation:
A Mechanistic-Empirical Performance-Based LCCA Approach ..................................... 177
Neville A. Parker, Sajjad Hussain, Kaan Ozbay, and Dima Jawad

Vibration-Based System for Pavement Condition Evaluation ........................................ 183
Bill X. Yu and Xinbao Yu

Definition of Yield Zones on Concrete Barrier Structures under a Transverse Impact Load .................................................................................................................... 190
Huali Geng, Nien-Yin Chang, and Trever Wang

Asset Management Technologies

The Role of Advanced Technology in Asset Management: International Experiences ................................................................. 202
D. Mizusawa and S. McNeil

Coordination of Maintenance and Rehabilitation Policies for Transportation Infrastructure ....................................................................................................................... 208
Pablo L. Durango-Cohen and Pattharin Sarutipand

Impact of Higher Truck Loads on Remaining Safe Life of Louisiana Bridge Decks..... 214
Aziz Saber, Freddy Roberts, Xiang Zhou, and Walid R. Alaywan
### Imaging Based Technology for Detection and Operation

**Tests of Automated Incident Detection with Video Image Processors in Attica Tollway Tunnels**
- Bill M. Halkias, Kostas Papandreou, Pantelis Kopelias, Vily Vegiri, and Panos D. Prevedouros
- Page: 220

**A New Algorithm of Traffic Monitoring Based on Real-Time Video**
- X. J. Tan, Z. Yu, J. Li, and Z. C. He
- Page: 226

**A Video-Based Method for Evaluating Traffic Data from Detectors**
- Nan Zou and Jianwei Wang
- Page: 232

**Uses of Airborne Imagery for Microscopic Traffic Analysis**
- Mark Hickman and Pitu Mirchandani
- Page: 238

### Traffic Visualization, Incident, and Safety Management

**Temporal Variations in Traffic Flow and Ramp-Related Crash Risk**
- Chris Lee and Mohamed Abdel-Aty
- Page: 244

**Application of Data Mining Techniques for Real-Time Crash Risk Assessment on Freeways**
- A. Pande and M. A. Abdel-Aty
- Page: 250

**Estimating Pedestrian Counts in Urban Areas for Transportation Planning and Safety Analyses**
- Srinivas S. Pulugurtha, Shashi S. Nambisan, and Pankaj Maheshwari
- Page: 257

### Safety and Security

**A Robust Dynamic Segmentation Tool for Highway Safety Analysis**
- Kaiyu Liu and Albert Gan
- Page: 263

**3D Traffic Simulation for Intermodal Safety and Security**
- Lee-Fang Chow, Fang Zhao, L. David Shen, Hongbo Chi, Xuemei Liu, and Jingtao Shan
- Page: 269

**Effect of Vehicle to Vehicle and Vehicle to Infrastructure Communication Systems on Transportation Safety**
- S. Diwan, B. Dalla Chiara, and F. Deflorio
- Page: 275

**Intelligent Decision Support System for Traffic Incident Management**
- Hongqiang Li, Huapu Lu, and Intikhab Ahmed Qureshi
- Page: 292

### Automated Traffic Data Collection and Data Mining

**Traffic Flow Data Extracted from Imagery Collected Using a Micro Unmanned Aerial Vehicle**
- B. Coifman, M. McCord, R. G. Mishalani, M. Iswalt, and Y. Ji
- Page: 298
Applications of Advanced Technology in Transportation

Analyzing Freeway Service Patrol Data ..............................................................304
Chengjun Zhan, Albert Gan, and Mohammed Hadi

Using Data Mining to Analyze Archived Traffic Related Data .........................310
Vanessa Amado and Mark R. Virkler

Dynamic Activity-Travel Diary Data Collection Using a GPS-Enabled Personal
Digital Assistant ........................................................................................................319
B. Kochan, T. Bellemans, D. Janssens, and G. Wets

Advanced Traffic Management

Experimenting with Real-Time ATIS: Stepping Forward from ADVANCE .............325
Alixandra Demers, George F. List, Jeffrey Wojtowicz, Alain Kornhauser,
Al Wallace, Earl E. Lee, and Paul Salasznyk

Real-Time Background Generation and Update Using Online CCTV Videos ..........331
Woochul Lee and Bin Ran

Software-Based Traffic Management Information System for Urban Road
Networks: An Empirical Study ..................................................................................337
R. Gyampoh-Vidogah and R. Moreton

Statistical Models for Preferred Time Headway and Time Headway of Drivers
in Steady State Car-Following ..................................................................................344
Ghulam H. Bham and Siva Rama Prasad Ancha

Probe Vehicles for Data Collection

A Case Study on Measuring Travel Time, Speed, and Delay Using
GPS-Instrumented Test Vehicles ............................................................................350
Hoe Kyoung Kim, Seung Kook Wu, and Michael Hunter

Instrumented Vehicle Measured Speed Variation and Freeway Traffic
Congestion ..................................................................................................................356
Joonho Ku, Randall Guensler, Michael Hunter, and Hainan Li

Enhancing Transit Facility Design Using Pedestrian Simulation .......................362
Steven P. Scalici, Patrick J. O’Mara, and Raymond Dominguez

A Wireless Mesh Network for Real-Time Vehicle Guidance ..............................368
Alan Wolff and C. C. Lee

Incident and Congestion Management and Hazard Response System

Model of a Self-Organizing Traffic Management Hazard Response System ..........374
R. Kicinger and M. Bronzini

Design, Implementation, and Test of a Wireless Peer-to-Peer Network
for Roadway Incident Exchange .............................................................................381
Trevor Harmon, James Marca, Ray Klefstad, and Peter Martini

Harnessing Advanced Technologies to Eliminate Recurring Freeway Congestion ....388
Patrick DeCorla-Souza

Applications of Advanced Technology in Transportation

American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191 USA
Phone: 1-800-548-ASCE (2723) or 1-703-295-6300  Fax: 1-703-295-6211
Internet: www.pubs.asce.org
Applications of Advanced Technology in Transportation

Traffic Control Systems

Mapping Misuse Cases to Functional Fault Trees in Order to Secure Positive Train Control Systems .................................................................394
Mark Hartong, Rajni Goel, and Duminda Wijesekera

Evaluating the Effectiveness of “Turning Traffic Must Yield to Pedestrians (R10-15)” Sign .................................................................400
Ganesh Karkee, Srinivas S. Pulugurtha and Shashi S. Nambisan

Guangwei Zhou, Albert Gan, Chengjun Zhan, and Xiaoxia Zhu

Augmented Reality Applications to Traffic Operations ........................................412
Ghada S. Moussa, Essam Radwan, and Khaled F. Hussain

Data Collection, Simulation, and Modeling

Bayesian Estimation of Statewide OD Flows Using Link Volumes Estimated from Combined Information in Remotely Sensed Data and Ground Counts ..........418
Prem K. Goel, Mark R. McCord, Shiling Ruan, and Morton O’Kelly

An Improved Compound Clustering Algorithm in Vehicular Ad-Hoc Networks ........424
Peng Fan, James G. Haran, Peter C. Nelson, and John Dillenburg

Developing Microscopic Integrated Freeway-Toll Plaza Model ..........................430
Haitham M. Al-Deek and Nezamuddin

Block Container Trains Formation Plan between Railway Network Container Freight Stations Based on Genetic Algorithm ...................................437
Haifeng Yan, Quiyuan Peng, and Yunjiang Tan

Criteria for a Steady-State Initialization in a Large-Scale Railroad Network Simulation .................................................................443
Feng Xu and Zong Tian

Transportation Modeling

GA and ANN Algorithms

Genetic Algorithm Based Approach for the Optimal Location of Traffic Counts Sections .................................................................449
E. Cipriani and M. Petrelli

An Application of Neural Network in Corridor Travel Time Prediction in the Presence of Traffic Incidents ..............................................455
Yang Tao and Bin Ran

Multi-Layer Traffic Signal Control Model Based on Fuzzy Control and Genetic Algorithm .................................................................461
Ruimin Li, Jianguang Li, and Huapu Lu

Applications of Advanced Technology in Transportation

American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191 USA
Phone: 1-800-548-ASCE (2723) or 1-703-295-6300 Fax: 1-703-295-6211
Internet: www.pubs.asce.org
Applications of Advanced Technology in Transportation

Estimating a Transit Route OD Matrix from On-Off Data through an Artificial Neural Network Method.................................................................467
Jie Yu and Xiao-guang Yang

Advanced Simulation Models I

Tests of Simulation Models FREQ, KRONOS, Integration and VISSIM in Replicating Congested Freeway Flow .................................................................473
Panos D. Prevedouros, James Watson, and Jerry Ji

Comparison of PASSER V, Synchro, and TRANSYT-7F for Arterial Signal Timing Based on CORSIM Simulation.................................................................479
Yunlong Zhang and Yuanchang Xie

Evaluation of ITS Alternatives Targeting Crash Mitigation on Freeways Using Micro-simulation.................................................................485
Mohamed Abdel-Aty and Alinder Dhindsa

Heterogeneous Traffic Flow Modeling and Simulation Using Cellular Automata........492
Tom V. Mathew, Pradip Gundaliya, and S. L. Dhingra

A Comparison of Microscopic Simulation Models: FRESIM, VISSIM, and CELLSIM Based Weaving Model.................................................................498
Shengnan Kan and Ghulam H. Bham

Advanced Simulation Models II

Examining the Operational Benefits of Freeway Ramp Metering Control Using CORSIM (CORridor SIMulator) .................................................................504
Md. Shoaib Chowdhury

Automatic Calibration of Two-Lane Highway Traffic Simulation Models Using a Genetic Algorithm .................................................................510
C. Y. Egami, M. L. Mon-Ma, J. R. Setti, and L. R. Rilett

Advanced Simulation Technology Applied to Port Safety and Security .....................516
C. Berkowitz and C. Bragdon

Parameter Calibration for VISSIM Using a Hybrid Heuristic Algorithm:
A Case Study of a Congested Traffic Network in China.................................................................522
Haode Liu, Xiaoguang Yang, and Jian Sun

Topological and Operational Improvements to a Cell-Transmission-Based Simulation Model.................................................................528
Sherif Ishak, Ciprian Alexsandru, and Dan Seedah

Estimation and Prediction of Traffic and Flow

Application of Wavelet Time Series Analysis in Short-Term Traffic Volume Prediction .................................................................536
Yuanchang Xie and Yunlong Zhang
Applications of Advanced Technology in Transportation

Real-Time Traffic State Estimation on Urban Road Network: The Application of Unscented Kalman Filter ..........................................................542
R. Pueboobpaphan and T. Nakatsuji

Revised Approaches for Estimation of Time-Varying Origin-Destination Flows in Freeway Corridors .................................................................548
Pengpeng Jiao, Huapu Lu, and Noboru Harata

A Robust Algorithm of Estimating Dynamic O-D Matrix for Large Freeway Networks with Measurement Errors ......................................................554
Pei-Wei Lin and Gang-Len Chang

Estimation of Freeway Travel Time Based on Sparsely Distributed Detectors .......560
Ying Liu and Gang-Len Chang

Traffic Management

Evaluation of Urban Traffic Management in China ........................................566
Pengpeng Jiao, Huapu Lu, and Noboru Harata

Evaluation of Traffic Management Plans in CBD Area within Baghdad City ..........572
A. Al-Azzawi, N. Al-Saoudi, and M. Abdul-Ghani

Measuring the Response of Drivers to a Yellow Phase with a Video Based Approach ..........................................................578
Yue Liu, Gang-Len Chang, Ruishua Tao, Eric Tabacek, and Thomas Hicks

Tests of Traffic Sensors and Telemetry Services ........................................584
Panos D. Prevedouros and Goro Suliojoadikusumo

Capacity of Multi-Lane Roundabout: Methodology Based on Lane Utilization ....590
Jing Bie, Hong K. Lo, and S. C. Wong

Data and Experiences

Arizona’s Experience with Context Sensitive Solutions to Implement NEPA ..........596
Maria Angelica Deeb and K. J. Heidel

Architecture for On-Line Deployment of DynaMIT in Hampton Roads, VA ........605
Byungkyu “Brian” Park, Devi Manohar Pampati, and Ramachandran Balakrishna

WisTransPortal: A Wisconsin Traffic Operations Data Hub .............................611
Steven T. Parker and Yang Tao

Traffic Control Devices and Data Collection

Improving Actuated Traffic Signal Control Operations using a Concept of Dynamic Gap-Out ..........................................................617
Byungkyu “Brian” Park, Curtis Myzie, and Seli James Agbolosu-Amison

A Single Loop Detector Diagnostic: Mode On-Time Test ..............................623
Benjamin Coifman and Ho Lee
Applications of Advanced Technology in Transportation

Effect of Speed Feedback Device on Speeds in Interstate Highway Work Zones ..........629
M. V. Chitturi and R. F. Benekohal

Use of Hardware-in-the-Loop Traffic Simulation in a Virtual Environment .................635
Ayman Smadi and Shawn Birst

Advantages of Using Innovative Traffic Data Collection Technologies ......................641
Ayman Smadi, Jason Baker, and Shawn Birst

Transportation Planning

Demand Modeling I

Determining Origin-Destination Flows Across a Two-Intersection Network from Non-Overlapping UAV and Ground-Based Imagery .................................................647
Mark R. McCord, Rabi G. Mishalani, Benjamin Coifman, Yuxiong Ji, and Michael V. Iswalt

Traffic Demand Reduction Using an Automated Work Zone Information System for Urban Freeway Rehabilitation .................................................................653
Eul-Bum Lee, Chang M. Kim, and John T. Harvey

Modeling Tour Mode and Destination Choice in the Jakarta Metropolitan Area ..........659
S. Yagi and A. Mohammadian

An Exploratory Analysis of the Household Travel Behavior and Lifestyle Choices .....665
Y. Zhang and A. Mohammadian

Demand Modeling II

Development and Analysis of an Internet-Based Travel Survey ..................................671
Michael Anderson, Jose Ortega, Sampson Gholston, and Steven Jones

Transportation Network Analysis to Access Community Resources by Older Populations .................................................................677
Srinivas S. Pulugurtha, Barbara A. Hirshorn, Vanjeeswaran K. Krishnakumar, and John E. Stewart

An Activity-Based Model of Travel Demand in the Jakarta Metropolitan Area ..........683
S. Yagi and A. Mohammadian

Trip Rate Analysis for a Metropolitan City in Indian Context ......................................689
G. J. Joshi and B. K. Katti

Discrete Choice Modeling with Partially Missing Information from a Revealed Preference Survey .................................................................................................695
Quentin K. Wan and Hong K. Lo

Urban Transportation Systems

Computer-Assisted Scheduling and Dispatching Systems for Paratransit Transportation: An Assessment of Agency Readiness in Planning for Statewide Deployment ........................................................................................................................................671
P. Metaxatos and A. M. Pagano

Applications of Advanced Technology in Transportation

American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191 USA
Phone: 1-800-548-ASCE (2723) or 1-703-295-6300 Fax: 1-703-295-6211
Internet: www.pubs.asce.org
Applications of Advanced Technology in Transportation

**Time-Dependent Transport Network Design and Urban Development** ........................................707
Barbara W. Y. Siu and Hong K. Lo

**Applying Cellular-Based Location Data to Urban Transportation Planning** ..................713
Jiangang Lu, Shan Di, Changxuan Pan, and Bin Ran

**AVL Data Mining for Transit Service Performance** ..........................................................719
Jingtao Shan and Fang Zhao

**A New Approach for Reliability Assessment of Urban Transportation Networks** ..........725
A. Shariat Mohaymany and M. Mesbah

**Transit and Bus Systems**

**Model and Algorithm for Iterative Design of Bus Network** ............................................731
Bin Yu and Zhongzhen Yang

**A Genetic Algorithm for Bus Schedule Synchronization** ...............................................737
Fabian Cevallos and Fang Zhao

**Chinese Smart Bus Demonstration Project and Its Implementation** ............................743
Sufeng Wu, Xiaoguang Yang, Zhongshuai Lin, and Canbin Huang

**Urban Development with Sustainable Public Transit Services** ......................................749
Z. W. Wang and Hong K. Lo

**Planning and Management of Corridor and Rail Systems**

**The 1st True High Speed Rail System/“Bullet Train” for the USA** .................................755
Mike Lehman

**Study of the Effect of Heterogeneity of Traffic on Intercity Roadways Using Computer Simulation** ...........................................................762
V. Thamizh Arasan and Shrinivas S. Arkatkar

**Analysis of Regional Supply Chain Economic and Environmental Effects of Expansion of the U.S. Freight-Rail System** ..............................................................768
Chris Hendrickson, H. Scott Matthews, and Gyorgyi Cicas

**Assessing Benefits of Implementing Integrated Corridor Management Strategies** ......774
H. Tanikella, B. Park, B. L. Smith, and M. G. Best

**Evaluation and Decision Models**

**Field Evaluation of the Effect of Speed Monitoring Displays on Speed Compliance in School Zones** .............................................................780
Kelly G. Ash and Mitsuru Saito

**Development of Group Decision-Support Model and System for Combined Transportation and Utility Construction** ........................................786
Chien-Cheng Chou, Carlos H. Caldas, James T. O’Connor, and Grant K. Goldman

**A Study of Lane Change Frequency on a Multilane Freeway** .......................................792
Vivek Goswami and Ghulam H. Bham
Applications of Advanced Technology in Transportation

Evaluation of New Coordinated Feedback-Based Freeway Ramp Metering Strategy Using Macroscopic and Microscopic Simulation Models ........................................ 798
I. Yasar, K. Ozbay, and P. Kachroo

Optimization and Spatial Tools for Planning

Continuous Network Design with Emission Pricing as a Bi-Level Optimization Problem ........................................................................................................ 804
Tom V. Mathew and Sushant Sharma

Resectorization Analysis of Air Sector Capacity ........................................................................ 810
Sui-Ling Li

Impact of Information on Housing Relocation Using Analytical Hierarchy Process and Interactive GIS ........................................................................................................ 816
P. S. Sriraj, Mark Minor, and Piyushimita (vonu) Thakuriah

Automated Identification of Traffic Patterns from Large Data Archives .................................. 822
Ramkumar Venkatanarayana, Brian L. Smith, Michael J. Demetsky, and Guimin Zhang

Development of Spatial Data Tools to Manage Transportation Networks .............................. 828
Mukund Dangeti, Srinivas S. Pulugurtha, and Shashi S. Nambisan

Equilibrium Models, Pricing of Land Use, and Public Information System

An MPEC Model for the Optimal Contraflow Operation Problem with User Equilibrium Constraints ........................................................................................................ 834
Q. Meng, H. L. Khoo, Y. K. Huang, and R. L. Cheu

Selecting Path Flow Pattern for Sensitivity Analysis of Deterministic User Equilibrium ........................................................................................................ 840
L. Cheng and W. Wang

Pricing Incremental Reductions in Vehicular Emissions through Motor Fuel Regulation .............. 846
F. W. Rusco and W. D. Walls

Modeling Time-Dependent Tolls under Transport, Land Use, and Environment Considerations ........................................................................................................ 852
X. Q. Li, W. Y. Szeto, and M. O’Mahony

Multi-System Interconnections Modes of Logistics Public Information Platform ............ 858
Youlin Chen and Yang Yang

Indexes

Subject Index .............................................................................................................................. 865

Author Index ............................................................................................................................ 869