Project Requirements Form USDOT
CREATE UTC Contract Number 69A3552348330
Center Lead: Texas State University; Texas State University

Research Project Name: Improving Post-Disaster Access to Critical Facilities for Coastal Communities (OSU)

Improving the Durability and Extending the Life of Transportation Infrastructure

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Research Project Funding:
Federal: $100,000 **Match:** $100,000 (OSU)

Project Start Date: 9/1/2024 **Project End Date:** 6/14/2026

Project Description: The increased frequency of acute coastal hazards (tsunamis and hurricanes) in conjunction with induced chronic hazards (coastal erosion) could result in the occurrence of unprecedented combinations of these hazards that can cause tremendous damage to the coastal transportation network. These disruptions combined with the prevailing lack of adequate redundancies in the transportation network can severely impact connectivity from coastal communities to critical facilities such as hospitals, fire stations, and other areas for post-disaster aid. Thus, this proposal will first quantify the impact of unprecedented combinations of coastal hazards on the connectivity of rural communities to critical hazards. Additionally, this project seeks identify appropriate post-disaster response and recovery strategies to minimize differential impacts on coastal populations by improving their access to critical facilities after unprecedented disasters. These strategies include the identification of appropriate operations based on the region and the hazard for recovery and creation of discrete event simulation models to enable quantification of their performance. These will also enable a large-scale optimization in the allocation of resources considering a region's hazard exposure and the type of operations enabled.

US DOT Priorities: This project strongly aligns with the Safety goal from USDOT's strategic development plan due to its specific focus on ensuring all populations have access to critical facilities after a disaster. Numerous studies have noted that certain populations such as the elderly, rural, and tribal populations are at particular risk of being isolated after disasters due to numerous barriers including lack of knowledge of available resources, and an inability to respond to disaster onset in a timely manner. Disparities in regional infrastructure durability among populations can be expected to widen in the face of unprecedented disasters, and this research thus takes an interdisciplinary effort to integrate the perspectives of disaster impact, evacuation modeling, and recovery planning to mitigate impact on connectivity for all.

This project engages in advanced research by integrating hitherto siloed aspects of disaster impacts including: impact on infrastructure; its cascading differential impact on coastal populations; and potential means of mitigating these impacts by focusing on resources needed for recovery.

Outputs: The primary research output is to be developed in this project consists of a framework to link GIS-based analysis with discrete event simulation for operations analysis. This framework will be applied to coastal communities in Oregon to enable linking hazard characteristics to regional connectivity; and also, recovery operations to enable decision-makers to allocate resources. This output will be presented in the form of interactive geospatial connectivity maps that clearly identify coastal communities. These connectivity maps will be updated based on local equipment availability and thus enable experimentation with various allocation strategies for recovery. Partnerships have been established with debris contractors (Ceres Environmental) and researchers at Florida State University who focus on debris clearance after disasters to aid with validation of study.
Outcomes/Impacts: The anticipated outcome of this research is a method to allocate resources that are needed for repairing roadways after disasters by considering both disaster characteristics, as well as population needs to access critical facilities. It is thus anticipated that the research proposed can improve durability of coastal transportation networks in the face of unprecedented natural hazards.
Final Research Report: URL to final Report will be provided upon completion.