

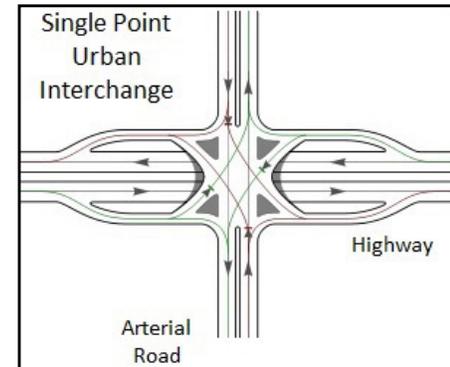
# Traffic Systems Inc. Applications Note:



## New York State DOT/Fort Drum Connector Single Point Urban Interchange (SPUI) with Sensys Wireless In-Pavement Vehicle Detection



The NYS DOT recently completed construction of a Single Point Urban Interchange (SPUI) at the Fort Drum Connector junction with Route 11. The SPUI uses a wireless in-pavement vehicle detection system instead of video vehicle detection for this fully actuated intersection. The wireless in-pavement system was implemented by Traffic Systems, Inc., under contract to Stilsing Electric.



The Single Point Urban Interchange (SPUI) is a new highway interchange design that moves high volumes of traffic through interchanges more efficiently than diamond configurations, and in less space. It compresses the two intersections of a typical diamond into a single intersection under (or over) a highway, allowing opposing left turns to proceed simultaneously. A “single point” set of traffic signals controls all through traffic for each arterial street direction as well as for each lane turning left onto or off of the interchange.

### Difficulty with Video Vehicle Detection:

The Fort Drum SPUI was originally designed utilizing video vehicle detection to drive the actuated signal control. But the harsh upstate New York winter weather was known to degrade video system performance and reliability. In addition, there were significant video occlusions that would complicate vehicle detection. Traffic Systems, Inc. proposed replacing the video system with the innovative new wireless in-pavement system from Sensys Networks Inc. that’s gaining wide acceptance in traffic, tolling and congestion management applications.

The Sensys vehicle detection system uses 4 inch diameter, cylindrical solid state in-pavement magnetometer “pucks”. The detector pucks are battery operated and communicate wirelessly to a roadside receiver and access point card in the signal cabinet. Detector installation is faster and less expensive than mounting and aligning video detection cameras or cutting loops. They require only a single four inch wide pavement bore, and no electrical cabling and conduit. Detectors have a ten year battery life, and performance and reliability is not affected by temperature, humidity, wind or precipitation. New “deep” pucks can be installed five inches below the pavement to allow future milling and resurfacing.

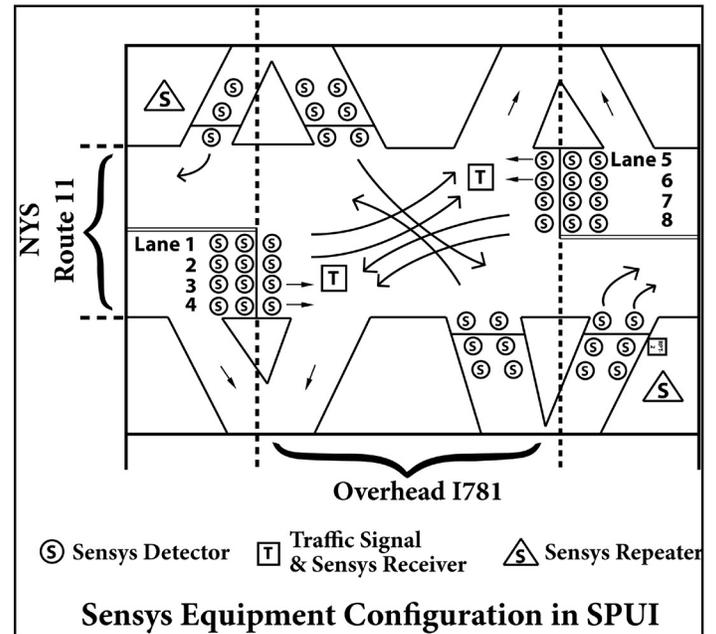
***The change to a Sensys system resulted in a net cost savings even when including the cost of the conduit runs for the original Video system that was not used.***

## Original Fort Drum Video Vehicle Detection Scheme:

The video vehicle detection system was designed to use six video cameras, each with electrical conduits and wire runs back to the intersection signal controller. Coaxial cables were to be terminated onto video processing cards that fed signals to the traffic controller. The video cameras were to be positioned to detect vehicles in each of the opposing arterial left turn lanes, and highway exit lanes.

## Wireless Vehicle Detection Scheme:

The six video cameras were replaced with three Sensys wireless detectors in each of the 15 lanes in the interchange (45 sensors total, see diagram to right). Two overhead antennas receive signals from the detectors and send them to an Access Point and 4 contact closure cards in the signal controller cabinet. Similar to video vehicle detection, the Sensys Access Point and contact closure cards process vehicle detection data and send outputs to the signal controller. Two wireless, battery-powered repeaters were also installed to re-transmit signals from the furthest lane detectors.



## Advantages and Benefits of Sensys Wireless In-Pavement Vehicle Detection:

SPUIs are tight, compact interchanges with occlusions that make it difficult to position video cameras for reliable vehicle detection. Sensys wireless detectors eliminate this constraint, and provide accurate, reliable vehicle detection in any roadway configuration. And accurate, continuous real time traffic data can be collected with the addition of only a single detector in each lane.

With thousands installed in the Northeast, Sensys solid state wireless vehicle detectors have proven their performance and reliability in the extreme weather frequently encountered upstate New York, including blinding snow and rain. They are essentially maintenance free, and do not go out of alignment.

The Sensys system is easier to install, operate and maintain than video vehicle detection and loops. Intuitive, easy to use software tools assist installers in configuring and cataloging the devices prior to installation. It also monitors radio frequency (RF) signal strength and interference. In the rare event interference is detected, the installer simply selects another channel to communicate on. Communication channels can be easily changed even after detector pucks are installed in the pavement.

Sensys devices can continuously send status messages for device health, signal strength and battery power levels. This is particularly useful because it allows maintenance staff to monitor battery life and proactively schedule their replacement, a procedure that's similar to the original installation, but quicker and easier.