

**Project Number**

BDV31-977-21

**Project Manager**

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## Florida Department of Transportation Research

# Determination of Barge Impact Probabilities for Bridge Design

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**Current Situation**

Bridges must be designed to allow the free passage of vessels on active waterways, creating a risk of collision between a vessel and the bridge structure. In the case of a barge or flotilla of linked barges, a single collision can result in severe damage to the bridge, halting the passage of traffic on the water or land.

To mitigate the damage caused by collisions, the American Association of State Highway and Transportation Officials (AASHTO) provides engineers with detailed procedures for calculating vessel impact loads as part of a comprehensive risk assessment. Correct probabilities for the likelihood of how often a barge will go off course (the base aberrancy rate) are critical to these calculations. However, these probabilities are currently based on a limited number of data sets and assume technologies used in the maritime industry over 20 years ago.

**Research Objectives**

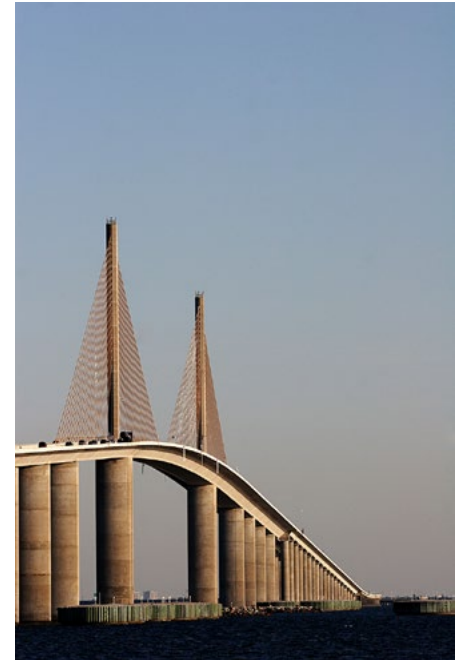
University of Florida researchers developed a revised barge impact probability expression applicable for the design of bridge structures located on Florida waterways.

**Project Activities**

University of Florida researchers obtained barge flotilla traffic data and barge-to-bridge collision data for Florida bridge locations. Using these data, they were able to calculate historical barge-to-bridge collision rates and probabilities. The Florida-specific probabilities were used with additional information from the AASHTO procedures to work backwards and calculate base aberrancy rates for each bridge location for which data had been obtained. A subset of these rates was selected to produce a single value that can be used in the design process for risk assessments for new and existing bridge structures in Florida.

**Project Benefits**

Utilizing the most current and accurate data to design bridges for vessel impact is critical to ensure efficiency and safety of Florida's waterway bridges. This research provides an updated approach of the barge impact probability expression utilizing current available information for Florida waterways.



*The Sunshine Skyway Bridge, which carries I-275 across Tampa Bay, must be tall enough to allow the largest ocean-going vessels to access Tampa Bay. Notice the pier protection system that prevents off-course vessels or barges from striking the bridge's piers.*

*For more information, please see [dot.state.fl.us/research-center](http://dot.state.fl.us/research-center)*