CURRICULUM VITA of KYLE D. BATHGATE

Department of Civil, Architectural, and Environmental Engineering
The University of Texas at Austin
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EDUCATION

University of Texas at Austin, Austin, TX — May 2021-Present
Department of Civil, Architectural, and Environmental Engineering
Ph.D. Transportation Engineering, GPA: (4.00/4.00)
Dissertation Advisor: Dr. Zhanmin Zhang

University of Texas at Austin, Austin, TX — Aug 2019-May 2021
Department of Civil, Architectural, and Environmental Engineering
M.S.E. Transportation Engineering, GPA: (3.93/4.00)
Thesis Advisor: Dr. Zhanmin Zhang
Thesis: "Resilience through Risk Assessment: A Conceptual Framework for Extreme Weather Risk Assessment of the Texas Port System," May 6, 2021

University of Illinois at Urbana-Champaign, Urbana, IL — Aug 2015-May 2019
Department of Civil and Environmental Engineering
B.S. Civil and Environmental Engineering with High Honors, GPA: (3.89/4.00)
Concentration: Transportation and Hydrology

RESEARCH EXPERIENCE

Graduate Research Assistant — Austin, TX
Resilient Infrastructure and Smart Cities (RISC) Lab — Aug 2019-Present
University of Texas at Austin Center for Transportation Research (CTR)

- Analyzed TxDOT coastal intermodal infrastructure resilience to extreme weather events
- Assessed TxDOT real-time evacuation traffic monitoring system for effectiveness and recommended improvements
- Research interests: infrastructure management, resiliency, interdependencies, and sustainability

Undergraduate Research Assistant — Champaign, IL
University of Illinois at Urbana-Champaign — Oct 2017-May 2019

- Conducted testing on roller compacted concrete (RCC) admixtures for Dow Chemical
- Employed Arduino circuit and ArcGIS to examine the urban heat island effect

SPONSORED RESEARCH

"Define a Statewide Plan for a Sustainable Real-Time Travel Time Network for Texas Hurricane Evacuations and Safe Citizen Return," sponsored by Texas Department of Transportation, PI: Dr. Zhanmin Zhang, awarded for 2 years and $399,868.11 (1/15/2022-Present)

- Led project proposal authorship team
- Surveyed past hurricane evacuation participants and decisionmakers in Texas
- Modeled evacuation network and identified corridors for traffic monitoring system expansion
- Prioritized traffic monitoring device upgrade and expansion using asset management methods

"Creating a Resilient Port System in Texas: Assessing and Mitigating Extreme Weather Events," sponsored by the Texas Department of Transportation, PI: Dr. Zhanmin Zhang, $317,000 (1/15/2020 – 12-31-2021), Publication Link

- Collected data from port stakeholders to understand existing resilience capabilities and shortcomings
- Created framework to assess port vulnerability, exposure, and risk to extreme weather events
- Estimated economic impacts of hurricanes of varying intensity on Texas ports
- Developed Excel-based tool (PortRESECO) for stakeholders to assess the resilience of their facilities
- Recommended action items for port stakeholders to implement to improve their resilience capabilities

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JOURNAL PUBLICATIONS

First author manuscripts

Bathgate, K., Jiang, K., Han, Z., Murphy, M., and Zhang, Z. (***2022, under review***). "Evacuation Volume and Safety Assessment: A Case Study in Rural Texas Highways during Hurricane Laura on US 90 and US 287."

Bathgate, K., Perez de la Cruz, A., and Zhang, Z. (2022). "Quantitative Analysis of Hurricane Harvey Impacts on Texas Maritime Facilities." *Transportation Research Record: Journal of the Transportation Research Board*, 2676(7), 411-422. https://doi.org/10.1177/03611981221078574

Coauthor manuscripts

Pan, S., Sun, J., Bathgate, K., and Zhang, Z. (***2022, in progress***). "Modeling Interdependent Infrastructure System Failures with Imprecise Information Using a Two-Step Fuzzy Inference System."

Sun, J., Pan, S., Bathgate, K., and Zhang, Z. (***2022, in progress***). "Bayesian Network-based Infrastructure Resilience Assessment under Optimal Resource Allocation Strategies."

Sun, J., Bathgate, K., Pan, S., and Zhang, Z. (***2022, in progress***). "Network-based Method for Vulnerability Analysis of Port Systems Considering Cascading Failures."

CONFERENCE PRESENTATIONS

"An Extreme Weather Risk-Assessment Framework for Port Infrastructure Systems," UT Center for Transportation Research Symposium. April 12, 2022. Austin, TX.

"Quantitative Analysis of Hurricane Harvey Impacts on Texas Maritime Facilities," UT Center for Transportation Research Symposium. April 12, 2022. Austin, TX.

"Hurricane Harvey Impacts on Texas Maritime Facilities: An AIS Big Data Statistical Analysis," CAEE Graduate Research Symposium. April 6, 2022. Austin, TX.

"Quantitative Analysis of Hurricane Harvey Impacts on Texas Maritime Facilities," Transportation Research Board 101st Annual Meeting. January 9-13, 2022. Washington, DC.

"An Extreme Weather Risk-Assessment Framework for Port Infrastructure Systems," 16th Annual Inter-university Symposium on Infrastructure Management (AISIM). July 17-18, 2021. Virtual proceedings. *Awarded "Best Presentation" and selected for presentation at TRBAM 101 (2022).*

"A Study on the Effectiveness of Bus Rapid Transit in the South Congress/North Lamar Corridor in Austin, Texas" 62nd International Meeting of the Transportation Research Forum. April 6-8, 2021. Virtual proceedings.

"Texas Seaport Resilience Assessment: Incorporating Stakeholder Input" 2020 Dwight David Eisenhower Transportation Fellowship Program, 28th Annual DDETFP Research Showcase. January 25-29, 2021. Virtual proceedings.

TEACHING EXPERIENCE

Course Grader
University of Texas at Austin, CE 321 Transportation Systems Jan-May 2022

- Graded homework and project assignments for transportation introductory course
- Presented a guest lecture on transportation system resilience to undergraduate students

Undergraduate Learning Assistant Aug-Dec 2018
University of Illinois at Urbana-Champaign, CEE 398 Project-Based Learning

- Mentored and guided underclassman in investigating a campus infrastructure problem
- Delivered organizational, planning, and grading support for instructors

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PROFESSIONAL EXPERIENCE

Applied Pavement Technology Urbana, IL
Pavement Engineering Intern May-Aug 2019

- Inspected roadway and airfield pavement facilities in accordance with PCI methodology
- Managed pavement facility assets using PAVER software, GIS, and MS Access

Clark Dietz, Inc. Champaign, IL
Transportation Engineering Intern
Provided construction engineering services on $14 million roadway and drainage project May-July 2018

- Observed and inspected storm, sanitary, water main, and roadway construction
- Compiled and organized American Iron and Steel certifications for US EPA site visit

Documented construction and oversaw water main on $42 million MCORE project April-Aug 2017

- Calculated quantities and revised road plans using Bentley MicroStation & GEOPAK
- Performed spatial analysis using GPS, surveying, and ESRI ArcGIS

Williamson County 911 Marion, IL
GIS Contractor June-Aug 2016

- Created county atlas for emergency services personnel with ESRI ArcGIS software
- Coordinated with County 911 Director to ensure deliverables fulfilled requirements

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SELECTED PROJECTS

"Texas Traffic Crash: A Data Mining Analysis April 2022

- Used decision tree methods to classify car crash severity based on climate and roadway variables
- Mined association rules to determine commonly occurring factors in Texas car crashes

"Transit and Gentrification in Austin, Texas" Dec 2021

- Employed transit, land use, construction permitting, and census "big data"
- Predicted population displacement due to transit system expansion with machine learning

"*Reliability Models in Transit Operations of the Panama Canal"* Dec 2020

- Modeled reliability of Panama Canal lock operations and transit times
- Predicted canal transit times using machine learning methods

"Panama Canal Adaptations for a Changing Climate: Examining Historical Water Usage and Availability" May 2020

- Calculated economic impacts of Panama Canal draft restrictions
- Determined canal water requirements and feasibility of additional water supply source

"The Anemo Express Toll Road" May 2020

- Performed financial analysis for a proposed toll road P3 concession
- Forecasted traffic, determined OPEX and CAPEX, and studied financial structure

"A Study on the Effectiveness of BRT in the South Congress/North Lamar Corridor in Austin, Texas" Dec 2019

- Conducted statistical analysis on Capital Metro GTFS and APC data in Austin, TX
- Determined on-time-performance, delay, and hourly ridership for rapid and local bus routes

"Roadway Network Impacts of Natural Disaster Events: Resiliency Scenario Planning in Sioux Falls, South Dakota" Dec 2019

- Modeled travel demand and trip assignment in Sioux Falls, SD post-tornado event
- Evaluated emergency management strategies to determine best practices for tornado response

"Illini Infinity Interchange" April 2019

- Analyzed congestion issues at intersection in Valparaiso, IN and proposed improvements
- Won 2019 ASCE Great Lakes Student Conference Transportation Design Competition

"PR-2TC Multimodal Corridor, Geometric and Hydraulic Design" May 2018

- Designed new roadway alignment for autonomous vehicles and bike paths using Civil3D
- Performed hydraulic design on culvert sizing, floodplain modeling, and retention basins

"An Investigation into the Traffic Usage and Flow at the Armory and Wright Intersection" Dec 2016

- Analyzed existing traffic patterns and proposed a design to alleviate bicycle conflicts
- Received Best Poster Award at UIUC CEE Project-Based Learning Symposium

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LEADERSHIP

American Society of Civil Engineers Transportation & Development Institute (T&DI) 2022-Present

- *Int'l. Conf. on Transportation & Development (ICTD), Student Volunteer Committee Chair*

TRB Sustainability and Resilience Group, Young Member Council 2022-Present

- *Council member (2021-Present), Annual Meeting Working Group (2022-Present)*

TRB Standing Committee on Extreme Weather and Climate Change Adaptation (AMR50) 2020-Present

- *Friend of the committee (2020-Present)*

Graduate Student Advisory Board (GSAB) 2020-2022

- *Transportation Representative (2020-Present)*; University of Texas CAEE Dept

Intelligent Transportation Society of America 2019-2022

- *President (2019-2021), GSAB Liaison (2021-2022)*; University of Texas Student Chapter

Institute of Transportation Engineers 2017-2019

- *President (2018-2019), Secretary (2017-2018)*; University of Illinois Student Chapter

American Society of Civil Engineers 2016-2019

- *Outreach Chair, Secretary (2016-2018)*; University of Illinois Student Chapter
- *Design Captain (2017-2019)*; UIUC Concrete Canoe Team

Folk and Roots Club – The Pickin' Illini 2015-2018

- *President (2016-2017)*; Registered Student Organization for bluegrass music performance

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HONORS AND AWARDS

- UT Thrust 2000 - Charles W. Merritt Endowed Graduate Fellowship in Engineering Fall 2019-Present
- Dwight David Eisenhower Transportation Fellow 2020
- University of Illinois Campus Honors Program (Chancellor's Scholar) 2015-2019
- Tau Beta Pi Engineering Honors Society, Member Spring 2017
- Chi Epsilon Civil Engineering Honors Society, Member Fall 2016

SKILLS

Enrolled Professional Engineer Intern, State of Illinois, License No. 061.040866

Computer: ESRI ArcGIS, Python, R, Microsoft Office, LATEX, AnyLogic, AIS data processing

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