Florida Department of Transportation Research

Update of Commercial Vessel Past Point Data for Designing Bridges across Navigable Florida Waterway

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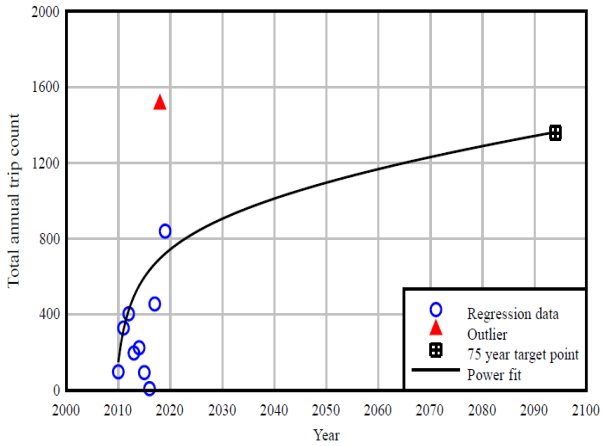
Current Situation

In the late 1990s, the Florida Department of Transportation (FDOT) developed a database of vessel traffic information to use with AASHTO's risk assessment procedure to determine the risk potential for vessel collisions near bridges that span over navigable waterways in Florida.

With significant changes in commercial vessel traffic and innovations in maritime technology, FDOT may be poised to refresh this procedure with new vessel traffic data.

By updating the database, FDOT will increase its capability to estimate future vessel traffic, determine representative vessel speeds for bridge design, and develop design guidance for assessing pier column vulnerability to direct impact, among other advantages.



A model developed using past point data from the study projection growth of vessel traffic with total annual trip count on the y-axis and year on the x-axis.

Research Objectives

The objectives of this study were to update the FDOT vessel past point database that characterizes modern vessel traffic throughout navigable waterways in Florida and to develop updated models of future traffic projection.

Project Activities

Following a literature review, the University of Florida research team collected commercial past point traffic data (typical vessel sizes, trip counts, etc.) from the Army Corps of Engineers (USACE) Waterborne Commerce of Statistics Center (WCSC) from 2010 to 2019. Next, the team used automatic identification system (AIS) data, which consists of the global positioning system (GPS) positional coordinates, time, and speed of a vessel at the time when the signal was transmitted, to collect vessel speed data.

To incorporate vessel characteristics pertinent to bridge design, the team also collected barge rake geometry data through a site visit to the facilities of Green Cove Spring's MOBRO Marine, a maritime transportation company that routinely engages in the inland and oceangoing towing of barges. In addition to photographing typical barge bow shapes and directly measuring rake measurement, the team consulted with an onsite maritime professional regarding typical barge bow geometries.

Next, the team developed algorithms to analyze the traffic data, future projection models to estimate future changes in vessel traffic, vessel characteristics through past point data, and, finally, design values of speeds.

Project Conclusions and Benefits

Using the results of this research, FDOT has an opportunity to update its vessel collision risk assessment software and design guidance pertaining to vessel collision risk assessment of bridges, providing consistent past point data to be used by designers for vessel impact risk analysis throughout the state.

For more information, please see fdot.gov/research.