2022 CTR Symposium Poster Session

**Quantitative Analysis of Hurricane Harvey Impacts on Texas Maritime Facilities**

By Kyle Bathgate, Antonio Perez De La Cruz & Dr. Zhanmin Zhang

This study assesses the impacts of Hurricane Harvey on actual vessel movements in the Houston region, using data extracted from the Automatic Identification System (AIS) and the metrics of Net Vessel Count (NVC) and dwell time distribution. The methods may be applied by state transportation officials to quantify the post-disaster impacts of a disruption on port operations.

Presenter: Kyle Bathgate
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**Statewide Preliminary Engineering Cost Estimates by Unified Transportation Program Funding Categories**

By Dr. Junghye Son & Nabeel Khwaja

The Unified Transportation Program (UTP) is TxDOT's 10-year fiscally constrained plan and is projected to cost $75 billion. This study developed a model and an accompanying tool to help estimate and plan the UTP's associated engineering costs by using its funding categories and their associated construction dollars.

PIs: Nabeel Khwaja (khwaja@mail.utexas.edu); Dr. Junghye Son (junghye.son@Austin.utexas.edu)

**Synthesis on Automated Pedestrian Data Collecting Techniques and Applications in Transportation Planning, Design, and Management**

By Angela Haddad, Kenneth Perrine, Lisa Macias & Dr. Chandra Bhat

This project aims to understand the state-of-the-art and the state-of-the-practice of automated pedestrian detection, including well-established and emerging artificial intelligence and sensor-based technologies. Surveys and interviews aided the development of an information-based decision-support tool to evaluate the appropriateness of different equipment.

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**The Texas Department of Transportation Alternative Delivery System Decision-Support Tool V2.0**

By Vassilina Demetracopoulou, Dr. William O'Brien & Nabeel Khwaja

This study presents the Alternative Delivery System (ADS) Decision-Support Tool V2.0, a delivery method selection tool customized for TxDOT. It was developed based on Design-Build outcomes since it became legislatively available in 2012, V1.0 of ADS (2014), the contracting community's experience with risk, and TxDOT's programmatic changes for alternate delivery.

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**Weather-Responsive Management Strategies**

By Dr. Chandra Bhat, Dr. Christian Claudel, Kenneth Perrine, Lisa Macias, Aupal Mondal & Hassan IQbal

Winter operations sensing capabilities are added to TxDOT Abilene and Lubbock District vehicles to track where treatment activities are occurring. Existing fleet tracking and GIS application infrastructure are used to dashboard, analyze, and report live and historic winter weather activities, heightening safety and improving treatment quality.

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**What Does It Look Like From...**

By Cameron Schmelts, Nabeel Khwaja, Juan Loaya, Christopher Pruner & Mengyu Fu

3D visualization is a valuable tool frequently used on major transportation projects to show the public what the finished roadways will look like before they are constructed. TxDOT and CTR have been utilizing 3D visualization in non-traditional ways (e.g., driver’s perspective of an overhead sign) to support decision-making in the planning and construction phases.

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**Analysis of Pedestrian Crashes at Texas Intersections and Mid-Blocks**

By Dr. Natalia Zuniga-Garcia, Kenneth A. Perrine & Dr. Kara Kockelman

Ten years of TxDOT CRIS crash reports are used to analyze pedestrian crash counts at over one million intersections and mid-block segments. Traffic control, highway design, and land use modeled for Texas and the City of Austin suggest mid-blocks are more vulnerable than intersections and point toward the importance of factors such as economic inequality.

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**Developing a Preliminary Engineering Cost Estimation Method for a Portfolio of Bridge Construction Projects in Project Planning Phase**

By Dr. Junghye Son & Nabeel Khwaja

This study proposes a preliminary engineering (PE) cost estimation method for bridge construction projects during the planning phase, when detailed project information is sparse. The proposed method estimates PE cost using construction cost estimates for different project types and sizes, which provides a more reliable and accurate PE cost estimate than using a single-percentage estimate method.

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**Developing Assessment Criteria for State DOTs’ Standard Specifications on Contractor Schedules**

By Byung Gi Han, Dr. Junghye Son, Nabeel Khwaja & Dr. William O’Brien

Standard scheduling specifications serve as the basis for project schedule control, establishing minimum requirements for the contractor schedule quality and allowing DOTs to effectively communicate and manage project schedule performance. From a review of 18 states, this study identifies assessment criteria that DOTs can use to benchmark their specifications.

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**Development of Crash Database Parsing Tools to Support the Highway Safety Improvement Program in Texas**

By Manar Hasan, Dr. Zhe Han, Dr. Randy Machemehl & Dr. Michael Murphy

This study presents a set of computerized tools that parse the crash database to identify crash hotspots, suggest potential treatments, and calculate safety benefits. These tools can be used by transportation agencies to support decision-making. A case study was conducted that returned 6,174 candidate projects and recommended the most effective treatments.

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**Energy Corridor Analysis: Forecasting Rapid Pavement Wear Due to Oil Drilling Activity**

By Jennifer Zuehlke, Carolina Baumanis, Dr. Mehmet Kunt & Dr. Randy Machemehl

A procedure for predicting oil drilling traffic volumes and potential damage to low volume roads before the drilling occurs. This is particularly relevant as the $100+ per barrel crude oil price spike due to the Russian invasion of Ukraine is likely to stimulate oil drilling.

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**PI: Aupal Mondal**

**PI: Byung Gi Han**

**PI: Dr. Junghye Son**

**PI: Dr. William O’Brien**

**PI: Manar Hasan**

**PI: Dr. Randy Machemehl**

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Evaluate Improved Streamflow Measurement at TxDOT Bridges

By Dr. David Maidment, Harry Evans & Dr. Paola Passalacqua

Radar stream-gauging sensors are being mounted on 80 TxDOT bridges to provide real-time measurement of water surface elevation and velocity. These data are combined with National Water Model forecasting to provide maps of current and predicted flooded road depths and warnings for bridges at risk for flooding.

Presenter: David Maidment
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Examining the Impacts of a Vehicle Miles Traveled Fee for Daily Weekday Travel: A Case Study of Oregon

By Michael Moore, Dr. Andrew Waxman & Dr. Randy Machemehl

This study presents an approach to evaluate the impacts of a switch to a vehicle miles traveled (VMT) fee on road users groups. A gas tax equivalent fee and alternative VMT fee structures were examined to assess their revenue generation capabilities and equity impacts by road user group and socio-demographics.

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An Extreme Weather Risk-Assessment Framework for Port Infrastructure Systems

By Kyle Batgath, Jingran Sun, Shidong Pan, Dr. Zhe Han, Dr. Michael Murphy & Dr. Zhannin Zhang

This study presents a framework for the risk assessment of port system infrastructure to extreme weather events. The framework is straightforward for easy implementation using existing GIS datasets. The methods inform port stakeholders of the susceptibility of their infrastructure assets and offer a tool to increase system resilience through project selection and allocation measures.

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Hydraulic Analysis of Portable Concrete Median Barriers for Flood Prone Regions

By James Holyoke, Dr. Blair Johnson, Dr. Michael Barrett & Greg Hendrickson

Concrete median barriers are used in roadway design to reduce accidents; however, they can obstruct flow and increase roadway flooding during storms. Therefore, it is necessary to study the hydraulic efficiency of a barrier to determine the optimal design to retain structural integrity while also maximizing its flow capacity.

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Integration of Stated Preference and Revealed Preference Methods in Regional Travel Survey Programs, with a Teleworking Application

By Katherine Avmussen, Aupai Mondal, Lisa Maclas, Katherin Dannemiller & Dr. Chandra R. Bhat

This study aims to demonstrate state-of-the-art stated preference (SP) techniques within a revealed preference (RP) survey. These techniques are exemplified through the design, deployment, and analysis of an RP-SP survey that explores telework behavior across the state of Texas during COVID-19, today and into the unpredictable future.

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Modeling Impacts of COVID-19 on Capital Metro Rideship

By Jennifer Hall, Carolina Baumanis & Dr. Randy Machemehl

This research examines the impacts of the COVID-19 pandemic upon bus ridership through autoregression and multi-linear regression models. The autoregression model was able to capture 75% variability throughout the pandemic (R² = 75%). The multi-linear regression models showed that COVID-19 confirmed cases as well as fatalities were significant toward weekday and Sunday travels, but not toward riders on Saturday.

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Multifunctional Centerline Rumble Strips for Highway Condition Improvement during Winter Weather Operations

By Md Al Amin, Vivek Turkar, Michael Rung & Dr. Raissa Ferron

The use of snowplows in northern Texas results in loss of RPMs, which is not only costly but also creates unsafe driving conditions. This study showed that rumble strips can be used in a multifunctional way to not only provide sound awareness, but also protect RPMs from snowplows.

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Network Assignment-Based Estimation of Origin-Destination Matrices with a Full Travel Demand Model

By William Alexander, Carlin Liao, Rishabh Thakkar, Karthik Velayutham & Dr. Stephen Boyles

Traditional techniques for origin-destination (OD) matrix estimation that focus on ad-justing the matrix directly are prone to overfitting and reduce its behavioral interpretability. We propose tuning trip generation parameters instead. Our procedure calibrates an initial estimate of trip generation rates using a local search to reduce the error between the flows predicted by a demand model and link flow observations as a proxy for finding the true (but unobservable) trip generation rates.

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Optimal Sensor Placement on Highway Networks: A Traffic Dynamics Based Approach

By Dr. Sebastian Nugroho, Syuyash Vishnoi, Dr. Ahmad Taha & Christian Claudel

This study investigates the engineering problem of traffic sensors placement on highways with ramps. Since it is virtually impossible to install traffic sensors on each highway segment, it is crucial to find placements that result in optimized network-wide traffic observability. Consequently, this results in accurate traffic density estimates on segments where sensors are not installed.

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