

Quantitative Analysis of Hurricane Harvey Impacts on Texas Maritime Facilities

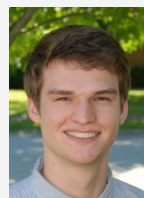
By Kyle Bathgate, Antonio Perez De La Cruz & Dr. Zhanmin Zhang

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.

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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.

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

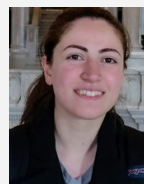
By Angela Haddad, Kenneth Perrine, Lisa Macias & Dr. Chandra Bhat

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 Schmeits, Nabeel Khwaja, Juan Loayza, Kristopher 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 inequity.

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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

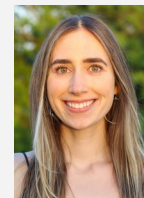
By Jennifer Zuehlke, Carolina Baumanis, Dr. Mehmet Kunt & Dr. Randy Machemehl

Using drilling permits along with water source and disposal data, the CTR team developed 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.

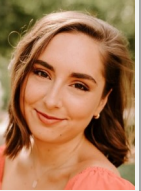
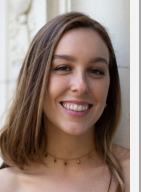


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Evaluate Improved Streamflow Measurement at TxDOT Bridges	
<p>By Dr. David Maidment, Harry Evans & Dr. Paola Passalacqua</p> <p>Radar stream-gauging sensors are being mounted on 80 TxDOT bridges to provide real-time measurement of water surface elevation 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.</p> <p>PI: Dr. David Maidment (maidment@utexas.edu)</p>	<p>Presenter: David Maidment</p> <p>Professor Emeritus Environmental & Water Resources maidment@utexas.edu</p> 
Examining the Impacts of a Vehicle Miles Traveled Fee for Daily Weekday Travel: A Case Study of Oregon	
<p>By Michael Moore, Dr. Andrew Waxman & Dr. Randy Machemehl</p> <p>This study presents an approach to evaluate the impacts of a switch to a vehicle miles travelled (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.</p> <p>PI: Dr. Randy Machemehl (rbm@mail.utexas.edu)</p>	<p>Presenter: Michael Moore</p> <p>Ph.D. Student Transportation mikemoore119@utexas.edu</p> 
Exploring the Use of Artificial Intelligence to Leverage TxDOT Data for Enhanced Corridor Management and Operations	
<p>By William Alexander, Dr. Stephen Boyles, Kenneth Perrine & Dr. Natalia Ruiz-Juri</p> <p>Project 0-7034 is testing real-time travel time estimation methods under field conditions. The models implement machine learning to compute dynamic travel times on freeway corridors using probe-based speeds from INRIX and ITS sensors traffic volumes. Preliminary experiments show accuracy improvements of up to fifty percent with respect to current practice.</p> <p>PI: Dr. Natalia Ruiz-Juri (nruizjuri@mail.utexas.edu)</p>	<p>Presenter: Natalia Ruiz Juri</p> <p>Research Scientist Network Modelling & Data nruizjuri@mail.utexas.edu</p> 
An Extreme Weather Risk-Assessment Framework for Port Infrastructure Systems	
<p>By Kyle Bathgate, Jingran Sun, Shidong Pan, Dr. Zhe Han, Dr. Michael Murphy & Dr. Zhanmin Zhang</p> <p>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.</p> <p>PI: Dr. Zhanmin Zang (z.zhang@mail.utexas.edu)</p>	<p>Presenter: Jingran Sun</p> <p>Ph.D. Student Transportation jingransun@utexas.edu</p> 
Hydraulic Analysis of Portable Concrete Median Barriers for Flood Prone Regions	
<p>By James Holyoke, Dr. Blair Johnson, Dr. Michael Barrett & Greg Hendrickson</p> <p>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.</p> <p>PI: Dr. Blair Johnson (blairjohnson@utexas.edu)</p>	<p>Presenter: James Holyoke</p> <p>Ph.D. Student Environmental & Water Resources jameshol@utexas.edu</p> 

Integration of Stated Preference and Revealed Preference Methods in Regional Travel Survey Programs, with a Teleworking Application	
<p>By Katherine Asmussen, Aupal Mondal, Lisa Macias, Katherine Dannemiller & Dr. Chandra R. Bhat</p> <p>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.</p> <p>PI: Dr. Chandra Bhat (bhat@mail.utexas.edu)</p>	<p>Presenter: Katherine A. Dannemiller</p> <p>M.S. Graduate Transportation kadannemiller@utexas.edu</p> 
Modeling Impacts of COVID-19 on Capital Metro Ridership	
<p>By Jennifer Hall, Carolina Baumanis & Dr. Randy Machemehl</p> <p>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 ($R^2 = \sim 75\%$). 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.</p> <p>PI: Dr. Randy Machemehl (rbm@mail.utexas.edu)</p>	<p>Presenter: Jennifer Hall</p> <p>Ph.D. Student Transportation jennyhall381@gmail.com</p> 
Multifunctional Centerline Rumble Strips for Highway Condition Improvement during Winter Weather Operations	
<p>By Md Al Amin, Vivek Turkar, Michael Rung & Dr. Raissa Ferron</p> <p>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.</p> <p>PI: Dr. Raissa Ferron (rferron@mail.utexas.edu)</p>	<p>Presenter: Md Al Amin</p> <p>Ph.D. Student Transportation alamince@utexas.edu</p> 
Network Assignment-Based Estimation of Origin-Destination Matrices with a Full Travel Demand Model	
<p>By William Alexander, Carlin Liao, Rishabh Thakkar, Karthik Velayutham & Dr. Stephen Boyles</p> <p>Traditional techniques for origin-destination (OD) matrix estimation that focus on adjusting 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.</p> <p>PI: Dr. Stephen Boyles (sboyles@austin.utexas.edu)</p>	<p>Presenter: William Alexander</p> <p>Ph.D. Student Transportation wealexander@utexas.edu</p> 
Optimal Sensor Placement on Highway Networks: A Traffic Dynamics Based Approach	
<p>By Dr. Sebastian Nugroho, Suyash Vishnoi, Dr. Ahmad Taha & Dr. Christian Claudel</p> <p>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.</p> <p>PI: Dr. Christian Claudel (christian.claudel@utexas.edu)</p>	<p>Presenter: Suyash Vishnoi</p> <p>Ph.D. Student Transportation scvishnoi@utexas.edu</p> 