



**Project Requirements Form USDOT
CREATE UTC Contract Number 69A3552348330**

Center Lead: Texas State University; University of Puerto Rico – Mayagüez

Research Project Name: Use of Enhanced Visualization Technology to Assess the States of Coastal Transportation Infrastructure.	
Improving the Durability and Extending the Life of Transportation Infrastructure	
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Project Partners: Puerto Rico Local Technical Assistance Program (LTAP) Center, the UPRM Coastal Resilience Center (CRC), the RISE-UP initiative at UPRM, and the Municipality of Isabela.	
Research Project Funding:	
Federal: \$62,344	Match: \$49,846
Project Start Date: 09/01/2024	Project End Date: 08/30/2025
Project Description: The main goal of this project is to develop a mechanism that integrates the needs and preferences of coastal communities into the creation of a decision-support tool. This tool will assess risks for transportation corridors based on equity and performance criteria and will improve infrastructure and services in support of the blue economy. The equity analysis will focus on road accessibility in underserved coastal communities, which represents an urgent challenge that needs to be addressed promptly. Fundamental concepts such as intergenerational equity, resilience, sustainability, and quality of life must involve all stakeholders, especially in underserved communities. Integrating public and community participation in decision-making processes remains a challenging task for transportation planning, as there is often a gap between what is achievable and what is implemented. Incorporating visualization tools has high potential to facilitate communication with the community, both to convey information and to gather clear opinions and ideas from residents.	
US DOT Priorities: This project develops a practical framework to create tools that promote equity in road accessibility for marginalized coastal communities through the implementation of virtual reality visualizations strategies. The research outcomes are expected to be adaptable to other transportation sectors. Additionally, these activities will contribute to USDOT Challenges of Preserving the Existing Transportation System, Improving the Mobility of People and Goods, and Promoting Safety. Furthermore, the approach of incorporating community preferences into design and communicating with the public through visualizations is highly appealing to professionals, researchers, and the public. This early public engagement approach through visualizations, demonstrated in the project, has the potential to transform practices applied to future projects.	
Outputs: Develop and administer questionnaires to better understand community perspectives on Coastal Mobility Equity in Puerto Rico. These instruments are continuously designed to gather valuable feedback from the different types of audiences, offering insights into their views and experiences related to the project’s focus. Development of a Research Methodology specifically addressing Coastal Mobility Equity in terms of Road Accessibility. This methodology includes a preliminary experimental design that will integrate results within the 3 Equity States into advanced visualization techniques for better decision-making.	



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A presentation was offered at the Mega Viernes Civil 2024 Conference of the Puerto Rico Institute of Civil Engineers, related to the project's overall scope and objectives. Additionally, a poster was also presented with an in-depth overview of our research. We participated in the UPRM Research Symposium for Faculty and Graduate Students where we showcased three posters, related to the project activities in CREATE.

Outcomes/Impacts: CREATE-UPRM seeks to continue expanding the methodological concept based on the three equity states or dimensions: perception (social), reality (measured), and resilient design (target), to develop a comprehensive framework for an equity-based decision-making & project management tool. This model is also being referred to as the Equilibrium Cycle, which intends to address coastal mobility equity in terms of road accessibility due to multi-hazard by gathering perceptual information to propose solutions based not only on effectiveness and efficiency but also to propose tailored ones that meet the genuine societal needs of the most burdened communities.

CREATE-UPRM aims to develop interactive simulations using software such as Unity, which will allow for the creation of detailed models of solutions to improve accessibility on coastal roads for marginalized communities through immersive virtual reality technologies. These models will serve as valuable tools to assess the impact of various proposed solutions before their real-world implementation. As the project progresses, there may be opportunities to patent specific simulation technologies or innovative evaluation methodologies. Integrating these simulations into the planning and design process will enable more active participation from the affected communities. This participatory approach will not only enhance the accuracy and relevance of the proposed solutions but also promote greater acceptance and adaptability of the final solutions. Additionally, the use of advanced visualization technologies will facilitate a more precise assessment of the communities' needs and preferences, ensuring that the solutions are optimally tailored to their specific realities.

CREATE-UPRM also aims to develop a tool similar to the Caltrans Transportation Equity Index (EQI) to obtain a transportation-based priority populations screen for Puerto Rico coastal communities through spatial screening that integrates transportation and socioeconomic indicators. By identifying not only measures to account for equity-based outcomes and transportation-based priority communities, but also including blue economy workforce zones with potential sustainable development, the tool would assess and address equity issues within the transportation network, ensuring that all residents and visitors have equal and resilient access to transportation services. Similarly, the rise of the blue economy workforce development should provide fair and equal opportunities for local entrepreneurship within coastal employment.

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