

# Kyle D. Bathgate

Doctoral Candidate and Graduate Research Assistant  
Maseeh Department of Civil, Architectural, and Environmental Engineering  
The University of Texas at Austin  
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## EDUCATION

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### Ph.D. Civil Engineering

Present

University of Texas at Austin, 3.90 GPA

- Dissertation working title: Modeling the Resilience of Multi-Modal Freight Transportation Systems
- Committee: Dr. Stephen Boyles (advisor), Dr. Randy Machemehl, Dr. Tyler Dick, Dr. Kenneth Mitchell, Dr. Alison Conway

### M.S.E. Civil Engineering

May 2021

University of Texas at Austin, 3.93 GPA

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

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

May 2019

University of Illinois Urbana-Champaign, 3.89 GPA

- Concentrations: Transportation and hydrology
- Graduated with High Honors

## 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: Dr. Zhanmin Zhang, 2019-2023
- Simulation, Pricing, Adaptive Routing, and Traffic Assignment (SPARTA) Lab, PI: Dr. Stephen Boyles, 2023-Present

### Undergraduate Research Assistant

2017-2019

University of Illinois Urbana-Champaign

- PI: Dr. 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: Dr. Stephen Boyles, awarded \$160,125 (Sep 2023 – Dec 2024)

- 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

“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 and Dr. 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

“Creating a Resilient Port System in Texas: Assessing and Mitigating Extreme Weather Events,” sponsored by the Texas Department of Transportation, PI: Dr. 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

## REFEREED JOURNAL PUBLICATIONS

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- J6 J. Robbennolt, L. Xu, **K. Bathgate**, S. Pan, and S. Boyles. Identifying Critical Locations for Traffic Monitoring Devices during Hurricane Evacuations. Under review, *Journal of Infrastructure Systems*, 2024
- J5 J. Sun, **K. Bathgate**, S. Pan, and Z. Zhang. Network-based Method for Assessing Interdependent Transportation Network Vulnerability to Cascading Failures. Under review, *Sustainability Analytics and Modeling*, 2024a
- 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. 2024a. 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 2024c. 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 2024b. 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 2022a. ISSN 0361-1981. doi: 10.1177/03611981221078574. URL <https://doi.org/10.1177/03611981221078574>

## REFEREED CONFERENCE PRESENTATIONS

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- 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, 2024a. 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, 2024b. 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, 2024b. 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, 2023a. 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, 2022c. 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, 2021a. 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, 2021c. Virtual proceedings

## TECHNICAL PRESENTATIONS

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- 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, 2023b. Austin, TX
- P3 **K. Bathgate**. An Extreme Weather Risk-Assessment Framework for Port Infrastructure Systems. UT Center for Transportation Research Symposium, April 12, 2022b. 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, 2022a. 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, 2021b. 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 2022b. URL <https://library.ctr.utexas.edu/ctr-publications/0-7055-1.pdf>

## TEACHING EXPERIENCE

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### Teaching Assistant

Spring 2024

University of Texas at Austin, CE 321 Transportation Systems

- Assisted with curriculum development and course structure design
- Lectured on freight maritime transportation systems

### 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

## HONORS AND AWARDS

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- Jack E. Leisch Fellowship, ASCE Transportation and Development Institute (2023)
- Dwight David Eisenhower Transportation Fellow, FHWA (2020, 2023)
- Mary Kate (Kitty) 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)

## SOCIETY SERVICE

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

Student Presidential Group (SPG)

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

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)

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

- Standing Committee on Critical Transportation Infrastructure Protection (AMR10), Friend
- Standing Committee on Disaster Response, Emergency Evacuations, and Business Continuity (AMR20), Member
- Standing Committee on Extreme Weather and Climate Change Adaptation (AMR50), Friend
- Standing Committee on Geographic Information Science (AED40), Friend
- Standing Committee on Freight Transportation Data (AED70), Friend
- Sustainability and Resilience Group Young Member Council (AM000), Annual Meeting Working Group Member (2022)

### **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

### **Journal Referee:**

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

## **SKILLS**

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

**Programs:** ESRI ArcGIS, Python, R, Microsoft Office, AnyLogic, Git, L<sup>A</sup>T<sub>E</sub>X

**Methods:** data processing, statistical analysis, survey design, data visualization, geospatial analysis, modeling and simulation