

Best Practices for Road Weather Management

New Jersey Turnpike Authority Speed Management

The New Jersey Turnpike Authority (NJTA) operates an Advanced Traffic Management System (ATMS) to control 148 miles (237.9 kilometers) of the turnpike, which is one of the nation's most heavily traveled freeways. Various subsystems are employed to monitor road and weather conditions, manage traffic speeds, and notify motorists of hazardous conditions. Speed management and traveler information techniques have improved roadway safety in the presence of fog, snow, and ice.

System Components: ATMS control computers are located at the turnpike Traffic Operations Center in New Brunswick. Data transmission between field components and central control systems is accomplished via a wireless communication system using Cellular Digital Packet Data technology. A vehicle detection subsystem, which is comprised of inductive loop detectors and Remote Processing Units, is utilized to collect speed and volume data and to detect traffic congestion. A Closed Circuit Television subsystem may also be used to visually verify road conditions.

The turnpike's Road Weather Information System includes 30 environmental sensing sites. Three types of environmental sensors are deployed along the turnpike to gather road weather data. Nine Environmental Sensor Stations (ESS) detect wind speed and direction, precipitation type and rate, barometric pressure, air temperature and humidity, as well as visibility distance. Pavement temperature and condition data is collected at 11 sites, while ten others simply monitor visibility distance.

Traveler information is conveyed to motorist through 106 Dynamic Message Signs (DMS), nine Highway Advisory Radio (HAR) transmitters, and a Variable Speed Limit (VSL) subsystem. Over 120 VSL sign assemblies are positioned along the freeway at one-mile (1.6-kilometer) intervals to modify speed limits. Sign assemblies include VSL signs and speed warning signs, which display "REDUCE SPEED AHEAD" messages and reasons for reductions (i.e., "FOG", "SNOW", or "ICE").

System Operations: Traffic and emergency management personnel in the TOC monitor environmental data to determine when speed limits should be lowered. When reductions are warranted, VSL sign assemblies are manually activated to decrease speed limits in five-mph increments from 50, 55, or 65 mph (80.4, 88.4, or 104.5 kph) to 30 mph (48.2 kph) depending on prevailing conditions. System operators may also disseminate regulatory and warning messages via DMS and HAR. State police officers enforce the lower speed limits. When the vehicle detection and RWIS subsystems indicate that traffic and weather conditions have returned to normal, the original speed limits are restored.

Transportation Outcome: The speed control strategy effectively decreases traffic speeds in adverse conditions. Speed management and traveler information dissemination have improved safety by reducing the frequency and severity of weather-related crashes.

Implementation Issues: The turnpike's VSL subsystem is one of the oldest in the country. In the 1950s, before the system was installed, State police officers would patrol the freeway in inclement weather and temporarily nail up plywood signs to reduce speed limits. The VSL system was originally installed in the 1960s and upgraded in the 1980s.

Best Practices for Road Weather Management

Contact(s):

- Spencer W. Purdum, NJTA Maintenance Department, 732-247-0900, purdum@turnpike.state.nj.us.

Reference(s):

- "2000 Annual Report of the New Jersey Turnpike Authority," NJTA Board of Commissioners, <http://www.state.nj.us/turnpike/00arfull.pdf>.
- Malinconico, Joe, "If an Ill Wind Blows, Turnpike Staff Will Know," The Star Ledger, August 09, 2001, <http://www.nj.com/starledger/>.
- "Roadway Weather Station Debuts on the New Jersey Turnpike," NJTA News Release, August 2001, <http://www.state.nj.us/turnpike/01news89.htm>.
- "Welcome to the New Jersey Turnpike," NJTA, <http://www.state.nj.us/turnpike/tpbook.pdf>.
- Science Applications International Corporation (SAIC), "Examples of Variable Speed Limit Applications," presented at the Transportation Research Board (TRB) Annual Meeting, January 2000, <http://safety.fhwa.dot.gov/fourthlevel/ppt/vslexamples.ppt>.
- Sisiopiku, V., "Variable Speed Control: Technologies and Practice," Michigan State University, presented at the 2001 Annual Meeting of ITS America.
- Zarean, M., et al, "Applications of Variable Speed Limit Systems to Enhance Safety," SAIC, presented at the 7th World Congress on ITS, September 2000.

Keywords: fog, visibility, adverse weather, snow, ice, winter storm, speed management, freeway management, emergency management, traffic control, control strategy, motorist warning system, advisory strategy, traveler information, vehicle detection, environmental sensor station (ESS), road weather information system (RWIS), dynamic message sign (DMS), variable speed limit (VSL), highway advisory radio (HAR), crashes, safety