

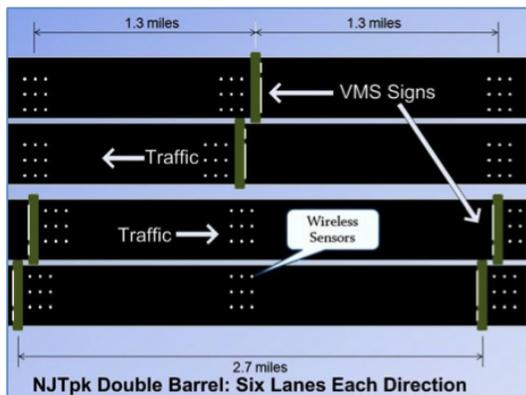
Traffic Systems, Inc. Applications Note:



New Jersey Turnpike Congestion and Incident Management System Restored, Enhanced and Expanded with Sensys Networks Wireless Vehicle Detectors



Since the 1950s, the New Jersey Turnpike Authority minimized roadway accidents by using variable message signs (VMS) to warn motorists of hazardous weather conditions, roadway incidents and congestion, and post reduced speed limits. But the vast network of pavement loops that detect vehicle volume and speed to drive the VMS messages, degraded. This reduced system effectiveness and required extensive, costly repair and replacement.



Following the merger of the Garden State Parkway (GSP) and the New Jersey Turnpike (NJTpk), the New Jersey Turnpike Authority (NJTA) implemented a 10 year ITS plan. The plan included a major enhancement to its Automatic Traffic Surveillance and Control System (ATSCS), and a new Statewide Traffic Operations Center (STOC). The ATSCS is currently being expanded to include both the NJTpk and the GSP, with vehicle detection points installed approximately every 1.3 miles, and VMS signs every 2.5 miles. Traffic detection and speed data is sent to the STOC which will then send travel advisories to the VMS signs.

In total, the project encompasses several thousand wireless detectors and approximately 250 VMS signs. Each vehicle detection point includes three Sensys detectors: two for vehicle count and speed determination, and a third spare.

The large number of vehicle detection points precluded the use of video vehicle detection systems or loops, both of which are costly to install and maintain. But Sensys wireless, battery powered in-pavement magnetometer vehicle detectors provided a highly cost effective solution that made a system of this scale possible. The Sensys systems were provided and integrated by Traffic Systems, Inc., and were installed by various electrical contractors and NJTA staff.

Sensys Wireless, Battery Powered In-Pavement Vehicle Detectors as Accurate, Yet More Reliable Than Loops:

Vehicle detection accuracy and reliability were a key requirement of the NJTA. HNTB, who developed the Turnpike's ITS Master Plan, determined that Sensys wireless vehicle detectors were more accurate than video, radar and acoustic systems, and equal to that of the "Gold Standard" loops. They are highly reliable solid state devices whose performance is unaffected by temperature, humidity, wind, precipitation, or sun glare, shadows, headlights or visual occlusions.

In addition to superior performance and reliability, Sensys wireless detectors have a small profile and require only a single 4 inch diameter pavement bore to install. Their wireless operation eliminates the need for expensive conduit and wire runs, dramatically reducing installation costs. The Sensys system's low cost made it economically possible to expand the ATSCS across the entire stretch of both roadways, and the Turnpike standardized on them for vehicle detection for this project and other future applications.

Sensys Vehicle Detection Backbone Drives Agency-Wide ATSCS System:



Sensys wireless in-pavement vehicle detectors provide the core vehicle detection, lane occupancy and traffic speed data that the entire ATSCS will rely on to operate. Vehicle data is collected wirelessly from the in-pavement detectors by Sensys gantry mounted wireless access points. The access points transmit vehicle data over dedicated WiFi and cellular connections to the Turnpike Authority's fiber optic data communications network, and on to the new STOC in Woodbridge. At some locations where the detectors are installed out of range of the access point antennas, Sensys wireless, battery powered repeaters provide a flexible, convenient and cost effective method to retransmit data back to the access points.

Vehicle detection data is processed by Sensys Networks Archive Proxy Servers (SNAPS) at the STOC, as well as by the soon to be completed new central ATSCS software. Based on the Sensys lane occupancy and vehicle speed data which is augmented by CCTV and weather sensors, the central ATSCS software will automatically send appropriate motorist messages to any of the 250 NTCIP compliant VMS signs within a two minute maximum response time. These messages include roadway weather, incident, congestion and travel time advisories, as well as speed limit restrictions. SNAPS servers allow for quick monitoring and standardized reporting of local traffic conditions, and information archiving.

Wireless In-Pavement Vehicle Detection System Meets Aggressive 10 Year ITS Plan Functionality, Maintenance, Lane Closure and Cost Goals:

The Turnpike Authority's ITS plan required that the new ATSCS system restore and improve on the original system functionalities, but at lower installation and maintenance costs, and with less lane closure time. The Sensys system met all of these goals while supporting the overall maximum ATSCS response time criteria and system expansion capability.

Sensys vehicle detectors are essentially maintenance free, and have a dramatically streamlined installation process. Because the sensors require only a single bore and no conduit or wiring, a three sensor lane array can be completely installed within a 15 minute rolling lane closure. Detectors and repeaters have a ten and seven year battery life respectively, and no moving parts. Sensys devices can continuously send status messages for device health and battery power levels. This is particularly useful because it allows maintenance staff to monitor battery life and proactively schedule their replacement. These features combine to provide a significantly lower lifetime Total Cost of Ownership than loops.

Intuitive, easy to use software tools assist installers in configuring and cataloging Sensys devices prior to installation. The system also monitors radio frequency (RF) signal strength and communications line quality. There are sixteen different RF channels available for selection during installation to insure reliable uninterrupted communications. Communications channels can be easily changed even after the detectors are installed in the pavement. New "deep" detectors can be installed eight inches below the pavement to accommodate milling and resurfacing.

