

Best Practices for Road Weather Management

Version 3.0

Michigan DOT Measurement of Regain Time

The Michigan Department of Transportation (MDOT) spends roughly \$100 million on winter maintenance each season. This represents approximately forty percent of its total maintenance budget. With this significant expenditure, there is a need to find an effective performance measure that will allow MDOT to evaluate the effectiveness of changes to its operations and to communicate this with the public.

For the winters of 2009-12, MDOT has collected speed information along the Interstate 96 (I-96) corridor from the Ionia County line eastward to the Oakland County line. Portable microwave sensors are used to detect traffic speed before, during and after a winter storm event. This information is then downloaded and graphs are prepared to show the average speeds over time. In addition, storm start times and end times are recorded by maintenance staff along with other information about the intensity and temperatures during the storm. The data are then used to illustrate regain time, which is the time needed after a winter storm event until vehicle speeds return to normal operating speeds.

System Components: The main components of the system are three microwave sensors that detect the speed of the traffic along the I-96 corridor. The sensors are spaced such that each is collecting information from a segment of interstate maintained by different MDOT road maintenance garages. Figure MI-1 illustrates a typical sensor apparatus.

Two of the sensors have a wireless signal that allows MDOT to remotely download the data from the office. The third sensor does not have Internet capability so the data is downloaded manually through a computer cable.

In order to sustain power to the sensors, each unit is hooked up to a Pointer Record (PTR) station that has a constant power source. During winter months, the solar panels do not generate enough power for the sensors to work. A power hook-up is needed.

System Operations: Two of the microwave sensors are mounted on portable trailers while the third is a portable unit that is attached to a power pole adjacent to I-96. The Microwave Vehicle Detection System (MVDS) High Definition Sensors use Wavetronix software for communications. This software is freely downloaded from Wavetronix with the purchase of the equipment.



Figure MI-1. Speed sensor apparatus to determine regain time.

Once MDOT receives the data it will need to be filtered through to match up with the storm events and analyzed. Some of this data is also shared with the Planning division since we collect all the lanes that we can along with speed, volume, occupancy, truck percentages, and 85% speeds.

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Transportation Outcome(s): Speed seems to be one of the best indicators of effectiveness of MDOT's winter maintenance operations. The motoring public values the ability to move at posted speeds and have minimum delay. Assuming speed measurements are the best indication of regain time, the system can be scaled up to determine regain time for any areas with valid speed data. Speed data is already generated on most state freeways by the mobile phones of participating motorists. Additionally, other areas have various detection devices which capture speed data.

Implementation Issues: The use of portable traffic collection trailers is challenging given the winter conditions typically experienced in Michigan. MDOT found that the collection trailers would not adequately recharge with use of solar panels. The trailers had to be powered with a direct connection to the electrical power grid, eliminating many potential monitoring areas along the roadway. In addition, the cell phone connection used for data transmission has not always been reliable. These issues should be resolved once MDOT begins using speed data from mobile phones and other sources.

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Reference(s):

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<http://www.nritsconference.org/downloads/Presentations09/S5_Foley.pdf>

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