Florida Department of Transportation Research

Evaluation of Truck Tonnage Estimation Methodologies

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Current Situation

Due to its large population, geographic location, and existing infrastructure and industries, freight – the movement of goods and commodities – has a significant impact on Florida's economy, providing goods and services not just to residents and visitors, but also to other states and countries. Over the last few decades, the demand for freight transportation in Florida has grown significantly and is projected to increase by another 40 percent by 2040 according to the Florida Transportation Plan. Trucks accounted for about 70 percent of commodity movements by weight and value in 2017. An accurate calculation of truck tonnage would support effective decision making in transportation planning, maintenance, and operations.

A truck approaches sensors embedded in the pavement that can capture the weight, the number of axles, and other information.

Research Objectives

The primary objective of this study was to evaluate the current methodologies for estimating truck tonnage through a literature review and identify alternatives that could improve Florida's current truck tonnage formula. The development of a new truck tonnage model was also an option.

Project Activities

The researchers reviewed methods of truck tonnage calculation in six states, including Florida. The variety of methods and supporting data sources did not allow for straightforward comparison. They also examined additional methods of truck tonnage calculation and potential data sources for truck tonnage calculations, such as the Freight Analysis Framework, Weigh in Motion (WIM), and the Commodity Flow Survey. As a result, the researchers developed a mathematical model to estimate truck tonnage.

The method for truck tonnage estimation consists of three main parts: (i) WIM sites clustering, (ii) truck volume estimation based on Telemetric Traffic Monitoring sites (TTMS) data, and (iii) average truck tonnage calculation for WIM site. Florida's 37 WIM stations collect, store, process, and transmit bus and Class 4 and higher vehicular data on the Florida State Highway System. They provide weight, axle weight, volume, speed, FHWA classification, and time stamp of every truck crossing WIM stations. The TTMS collect and report traffic data that may include daily counts, classification of vehicles, speeds, weight, directional factor, truck factor, and factor of design hours, depending on the location. Estimates of truck weight, truck classes, truck traffic volume, and empty vehicle weight were derived from WIM and TTMS data.

One advantage of the newly developed methodology over current methods is that it allows the data to be updated on an annual basis. The method also provides more accurate estimation of truck tonnage by including all trucks (Classes 5-13) instead of only combination trucks (Classes 8-13).

Project Benefits

An improved method of truck tonnage estimation can capture more accurate data and provide information that is important to pavement design, weight enforcement, and freight transportation planning, among others.

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