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TRANSPORTATION POOLED FUND PROGRAM

TECHNICAL SUMMARY

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TOTAL PROJECT COST:
$468,916

MnDOT CONTRIBUTIONS:
$30,000

PARTICIPATING STATES:
AK, CT, FL, ID, IL, MI, MN, NY, OH, PA, TX, WA, WI, WY

High-resolution video was used to establish length standards for various vehicle classifications.

RESEARCH SERVICES

OFFICE OF POLICY ANALYSIS, RESEARCH & INNOVATION

Pooling Our Research: New Techniques for Classifying Traffic

Why a Pooled Fund Study?

Effective traffic forecasting informs pavement design, transportation planning, and long-term planning and budgeting for highway construction and maintenance. To maintain a transportation network that runs smoothly, state agencies must accurately estimate traffic needs now and in the future.

TPF-5(192): Loop and Length Based Classification Pooled Fund. *New technologies that support computing traffic levels by measuring vehicle lengths rather than axle loads could cut the cost of computing these levels in half through reduced man-hours and less expensive equipment.*

For decades, the standard tool in classifying average daily traffic has been classification of vehicles based on axle spacing. Gathering this data has required time-consuming methods such as placing traffic-counting tubes across wheelpaths or using personnel alongside roadways for visual traffic counting. Methods that require less personnel involvement have also been available, such as embedding piezoelectric sensors in the pavement. However, a typical permanent automatic traffic recorder setup by MnDOT can cost $40,000 or more in equipment and labor.

Some technologies could assess traffic by measuring vehicle lengths rather than axle configuration. Length-based classification employs familiar technology (loop sensors embedded in pavement) as well as other in-road sensors and side-fire sensors that measure vehicle length. Such options could cut measurement costs in half by reducing man-hours and equipment costs, but they had not been sufficiently examined for uniform use across the country.

What Was the Pooled Fund Study's Goal?

Many states currently collect length-based data, but the collection criteria vary by state. Effective use of length-based data requires understanding the variables that inform various methods and establishing more uniform approaches to measurement and analysis.

MnDOT initiated a multi-state effort to review available literature, gather data and distribute analyzed data into standard length categories or bins. Researchers would then assess the viability of using such data for planning, maintenance and design purposes.

What Did We Do?

Investigators met with pooled fund participants to determine vehicle classification needs, how length-based assessments could work feasibly, how to study loop detector technologies in the field and laboratory, and how these methods could be implemented. They selected six loop detectors, four nonloop detectors and three inductive-signature detectors for testing.

The loop detectors were connected to 10 loops installed on Interstate 35 near the city of Wyoming, Minnesota. Laboratory assessments of loop detector cards and loop simulators followed, comparing speed and length measurements from the six technologies with standard, square 6x6 foot loops and less standard loop shapes. Bin sizes then were compared to standard vehicle axle configurations to determine how well length-based methods compare to existing axle-based methods.

continued

"We can make use of length data to enhance heavy commercial data, especially in areas where it is hard to collect axle-based data."

—Gene Hicks,
Director, MnDOT Traffic Forecasting and Analysis

"States are going to look more closely at establishing length-based classification in planning and designing transportation systems. We believe they can implement such a classification system with this research."

—Erik Minge,
Principal, SRF Consulting Group, Inc.

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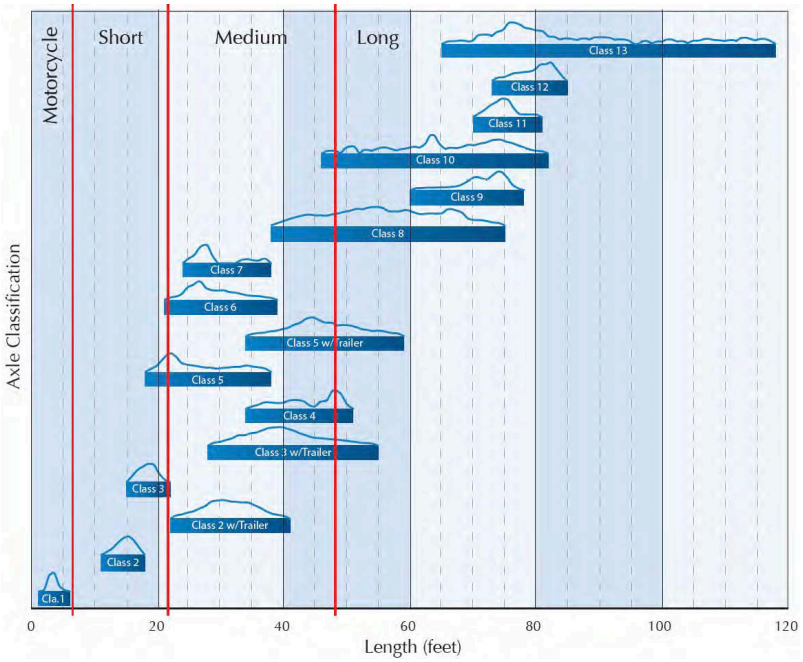

This graph shows how length bins correspond to standard axle configurations.

What Did We Learn?

All of the technologies studied effectively assessed vehicle length and speed. While length-based methods for measuring traffic volumes were not found to be any more accurate than axle-based methods, they may be more cost-effective and sufficiently accurate for many agency uses. The new methods proved effective enough to replace the use of road tubes for some purposes, mitigating risks to crews in certain high-traffic areas.

Length-based data usefully supplements axle-based data, particularly for heavy commercial vehicle traffic. This type of data can help with planning and design, and can be used in areas where axle-based data collection proves difficult. If properly calibrated, existing dual-loop installations can be used for assessing vehicle lengths in traffic.

Investigators recommend a four-bin classification system: motorcycle (0 to 6.5 feet), short vehicle (6.5 to 21.5 feet), medium vehicle (21.5 to 49 feet) and long vehicle (49 feet or greater). These bin lengths generally correspond to typical axle-based classifications. Variations on this scheme were provided for areas where a significant portion of traffic is made up of longer vehicles—useful in areas with significant natural resource hauling—and for urban environments.

Bin lengths prove limiting in certain cases. For instance, the length of a UPS truck can be the same as the length of an SUV pulling a trailer. Axle distribution between these configurations, however, may not be similar.

What's Next?

Length-based classification can replace axle-based classification in some cases and complement it in others. Individual state agencies will evaluate results for use in supplementing current data collection methods. Loop- and length-based data will improve current planning and design efforts, especially where axle-based methods are costly or otherwise impractical.

This Technical Summary pertains to Report 2012-33, "Loop- and Length-Based Vehicle Classification, Federal Highway Administration—Pooled Fund Program [TPF-5(192)]," published November 2012. The full report can be accessed at www.lrrb.org/PDF/201233.pdf. *This research was conducted as part of a MnDOT-led pooled fund study, described at* http://www.pooledfund.org/details/study/416.

For more than 25 years, FHWA's Transportation Pooled Fund Program has been providing state DOTs and other organizations the opportunity to collaborate in solving transportation-related problems. The TPF Program is focused on leveraging limited funds, avoiding duplication of effort, undertaking large-scale projects and achieving broader dissemination of results on issues of regional and national interest.