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TRANSPORTATION POOLED FUND PROGRAM

TECHNICAL SUMMARY

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PROJECT COST:
$210,000

Mn/DOT CONTRIBUTION:
$15,000

PARTICIPATING STATES:
CT, FL, GA, HI, IA, ID, IL, MN, MS, MT, NY, OH, TX, WI

Members of the pooled fund study's Technical Advisory Committee toured the shelter at Mn/DOT's permanent test site.

RESEARCH SERVICES

OFFICE OF POLICY ANALYSIS, RESEARCH & INNOVATION

Pooling Our Research: Evaluating Non-Intrusive Traffic Detection Technologies

Continuing with research that began in 1994, pooled fund TPF-5(171) evaluated the accuracy of the newest generation of non-intrusive traffic detection technologies that collect speed and volume data, and have the added capability of gathering classification data.

What Was the Need?

Transportation agencies collect traffic data to spot areas of congestion and forecast future infrastructure investments. Today, the most commonly used technology for traffic monitoring is the inductive loop detector. While accurate, loop detectors require road closures for installation and maintenance. Non-intrusive sensors provide an alternative that meets the accuracy of loop detectors and offers other benefits. Rather than requiring installation in the pavement, these sensors are placed above, beneath or to the side of the roadway. This means safer installation and maintenance, no disruption in traffic flow, and the added bonus of gathering more than vehicle-presence data.

Mn/DOT's interest in non-intrusive traffic detection dates back to 1994, when it collaborated with the Federal Highway Administration to launch the first of two projects that evaluated emerging technologies; a second study concluded in 2002. The two projects evaluated 26 sensors representing eight technologies and compared them to roadway-embedded technologies.

FHWA's national Transportation Pooled Fund Program provided an optimal method for Mn/DOT to lead a coalition of states to further pursue this line of research.

What Was Our Goal?

The objective of this pooled fund study was to conduct field tests of the latest generation of non-intrusive traffic sensors to assess their accuracy in detecting volume, speed and vehicle classification by length and axle configuration under a variety of conditions.

What Did We Do?

Researchers conducted a literature search to identify sensors to include in the study. Among the five products tested were:

- Two optical sensors that are installed on the side of the roadway: Peek Traffic Corporation's AxleLight and the Transportable Infra-Red Traffic Logger, or TIRTL, side-fire laser sensor from Control Specialists Company. Both of these systems are axle-based sensors that detect vehicle presence when wheels break the laser's beam, and can also collect speed and classification data.
- Miovision Technologies Inc.'s Video Collection Unit, a video sensor that includes a telescoping mast that can be attached to an existing pole or mounted as part of a stand-alone tripod system and a sensor that performs similarly to loop detectors.
- Canoga Microloop sensors from Global Traffic Technologies. These magnetic sensors are installed under the roadway in conduit bored from the roadway shoulder and gather data on volume, speed and vehicle length.
- SmartSensor HD (Model 125) from Wavetronix LLC, a radar sensor with a detection range of 250 feet that measures volume, speed, classification and other traffic parameters.

continued

"There are some things one product can do better than others. Agencies should think about the type of data that's most important to them, and then look at each product's accuracy and cost to make the best choice for their needs."

—Jerry Kotzenmacher,
Senior Engineering Specialist, MnDOT Office of Safety, Traffic and Operations

"Newer non-intrusive traffic detectors have more capabilities than ever, and required us to conduct a detailed per-vehicle analysis to better understand the subtleties of observed errors in the products we tested."

—Erik Minge,
Senior Associate, SRF Consulting Group

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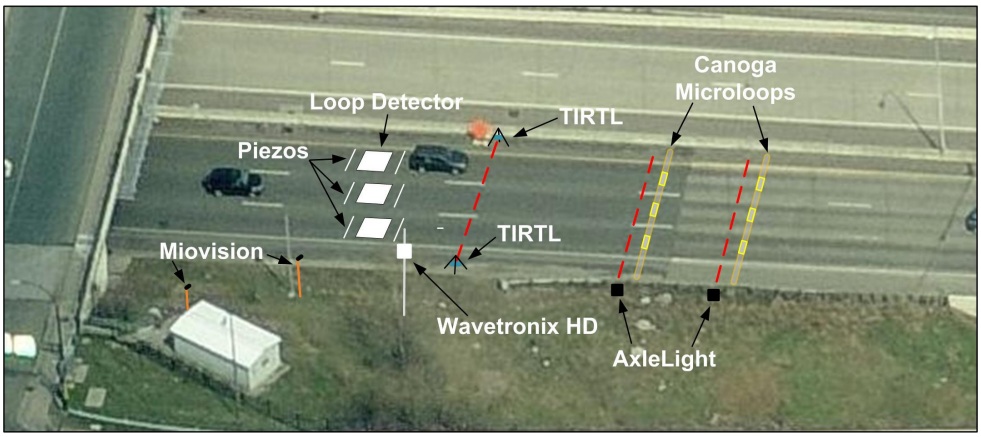

This shows the layout of Mn/DOT's permanent test site located at Penn Avenue and I-394 near downtown Minneapolis. Researchers gathered baseline data and most of the test data for the five products examined in the study at this site.

Researchers evaluated four types of data: volume, axle-based classification, length-based classification and speed. Much of the testing occurred at Mn/DOT's permanent test site located near downtown Minneapolis.

An additional test evaluated the Miovision sensor's ability to perform for intersection turning movement counts. Researchers conducted hourly and 24-hour testing during periods of heavy congestion and varying weather and lighting conditions. Baseline data collected at the Mn/DOT test site using loop detectors, video cameras and manual counts were compared with results from the sensors tested.

What Did We Learn?

While the sensors tested in the current project performed better than sensors tested in Phase I and Phase II with regard to accuracy of speed and volume data, the additional classification capabilities generated mixed results. The length-based sensors were generally able to report accurate vehicle lengths. However, the lack of a presence detector caused axle-based sensors to erroneously classify tailgating passenger vehicles as four-axle trucks. A presence sensor can be used in conjunction with axle-based laser sensors to overcome classification irregularities, or an agency can modify its classification algorithm to properly reflect traffic flow.

What's Next?

Mn/DOT and many other agencies are already using some of the technologies tested in this study. Mn/DOT offices and programs with an interest in traffic detection—including traffic engineering, traffic forecasting and analysis, Minnesota Guidestar, Mn/DOT's Intelligent Transportation Systems program and the Regional Transportation Management Center—can use these research results to validate current use of the tested technologies, make adjustments to data analysis recommended by the research or make the case for deployment of a new technology.

This Technical Summary pertains to Report 2010-36, "Evaluation of Non-Intrusive Technologies for Traffic Detection," published September 2010, produced to conclude Pooled Fund TPF-5(171). The final report can be found at http://www.lrrb.org/PDF/201036.pdf, *and details of the pooled fund effort can be found at* http://pooledfund.org/projectdetails.asp?id=398&status=4 *and* http://portal.srfconsulting.com/NITPhase3.