Intelligent Transportation Systems (ITS)

A Technology Roadmap

Recommendations lay the foundation for integrating smart transportation infrastructure on Oneida County's local roadway network to technologically connect them to the state highway network.

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About Oneida County's Vision 2020

Vision 2020 was created to align Oneida County's resources with the increasing demand for a broad range of skilled workers and support the transportation needs of our workforce and the travelling public. Since its inception, Vision 2020 has brought together leaders in education, workforce development, and industry to develop a comprehensive plan to drive the region's economy in the coming years. This includes preparing our workforce for existing and new job and career opportunities; enhancing our transportation infrastructure to increase accessibility; accommodating alternative modes of transportation; and improving connectivity throughout the county.

This effort is supported by the New York State Energy Research and Development Authority (NYSERDA) and the New York State Department of Transportation (NYSDOT).

Information contained in this document, such as web page addresses, is current at the time of publication.

What are Intelligent Transportation Systems?

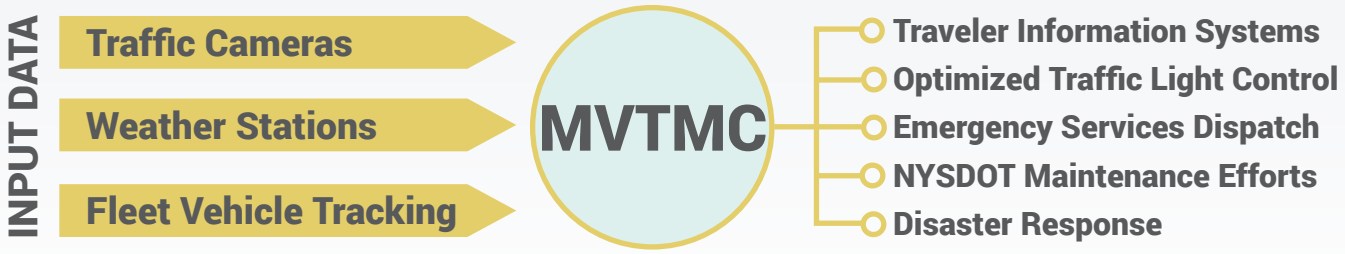
Intelligent Transportation Systems (ITS) integrate advanced monitoring, control, and communication technologies into transportation infrastructure to increase transportation safety, efficiency, and resiliency.

This allows for the seamless management of a transportation network by allowing system administrators to more accurately monitor conditions, share information, and react to changing scenarios in real time. For the traveling public, a transportation system that can immediately respond to a variety of road conditions will safely move commuters throughout Oneida County while reducing fuel consumption and emission output.

Thanks to a partnership between the New York State Department of Transportation (NYSDOT) and local transportation departments, state ITS infrastructure, solutions, and personnel can be used by smaller municipalities that would not otherwise be able to design and manage ITS solutions on their own. This partnership also provides additional local roadway data to state agencies that can inform decision-making and ensure public safety.

Throughout the state, NYSDOT Transportation Management Centers (TMCs) monitor and manage state-supervised roadways. Here in the Mohawk Valley, the Mohawk Valley TMC (MVTMC) oversees state roadways in six counties, including those in Oneida County. The **MVTMC** is responsible for:

- Coordinating the sharing of data and information with appropriate agencies, first responders, and the travelling public
- Monitoring data from state-owned ITS technology
- Controlling traffic devices on state-operated roadways
- Serving as regional operation center during emergency situations



ITS Technologies

Traffic Cameras

Traffic cameras provide real-time remote viewing of roadways and current traffic conditions. Cameras may be mounted on high mast poles for a long range of view or attached to traffic signals to monitor intersections.

Weather Stations

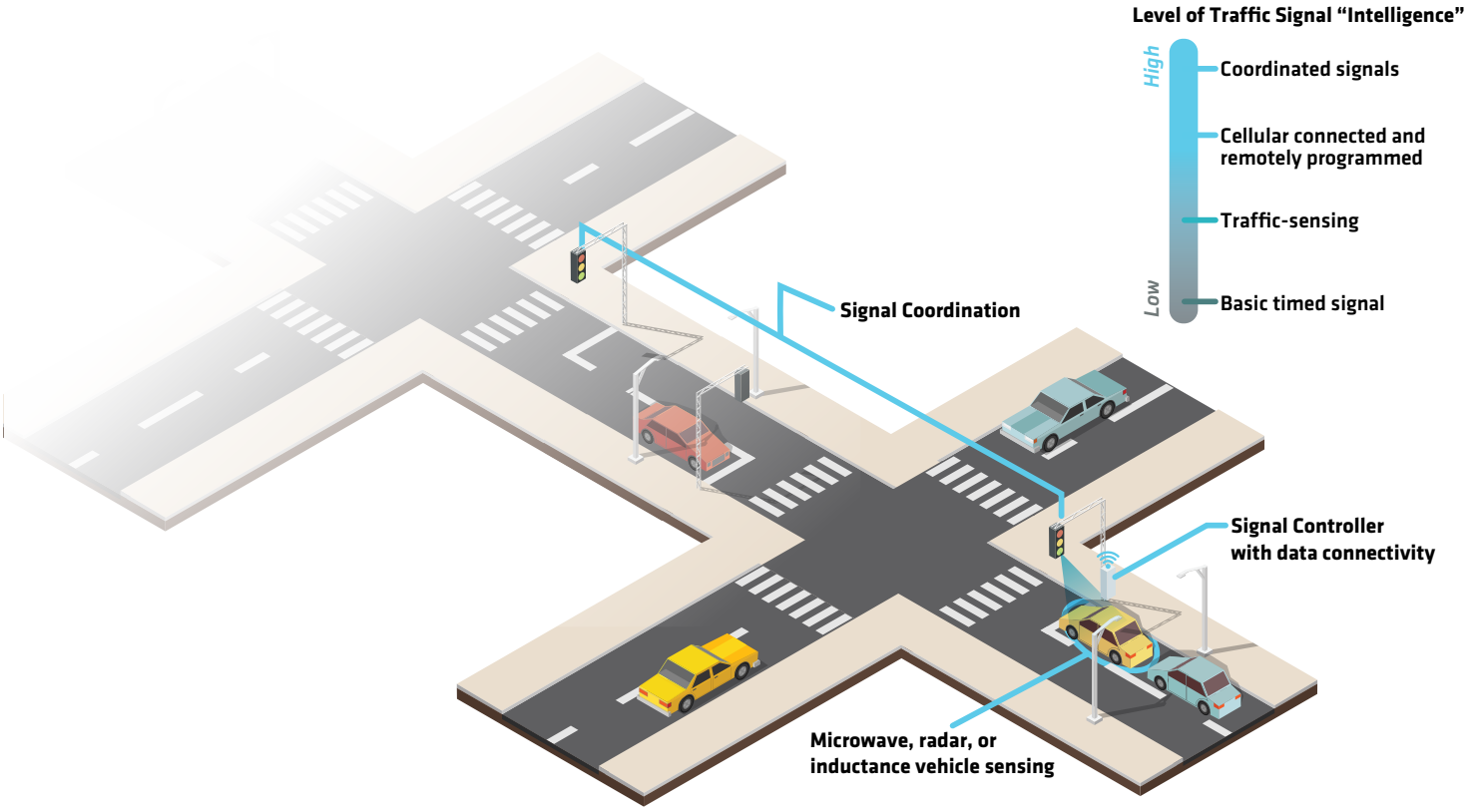
In addition to information and data provided by the National Weather Service, additional technology at the local level can be installed to more closely monitor environmental conditions to help inform decision-making and enhance overall responses to changing conditions. Weather stations can be equipped to measure rainfall, roadway temperature, snow depth, ice thickness, wind speed, wind direction, and other environmental conditions. A network of stations throughout a region can provide a powerful tool for monitoring the movement of weather and predicting weather conditions for commuters.

Traffic Signal Optimization

The simplest traffic signals use a fixed timing device that is programmed to change the signal from red to yellow to green after a certain amount of time. This timing can be manually adjusted as needed to improve traffic flow, but it cannot respond to traffic conditions in real time.

By adding traffic-sensing technology, traffic signals can react independently to existing traffic conditions. Additionally, networking the traffic light controller via wireless signals to a control center enables control center personnel to adjust traffic signal timing and better manage the flow of traffic in response to weather, events, and emergency situations.

Communication technology also allows nearby signals to "talk to each other" by sharing data used to coordinate actions and further optimize traffic flow. These technologies improve traffic flow, resulting in less congestion and fewer emissions due to local travel.



Variable Message Signs

Variable Message Signs (VMS) are electronic traffic signs often used to share critical information or warnings about traffic congestion, roadwork, emergencies, and weather that could negatively impact motorists. VMS also can be used to restrict travel in certain lanes, impose variable speed limits or suggest alternative routes.

Traffic Signal Preemption Control

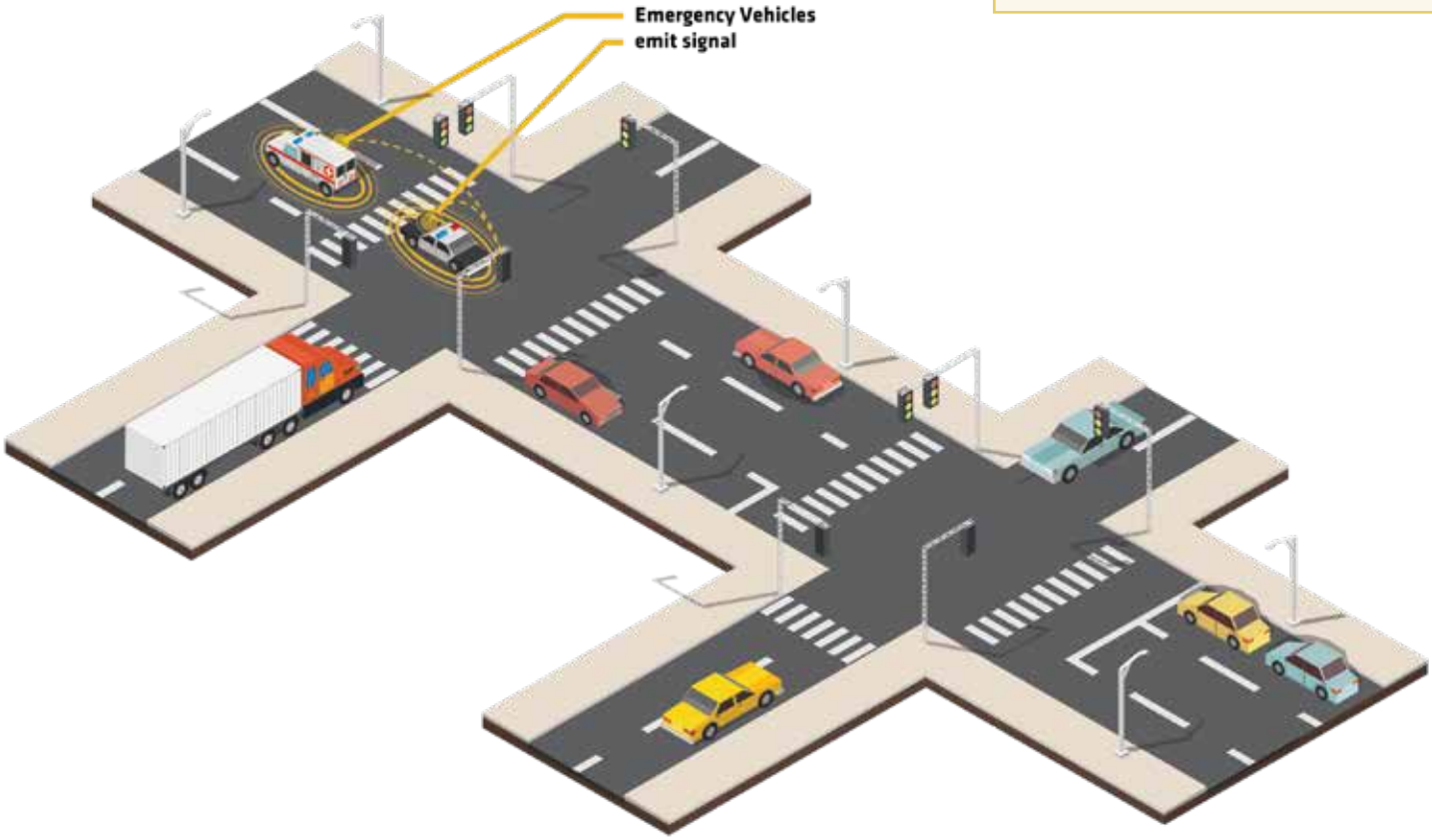
Traffic signal preemption allows emergency vehicles and transit buses to temporarily manipulate traffic signals along their route. This system could halt conflicting traffic, giving the priority vehicle right of way in order to improve travel times and enhance traffic safety. Similar to an electronic tolling pass (an E-ZPass®) in a car, a detector at an intersection picks up a signal emitted from the priority vehicle. The detector then prompts the traffic light and adjusts the flow of traffic to allow for the priority vehicle to pass through the intersection safely. For Oneida County, preemption technology could be added to existing controllers in the future by local agencies, if desired.

Other Technologies

- Map apps (shows traffic or better routes)
- Fleet vehicle telematics (provides GPS location, speed, fuel usage, engine performance)
- Vehicle-to-infrastructure communication
- Automated toll collection (E-ZPass®)

While useful, these solutions are vehicle based or have limited applicability for local roadways in Oneida County.

Preemption Control



Implementing ITS

The following process was used to develop a roadmap to lay the foundation for ITS recommendations for Oneida County. The goal was to:

- Increase understanding of smart transportation infrastructure and its benefits
- Build consensus with stakeholders on potential ITS solutions for Oneida County
- Identify key corridors that could significantly benefit from smart transportation infrastructure and traffic management
- Develop a geographic information system (GIS) database of smart transportation infrastructure through combined geolocating and mapping of assets
- Create a roadmap for implementing cost-effective ITS solutions and strategies that have the most impact on the key corridors
- Secure support from the Authority Having Jurisdiction (AHJ) and other stakeholders to implement ITS solutions

Going forward, this roadmap will serve as a guide for additional corridors in Oneida County as the intelligent transportation systems expand.

Identifying Key Corridors and Conducting Corridor Asset Inventory

Criteria used to identify high priority roadways for ITS deployment include:

Traffic Volume - Corridors with higher traffic volumes typically have more congestion and traffic flow concerns

Importance to the Overall System - During emergencies and large events, connections to major roadways are critical for efficient traffic flow

Connection to State-Operated Corridors - Expand on existing NYSDOT ITS capabilities

Applicability of ITS Technology - Urban settings with existing signals tend to have more potential for technological upgrades and see greater potential for environmental benefits

Methods used to identify corridor assets include:

- Surveying of corridor roadway and intersections
- Identification of existing traffic-control technology
- Evaluation of traffic flow restrictions, problematic areas, peak traffic times, etc.

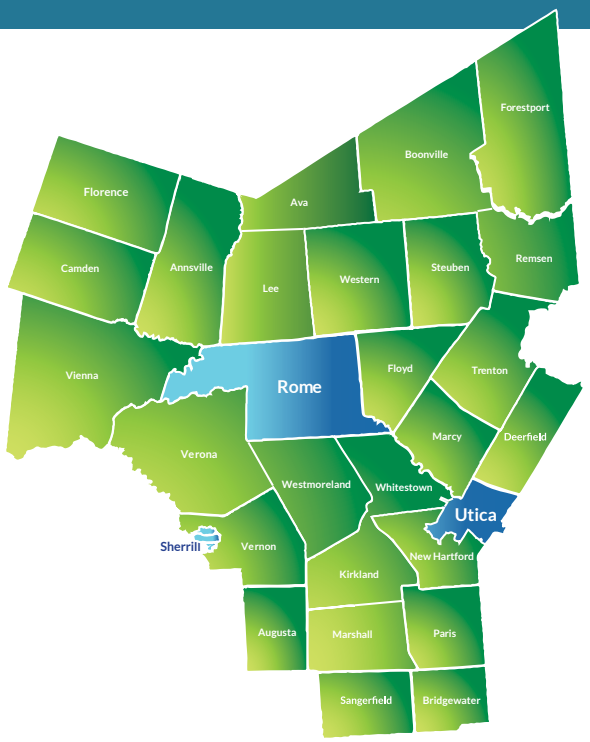
Developing an ITS Solution and Implementation Plan

With the overarching project objective to create a roadmap outlining a plan to implement ITS solutions on selected key corridors, a stakeholder engagement strategy identified stakeholder needs, interests, and potential issues in order to build consensus on recommended solutions.

The consulting team worked collaboratively with a variety of stakeholders throughout Oneida County, including:

- Transportation Organizations
- Transportation Providers
- Elected Officials
- Government Planning and Public Works Departments
- Emergency Responders
- Economic Development Organizations
- Travel and Tourism Organizations
- Health and Human Services Organizations

Identifying Key Corridors and Conducting Corridor Asset Inventory *(continued)*



Steps in the stakeholder process included:

- Kick-off meeting with all stakeholders to brainstorm and build consensus on criteria for identifying priority corridors
- One-on-one briefings and presentations with key stakeholders to provide information on project and steps
- Regular project bulletins for participants and other key stakeholders/leadership
- Stakeholder meetings to review ITS recommendations and gain final input on the plan, which includes:
  - Required hardware upgrades and estimated implementation costs
  - Integration with other ITS capabilities (e.g., MVTMC)
  - Anticipated benefits

Note, the Authority Having Jurisdiction (AHJ) must lead the actual deployment of the ITS technology as it impacts its infrastructure, and will be owned and operated by the AHJ or under agreements issued by the AHJ. With additional outside support, as needed, continued stakeholder involvement is essential to maximize ITS investments and public benefits.

Priority corridor case studies with recommended ITS solutions for Oneida County were developed in collaboration with local stakeholders.

North Genesee Street

Priority Corridors and Recommendations Case Studies

Floyd Avenue (Rome, N.Y.)

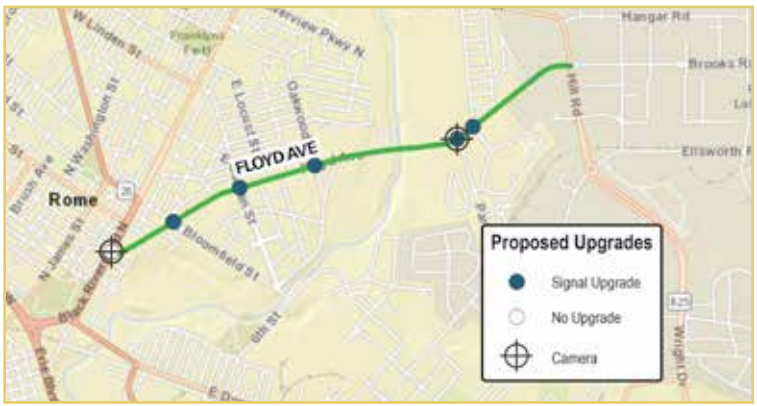
Characteristics of this Key Corridor

Connection to State-Operated Corridors: This corridor is used as an access point to Black River Boulevard that accesses NY-49. The corridor ends in the east at Hill Road and provides access to Griffiss Business and Technology Park/Griffiss International Airport (Griffiss) for the eastern part of the city.

Traffic Volume: The influx of economic opportunities at Griffiss and in the surrounding area has resulted in Floyd Avenue becoming much more heavily traveled as one of the primary corridors to Black River Boulevard. This corridor includes densely populated residential areas, commercial zones, and large state roadways.

Importance to the Overall System: Floyd Avenue is a total of 1.8 miles long and links the city of Rome's downtown district to residential neighborhoods, a community college, industrial areas, and the airport.

Applicability of ITS Technology: There are three signalized intersections along Floyd Avenue that consist mostly of timed (fixed) with one inductance loop controlled. All of the signals are owned by the city of Rome; they were replaced in 2003-2005.



Proposed ITS Solution

Traffic Signals: The proposed signals to be upgraded include communication and optimization capabilities on East Bloomfield Street, East Garden Street, Oakwood Street, Park Drive, and Bell Road.

Cameras: It is also recommended that traffic cameras be added at Black River Boulevard and Park Drive to monitor traffic at the corridor's midpoint.

Estimated Costs for the Floyd Avenue Proposed ITS Solution

Signal Controllers and Auxiliary Cabinets	Traffic Sensors	Traffic Cameras	VMS Board	Network Modems	Installation Costs	Total Initial Cost	Annual Service Cost	Annual Maintenance Cost (10%)
$65,000	$30,000	$3,000	**$0**	$1,750	$101,750	**$201,500**	*$8,400*	*$9,975*

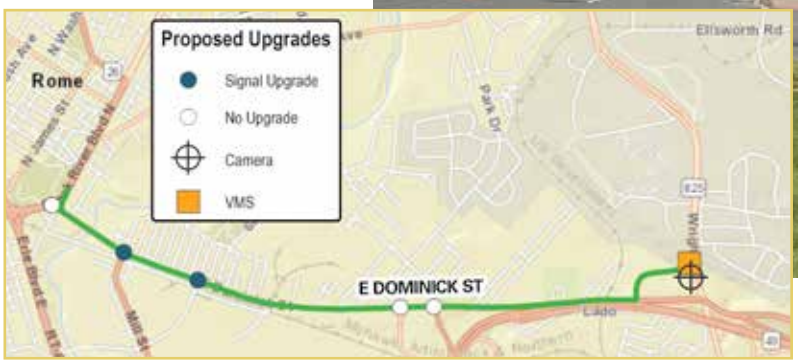
Floyd Avenue at Garden Street

East Dominick Street (Rome, N.Y.)

Characteristics of this Key Corridor

Connection to State-Operated Corridors: East Dominick Street connects Black River Boulevard (NY-46) to Wright Drive (NY-825) and serves as an access point to NY-49.

Traffic Volume: The roadway links the city of Rome's downtown district with the south end of Griffiss where Rome Free Academy is located. There is a mix of residential and commercial properties along East Dominick Street with dense neighborhoods to the north and several industrial operations to the south.



Importance to the Overall System: East Dominick Street is an alternate to NY-49 and traffic can be diverted from one to the other as needed. Travelers from Griffiss and Rome Free Academy lack information related to which route is better until after they select their route.

Applicability of ITS Technology: There are five traffic signals along East Dominick Street – three of which are operated by NYSDOT and already remotely monitored and controlled as needed. The signals are close enough to one another to coordinate for better optimization of traffic flow.

Proposed ITS Solution

Traffic Signals: To coordinate signal timing along the entire corridor, the city of Rome's traffic signals at the intersection of Mill Street and 5th Street must be upgraded to enable communication and remote control. This is a minimal investment to significantly improve traffic flow and considered a high priority.

Variable Message Sign (VMS): A VMS is recommended on NY-825 (after the Rome Academy) to inform commuters about any upcoming traffic delays or other issues before merging onto NY-49 or East Dominick Street from Griffiss.

Camera: A camera mounted (potentially on the VMS board) at NY-825 is also recommended to enable real-time traffic monitoring of NY-825, NY-49, and East Dominick Street.

Estimated Costs for the East Dominick Street Proposed ITS Solution

Signal Controllers and Auxiliary Cabinets	Traffic Sensors	Traffic Cameras	VMS Board	Network Modems	Installation Costs	Total Initial Cost	Annual Service Cost	Annual Maintenance Cost (10%)
$26,000	$8,000	$1,500	$25,000	$1,000	**$36,375**	**$97,875**	*$4,800*	*$6,150*

East Dominick Street at Fifth Street

Priority Corridors and Recommendations Case Studies *(continued)*

The Parkway (Utica, N.Y.)

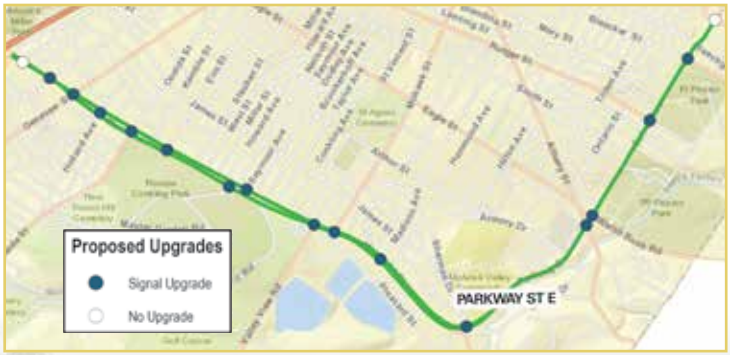
Characteristics of this Key Corridor

Connection to State-Operated Corridors: The Parkway corridor connects State Route 5 to the west and State Routes 8/12 to the south of the downtown area.

Traffic Volume: East of Sherman Drive, the corridor is four lanes and has a median between Genesee Street and Sherman Drive. West of Sherman Drive, the corridor is two lanes. To the north and east of the corridor are mostly dense neighborhoods mixed with some commercial properties.

Importance to the Overall System: This corridor also includes Mohawk Valley Community College (MVCC), the Army National Guard Recruiter, and the Utica Zoo.

Applicability of ITS Technology: There are a total of 17 signalized intersections. Signal controls are a mix of inductance loop, microwave detectors, and timed (fixed). The signals are owned by NYSDOT or the city of Utica.



Proposed ITS Solution

Potential ITS solutions for this corridor are divided into four phases based on implementation simplicity and impact. While all phases could be completed simultaneously, if possible, they are ranked in phases should the city of Utica choose to upgrade this corridor incrementally.

Traffic Signals:

Phase 1 intersections include Valley View Road and Mohawk Street. It is recommended that the traffic signals at each be upgraded to enable communication, remote control, and coordination due to their proximity to each other.

Phase 2 intersections include Steele Hill Road and Elm Street. In this section, the Parkway becomes a divided highway, and includes the Parkway (westbound) and Pleasant Street (eastbound), resulting in each intersection being made up of two traffic signal systems. It is recommended that each of these be upgraded to ITS standards with communication and control capabilities.

Phase 3 section is a partially divided highway (west of Genesee Street) and joined east of Genesee Street. Recommended upgrades include traffic signals with communication and control capabilities.

Phase 4 is defined as everything east of Mohawk Street, including sections near MVCC where the corridor turns into Culver Avenue. These intersections are relatively spread out but would still benefit from ITS capabilities to optimize traffic flow.

Estimated Costs for the Parkway Proposed ITS Solution

Section	Signal Controllers and Auxiliary Cabinets	Traffic Sensors	Traffic Cameras	VMS Board	Network Modems	Installation Costs	Total Initial Cost	Annual Service Cost	Annual Maintenance Cost (10%)
Phase 1	$26,000	$0	$0	**$0**	$500	**$10,000**	**$36,500**	*$2,400*	*$2,650*
Phase 2	$39,000	$0	$0	**$0**	$750	**$15,000**	**$54,750**	*$3,600*	*$3,975*
Phase 3	$52,000	$0	$0	**$0**	$1,000	**$20,000**	**$73,000**	*$4,800*	*$5,300*
Phase 4	$78,000	$30,000	$0	**$0**	$1,500	**$105,000**	**$214,500**	*$7,200*	*$10,950*
Total Corridor	$195,000	$30,000	$0	**$0**	$3,750	**$150,000**	**$378,750**	*$18,000*	*$22,875*

Pleasant Street at Steele Hill Road and Seymour Avenue

Herkimer Road and Leland Avenue (Utica, N.Y.)

Characteristics of this Key Corridor

Connection to State-Operated Corridors: A 0.3-mile section of Herkimer Road was evaluated from Genesee Street to Van Rensselaer Road and a 0.2-mile section of Leland Avenue was evaluated from Herkimer Road to the Interstate 790 (I-790) off-ramp.

Traffic Volume: Herkimer Road connects I-790 and commercial properties in the east where it eventually becomes State Route 5, leading to mostly residential neighborhoods.

Importance to the Overall System: Leland Avenue links commercial properties in the north to an industrial district in the south.

Applicability of ITS Technology: There are a total of eight signalized intersections along Herkimer Road and Leland Avenue. These are a mix of synced timed (fixed) and inductance loop controlled signals that are owned by either NYSDOT or the city of Utica.

Proposed ITS Solution

Traffic Signals: Existing traffic signals at Genesee Street and the I-790 ramp are currently NYSDOT controlled and have existing ITS technology installed. Additional intersections at Northern Road, Leland Avenue, and Van Rensselaer Road are not currently NYSDOT controlled and could benefit from communication capabilities. They currently have vehicle-sensing loops installed. The additional control flexibility would reduce peak period congestion by enabling signal coordination to smooth traffic flow.

Camera: A traffic signal mounted camera is recommended at the Leland Road intersection to enable monitoring traffic on Herkimer Road and traffic getting off of I-790.

Estimated Costs for the Herkimer Road/Leland Avenue Proposed ITS Solution

Signal Controllers and Auxiliary Cabinets	Traffic Sensors	Traffic Cameras	VMS Board	Network Modems	Installation Costs	Total Initial Cost	Annual Service Cost	Annual Maintenance Cost (10%)
$39,000	$0	$1,500	$0	$1,000	$15,875	**$57,375**	*$4,800*	*$4,150*

Herkimer Road at Leland Avenue

Priority Corridors and Recommendations Case Studies *(continued)*

Genesee Street (Utica, N.Y)

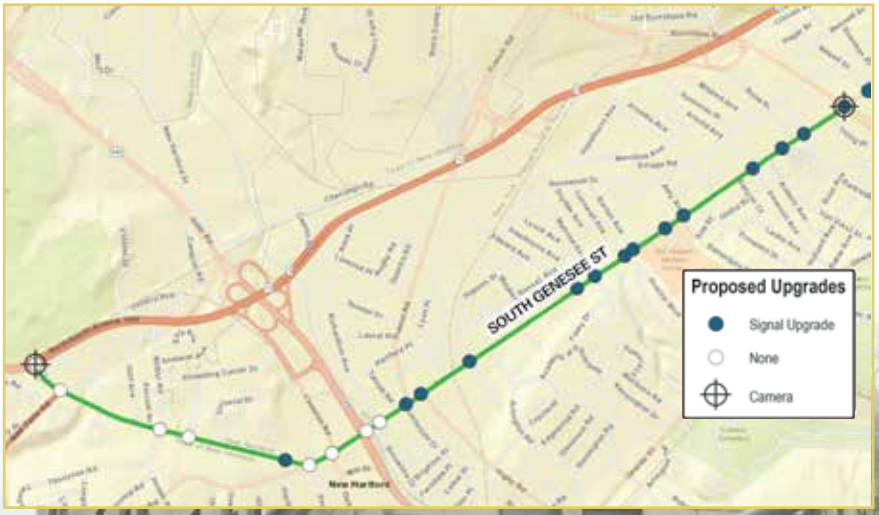
Characteristics of this Key Corridor

Connection to State-Operated Corridors: Genesee Street branches off and then runs parallel to State Route 12 and eventually connects to I-790 and I-90.

Traffic Volume: In the south, the corridor is a four-lane road but becomes a two-lane road east of Sherman Oaks Drive. It becomes a four-lane road again north of Pearl Street until the roundabout. It then briefly becomes two lanes west of the roundabout before returning to four lanes for the remainder of the corridor east of the roundabout.

Importance to the Overall System: Genesee Street is 5.7 miles long and is located mostly in the city of Utica with a section in the town of New Hartford. South Genesee Street includes a hospital (St. Elizabeth) and the central portion includes downtown Utica with the Stanley Theatre and Munson-Williams-Proctor Arts Institute.

Applicability of ITS Technology: There are a total of 37 signalized intersections along Genesee Street. Signal controls consist of a mixture of inductance loop, microwave detectors, and timed (fixed) and are owned by NYSDOT or the city of Utica.



Genesee Street at Court Street

Proposed ITS Solution

Due to the extensive length and overall number of intersections included in this corridor, recommended solutions are split into three sections: northern, central, and southern.

Traffic Signals: Northern Genesee Street is defined as north of Oriskany Boulevard (NY-5S). It was previously updated by NYSDOT with communication-enabled traffic lights and modern sensor technology.

Recommended solutions for central Genesee Street apply to intersections south of Oriskany Boulevard and north of the Parkway. Due to the importance of this section and the current state of the technology, this portion of the corridor is considered a high priority for ITS technology integration. Recommended traffic signal upgrades include adding vehicle sensing, updating controllers with communication capabilities, and incorporating control with NYSDOT systems for all intersections.

The southern Genesee Street section extends south from the Parkway to the State Route 5/12 intersection near New Hartford. This portion of the corridor has a mix of timed (fixed) lights and NYSDOT monitored and controlled traffic signals. The recommended solution is to upgrade the remaining older signals to the same level as the NYSDOT controlled signals to provide continuity along the entire corridor.

Camera: It is recommended that signal mounted traffic cameras be added at State Route 5S, the Parkway, and State Route 5/12 intersections.

Estimated Costs for the Genesee Street Proposed ITS Solution

Section	Signal Controllers and Auxiliary Cabinets	Traffic Sensors	Traffic Cameras	VMS Board	Network Modems	Installation Costs	Total Initial Cost	Annual Service Cost	Annual Maintenance Cost (10%)
Northern	$0	$0	$0	$0	$0	$0	$0	*$0*	*$0*
Central	$169,000	$34,000	$3,000	$0	$3,750	$151,750	$361,500	*$18,000*	*$20,975*
Southern	$169,000	$6,000	$1,500	$0	$3,500	$80,875	$260,875	*$16,800*	*$18,000*
Total Corridor	$338,000	$40,000	$4,500	$0	$7,250	$232,625	**$622,375**	*$34,800*	*$38,975*

Genesee Street at Wurz Avenue

Priority Corridors and Recommendations Case Studies *(continued)*

Kellogg Road (New Hartford, N.Y.)

Characteristics of this Key Corridor

Connection to State-Operated Corridors: The corridor consists of 0.6-mile-long Kellogg Road and 1.3 miles of Chapman Road, ending at Higby Road.

Traffic Volume: There is a small shopping plaza adjacent to State Route 8 with residential neighborhoods farther to the east and west. Chapman Road extends from Oneida Street east to Higby Road and passes several small residential streets and the Ralph Perry Junior High School. The school puts a considerable strain on the immediate area's traffic control infrastructure due to the bus volume during the morning drop-off and afternoon dismissal.

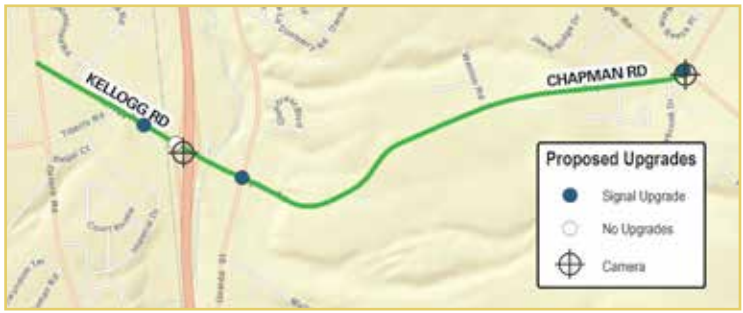
Importance to the Overall System: The Kellogg Road corridor links residential neighborhoods to State Route 8.

Applicability of ITS Technology: There are a total of four signalized intersections along Kellogg Road and Chapman Road. All of the signal controls are via inductance loops and are owned by either NYSDOT or the town of New Hartford.

Proposed ITS Solution

Traffic Signals: Intersections along this route that would benefit from communication and vehicle-sensing upgrades include the shopping plaza access road, Oneida Street, and Higby Road. The northbound State Route 8 ramps are currently not signalized, but NYSDOT is currently investigating the potential need for traffic control at this location.

Cameras: In addition to upgraded traffic lights, it is also recommended that a traffic signal mounted camera be located at the Higby Road intersection. An additional camera would also be beneficial near State Route 8, and NYSDOT is planning a high mast camera installation at this location.



Estimated Costs for the Kellogg Road Proposed ITS Solution

Signal Controllers and Auxiliary Cabinets	Traffic Sensors	Traffic Cameras	VMS Board	Network Modems	Installation Costs	Total Initial Cost	Annual Service Cost	Annual Maintenance Cost (10%)
$39,000	$8,000	$1,500	$0	$1,000	$35,875	**$85,375**	*$4,800*	*$4,950*

Kellogg Road at Shopping Plaza

Henderson Street (New York Mills, N.Y.)

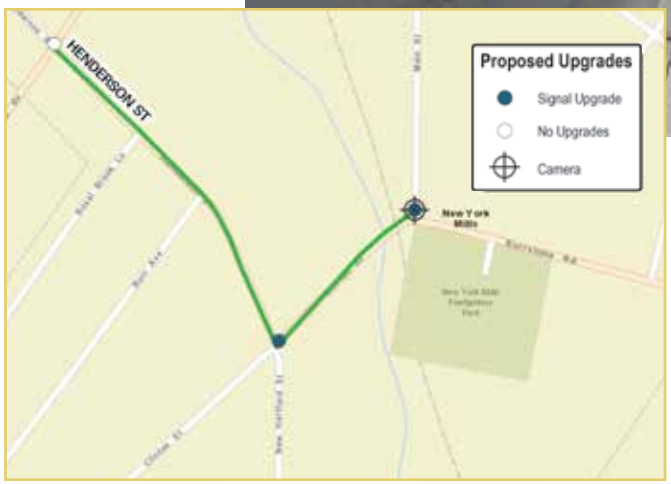
Characteristics of this Key Corridor

Connection to State-Operated Corridors: Henderson Street connects with Commercial Drive (NY-5A) on one end and Clinton Street on the other. Clinton Street connects State Route 840 to Main Street and Burrstone Road, which extend through the city of Utica to the north and west, respectively.

Traffic Volume: Traffic within this corridor is heavily comprised of arterial and city access along with traffic accessing commercial properties.

Importance to the Overall System: Henderson Street is 1.1 miles long, Clinton Street is 0.7 miles long, and both are located in the village of New York Mills. Henderson Street accesses a residential neighborhood in the north and commercial properties in the south.

Applicability of ITS Technology: There are a total of three signalized intersections within this area. The signal on Commercial Drive is owned by NYSDOT; the other two are owned by the village. Each of the signal controls are via inductance loops.



Proposed ITS Solution

Traffic Signals: Recommended ITS solutions include upgrading traffic lights at the Henderson Street and Clinton Street intersection and the Main Street, Clinton Street, and Burrstone Road intersection with vehicle sensing and communication technologies. These signals could also be coordinated to enable smoother traffic flow and reduced congestion in this area.

Camera: A traffic signal mounted camera is recommended at the Main Street, Clinton Street, and Burrstone Road intersection to enable real-time viewing of conditions at this location.

Estimated Costs for the Henderson Street Proposed ITS Solution

Signal Controllers and Auxiliary Cabinets	Traffic Sensors	Traffic Cameras	VMS Board	Network Modems	Installation Costs	Total Initial Cost	Annual Service Cost	Annual Maintenance Cost (10%)
$26,000	$0	$1,500	$0	$750	$10,875	**$39,875**	*$3,600*	*$2,825*

Clinton Street, Main Street, at Burrstone Road intersection

Approving the Plan and Securing Funding

Before implementing the roadmap, establishing strategies for ownership and operation is critical to maximizing the long-term benefits of ITS. This includes:

- Exploring shared service agreements with NYSDOT to monitor and manage the technology
- Allocating resources for ongoing networking and maintenance costs in the budget development process

Funding to implement ITS technology may be available through grants, as these projects address transportation resiliency, energy savings, safety, economic development, and tourism efforts. Potential funding sources may include:

- Climate Smart Communities – projects that advance the work of municipalities to address climate change (i.e., greenhouse-gas mitigation activities related to transportation)
- Community Development Block Grant Program – creating or expanding job opportunities, providing safe affordable housing, and/or addressing local public infrastructure and public facilities issues

Implementation and Optimization

Identify opportunities for cost efficiencies to continually monitor and further optimize ITS:

- Leverage volume equipment purchases and ITS deployment experience of NYSDOT for potential cost savings
- Consider implementation phases for larger corridors and complex applications to simplify installation
- Supplement, not replace, the capabilities of the installed ITS technology with new technologies
- Extend ITS technology deployments on adjacent roadways to further improve traffic flow

Benefits of ITS

ITS technology provides traffic control capabilities to address a wide range of situations which result in several benefits:

Real-Time Traffic Management

- Provides added traffic control, awareness, and response capabilities during inclement weather (heavy snow, flooding, etc.)
- Enables multiple roadways to manage traffic flow in the event of a primary highway shutdown (due to accidents or weather)
- Enables remote traffic control for sporting events, concerts or parades, and planned roadway maintenance

Efficiency

- Enables intersection optimization, increasing traffic throughput and reducing travel time by up to 25%*
- Intersection coordination creates steady traffic flow, reducing stop-and-go driving from 10-40%*
- Fuel consumption is reduced by up to 10% and harmful emissions are cut by up to 22%*

**Based on data from the National Transportation Operations Coalition (NTOC)*

Safety

- Provides motorists with early information and warnings resulting in reduced vehicle collisions