Florida Department of Transportation Research

GPS Data for Truck-Route Choice Analysis of Port Everglades Petroleum Commodity Flow

February 2016

Project Number
BDV25-977-17

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Current Situation

The petroleum supply for 12 counties in South Florida is delivered through Port Everglades. The impact on the transportation network of this critical commodity must be understood as part of the transportation analysis and planning process in South Florida.

Research Objectives

This project was jointly funded by the Florida Department of Transportation (FDOT) and the Strategic Highway Research Program 2 (SHRP2) C20 initiative, which promotes using emerging technologies to better understand goods movement. In this project, University of South Florida researchers demonstrated the ability to combine GPS data from tanker trucks with other data to understand truck route choices in the region to clarify the complex supply chain of petroleum commodities in South Florida.

Fuel storage tanks at Port Everglades.

Project Activities

To develop delivery patterns, the project team had to identify delivery trucks and their destinations. From truck data supplied by the American Transportation Research Institute (ATRI), the project team identified trucks found within a polygon drawn around a given petroleum terminal. Then, from its database, ATRI extracted GPS travel data for these vehicles in the 12-county region for one month in 2014 and one in 2015, yielding over 242,000 records.

To determine destinations of petroleum deliveries, the project team sourced records from the Florida Department of Revenue for locations of fuel recipients, based on fuel tax records, and gas station locations from the mapping service Here.com. The geocoding of these records had to be corrected in some cases, and comparison with ATRI data revealed additional destinations.

An algorithm adapted from a previous project led by Pinjari (BDK84-977-20) converted the ATRI data on periodic GPS truck locations into 14,598 trips. Trip destinations were verified against mapping data and resulted in 12,469 validated trips.

Validated trips were then converted to 1,320 trip chains made by 92 unique trucks. These chains comprised the various stops made by the delivery trucks outbound or inbound from Port Everglades. Chains were eliminated from further analysis if they did not include Port Everglades, leaving 807 trip chains. In the final step, a mapping layer containing the routes of all accepted trip chains was made by correlating GPS-defined trip chains with GIS layers containing roadway designations using a map-matching algorithm.

Project Benefits

Freight constitutes a significant portion of the traffic on Florida roads, and an in-depth understanding of freight traffic is essential to planning future transportation projects.

For more information, please see dot.state.fl.us/research-center