Research Project Name: Professional capacity building and field-based education in coastal transportation durability (UPRM)

Improving the Durability and Extending the Life of Transportation Infrastructure

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Project Partners:
Puerto Rico Local Technical Assistance Program (LTAP) Center

Research Project Funding:
Federal: $68,881 Match: $51,367 (UPRM)

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Project Description: Coastal transportation assets are routinely exposed to coastal hazards, including flooding, erosion, saltwater intrusion, and storm impacts, that undermine safety, mobility, and service continuity. Capacity building in effective vulnerability assessment and risk management requires more than technical modeling: practitioners need applied skills in infrastructure screening, community-sensitive evaluation, data-driven decision making, risk communication, and cross-agency coordination. The US-DOT developed in 2015 a spreadsheet-based tool called Vulnerability Assessment Scoring Tool (VAST) to assist in documenting the vulnerability of transportation assets in a study area. The assessment includes (1) determining the scope of the vulnerability assessment, (2) selecting appropriate indicators, (3) collecting data about those indicators, and (4) devising an approach to convert raw data about indicators into scores. The result is a set of vulnerability scores that can be used to rank assets by their level of vulnerability or inform other analyses of the results. Today, state and local agencies often lack the staffing and training to use screening tools consistently or to translate assessment results into prioritized investments, while college education delivers essential theory but rarely provide the real-world, community-engaged practice needed to make assessments actionable. To close current workforce gaps, this project proposes two complementary capacity-building tracks: a college-level track that will prepare upcoming engineers and architects with interdisciplinary foundations and hands-on experiences, and a professional-level track that will help upskill practicing engineers in the application of vulnerability assessment methods and tools, such as FHWA VAST. Both tracks share core competencies but differ in depth, delivery, and assessment to match learners' roles and incentives.

This project will address professional capacity gaps by developing educational modules, workshops, and training materials for students, communities, and professionals. These resources will be delivered through the UPRM Interactive Learning Hub (ILHUB) and in-person sessions via the Puerto Rico LTAP training program. The ILHUB serves as an online repository focused on coastal resilience and community preparedness. The educational approach integrates coastal resilience, transportation performance, and blue economy strategies into accessible learning resources, enhancing technical knowledge and community capacity across diverse stakeholders. The UPRM team is applying the VAST approach using data from the PR-466/4466 coastal highway corridor in Isabela, Puerto Rico, incorporating community characteristics into the scoring method to enrich the assessment with contextual insights. Professionals will strengthen their competencies in blue economy and transportation durability strategies, as well as in applying the Enhanced VAST. Building on this effort, the project will develop instructor-led and self-paced online training modules to equip professionals with the skills to apply the assessment

tool in real-world contexts. Puerto Rico LTAP will assist in delivering these sessions and disseminating the educational materials through its network. On the college track, students will gain hands-on experiences through field case studies of transportation vulnerability situations in coastal zones that will complement their classroom education, strengthen their problem-solving and critical thinking skills, and improve their career readiness. Communities will be also engaged as part of the case studies to improve their understanding of how the durability of transportation systems supports coastal livelihoods and access to

US DOT Priorities: *Section left blank until USDOT's new priorities and RD&T strategic goals are available in Spring 2026.*

Outputs:

- **Interactive Learning Hub (ILHUB):** This web-based tool has been developed to serve as a knowledge repository, enabling community members and professional stakeholders to strengthen their capacity in blue economy strategies, coastal infrastructure durability, and transportation performance. This activity builds upon an existing online platform originally created by the UPRM Coastal Resilience Center research team under sponsorship from the Department of Homeland Security.
- **Technology Transfer Modules:** A series of seminars and training sessions will be developed to transfer best practices and research findings. These modules are aligned with the LTAP vision of improving transportation safety and quality through information exchange. The outputs will strengthen stakeholder capacity in coastal resilience, transportation performance, and blue economy strategies.

Outcomes/Impacts:

- The project will deliver educational modules and capacity building materials through the ILHUB, establishing a central access point for exchange of knowledge on coastal resilience, transportation performance, and blue economy strategies.
- The educational modules will also be offered in-person sessions with the assistance of the Puerto Rico LTAP to strengthen local and regional capacity, expand pathways toward blue economy careers, and create an educational framework that can be replicated in other coastal and island contexts.

Curriculum modules to implement field case studies for engineering and architecture majors at the undergraduate levels with detailed classroom lectures and preparation of the case studies. It is anticipated that the research outcomes will be adaptable to other transportation sectors.

Final Research Report: URL to final Report will be provided upon completion.