Impact of Automated Port Operations on Landslide Freight Corridor Performance: Opportunities, Barriers, and Future Directions with the Port of Long Beach – Project 7

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

Research Priority: Improving Mobility of People and Goods

Principal Investigator(s): Shailesh Chandra (CSULB) and Kevin Heaslip (UTK)

Project Partners: Port of Long Beach, Caltrans, NEXT Trucking, Harbor Trucking Association

We have included some partners in the FERSC advisory board and will schedule regular meetings with the partners, update them on our project's progress, and seek feedback.

Research Project Funding: $150,000 Federal and $163,962 Non-Federal Funding

Project Start and End Date: 8/1/2023 – 7/31/2024

Project Description: Automated terminals at the Port of Long Beach have helped process containers faster. Software-assisted cranes and autonomous vehicles have been crucial to improving efficiencies. However, little is known about how automation at the port synchronizes with the other conventional operations of container transportation in the multimodal freight network consisting of the freeways and highways in the Southern California Region. This research will develop tools to assess the status quo of supply chain operations and identify gaps to be filled through research and insights to build an efficient and resilient supply chain operating from the Port of Long Beach to other parts of the nation. Interviews will be conducted with the Port of Long Beach engineering and operations division and the freight truck operators of the region to gather insights into automation integration of the conventional supply chain functioning of container transportation across the trade corridors.

Of particular focus will be developing an understanding of the extent of improvements possible for the Southern California Region's trade corridors through simulation and analytical models. The models developed will mimic the comprehensive multimodal freight operations with automation in container transportation considered backbone of supply chain activities.

The objective of this proposed research is to develop an analytical framework to evaluate the impact of the automation technologies at the Port of Long Beach (POLB) on the performance of the surrounding freight transportation network. The framework will be constructed by data and information collected through interviews with various personnel and staff at the POLB entrusted with efficient container movement across the port.

US DOT Priorities: The project will directly support the USDOT strategic goal of Economic Strength and Global Competitiveness by improving the container operations and freight truck movement in the Southern California Region. In addition, this project will help the USDOT strategic goal of Climate and Sustainability by saving energy and reducing emissions through intermodal solutions. Specifically, the proposed intermodal solution responds to the RD&T priorities of "Resilient Supply Chains", "System Performance", and "Decarbonization" by improving the efficiency and resiliency of port operations and freight truck movement in the Southern California Region.

This objective of this proposed research is to develop an analytical framework for assessing freight network performance sensitive to port automation technologies with a focus on the Port of Long Beach (POLB). The framework will be constructed by data and information collected through interviews with various personnel and staff at the POLB entrusted with efficient container movement across the port.

Outputs: This project will support the USDOT strategic goal of *Economic Strength and Global Competitiveness*. One of the critical outcomes of this project would be to identify operational efficiencies in container movement due

to the impact of automation. An important aspect of this project will be to document how sensitivity in automation of various activities within the Port of Long Beach may result in congestion for ships waiting in queues for a berth to unload containers at terminals at the beginning stage of the container movement, and at the other end, observing the freight trucks' queuing and delays on land. In this way, the extent of efficiency gaps when automation takes over manual operations and vice-versa will be highlighted.

Outcomes/Impacts: The recommendations will be both for the container ships as well as truckers for efficiently managing pick-up and drop-off of containers at the Port of Long Beach. Potential shortcomings of any human-to-machine interactions from a supply-chain operations point of view will be documented with recommendations for improvement and training for the workforce associated with the Port. Trade corridors and other key freight dominating corridors in the Southern California Region that rely heavily on automated machines in-house at the Port of Long Beach will benefit in adhering to a more coordinated freight movement.

This has implications for the local authorities as well the Caltrans to develop appropriate measures and metrics to assess projects that can decrease perpetual congestion, improve freight throughput, and improve air quality for the disadvantaged communities living around the Port and close to freight routes.

U.S. Department of Transportation
Office of the Secretary of Transportation