MarTREC
Maritime Transportation Research & Education Center

BIL MarTREC Tier 1 UTC Project Request Form
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Submission Date: January 26, 2024
Lead Recipient/Grant Number: University of Arkansas / 69A3552348331
Principal Investigator Institution: Vanderbilt University
Center Name: Maritime Transportation Research and Education Center
USDOT Research Priority: Preserving the Existing Transportation System
Primary USDOT Strategic Goal (*select drop down*): Economic Strength and Global Competitiveness
Principal Investigator(s) with ORCID(s) and Contact Information: **Dr. Hiba Baroud** (ORCID No. 0000-0003-3641-6449) Assistant Professor of Civil and Environmental Engineering, PMB 351831, 2301 Vanderbilt Place, Nashville, TN 37235-1831, phone: 615-322-0471, email: hiba.baroud@vanderbilt.edu; **Co-Principal Investigator(s): Dr. Paul M. Johnson** (ORCID No. 0000-0002-6585-3034, Postdoctoral Research Fellow, Vanderbilt University School of Engineering, PMB, 351831, 2301 Vanderbilt Place, Nashville, TN 37235-1831; phone: 770-893-7363; email: paul.m.johnson@vanderbilt.edu); **Dr. Craig Philip** (ORCID No. 0000-0001-9564-6418) Research Professor of Civil and Environmental Engineering, PMB 351831, 2301 Vanderbilt Place, Nashville, TN 37235-1831, phone: 615-322-6013, craig.e.philip@vanderbilt.edu)
Project Partners: *N/A*
Project Type (*select drop down*): Applied Research
Project Research Topic Type (*select drop down*): Maritime Sustainable and Resilient Infrastructure
Transportation Modes Involved (*check all that apply*): ☒Waterway ☐Road ☐Rail ☐Pipeline ☐Other
Research Project Funding: **(**USDOT + Matching funds = Total Cost): USDOT (MarTREC) funds: $93,368; matching: $46,684. Total Cost: $140,052.
Project Start and End Dates (Format month/day/year to month/day/year): 02/01/2024 to 08/31/2025
Project Title: Financing for Marine Transport: Analyzing the Impact of Resilient Infrastructure Investments for the Inland Waterways (Part II)
Project Abstract (Brief Description): The U.S. inland waterways play a vital role in the domestic economy, but disruptive weather events, namely floods and droughts, perennially threaten to disrupt their operations. The frequency and severity of these disruptions are of particular concern. In Part I of this project, our research team successfully integrated downscaled flood projections with agent-based and economic models to effectively simulate supply chain disruptions along the inland waterways due to various flood scenarios and estimate resulting economic impacts of businesses' decisions to re-route, or not re-route, shipments in response to these events. In Part II of this project, we focus on integrating the decoupled net present value (DNPV) financial framework with the simulations. Doing so will allow us to highlight cases where investments in resilient, water-borne infrastructure can offer cost-effective means of mitigating impacts of disruptive weather events. We aim to use the development of The Port of Cates Landing, a flood-resilient port located near the mouth of the Upper Mississippi River, as an in-depth case study to demonstrate this approach. However, our work can be extended to other sections of the waterways and transportation modes.

USDOT Priorities: Our project paves the way for researchers being able to quantify the return on investments in hardened infrastructure along the inland waterway supply. This work will greatly improve our understanding of the expected economic impacts of future high- and low-water conditions along the Mississippi River and help identify key areas where investments in resilient infrastructure can serve as cost-effective investment opportunities.
Outputs (results of the work performed): Our project will establish a baseline methodology for researchers in being able to quantify the benefits and costs of investing in resilient infrastructure for inland waterway supply chains. This methodology is a state-of-the-art, data-driven solution that combines the decoupled net present value (DNPV) financial framework with hazard modeling, simulation methods, statistical models, and economic models.
Outcomes/Impacts: This achievement will fill a substantial knowledge gap in the scientific literature. Additionally, our results and modeling framework can help policymakers better allocate funding for mitigating future supply chain disruptions.
Technology Transfer Activities: Knowledge transfer will be pursued, including presentations of project results at major conferences (e.g., TRB annual meeting, Society of Risk Analysis, and more) and publication in peer-reviewed journals. Vanderbilt will also seek to disseminate results to and obtain model feedback from stakeholders via its connections with the Lower Mississippi River Science Symposium, Ingram Barge Company, and United States Army Corps of Engineers.
Final Research Report: Upon completion of the project, provide a URL link to final report will be provided
Project Deliverables: ☒ PI agrees to submit all deliverables within 4 weeks after the project end date.
Data Management Plan (DMP): ☒ PI has reviewed and agrees to adhere to MarTREC DMP. Proposed project DMP must be attached to the submission email along with this form.
Center Director Approval Signature and Date:  09/25