After building roads, lighting roads, and adding signals to their intersections, the next steps in a transportation manager’s mind are:

• How many vehicles are using this road?
• When during the day?
• Does traffic vary by day of the week?

To answer these questions, transportation sensor systems (TSS) gather traffic flow and time-of-usage data, and then transmit that data for evaluation and response. NTCIP 1209 v02, Object Definitions for Transportation Sensor Systems, standardizes TSS data, allowing more consistent communication with other elements of the traffic management system, such as a traffic management center.

First published in 2005, NTCIP 1209 v02 was developed with participation from NEMA 3TS members Eberle Design, Inc.; Image Sensing Systems; Peek Traffic Corporation; and Traficon USA, LLC. In addition, recognition is given to support provided by the U.S. Department of Transportation, Research and Innovative Technology Administration.

During the period from 1987 to 1997, U.S. highway miles traveled increased by 33 percent, while actual highway miles increased by less than 2 percent. TSS provides the traffic flow and time-of-usage data that allow intelligent transportation systems (ITS) to implement strategies that promote more efficient utilization of existing roads with better traffic flow.

A TSS is any system capable of sensing and communicating near real-time traffic parameters. TSS functions include:

• monitoring the number of vehicles passing a particular zone
• specifying a time period for reporting
• reconfiguring the time period for reporting
• measuring vehicle speed
• communicating data to a traffic controller or a transportation management center (TMC)
• resetting the TSS
• modifying or reconfiguring the sensor zone

Relying on TSS data, strategies to improve traffic flow at a single intersection might include a pre-timed plan where a traffic signal’s phase and timing is based on the time of day, for example. An alternative to the pre-timed plan is a traffic-actuated plan where a traffic signal’s phase and timing adjust based on the number of vehicles waiting to pass through an intersection, the length of the line of vehicles, or the speed of vehicles passing through the intersection. Traffic actuated plans may also include limitations that allow each lane, at some point, to pass through the intersection, while still favoring the direction and lane where traffic is heaviest.

TSS data from multiple intersections may be coordinated to favor traffic flow:

• along a main road
• within a selected geographic region (e.g., downtown)
• throughout a larger geographic region (e.g., Washington, D.C., metro area)

While TSS data provides a basis for transportation management adjustments to control traffic flows, it may also be used to adjust traffic flows for many types of special events, such as sporting events, holidays, or concerts. Emergency vehicles may transmit signals that grant these vehicles priority passage through intersections, taking precedence over other TSS data.

TSS data adjustments improve traffic flow, decrease congestion, reduce travel time, improve safety, and reduce vehicle emissions. Transportation managers are well aware of the irritation and annoyance that stems from blocked intersections or clogged roads. Using ingenuity and TSS data, transportation managers are striving to reduce this all-too-common source of frustration in Americans’ daily lives.

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NTCIP is a family of data protocol standards that specifies commands for communication between a traffic management center (TMC) and field devices (e.g., signal control devices at an intersection).

NTCIP-specified implementations provide command and control capabilities for more visible elements of transportation infrastructure, such as the roadways themselves, and both require ongoing maintenance.

Since 1993, NEMA and member companies in the NEMA Transportation Management Devices Section have led the development and promotion of the NTCIP family of standards.