Corridor Planning Tool for Efficient and Resilient Agricultural Supply Chain in California – Project 9

Deliverables and Reporting Requirements for UTC Grants Awarded in 2023 (June 2023)

Exhibit D

Recipient/Grant (Contract) Number: The University of Tennessee; California State University, Long Beach, Grant No. 69- A3552348338

Center Name: Center for Freight Transportation for Efficient and Resilient Supply Chain (FERSC)

Research Priority: Improving Mobility of People and Goods

Principal Investigator(s): Shailesh Chandra (CSLB)

Project Partners: Caltrans

Research Project Funding: $70,000 Federal and $137,253 non-Federal funding

Project Start and End Date: 07/01/2024 – 06/30/2025

Project Description: In California, which leads in agricultural output and its economy relies on an extensive freight network, there exists a gap in providing stakeholders with the necessary guidance to assess the resilience of critical infrastructure elements such as corridors, intermodal connectors, and aging bridges for efficient movement of agricultural products and its supply chain. The objective of this proposed research is to enable stakeholders to identify and implement strategies that would improve the efficiency and resilience of freight networks for the movement of key agricultural commodities in California as well as in other states in which agricultural supply chain constitutes a significant part of the economy.

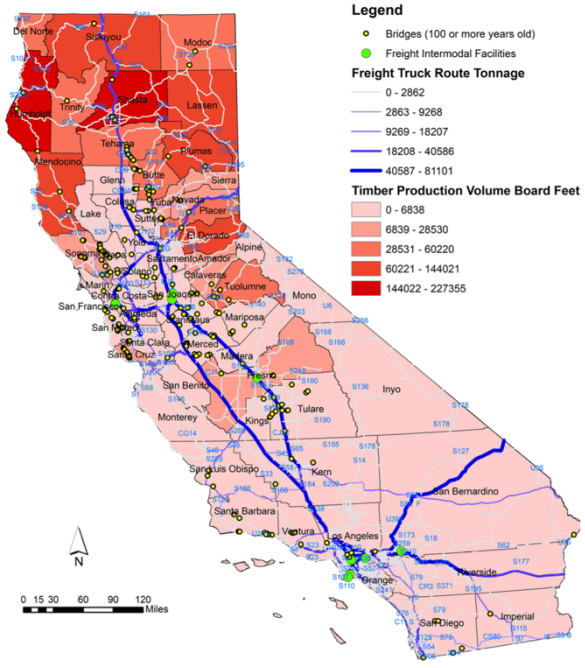

Figure 1. Network map with an example of timber

The research approach will involve developing a framework for risk priority of various elements of agricultural freight infrastructure in California.

As a first step, data will be collected on the type of agricultural produce such as commodities will include, as examples: dairy, cattle, poultry, and timber and service needs (such as fertilizer, water, feed, etc.). See map in Fig. 1.

A survey will be conducted among agriculture supply chain stakeholders consisting of producers, collectors, processors and distributors who are familiar with the challenges of the ag-related supply chain and freight transportation as well as the transportation planners and engineers from Caltrans and the planners and engineers from key agricultural ports of California. The purpose will be to determine elements (and the weights) from infrastructure that underline the criticality of the freight infrastructure. For example, what types of failure occurrences (and threshold values) are considered significant that could disrupt agricultural supply chain. The metrics could include weight restrictions of products allowed on certain routes, pavement/bridge and conditions, turn radius etc.

Subsequently, a risk priority number (RPN) will be developed dependent on agricultural produce, agriculture-related heavy-vehicle and commodity movement with varying month, season, etc. of the identified commodities transported in California. The flowchart for Failure Mode and Effects Analysis (FMEA) shown in Fig. 2 involve the seven steps beginning with selecting the freight network component (corridor, intermodal connector/facility or bridge) that facilitate movement of ag-related product, heavy equipment, etc., with the last step involving a list of network

components ranked by risk priority number (RPN) – a product of the potential occurrence, detectability and severity of the component failure.

US DOT Priorities: i) Improving Mobility of People and Goods.

Outputs: The outcomes of the research will be disseminated through presentations at professional meetings, including meetings of the TRB Committee on freight transportation and supply chain. Moreover, these findings will be submitted for publication in high impact factors journals like the Journal of Transport Geography and Transportation Research Part E: Logistics and Transportation Review. Furthermore, the PI and his team plan to communicate the insights gained from the research to local communities and public agencies, including Caltrans and key agricultural distributors of California. The PI will develop and share the tool developed with various stakeholders including Caltrans through workshop and training.

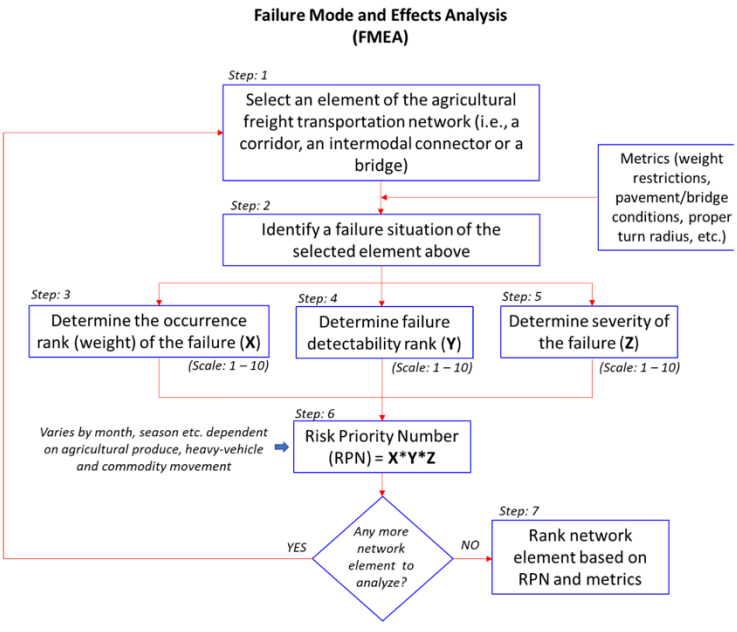

Figure 2. Flowchart for assessing critical (key) network components

Outcomes/Impacts: Based on the findings, strategies and metrics needed to design, construct and maintain the critical element of the agricultural in California can be recommended. Policies that increase agricultural network resiliency, as recommended by the tool, will also be identified and documented.

Therefore, in summary, the methodology will identify critical infrastructure elements of the agricultural freight network system consisting of the critical corridors, intermodal connectors, aging bridges etc. of the agricultural supply chain. Following this, the research will also lead to the creation of a user-friendly, spreadsheet-based tool. In conjunction with the tool development, there will also be an educational initiative, entailing planned workforce training to educate various stakeholders (including transportation planners from Caltrans) on how to effectively utilize this tool.

Therefore, the tool developed in this research will assist stakeholders in pinpointing strategies to bolster both the efficiency and resilience of the agricultural freight network pertinent to their regions through appropriate project selections for agriculture (supply chain) corridor planning.