Florida Department of Transportation Research

Development of Congestion Factors for Adjusting Traffic Counts during Congested Periods: Phase 1 — Literature Review and Survey

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Current Situation

The inductive loop detector (ILD) is a common feature of roadways throughout the U.S. The ILD uses a loop of wire connected to a power source. When the metal mass of a vehicle moves over the loop, the loop's electrical properties are changed, and the presence of the vehicle is detected. This technology was first introduced in the 1960s, and it remains the most common form of traffic detector and a very useful one, providing data on total traffic volume, speed, vehicle weight, vehicle length, occupancy, density, headways, and the number of vehicles belonging to a specific vehicle class. Nevertheless, when traffic is congested, the ILD may not distinguish between consecutive vehicles, which results in undercounting. So far, no attempts have been made to correct ILD counts for congested conditions, even though corrected counts would be very valuable for planning efforts to address roadway congestion.

These familiar pavement marks indicate the presence of inductive loop detectors, which collect data as vehicles pass over them.

Research Objectives

Florida State University researchers conducted a comprehensive literature review to collect information on traffic data collection using ILDs, particularly during congested periods.

Project Activities

The researchers conducted keyword searches of numerous scientific research databases, including Scopus, IEEE Xplore, Web of Science (WoS), Google Scholar, TRID Database, WorldCat, and Wiley Online Library. Keywords and phrases related to the project included inductive loop detectors, traffic detection, congestion monitoring, inductive loop signatures, traffic volume acquisition, traffic surveillance, highway automatic data collection systems, and vehicle classification. The search emphasized work published since 2000, but important sources published before that date were also used.

The researchers also conducted a survey to solicit information about ILD data quality in congested situations. Relevant personnel in all 50 states and at the Federal Highway Administration (FHWA) were identified, contacted by email, and asked to respond to the online survey. Promising responses were followed up with additional questions seeking more detailed information or clarification.

Information gained through the literature review and the survey were used to present (1) principles of ILD operation and factors that affect the quality of ILD data, (2) the effect of congestion on volume counts and vehicle classification, (3) efforts made to improve ILD data in congested situations, and (4) innovative approaches to improving ILD data quality for both congested and non-congested situations. Based on these findings, the researchers made a number of recommendations, including continuing efforts to develop congestion factors through field studies.

Project Benefits

Congestion factors and improved methods of analyzing data from inductive loop detectors will be valuable in identifying locations and causes of congestion and developing solutions.

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