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OFFICE OF TRANSPORTATION SYSTEM MANAGEMENT

TECHNICAL SUMMARY

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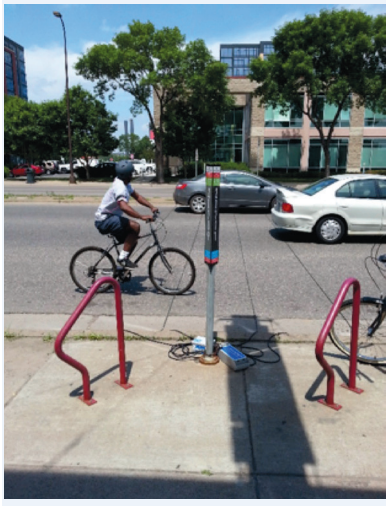
PROJECT COST:
$110,104



Pneumatic tubes are one tool suitable for short-term bicycle counts.

Putting Research into Practice: Developing a Guide for Automated Bicycle and Pedestrian Traffic Monitoring

What Was the Need?

MnDOT and local agencies have made significant investments in bicycle and pedestrian facilities in recent years. Accurate nonmotorized traffic data is necessary to see if these investments are paying off as well as to measure and improve safety. While police reports provide details about the number of fatalities and serious injuries, MnDOT can't know if overall safety levels are improving without knowing the amount of bicycle and pedestrian traffic.

Both state and local agencies have a strong demand for data about nonmotorized traffic levels, but the practice of gathering bicycle and pedestrian data is in its infancy. MnDOT has conducted research to develop methodologies for counting nonmotorized traffic and has also begun to implement that research and lay the groundwork for institutionalizing counting in a consistent way at both the state and local levels.

Investigators created a manual to help MnDOT and local agencies implement automated bicycle and pedestrian counting programs using various sensor technologies. These counts can be used to evaluate safety and overall use of bicycle and pedestrian facilities.

What Was Our Goal?

The implementation effort involved two projects: First, additional research was needed to demonstrate that short-term and permanent bicycle and pedestrian traffic counting technologies can successfully be used in Minnesota. Second, investigators aimed to prepare a manual that documents practical steps for collecting and interpreting nonmotorized traffic data.

What Did We Implement?

These efforts leveraged the results of MnDOT Reports 2013-24, The Minnesota Bicycle and Pedestrian Counting Initiative: Methodologies for Non-motorized Traffic Monitoring, and 2010-06, Practical Methods for Analyzing Pedestrian and Bicycle Use of a Transportation Facility.

How Did We Do It?

Investigators evaluated several commercially available technologies for automated counting of bicycles and pedestrians, including:

- Inductive loops for permanent monitoring of bicycle traffic on roads.
- Integrated passive infrared and inductive loop sensors for permanent monitoring of both bicycle and pedestrian traffic on trails.
- Pneumatic tubes for short-duration monitoring of bicycle traffic on roads or trails.
- Radio beam sensors for short-duration counts of bicycles and pedestrians on trails.
- Active infrared sensors for short-duration counts of total users on trails and sidewalks.

Investigators installed permanent sensors at five sites around the state and conducted short-duration counts at 40 sites. They validated the counts that these sensors produced by simultaneously counting either manually or by video. These tests required partner-

continued

"We've been seeing an increase in bike and pedestrian traffic since about 2005. But we don't have precise numbers, so we don't know how much our investments are paying off in terms of safety or overall usage."

—Lisa Austin,
MnDOT Bicycle and Pedestrian Planning Coordinator

"MnDOT has a long-standing count program for motorized vehicles. This manual is a first step toward formalizing a similar counting program for bicycles and pedestrians."

—Erik Minge,
Principal, Intelligent Transportation Systems, SRF Consulting Group, Inc.

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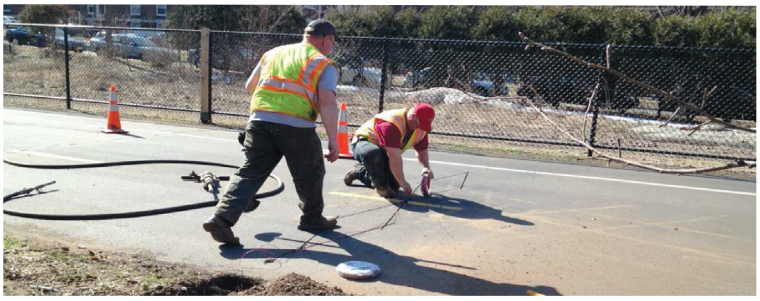

Inductive loops, which consist of three to five turns of loop wire embedded in a channel cut into pavement, are suitable for permanent counts, but they must be calibrated to detect bicycles.

ships with more than a dozen state and local agencies, private companies and other organizations, and resulted in the project winning the 2014 Center for Transportation Studies Research Partnership Award.

Based on observations and results from these installations and previous Federal Highway Administration and National Cooperative Highway Research Program guidance, investigators created the Draft Bicycle and Pedestrian Data Collection Manual.

What Did We Learn?

Sensor tests demonstrated that automated sensors produce counts that are sufficiently accurate for estimating annual average daily traffic and other statistics used in transportation planning and engineering. Sensors typically undercounted traffic, primarily because of difficulties in accurate counting of multiple bicycles or pedestrians passing a sensor at the same time.

Investigators proposed a technique for extrapolating AADT for bicycles and pedestrians from short-duration counts. This approach is similar to how AADTs are extrapolated for motor vehicles and is intended to align with existing motorized vehicle traffic analysis procedures. However, since bicycle and pedestrian traffic is much more seasonal and weather-sensitive than motor vehicle traffic, the technique incorporates a factor to account for the specific day of the year for the short-term count.

The data collection manual describes general principles for data collection, issues related to site selection and the various types of sensors that are currently used in Minnesota. It provides detailed instructions for installing and calibrating sensors, using them to conduct counts, and maintaining and troubleshooting them. In addition, case studies show how agencies have used nonmotorized traffic data in decision-making.

What's Next?

This project lays the groundwork for MnDOT and local agency nonmotorized traffic counting programs. Bicycle and pedestrian counts are already being used for practical decisions, such as evaluating the need for midblock crossings in Mankato or assigning rights of way at crossings between a multiuse trail and residential streets in Minneapolis.

MnDOT has funded a follow-up effort to institutionalize nonmotorized traffic data collection. The agency will install and manage permanent sensors at sites in every district and provide a set of portable equipment for each district that can be used for short-duration counts. The permanent continuous sites will provide reference data that can be used to extrapolate AADTs from short-duration count sites and index values that can be used to project general cycling and pedestrian traffic trends.

Updates to the manual are planned after about a year of implementation to incorporate lessons learned and new technologies. MnDOT will also continue to provide annual training and convene a task force to share information and ideas.

This Technical Summary pertains to Report 2015-33, "Draft Bicycle and Pedestrian Data Collection Manual," published July 2015, and Report 2015-34, "The Minnesota Bicycle and Pedestrian Counting Initiative: Implementation Study," published June 2015. The full reports can be accessed respectively at mndot.gov/research/TS/2015/201533.pdf *and* mndot.gov/research/TS/2015/201534.pdf.