

# Kyle D. Bathgate

Doctoral Candidate

Fariborz Maseeh Department of Civil, Architectural, and Environmental Engineering

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[Google Scholar Profile](#)

## EDUCATION

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### Ph.D. Civil Engineering

Dec 2025

University of Texas at Austin

- Dissertation: Modeling the Capacity and Resilience of Multimodal Freight Transportation Systems
- Committee: Stephen Boyles (advisor), Randy Machemehl, C. Tyler Dick, Kenneth N. Mitchell, Alison Conway

### M.S.E. Civil Engineering

May 2021

University of Texas at Austin

- Thesis: Resilience through Risk Assessment: A Conceptual Framework for Extreme Weather Risk Assessment of the Texas Port System
- Advisor: Zhanmin Zhang

### B.S.E. Civil and Environmental Engineering

May 2019

University of Illinois Urbana-Champaign

- Concentrations: Transportation and hydrology
- Graduated with High Honors

## HONORS AND AWARDS

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- Volunteer Excellence Award, TRB Sustainability and Resilience Young Member Council (2025)
- Dwight David Eisenhower Transportation Fellow, FHWA (2020, 2023, 2024)
- Talbot S. Huff, Sr. Highway Engineering Graduate Fellowship, UT Austin (2024)
- Jack E. Leisch Fellowship, ASCE Transportation and Development Institute (2023)
- Best Paper for 2023 by AMR20, the TRB Standing Committee on Disaster Response, Emergency Evacuations, and Business Continuity (2023)
- Mary Kate Collins Memorial Endowed Presidential Scholarship in Civil Engineering, UT Austin (2023)
- Charles W. Merritt Endowed Graduate Fellowship in Engineering, UT Austin (2019-2023)
- Campus Honors Program (Chancellor's Scholar), University of Illinois (2015-2019)
- Tau Beta Pi Engineering Honors Society, University of Illinois Chapter (initiated Spring 2017)
- Chi Epsilon Civil Engineering Honors Society, University of Illinois Chapter (initiated Fall 2016)

## RESEARCH EXPERIENCE

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### Graduate Research Assistant

2019-Present

Center for Transportation Research (CTR) at the University of Texas at Austin

- Resilient Infrastructure and Smart Cities (RISC) Lab, PI: Zhanmin Zhang, 2019-2023
- Simulation, Pricing, Adaptive Routing, and Traffic Assignment (SPARTA) Lab, PI: Stephen Boyles, 2023-Present

## Undergraduate Research Assistant

2017-2019

University of Illinois Urbana-Champaign

- PI: Jeffery Roesler

## SPONSORED RESEARCH

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“Data-Driven, Multimodal Freight Modeling for Waterways and Ports,” sponsored by the Coastal and Hydraulics Laboratory of the US Army Corps of Engineers Engineering Research and Development Center, PI: Stephen Boyles, awarded \$160,125 (Sep 2023 – Dec 2024)

- Established initial contact with project sponsor
- Led project proposal authorship team
- Processed and integrated data from multiple transport modes for simulation purposes
- Identified bottlenecks in multi-modal freight networks through discrete event simulation
- Simulated disruption scenarios to examine resilience and recovery bottlenecks
- Produced at least 1 technical report, 3 publications (in progress), and 4 conference presentations

“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: Zhanmin Zhang and Stephen Boyles, awarded \$399,870 (Sep 2021 – Jan 2024)

- 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
- Produced 1 technical report, 2 publications, and 2 conference presentations

“Creating a Resilient Port System in Texas: Assessing and Mitigating Extreme Weather Events,” sponsored by the Texas Department of Transportation, PI: Zhanmin Zhang, awarded \$317,000 (Jan 2020 – Dec 2021)

- Collected data from port stakeholders to understand existing resilience 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 port resilience
- Recommended action items for port stakeholders to implement to improve resilience capabilities
- Produced 1 technical report, 2 publications, and 3 conference presentations

## WORKING PAPERS

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W2 **K. Bathgate**, D. Bagchi, and S. Boyles. Use of AIS Data to Characterize Vessel Mix in Houston Port Operations for Simulation. *Submitted for presentation only and selected as lectern for 2025 TRB Annual Meeting. Manuscript pending journal submission, 2025*

W1 D. Bagchi, **K. Bathgate**, and S. Boyles. A Queuing Theory-based Operating Capacity Model for Multimodal Port Operations. *Submitted for presentation only and selected as lectern for 2025 TRB Annual Meeting. Manuscript pending journal submission, 2025*

## REFEREED PUBLICATIONS

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J7 **K. Bathgate**, S. Pan, and S. Boyles. *Handbook of Infrastructure Communication*, chapter 10: Transportation Infrastructure. Wiley, Hoboken, NJ. In Faust, K. and Stephens, K. eds. *In press*.

J6 J. Robbennolt, L. Xu, **K. Bathgate**, S. Pan, and S. D. Boyles. Identifying Critical Locations for Traffic Monitoring Devices during Hurricane Evacuations. *Journal of Infrastructure Systems*, 31(2): 04025006, June 2025. doi: 10.1061/JITSE4.ISENG-2563. URL <https://ascelibrary.org/doi/10.1061/JITSE4.ISENG-2563>. Publisher: American Society of Civil Engineers

- J5 J. Sun, **K. Bathgate**, S. Pan, and Z. Zhang. Network-based Method for Assessing Multi-modal Transportation Network Vulnerability to Cascading Failures. *Sustainability Analytics and Modeling*, 4:100034, Jan. 2024. ISSN 2667-2596. doi: 10.1016/j.samod.2024.100034. URL <https://www.sciencedirect.com/science/article/pii/S2667259624000067>
- J4 S. Pan, **K. Bathgate**, Z. Han, J. Sun, and Z. Zhang. Modeling Interdependent Infrastructure System Vulnerability with Imprecise Information Using Two Fuzzy Inference Systems. *Transportation Research Record*, page 03611981241270153, Aug. 2024. ISSN 0361-1981. doi: 10.1177/03611981241270153. URL <https://doi.org/10.1177/03611981241270153>
- J3 J. Sun, **K. Bathgate**, and Z. Zhang. Bayesian network-based resilience assessment of interdependent infrastructure systems under optimal resource allocation strategies. *Resilient Cities and Structures*, 3(2): 46–56, June 2024. ISSN 2772-7416. doi: 10.1016/j.rcns.2024.06.001. URL <https://www.sciencedirect.com/science/article/pii/S2772741624000243>
- J2 L. Xu, **K. Bathgate**, J. Robbennolt, J. Sun, S. Pan, Z. Han, and S. D. Boyles. Understanding the Utilization of Real-Time Traffic Information during Hurricane Evacuations in Texas. *Transportation Research Record*, pages 1–15, May 2024. ISSN 0361-1981. doi: 10.1177/03611981241242777. URL <https://doi.org/10.1177/03611981241242777>. *Awarded Best Paper for 2023 by the TRB Standing Committee on Disaster Response, Emergency Evacuations, and Business Continuity (AMR20)*
- J1 **K. Bathgate**, A. Perez de la Cruz, and Z. Zhang. Quantitative Analysis of Hurricane Harvey Impacts on Texas Maritime Facilities. *Transportation Research Record*, 2676(7):411–422, July 2022. ISSN 0361-1981. doi: 10.1177/03611981221078574. URL <https://doi.org/10.1177/03611981221078574>

## REFEREED CONFERENCE PRESENTATIONS

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- C11 **K. Bathgate**, D. Bagchi, and S. Boyles. Use of AIS Data to Characterize Vessel Mix in Houston Port Operations for Simulation. Transportation Research Board 104th Annual Meeting, January 6, 2025. Washington, DC
- C10 D. Bagchi, **K. Bathgate**, and S. Boyles. A Queuing Theory-based Operating Capacity Model for Multimodal Port Operations. Transportation Research Board 104th Annual Meeting, January 6, 2025. Washington, DC
- C9 L. Xu, **K. Bathgate**, J. Robbennolt, J. Sun, S. Pan, Z. Han, and S. Boyles. Understanding the Utilization of Real-Time Traffic Information during Hurricane Evacuations in Texas. Transportation Research Board 103rd Annual Meeting, January 9, 2024. Washington, DC
- C8 S. Pan, J. Sun, **K. Bathgate**, and Z. Zhang. Modeling Interdependent Infrastructure System Vulnerability with Imprecise Information Using Two Fuzzy Inference Systems. Transportation Research Board 103rd Annual Meeting, January 8, 2024. Washington, DC
- C7 J. Sun, **K. Bathgate**, and Z. Zhang. Bayesian Network-based Resilience Assessment of Interdependent Infrastructure Systems under Optimal Resource Allocation Strategies. Transportation Research Board 103rd Annual Meeting, January 8, 2024. Washington, DC
- C6 K. Jiang, **K. Bathgate**, S. Pan, J. Sun, Z. Han, M. Murphy, and S. Boyles. Perceptions and Usage of Traffic Monitoring Devices during Past Hurricane Evacuations in Texas. American Society of Civil Engineers Transportation and Development Institute, International Conference on Transportation and Development, June 14-17, 2023. Austin, TX
- C5 **K. Bathgate**, K. Jiang, Z. Han, M. Murphy, and Z. Zhang. Evacuation Volume and Safety Assessment: A Case Study in Rural Texas Highways during Hurricane Laura on US 90 and US 287. Transportation Research Board 102nd Annual Meeting, January 8-12, 2023. Washington, DC

- C4 J. Sun, **K. Bathgate**, S. Pan, and Z. Zhang. Network-based Method for Vulnerability Analysis of Port Systems Considering Cascading Failures. Transportation Research Board 102nd Annual Meeting, January 8-12, 2023. Washington, DC
- C3 **K. Bathgate**. Quantitative Analysis of Hurricane Harvey Impacts on Texas Maritime Facilities. Transportation Research Board 101st Annual Meeting, January 9-13, 2022. Washington, DC
- C2 **K. Bathgate**. 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)*
- C1 **K. Bathgate**. 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

## TECHNICAL PRESENTATIONS

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- P13 **K. Bathgate**. Data-driven Simulation for Multimodal Maritime System Capacity and Resilience Planning. TRB Conference on Data and AI for Transportation Advancement, May 28, 2025. Seattle, WA
- P12 **K. Bathgate**. Use of AIS Data to Characterize Maritime Freight Operations and Resilience at the Port of Houston. Lamar University, Industrial Engineering Professional Seminar, April 17, 2025. Virtual
- P11 **K. Bathgate**, D. Bagchi, and S. Boyles. Simulation Methods for Measuring Multimodal Maritime Freight System Capacity and Resilience: A Case Study at the Port of Houston. UT Center for Transportation Research Symposium, April 9, 2025. Austin, TX
- P10 **K. Bathgate**. Analysis and Simulation of Maritime Freight Resilience at the Port of Houston. Virtual Inter-University Symposium on Infrastructure Management (VISIM), April 4, 2025. Northwestern University, Virtual
- P9 **K. Bathgate**. Using Automatic Identification System Data to Understand Maritime Operations and Resilience. Environmental Protection Agency Port Technology Section Lunch and Learn, March 6, 2025. Virtual
- P8 **K. Bathgate**. Using AIS to Understand Port Systems: A Case Study at the Port of Houston. Transportation Research Board 104th Annual Meeting, 32nd Annual Dwight David Eisenhower Transportation Fellowship Program Research Showcase, January 7, 2025. Washington, DC
- P7 **K. Bathgate**, D. Bagchi, and S. Boyles. Identifying Capacities in a Multimodal Maritime Freight Network. Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, October 20, 2024. Seattle, WA
- P6 **K. Bathgate**, D. Bagchi, and S. Boyles. Data-Driven Modeling for Multimodal Port Resilience Assessment. UT Center for Transportation Research Symposium, April 3, 2024. Austin, TX
- P5 **K. Bathgate**. Data Integration for Multimodal Freight Resilience Assessment. Transportation Research Board 103rd Annual Meeting, 31st Annual Dwight David Eisenhower Transportation Fellowship Program Research Showcase, January 9, 2024. Washington, DC
- P4 **K. Bathgate**, K. Jiang, S. Pan, J. Robbennolt, L. Xu, J. Sun, Z. Han, and S. Boyles. Evaluation of Real-Time Traffic Monitoring Devices for Texas Hurricane Evacuations. UT Center for Transportation Research Symposium, April 19, 2023. Austin, TX
- P3 **K. Bathgate**. An Extreme Weather Risk-Assessment Framework for Port Infrastructure Systems. UT Center for Transportation Research Symposium, April 12, 2022. Austin, TX

- P2 **K. Bathgate**. Hurricane Harvey Impacts on Texas Maritime Facilities: An AIS Big Data Statistical Analysis. UT CAEE Graduate Research Symposium, April 6, 2022. Austin, TX
- P1 **K. Bathgate**. Texas Seaport Resilience Assessment: Incorporating Stakeholder Input. Transportation Research Board 100th Annual Meeting, 28th Annual Dwight David Eisenhower Transportation Fellowship Program Research Showcase, January 25-29, 2021. Virtual proceedings

## TECHNICAL REPORTS

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- R2 **K. Bathgate**, L. Xu, K. Jiang, J. Sun, J. Robbennolt, S. Pan, Z. Han, M. Murphy, S. Boyles, Z. Zhang, and R. Machemehl. Define a Statewide Plan for a Sustainable Real-Time Travel Time Network for Texas Hurricane Evacuations and Safe Citizen Return. Technical Report FHWA/TX-24/0-7123-1, Center for Transportation Research at The University of Texas at Austin, Austin, TX, Aug. 2024. URL <https://library.ctr.utexas.edu/ctr-publications/0-7123-1.pdf>
- R1 **K. Bathgate**, J. Sun, S. Pan, S. Balakrishnan, Z. Zhang, M. Murphy, Z. Han, and L. Loftus-Otway. Creating a Resilient Port System in Texas: Assessing and Mitigating Extreme Weather Events – Final Report. Technical Report FHWA/TX-22/0-7055-1, Center for Transportation Research at The University of Texas at Austin, Austin, TX, May 2022. URL <https://library.ctr.utexas.edu/ctr-publications/0-7055-1.pdf>

## TEACHING AND ADVISING EXPERIENCE

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### Undergraduate students mentored

- Dylan Croteau (2024)
- Richard Lee (2021)

### Teaching Assistant

**2024-2025**

University of Texas at Austin

CE 311S Probability and Statistics for Civil Engineers, Spring 2025

- Assisted with major course redesign
- Led two weekly discussion and recitation sections of 20 students each
- Average instructor evaluation score of 4.85/5

CE 321 Transportation Systems, Spring 2024

- Assisted with curriculum development and course structure design

### Course Grader

**Spring 2022**

University of Texas at Austin, CE 321 Transportation Systems

- Graded homework and project assignments for transportation introductory course
- Lectured on transportation infrastructure resilience and interdependencies

### Guest Lecturer

**2021-Present**

University of Texas at Austin, undergraduate and graduate-level civil engineering courses

- Courses: CE 311 S Probability and Statistics for Civil Engineers, CE 321 Transportation Systems, CE 392 N1 Infrastructure Systems Management
- Topics: Infrastructure Resilience and Interdependencies, Budget Planning and Budget Allocation, Statistics in civil engineering case study

### Undergraduate Learning Assistant

**Fall 2018**

University of Illinois Urbana-Champaign, CEE 398 Project-Based Learning

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

## PROFESSIONAL EXPERIENCE

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### **Applied Pavement Technology**

**May-Aug 2019**

Pavement Engineering Intern; Urbana, IL

- 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.**

**2017, 2018**

Transportation Engineering Intern; Champaign, IL

Provided construction engineering services on \$14 million roadway and drainage project, May-Jul 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, Apr-Aug 2017

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

### **Williamson County 911**

**Jun-Aug 2016**

GIS Contractor; Marion, IL

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

## SOCIETY SERVICE

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### **Transportation Research Board (TRB)**

Current affiliations

- Standing Committee on Transportation System Resilience and Security (ACF18)
- Standing Committee on Freight Data (AED13)
- Standing Committee on Transportation Network Analysis (AEP13)
- Standing Committee on Freight and Logistics Planning and Modeling (AT012)
- Standing Committee on Port Operations and Infrastructure (AW011)

Affiliations prior to June, 2025

- Standing Committee on Disaster Response, Emergency Evacuations, and Business Continuity (AMR20), **Member**
- Standing Committee on Freight Transportation Data (AED70), **Member**
- Standing Committee on Critical Transportation Infrastructure Protection (AMR10), Friend
- Standing Committee on Extreme Weather and Climate Change Adaptation (AMR50), Friend
- Standing Committee on Geographic Information Science (AED40), Friend
- Standing Committee on Ports and Channels (AW010), Friend
- Sustainability and Resilience Group Young Member Council (AM000), Annual Meeting Working Group Member

### **American Society of Civil Engineers (ASCE)**

Student Presidential Group (SPG)

- Transportation and Development Institute (T&DI) Representative (2024-2025)

Transportation and Development Institute (T&DI)

- International Conference on Transportation & Development (ICTD), Student Volunteer Committee Chair (2022-2023)

University of Illinois Student Chapter

- Concrete Canoe Team Design Captain (2017-2019)
- Concrete Canoe Paddling Team Member (2017-2018)
- Secretary (2017-2018)
- Outreach Chair (2016-2017)

## **Graduate Student Advisory Board (GSAB)**

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

- Transportation Representative (2020-2022)

## **Intelligent Transportation Society of America (ITS)**

University of Texas Student Chapter

- Member (2019-Present)
- President (2019-2021)
- UT CAEE GSAB Liason (2021-2022)

## **Institute of Transportation Engineers (ITE)**

University of Texas Student Chapter

- Member (2019-Present)

University of Illinois Student Chapter

- President (2018-2019)
- Secretary (2017-2018)

## **Folk and Roots Club (The Pickin' Illini)**

University of Illinois Registered Student Organization for bluegrass music performance

- President (2016-2017)

## **REFeree SERVICE**

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### **Conference Referee:**

Transportation Research Board

- AMR10, Standing Committee on Critical Infrastructure Protection
- AMR20, Standing Committee on Emergency Response, Business Continuity, and Evacuations
- AMR50, Standing Committee on Extreme Weather and Climate Change Adaptation
- AM000, Sustainability and Resilience Group Young Member Council
- AED50, Standing Committee on Artificial Intelligence and Advanced Computing Applications
- AED70, Standing Committee on Freight Transportation Data

### **Journal Referee:**

- Environmental Earth Sciences
- Journal of Computing in Civil Engineering
- Journal of Infrastructure Systems
- Journal of Management in Engineering
- Transportation Research Record

## **LICENSURE**

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