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Center Name: Pacific Northwest Transportation Consortium (PacTrans)

Research Priority: Improving the Mobility of People and Goods

Principal Investigator(s): Ahmed Ibrahim (UI)

Project Partners: N/A

Research Project Funding: $100,000 federal; $100,000 non-federal match

Project Start and End Date: 8/16/2023 – 8/15/2025

Project Description: The freight system is a critical component of the supply chain. An essential part of our freight systems is the multi-modal rural freight that consists of an interconnected network of local roads, freeways, railways, inland waterways, and ports. Economies of rural areas heavily rely on agriculture, fishing, and manufacturing, which depends on its multi-modal rural freight. It is crucial for the region's economic growth and global competitiveness that the rural freight system is safe and resilient. Such resilience and robustness require the availability of real-time, accurate, and localized data on the characteristics of the activities of different rural industries (land use and goods location, movement, and analysis) as well as the conditions of different elements of the freight network.

This proposed project aims to conduct i) a review of state-of-the-art strategies to improve the resiliency and efficiency of the freight network and a synthesis of those strategies that could be applied and implemented in rural areas, ii) interviews with different freight stakeholders to identify the data they need and availability/gaps of this data, and iii) three case studies for farming, manufacturing, and fishing to examine the availability of different datasets and the strategies to fill data gaps to assess the safety and resilience of rural freight networks. The outcome and findings of this study will be presented to different stakeholders through a set of webinars and other workforce development materials. The research results can help transportation agencies promptly detect, respond to, accommodate, and recover from disruptions, which also help agencies prioritize investment and resource allocations to maximize the resilience of the multi-modal rural freight network. All these will contribute to building a resilient supply chain for the region and the nation.

US DOT Priorities: The research intends to conduct several case studies for various multimodal fright corridors in the state of Idaho to examine and implement the proposed integrated framework developed as part of this research. The integrated area-based and link-based framework will be used to model the resiliency of multimodal rural freight corridors. The findings of this study will assist transportation authorities (USDOT) in identifying the weaknesses in various network components and in identify, and recovery from various interruptions to the fear corridor networks. In order to optimize the resilience of the multimodal rural freight network and advance the broader goal of a robust and resilient supply chain for the state, the area, and the country, the research findings will also assist agencies in

setting priorities for investments and resource allocation.

Outputs: The results of the work performed will provide a summary that details the findings from an extensive body of research on the resilience of multimodal freight corridors. The literature review will look at several definitions of resilience in multimodal freight routes and to study various approaches, metrics, and information to be utilized in the resiliency analysis of freight corridors. In addition, this project will create a comprehensive methodology that combines area- and link-based analysis to evaluate how susceptible the various components of multimodal freight corridors are to various disturbances.

Outcomes/Impacts: Transportation agencies will be able to evaluate risk indices for various freight corridor links under the proposed integrated framework, accounting for a variety of disruptions such as significant railway and highway crashes, natural disasters, and structural problems. The suggested approach will enable organizations to create strategies/framework for freight corridor risk management that are comprehensive, integrated, and account for all possible disruptions.

Final Research Report: *will provide upon completion of the project*