IV. THE TRANSPORTATION SYSTEM

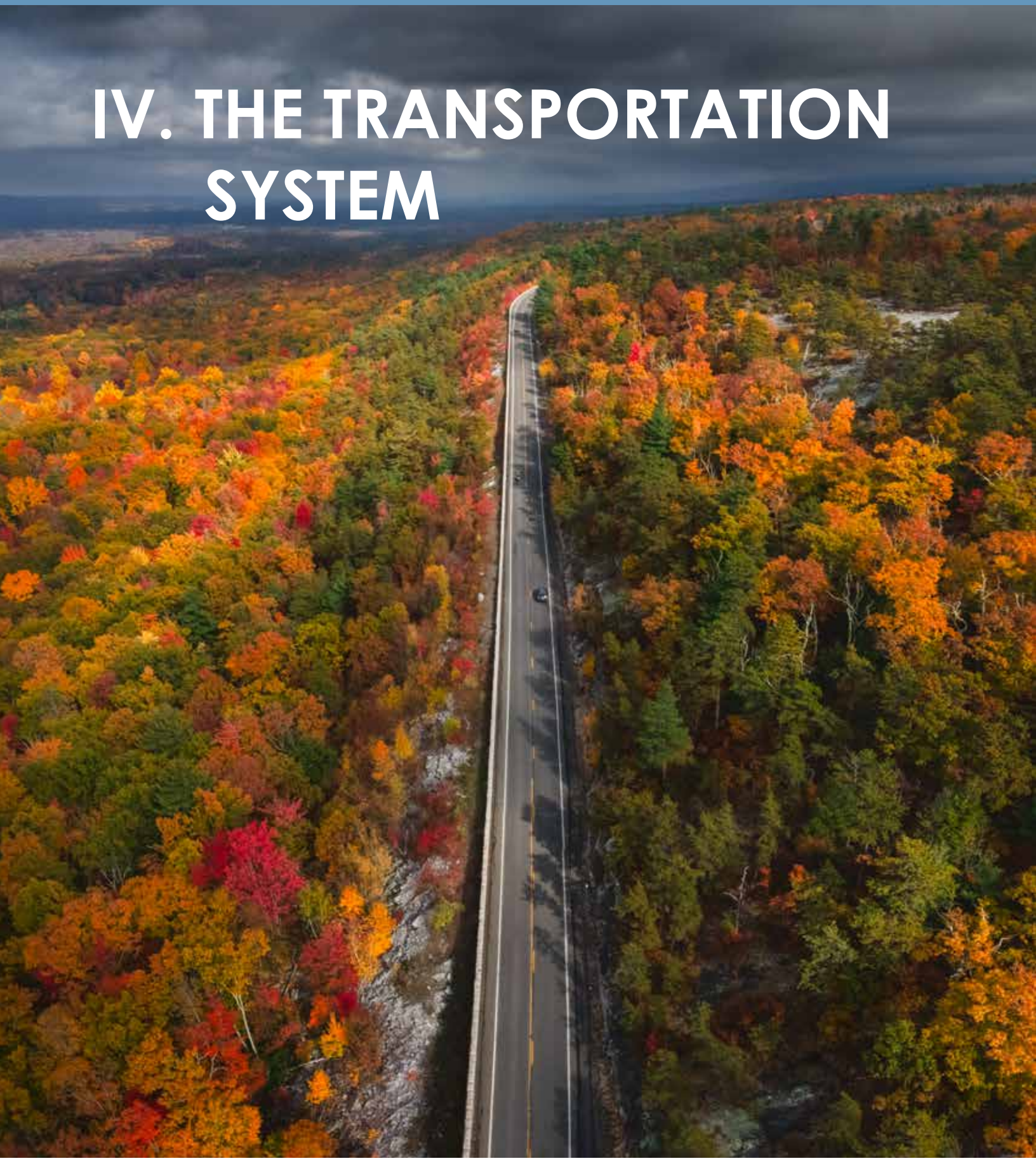


Photo by: Gerald Berliner

The regional profile in Section 3 describes Ulster County as a place, its people, and its businesses. The transportation system exists to serve the travel needs of these people and businesses.

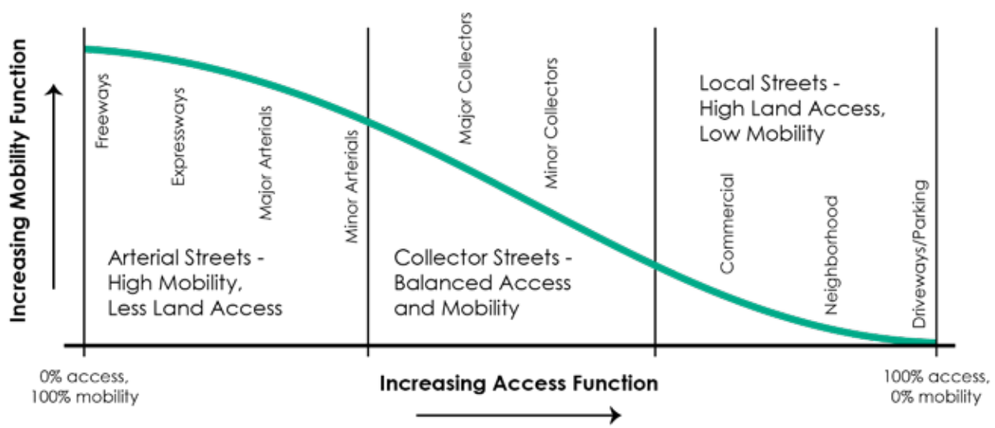
This section provides a summary of the modes that collectively comprise the Ulster County transportation system including highways and streets, transit operations, and facilities for non-motorized travel. This section describes the division of travel among these modes, existing safety related issues system wide, and freight movement across highways, railroads, waterways, and pipelines.

HIGHWAY SYSTEM

ROADWAY CLASSIFICATION AND JURISDICTION

Functional classification is a well-established system utilized by the Federal Highway Administration (FHWA) for grouping streets and highways into classes based on roadway characteristics and intended services. Basic to this process is the recognition that individual roads and streets cannot serve travel independently; rather, most travel involves movement through a network of roads. Thus, it is necessary to determine how to channelize travel within the network in a logical and efficient manner. Functional classification defines the extent to which roadways provide for through-travel versus the extent to which they provide access to land parcels. An interstate highway provides service exclusively for through-travel, while a local street is used exclusively for land access. Figure 4.1 illustrates the functional classification system.

Figure 4.1: Functional Classification of Roadways



Source: FHWA

Figure 4.2: Ulster County Roadway Functional Classifications

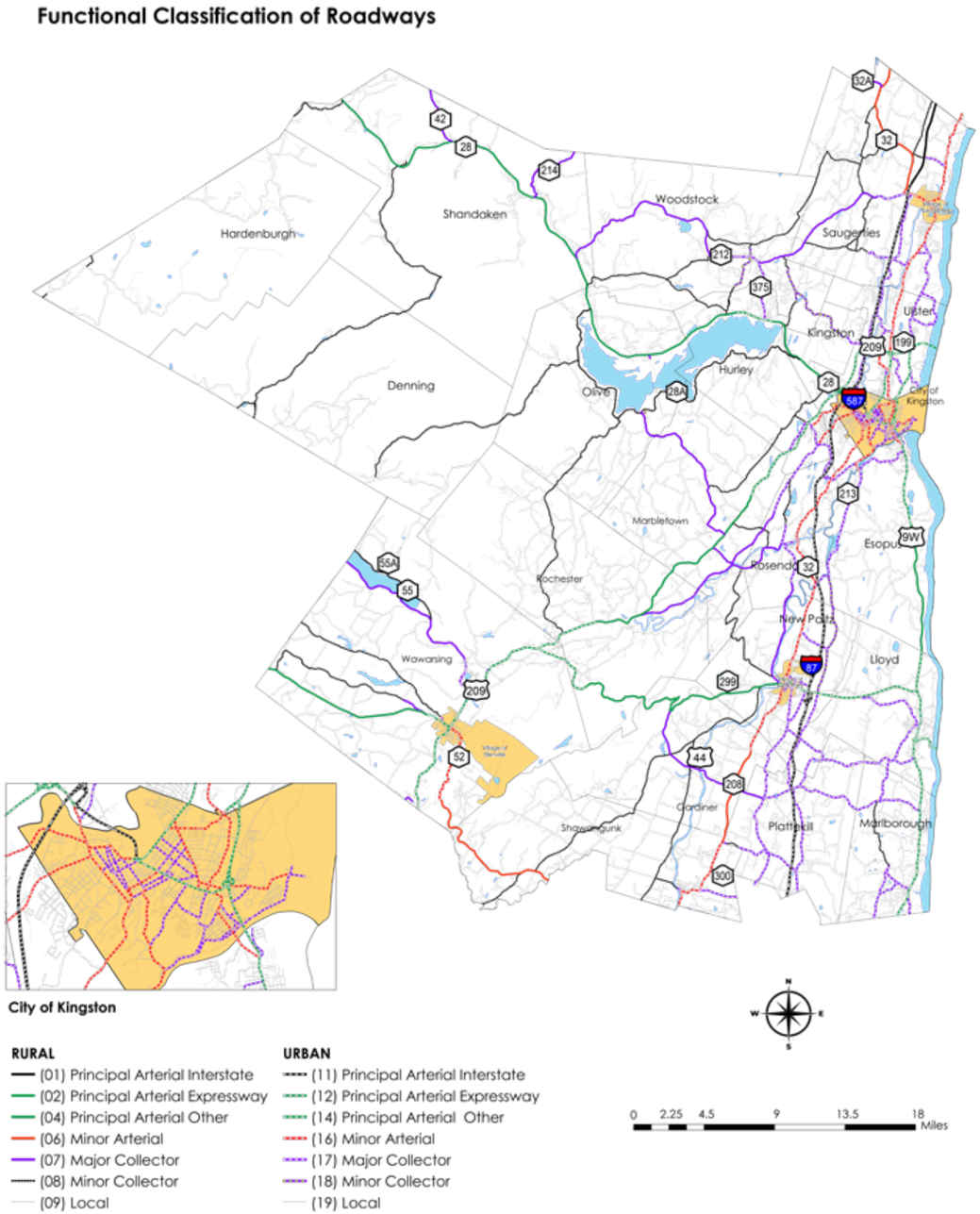


Figure 4.2 illustrates the Ulster County highway system by functional classification. Each roadway has a classification number based on its location, access, and capacity characteristics.

The majority (70%) of roads in UCTC's MPA are local roads, with 45% designated as rural local and 25% designated as urban local. Interstates comprise about 2% of the centerline miles, while other principal arterials comprise 6% of centerline miles. There are more rural centerline miles (60%) than urban centerline miles (40%) in the road system, which is a reflection of the rural land mass compared to urban developed land. Figure 4.3 provides a breakdown of UCTC's MPA centerline mileage by functional classification. It is important to note that Rural Local streets which are not eligible for federal funds make up 45% of the UCTC's road mileage.

Figure 4.3: Centerline Mileage by Functional Classification [i]

FC	Description	Centerline Miles	Percentage
1	Rural Principal Arterial Interstate	2.62	0%
4	Rural Principal Arterial Other	69.28	3%
6	Rural Minor Arterial	19.41	1%
7	Rural Major Collector	69.51	3%
8	Rural Minor Collector	188.16	8%
9	Rural Local	1,040.52	45%
11	Urban Principal Arterial Interstate	45.17	2%
12	Urban Principal Arterial Expressway	9.59	0%
14	Urban Principal Arterial Other	71.66	3%
16	Urban Minor Arterial	59.48	3%
17	Urban Major Collector	142.88	6%
18	Urban Minor Collector	13.81	1%
19	Urban Local	570.92	25%
Total		**2,303.01**	**100%**

NYSDOT, the New York State Thruway Authority (NYSTA), Ulster County, the City of Kingston, towns, and villages are responsible for maintaining and operating roadway facilities in Ulster County. The functional classifications described above assists in allocating resources and investment for roadways across these agencies.

Figure 4.4 summarizes the mileage and percentage of roadways by their respective jurisdiction. Over half (59%) of the roadway centerline miles in UCTC's MPA fall under the jurisdiction of towns. About 18% are county owned roads, while 13% are within NYSDOT's responsibility.

Figure 4.4: Centerline Mileage by Maintenance Jurisdiction [ii]

Maintenance Jurisdiction	Centerline Miles	Percentage
NYSDOT	293.85	13%
County	422.06	18%
Town	1368.35	59%
City or village	123.83	5%
Local Parks	0.55	0%
Other State agencies	8.96	0%
Other local agencies	28.77	1%
Private or Restricted Access	7.09	0%
NYS Thruway	47.78	2%
Other Toll Authority	1.62	0%
Bureau of Fish and Wildlife	0.03	0%
Army	0.12	0%
Total	**2,303.01**	**100%**

Functional class and jurisdiction are important not only in relation to operational and maintenance responsibility, but also in how roadway improvement projects can be funded. Funding eligibility limitations include:

- FHWA National Highway Performance Program (NHPP) can be used only on the National Highway System, which comprises the Interstates, all other Principal Arterials, and all designated NHS Connectors.
- FHWA Surface Transportation Program Block Grant program (STPBG) can be used on any facility except Local Roads and Rural Minor Collectors, thereby excluding 78% of roads in UCTC's MPA.
- FHWA Highway Safety Improvement Program can be used to address safety problems on any public road.
- New York State Dedicated Fund can be used only on State owned facilities.
- The Thruway Authority uses toll revenue to maintain its facilities.

ROADWAY ASSET CONDITION

Keeping pavements in a state of good repair is a central function of agencies with jurisdiction over roadways. Pavement condition is measured in two ways in New York. The first is surface condition, as measured through a visual scoring methodology. This method has been in place for many years and provides valuable information on underlying pavement problems. The second measure is ride-ability, as measured by the International Roughness Index (IRI). This is a more user-based metric. NYSDOT typically uses both methods to evaluate State highway system pavements. Some local governments and MPOs use the visual scoring method for locally owned roads, but this has not been done in Ulster County. As such, data is available only for the State Touring Route system. The most recent pavement data does not include visual pavement scoring and only includes IRI condition rating.

The IRI is determined by measuring the collective deviation from a smooth level surface in inches per mile. According to FHWA, an IRI of less than 95 inches/mile is considered "good ride quality" while an IRI between 96 and 170 inches/mile is considered "acceptable ride quality". Anything exceeding 170 inches/mile is "Unacceptable".

Figure 4.5 summarizes IRI by functional classification for State Touring Routes in Ulster County. A total of 365.93 centerline miles of roadways in Ulster County qualify as State Touring Routes while 362.72 centerline miles had a reported IRI in 2017. While the percent Unacceptable is very small except for rural collector roads, of greater concern is the percent Acceptable. NYSDOT's "Preservation First" approach to asset management is focused on these pavements, where less expensive pavement treatments can move the rating to Good, and more importantly extend the service life of the roadway for a number of years. Figure 4.6 shows that with over 51% of all state touring routes rated Acceptable, NYSDOT has a significant challenge in the coming years to maintain those facilities.

Figure 4.5: 2017 International Roughness Index (IRI) by Functional Classification on State Touring Routes

Functional Classification	Centerline Miles Scored		Good (<95)		Acceptable (=96-170)		Unacceptable (170+)	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Interstate	2.62	37.92	100%	88%	0%	11%	0%	1%
Expressway/Freeway	0	4.08	N/A	7%	N/A	74%	N/A	18%
Principal Arterials	69.28	60.98	54%	22%	34%	61%	12%	17%
Minor Arterials	19.41	46.11	27%	18%	73%	65%	0%	17%
Collectors	78.32	44	14%	9%	56%	69%	30%	22%
Total	**169.63**	**193.09**	**33%**	**31%**	**48%**	**54%**	**18%**	**15%**

Figure 4.6: IRI Summaries on State Touring Routes, 2017

TRAFFIC SIGNALS

Traffic signals are a key element of traffic control. Their location and timing affects the mobility of vehicles and pedestrians. National studies demonstrate that poorly timed traffic signals are responsible for a significant proportion of urban traffic congestion. Signal timing that does not allow sufficient time for pedestrians to cross a street can contribute to safety problems and act as a barrier to walking. The Manual on Uniform Traffic Control Devices (MUTCD) establishes minimum warrants that are to be met for installation of a signal, and for designation of exclusive turn lanes and movements.

Signal ownership is an important element, as each jurisdiction may have its own protocols for maintaining and retiming signals. Figure 4.7 summarizes signals owned by entity.

UCTC TRAFFIC SIGNAL WARRANT EVALUATION

The City of Kingston had identified 12 signalized intersections that were suspected to no longer meet the minimum traffic and safety warrants to justify their continued operation. In 2019, working under the guidance of Creighton Manning Engineering (CME), UCTC conducted a systematic evaluation of traffic conditions associated with those intersections throughout the City.

The primary objective was to evaluate traffic conditions at the locations and strategize appropriate measures for optimizing operations and safety for pedestrians, cyclists and the driving public. Removing unnecessary signals and substituting them with more appropriate regulatory and safety features (such as stop signs, warning lights, improved cross walks and lighting, curb bump-outs, and other engineering improvements) was considered.

Of the 12 locations evaluated, 11 were found to not meet any of the criteria required for a traffic signal to be installed. The City Department of Public Works has begun the process of removing the outdated signals and will monitor each location to ensure safe and efficient traffic operations.

Figure 4.7: Ulster County Signal Ownership

Maintaining Entity	Signals Owned	Signals Maintained
NYSDOT	126	132
City of Kingston	58	58
Private	7	1
Town of Ulster	3	6
Ulster County	4	1
Total	**198**	**198**

BRIDGE OWNERSHIP

Bridges provide necessary linkages across geographic or man-made barriers in the roadway network. A bridge that is not structurally sound and must be closed or load-posted creates a situation where all traffic, or just trucks, must detour. A bridge that is functionally obsolete in terms of narrow lanes can create a bottleneck, while one that has insufficient vertical clearance again results in truck detours.

The Ulster County transportation system includes 387 functional bridges; 40% are county-owned structures, 28% are NYSDOT-owned structures, and 19% are town-owned. The majority of bridges are classified as local rural facilities in townships, meaning these are generally smaller bridge structures carrying low volumes of traffic.

BRIDGE CONDITION

Federal law requires that all bridges be inspected biennially; those that have specific structural problems may require more frequent inspections. Inspections include evaluation and rating of numerous elements of the substructure, superstructure, and deck, with special attention paid to fracture-critical members. Underwater inspections occur no less than every 5 years to check for scour around bridge piers.

As part of the National Bridge Inventory (NBI), four key bridge components are assessed and scored: deck, superstructure, substructure, and culverts. This data is then reported back to FHWA on a regular basis. These components are rated on a 1-9 scale with a score greater than 7 being good, a 5 or 6 rated fair, and less than or equal to 4 being poor or structurally deficient. The lowest rating of the four components determines what condition a bridge is rated. Bridges in good condition suggest a newer or well-maintained bridge with no major investment needed. Bridges in poor or structurally deficient are safe to drive on but are reaching a point where substantial reconstruction or even replacement may be needed.

Figure 4.9 summarizes Ulster County bridges by owner and condition. Current data suggests that the majority of bridges in the Ulster system are in a reliable state of repair. However, just over ever one out of five bridges in the county is Poor or Structurally Deficient, indicating that there are many structures for which improvement will be necessary to ensure continued access and safety on the transportation system.

Figure 4.8: Ulster County Bridges by Owner

Municipality	City	Ulster County	NYC Water Supply	NYS Bridge Authority	NYS Thruway Authority	NYS DOT	State-Other	Town	Village	Grand Total
Crawford (Town)						1				1
Denning (Town)		19						2		21
Ellenville (Village)		1				5			3	9
Esopus (Town)		2			1	5		3		11
Gardiner (Town)		6				3		3		12
Hardenburgh (Town)		14						8		22
Hurley (Town)		1				1				2
Kingston (City)	1				4	5				10
Kingston (Town)		2								2
Lloyd (Town)		3		2		4		2		11
Marbletown (Town)		6	2			2		1		11
Marlborough (Town)						1				1
New Paltz (Town)		1			5	1		1		8
New Paltz (Village)									1	1
Olive (Town)		6	7					1		14
Plattekill (Town)					2	1				3
Rochester (Town)		21				3		9		33
Rosendale (Town)		3			5	4				12
Saugerties (Town)		12			6	4		4		26
Saugerties (Village)						2				2
Shandaken (Town)		25				18	2	20		65
Shawangunk (Town)		13				2		6		21
Ulster (Town)		3		1	7	18				29
Wawarsing (Town)		10	1			15		6		32
Woodstock (Town)		6				15		7		28
Grand Total	**1**	**154**	**10**	**3**	**30**	**110**	**2**	**73**	**4**	**387**

As shown in Figure 4.10, Ulster County owns more than half of the structurally deficient bridges in the county, contributing to the fact that 78% of structurally deficient bridges are owned by local governments. This is not unusual and is a consequence of the cost of major bridge projects combined with the limited options local governments have to pay for them. Figure 4.11 illustrates the locations and ratings of bridges. It should be noted that in 2015 Ulster County launched a major transportation initiative called "Building a Better Ulster County". That initiative will invest a total of nearly 10 million dollars in county funds and over 5 million dollars in state and local funds in a single year to improve county road and bridge infrastructure. Included in this is over 50 miles of new road surfaces, a minimum of 5 new bridge replacements and major repairs, shoulder installation at key pedestrian activity areas including schools, and several bank stabilization projects. This one time investment has helped the county to catch up to its major maintenance needs of its transportation infrastructure.

Figure 4.9: Ulster County Bridges by Owner, Condition and Sufficiency Rating

Owner	# of Bridges	Good	Fair	% Structurally Deficient
City of Kingston	1	100%	0%	0%
Ulster County	154	10%	60%	31%
NYC Water Supply	10	40%	40%	20%
NYS Bridge Authority	3	0%	100%	0%
NYS Thruway Authority	30	20%	63%	17%
NYS DOT	110	18%	71%	11%
State-Other	2	100%	0%	0%
Town	73	25%	51%	25%
Village	4	25%	50%	25%
Total	**387**	**17%**	**61%**	**22%**

Figure 4.10: Structurally Deficient Bridges by Owner

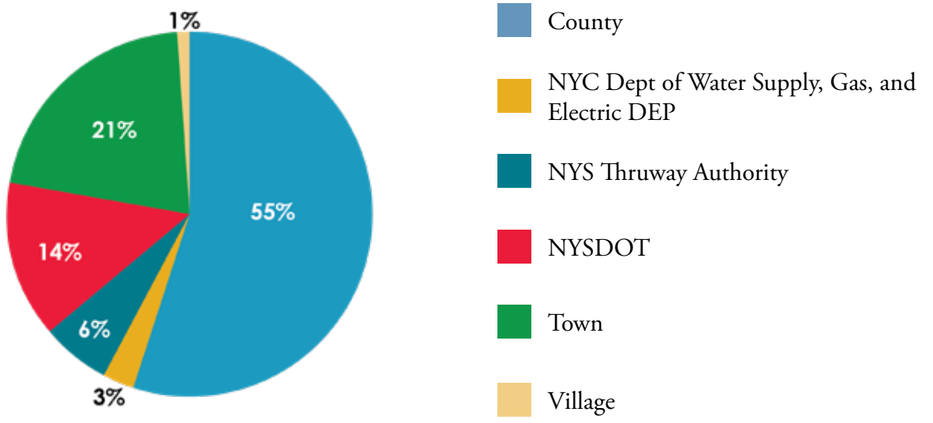
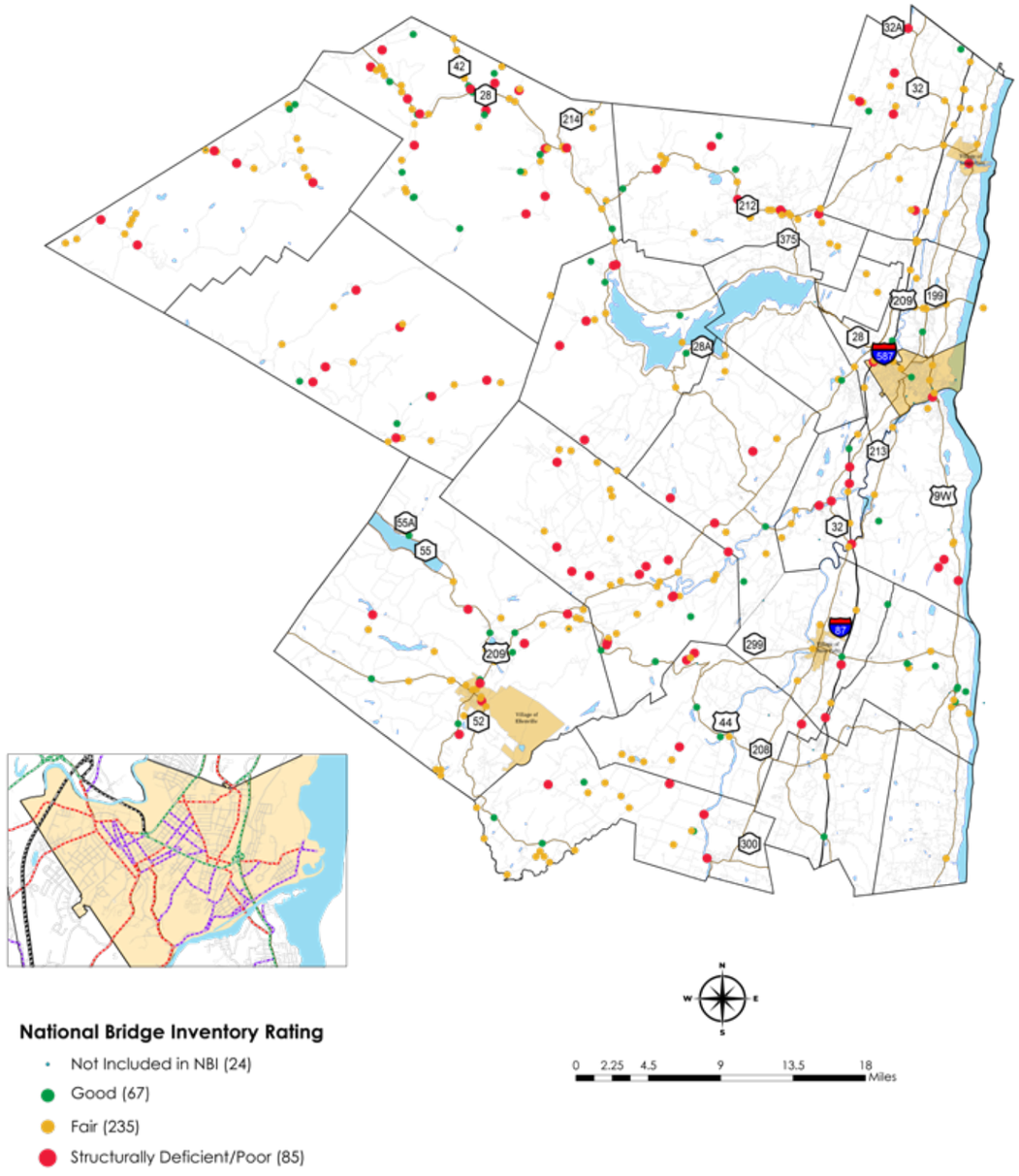


Figure 4.11: Ulster County Bridge Conditions (2019)



TRAVEL ON THE ROADWAY SYSTEM

SYSTEM USE

The UCTC's highway system exhibits a PM peaking traffic pattern in most corridors, which is driven by commuter travel. Some retail corridors, such as the Town of Ulster peak on Saturday afternoons. The I-587 corridor and its exits also exhibit weekend peaking with backups on Sunday night that often slow traffic to a crawl in the corridor from Kingston south.

CRITICAL CORRIDORS

Another way to view the roadway system is in terms of corridors. Critical corridors are those that serve major population centers including future growth areas; carry higher volumes of through traffic; carry higher volumes of freight movement; and serve primary economic generators, including recreational venues as well as traditional businesses. Ulster County's critical corridors include I-87 (NYS Thruway), I-587, US 9, US 209, NY 28, and NY 299 as illustrated in Figure 4.12. Figure 4.13 illustrates the variation in volume on critical corridors over time. Most volumes fluctuate similarly throughout the 1998 to 2012 time-frame, while US 209 observed a slight increase in traffic and SR 32 saw a decline, proportionally.

Figure 4.12: Critical Transportation Corridors

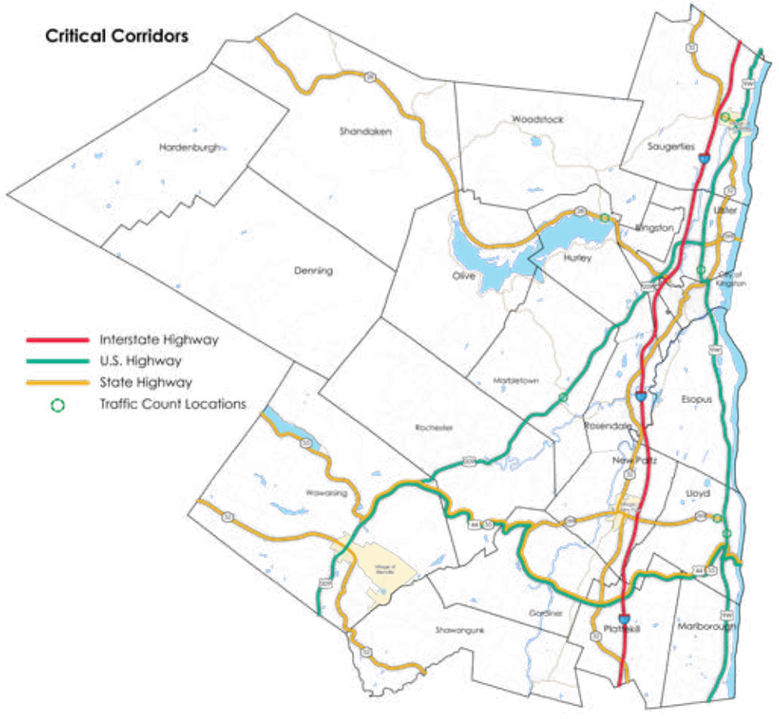
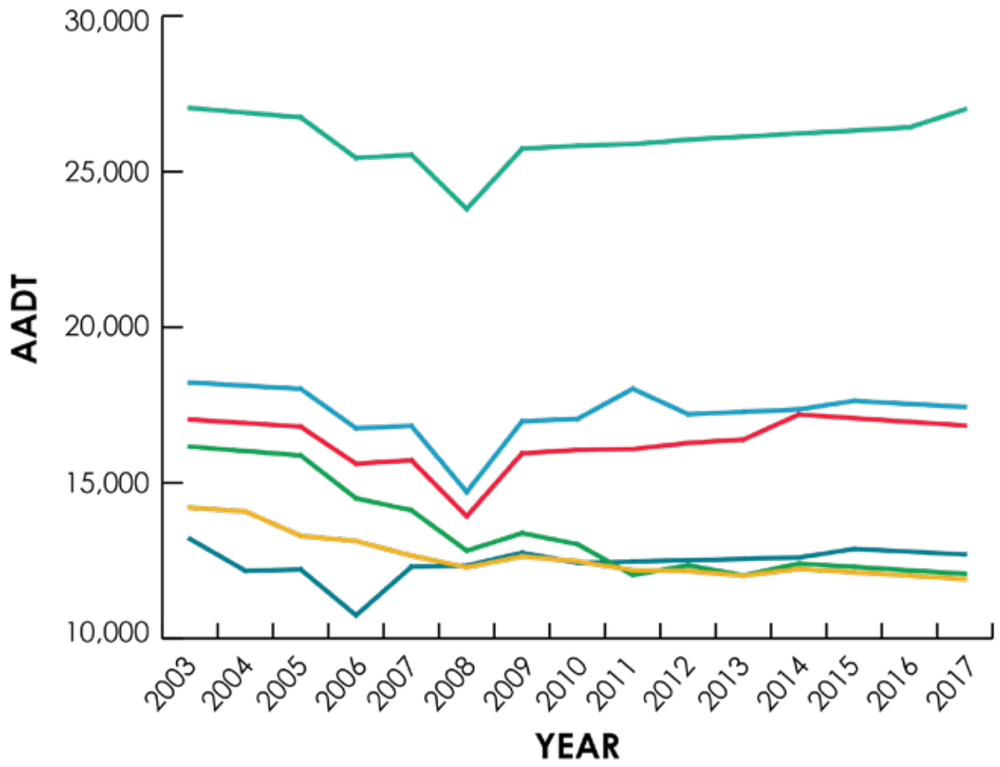


Figure 4.13: Average Annual Daily Traffic on Ulster County's Critical Corridors, 2003-2017

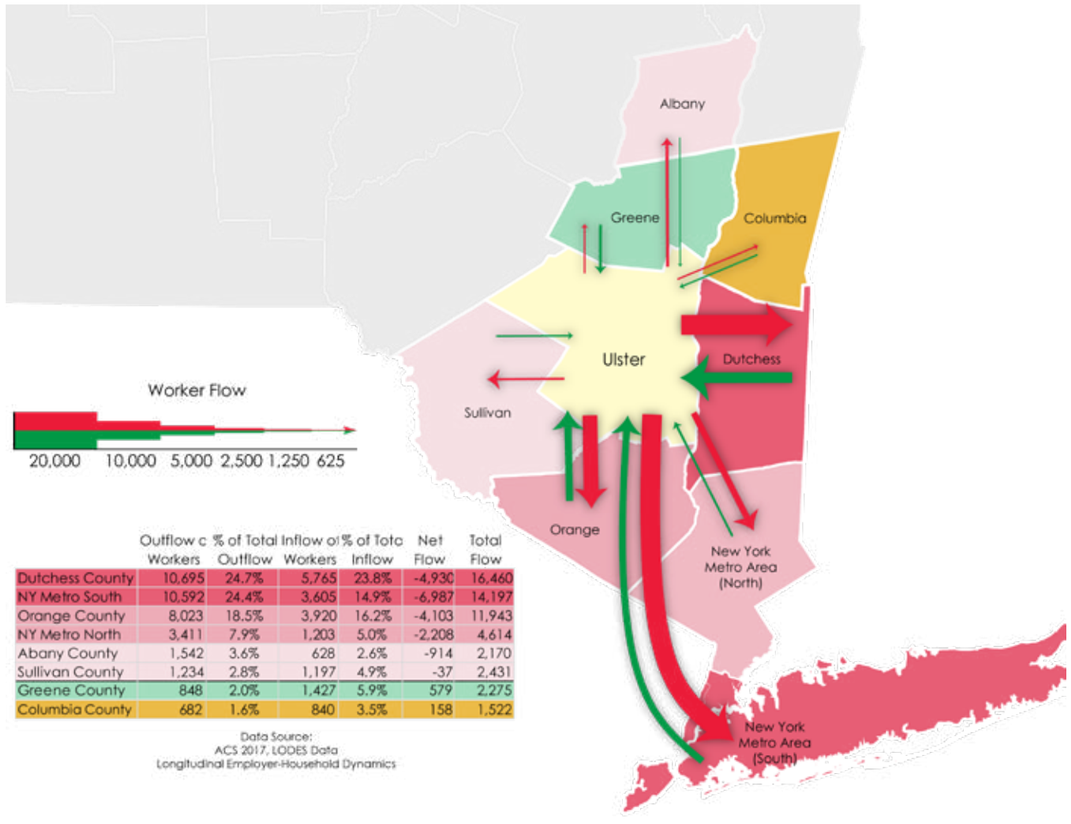


REGIONAL COMMUTATION

The UCTC's highway system exhibits a PM peaking traffic pattern in most corridors, which is driven by commuter travel. Some retail corridors, such as the Town of Ulster peak on Saturday afternoons. The I-87 corridor and its exits also exhibit weekend peaking with backups on Sunday night that often slow traffic to a crawl in the corridor from Kingston south.

Figure 4.14 depicts the variation in commuting patterns by counties adjacent to or surrounding Ulster County. The TMA region's workforce as a whole is on the move. While a large percentage of the workforce leave Ulster County every day (56%), both Dutchess (51%) and Orange (54%) experience similar commutation patterns. The top five counties for Ulster resident commuters were Dutchess, Orange, New York (Manhattan), Westchester, and Suffolk counties. Dutchess, Orange, Greene, Sullivan, and Suffolk counties are the top five counties contributing to inbound Ulster commuting patterns. These flows have considerable impact on congestion and drive investments in transit, park- and-ride facilities, and corridor improvements.

Figure 4.14: Commutation To and From Ulster County

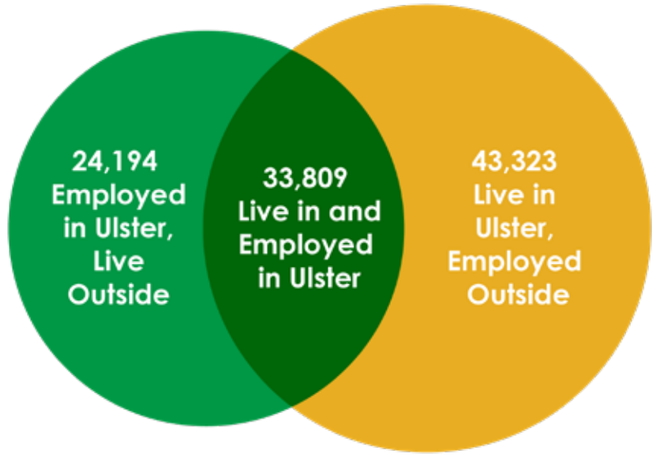


	Outflow c Workers	% of Total Outflow	Inflow of Workers	% of Tota Inflow	Net Flow	Total Flow
Dutchess County	10,695	24.7%	5,765	23.8%	-4,930	16,460
NY Metro South	10,592	24.4%	3,605	14.9%	-6,987	14,197
Orange County	8,023	18.5%	3,920	16.2%	-4,103	11,943
NY Metro North	3,411	7.9%	1,203	5.0%	-2,208	4,614
Abany County	1,542	3.6%	628	2.6%	-914	2,170
Sullivan County	1,234	2.8%	1,197	4.9%	-37	2,431
Greene County	848	2.0%	1,427	5.9%	579	2,275
Columbia County	682	1.6%	840	3.5%	158	1,522

Data Source:
ACS 2017, LODES Data
Longitudinal Employer-Household Dynamics

TRANSIT SYSTEM

Public transportation is an important transportation mode. It provides mobility to those unable to drive –"captive riders", including young people, senior citizens, those with disabilities, and drivers who cannot afford to own a car. An efficient transit system also captures "choice riders" – those that choose to travel by bus. Taken together, these transit trips offer an environmental benefit compared to automobile trips through reduced fuel use and emissions and reduced congestion in heavily traveled corridors.



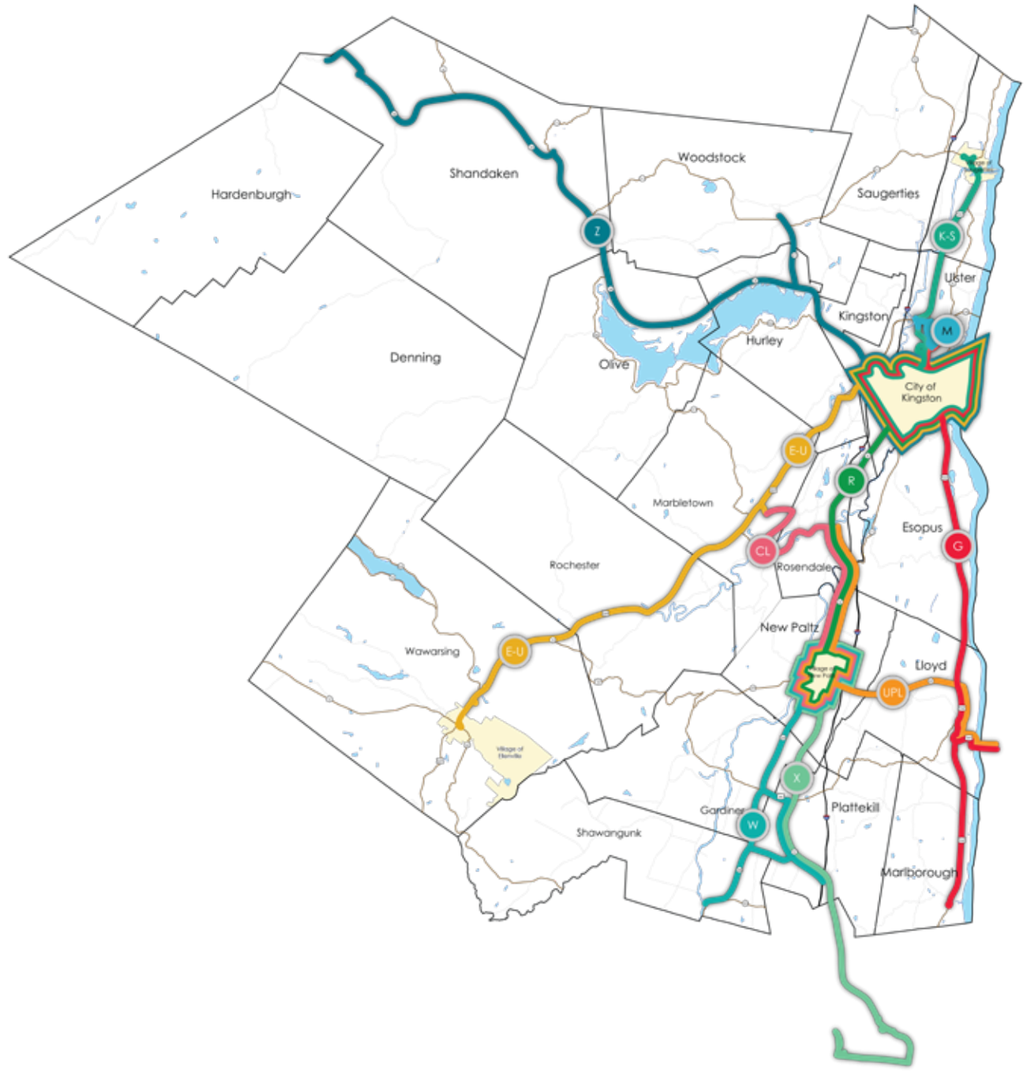
Public transit service in Ulster County changed significantly in July 2019 when Ulster County and the City of Kingston came to an historic agreement to expand Ulster County Area Transit (UCAT) service into the City of Kingston, thereby ceasing Kingston Citibus operations. One private intercity bus service -- Adirondack Trailways -- continues to operate service through Ulster County. Finally, commuter parking facilities along the I-87 Corridor compliment these transit services and allow for ride sharing. UCAT presently operates a total 15 scheduled fixed routes throughout Ulster County, including 3 looped routes serving the City of Kingston and 1 loop route serving the Village of New Paltz. In addition, qualifying residents within 1.5 mi. distance of any fixed route are eligible to receive paratransit service.

UCAT also offers rural route services by request to passengers in the rural areas of the county not served by the routes listed above. Passengers using this service must make appointments one day prior or at least a week in advance and confirm them the morning of the scheduled ride. Riders under 60 pay the normal fare, while passengers over 60 and registered with the Office for Aging can take one trip per week at a voluntary contribution level.

As of June 2020, UCAT owned a total of 46 vehicles – 35 devoted to fixed route service, 7 to paratransit service, and 4 for support service. Transit vehicles include heavy duty transit coaches, the newest of which are low-floor design to most easily accommodate those with mobility impairment; and lighter duty buses on a truck frame, known as cutaways. A full inventory of the UCAT vehicle fleet can be found in Appendix B. Six of these buses are hybrid gas/electric and biodiesel is utilized throughout the fleet. In 2020, Ulster County will purchase its first 3 all-electric transit vehicles.

Figure 4.15 provides a spatial reference for the location of UCAT routes throughout the county.

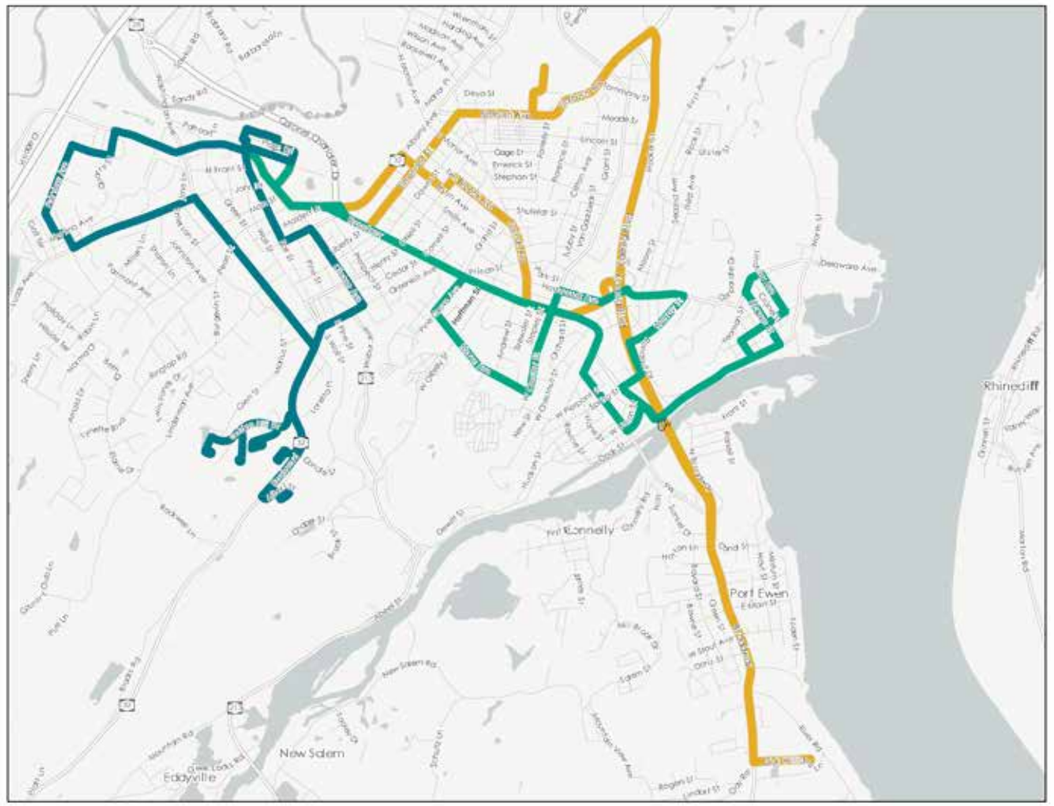
Figure 4.15: UCAT System Map



CITY OF KINGSTON SERVICE

Following the expansion of service in the City of Kingston by UCAT there have been several iterations of routes to meet the needs of riders and to encourage additional riders. Figure 4.16 provides details on the three routes primarily serving the City of Kingston.

Figure 4.16: UCAT Service in Kingston



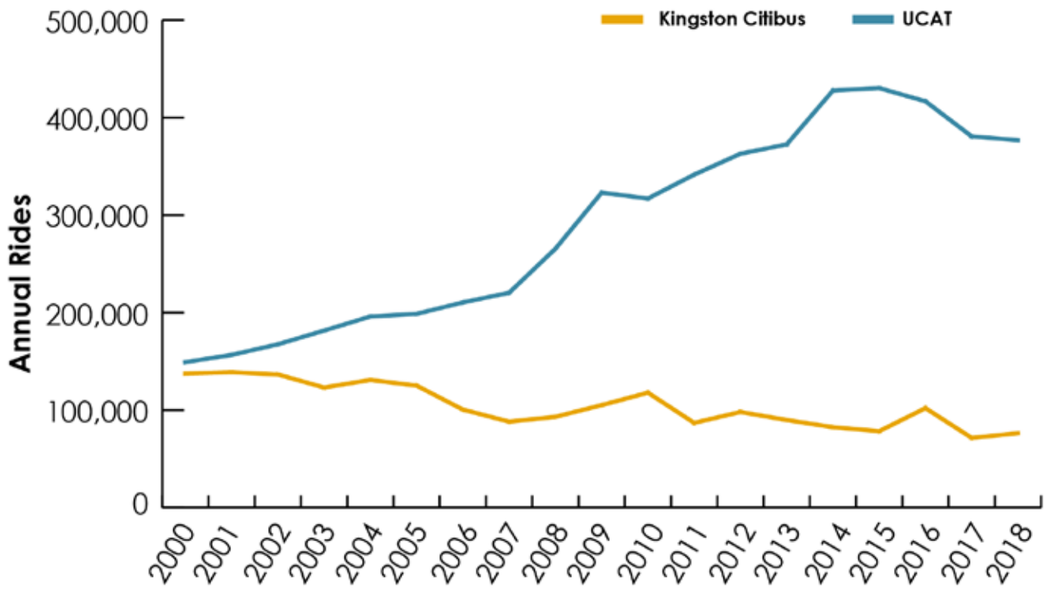
SYSTEM USE

Figure 4.17 summarizes UCAT and Citibus annual ridership for the period 2000 to 2018. Ridership data illustrates extensive growth on the UCAT system, with a 118% upswing in passengers in the past decade, a reflection of a significant expansion in service area and adjustment to rider reporting practices, which allowed transfers to count as an additional rider. Kingston Citibus ridership trends illustrates a steady decline in ridership, with an overall loss of 37% of riders since 2004. It is anticipated that the expansion of UCAT service into the City of Kingston in 2019 will have a positive effect on overall ridership throughout

the county by establishing more frequent service in the City of Kingston, providing a consistent fare and scheduling system throughout the public transit system, and further facilitating ease of use for riders.

Fares paid by riders finance only a portion of public transit systems and operations. Funding from FTA, the New York State Transit Operating Assistance program, and local match funds provide means to subsidize operations. One measure of financial efficiency is the farebox ratio, which is the percentage of operating expenses covered by fares. The UCAT farebox recovery has remained steady at about 8-9% over the past decade. This low recovery rate is typical for a small transit system.

Figure 4.17: Kingston Citibus & UCAT Passengers by System, 2000 - 2018 [iii]



INTER-CITY BUS

Ulster County is served by one intercity bus carrier, Adirondack Trailways. A majority of their operations provide access to a number of destinations outside the county and are used by a significant number of commuters traveling to the New York City metropolitan area. Trailways serves Saugerties, the transit terminal in Kingston, and three locations in New Paltz, including a terminal and location near the Thruway as well as Woodstock and the NYS Rt. 28 corridor. As a result of the service provided, any operators awarded routes by NYSDOT are eligible to receive FTA funds.

Upgraded in 2019, the Trailways NY Bus Terminal in Kingston, NY, received significant upgrades to improve ticketing facilities, accessibility and safety. FTA funding for the project was secured by the UCTC.

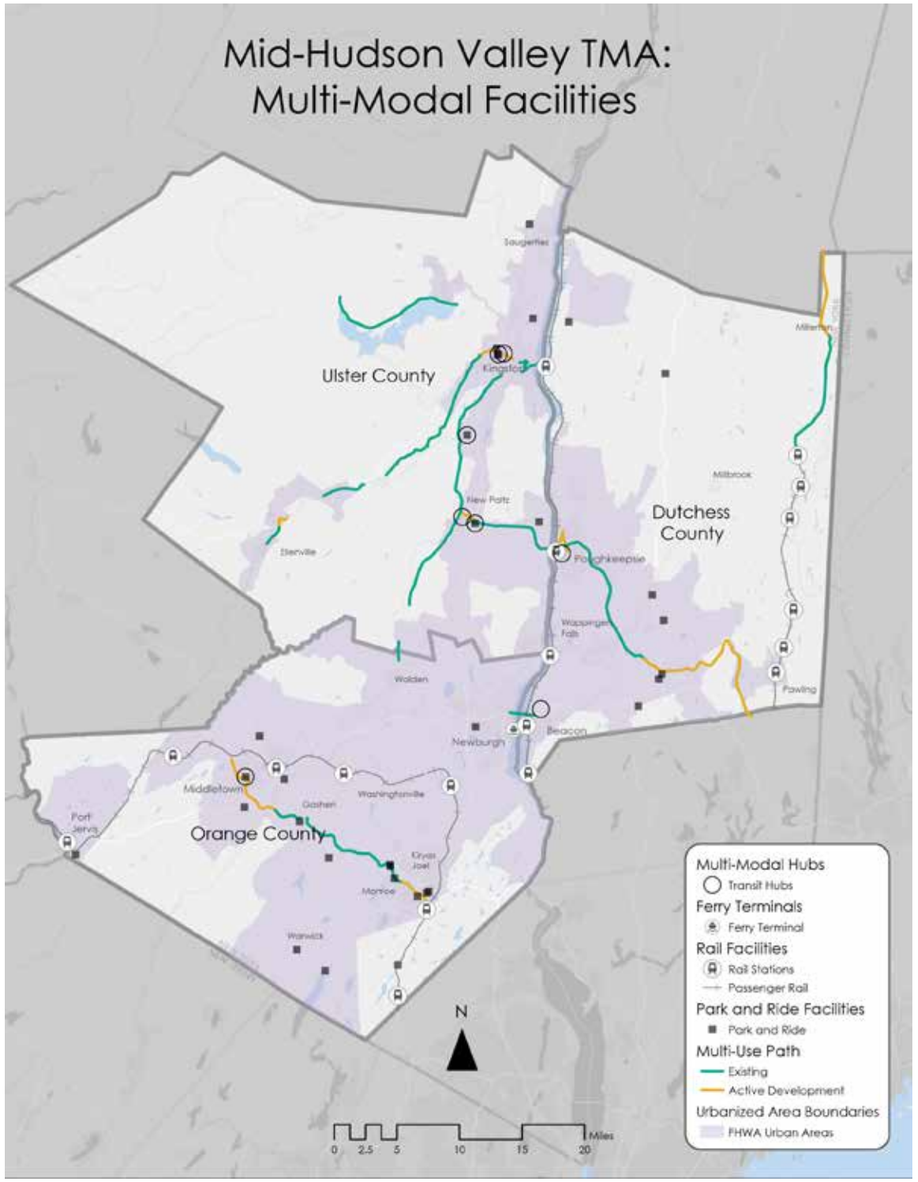
REGIONAL TRANSIT

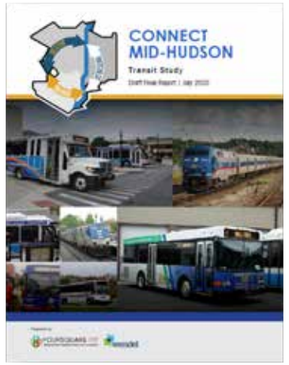
The Mid-Hudson Valley region, consisting of Ulster, Dutchess, and Orange Counties, is characterized by its small towns and cities, separated by rural farmland and undeveloped land along the Hudson River Valley. Its proximity to New York City allows many residents to commute into the City for work. The region is served by a robust and multi-modal transit network including bus, rail, and ferry services.

Federal transit funding helps support the various transit operations in the region. Parts of Dutchess, Orange and Ulster Counties fall within the census-designated Poughkeepsie-Newburgh Urbanized Area, also known as UZA 89. As federal funds are distributed at the UZA level, the three counties' Metropolitan Planning Organizations (MPO) have developed a funding sub-allocation process together with the New York State Department of Transportation (NYSDOT), and the Metropolitan Transportation Authority (MTA).

Through this sub-allocation process, federal transit funds flowing into the region are divided among the three counties, the Metro-North Railroad, and private commuter bus operations serving the region. However, a portion of these funds remain unallocated to a particular county or agency, and the three MPOs jointly decide how to spend the unallocated funds on regional transit investments.

Figure 4.18: Mid-Hudson Valley TMA Multi Modal Facilities





In 2019 and 2020, the three Mid-Hudson TMA MPOs partnered with the NYSDOT and regional transit agencies to develop the Connect Mid-Hudson report. The document presents recommendations on ways that the unallocated transit funds could be invested to improve regional transit service for Mid-Hudson Valley residents and commuters. The recommendations are preceded by an analysis of the unallocated transit funds available for investment, and a summary of identified transit issues that the recommendations could potentially address.

Connect Mid-Hudson Transit Study cover.

Key recommendations of the Connect-Mid Hudson Transit Study include the following:

- **Creation of a Transit Ombudsman –** to serve as an advocate and point of contact for the region's commuters, especially those who rely on publicly-subsidized but privately-operated commuter bus services.
- **Introduction of App-Based Microtransit Service –** to provide local mobility and regional connections where fixed-route service is either not available or not effective.
- **Expansion of Commuter Bus Service –** to address specific service gaps identified through an analysis of regional commuter patterns and current commuter services.
- **Capital Improvements –** focusing on roadway congestion hot-spots and capacity-constrained park-and-ride lots that impact the efficient operation of regional transit service in the Mid-Hudson Valley.
- **Creation of a Regional Transit Fund –** to create a structure for planning and dispensing the region's unallocated Federal transit funding.

Responsibility for the implementation of Plan recommendations will fall to the Mid-Hudson TMA members.

In February 2020, Ulster County and MPO staff evaluated proposals from bus manufacturers to purchase UCAT's first three all-electric buses.

MULTI-MODAL ACCESSIBILITY

The availability of multi-modal transportation options can alleviate network congestion by offering alternative modes of transportation, reducing single-occupant vehicle travel, and improving service integration within and across modes. In January 2020, the Mid-Hudson TMA produced a Technical Memo evaluating existing multi-modal conditions for the Mid-Hudson Valley Transportation Management Area (TMA). This evaluation identifies possible gaps in the network and recommends improvements. Figure 4.19 below shows the results for each multi-modal measure for Ulster County as well as the TMA average as a whole (Ulster, Dutchess and Orange County). The Multimodal Facilities Map in Figure 4.18 shows the bicycle network and major transit locations including train stations, ferry locations, transit hubs, and park & ride lots.

Figure 4.19: Mid-Hudson TMA Congestion Management Process Multi-Modal Measures

Multi-Modal Measures		UCTC Planning Area Status	TMA total/average (Dutchess, Orange, and Ulster Counties)
Park & Ride availability	The number of park & ride spaces and their percent occupancy during observations.	**685 spaces; 55% utilization**	Total Spaces: 3,646. Average utilization: 71%
Transit availability	The percentage of the population within a half-mile/quarter-mile of a train station, ferry station, transit hub, or bus route.	**Half-mile buffer = 50%, Quarter-mile buffer = 37%**	Average: Half-mile buffer: 45%, Quarter-mile buffer: 33%
Bicycle networks	The mileage of multi-use paths (including bridges with multi-use paths).	**50.4 miles**	Total: 92.7 miles
Bicycle parking availability	The number and percent of intermodal locations (train stations, ferry stations, transit hubs, park & ride lots) with bike parking (racks and lockers).	**6 of 11 locations (55%)**	Total locations: 25; overall coverage: 45%
Bicycle racks on buses	The percentage of public buses with bicycle racks.	**100% (35 of 35 buses)**	Average: 98%
Pedestrian networks	The percentage of sidewalk coverage within a half-mile/quarter-mile of key transit locations (train stations, ferry stations, transit hubs).	**Kingston Trailways and UCAT Kingston Plaza Hub: Half-mile buffer = 73%; Quarter-mile buffer = 92%**	N/A

NON-MOTORIZED SYSTEM

SYSTEM CHARACTERISTICS

Many people travel by bicycle and on foot, primarily for shorter trips. While many also use these modes for recreation, the focus here is on travel to meet specific needs. In some cases, people without access to an automobile or transit walk or bike out of necessity. Others do so as a travel choice. For the latter group, safety and convenience are significant factors. When a route is perceived to be unsafe, or there is a barrier to reaching the desired destination, people may choose to drive instead. The Journey to Work data (Figure 4.21) shows that 4% of all work related trips are made by walking or bicycling.

Bicyclist enjoying the Ashokan Rail Trail.

WALKING

Pedestrian travel requires a network of sidewalks without gaps and with accommodations for people with disabilities as defined by the Americans with Disabilities Act (ADA). There are instances, particularly in rural areas, where a wide shoulder is an acceptable substitute for a sidewalk. Safe pedestrian travel also requires protected crossings of busy streets with marked crosswalks and pedestrian signals and appropriate pedestrian phases at signalized intersections. Maintenance of existing sidewalks is also a constant concern for municipalities and residents.

BICYCLING

Bicycles are most often ridden on streets, and can be accommodated with designated bike lanes, wide curb lanes, or “Share the Road” signs and pavement marking.

MULTI-USE TRAILS

Ulster County is home to what is sometimes described as a “world-class” multi-use trail system. Multiuse trails can accommodate both bicycle and pedestrian travel. Because they are separate facilities, they are inherently safer for users. While trail use is often predominantly recreational, trails are also used for commuting and other travel needs. Ulster County currently has a robust trail network, consisting primarily of trails on former railroad rights of way:

- **Empire State Trail (EST) –** In January 2017, Governor Cuomo announced the Empire State Trail, a new initiative placing New York State at the forefront of national efforts to enhance outdoor recreation, community vitality, and tourism development. Approximately 400 miles of the Trail already exists in discrete, disconnected segments. When completed by the end of 2020, the Empire State Trail will be a continuous

750-mile route spanning the state from New York City to Canada and Buffalo to Albany, creating the longest multi-use state trail in the nation. In Ulster County, the EST connects to the Hudson Valley Rail Trail via the Walkway Over the Hudson State Park and travels north through the county via the Wallkill Valley Rail Trail and Kingston Greenline, before re-connecting to Dutchess County via the Kingston/Rhinecliff Bridge.

- **Hudson Valley Rail Trail (HVRT) –** The HVRT is a 12-foot wide, asphalt rail trail open for non-motorized uses, including walking, running, bicycling, horseback riding, inline skating, cross-country skiing and snowshoeing. The HVRT is flat or gently-sloped making it accessible to individuals with limited mobility. The HVRT currently extends 4 miles from the Walkway Over the Hudson State Historic Park (http://www.walkway.org/) — the longest elevated walkway in the world — in Highland (Town of Lloyd) eastward to Tony Williams Park located on South Riverside Road. A final trail segment was completed by Ulster County in 2018 bringing the trail further east to South Street in the Town of New Paltz. NYSDOT completed the final segment as part of its Empire State Trail effort, linking the HVRT with the Village of New Paltz through a mix of on-road and separated facilities. The EST then connects to the Wallkill Valley Rail Trail.

- **Wallkill Valley Rail Trail (WVRT) –** The WVRT is a primarily cinder/ stone dust rail trail open for non-motorized uses, including walking, running, bicycling, horseback riding, cross-country skiing and snowshoeing. The trail passes through Gardiner, New Paltz and Rosendale, where it crosses the restored Rosendale Trestle over the Rondout Creek. The WVRT now extends approximately 24-miles from the Town of Shawangunk/Town of Gardiner Town line to Rockwell Lane at the southern border of the City of Kingston, where on-road and separated segments constructed by the NYSDOT in 2020 will connect it to the Kingston Greenline.

- **Kingston Greenline –** The Kingston Greenline is a system of trails, linear parks, and complete streets that when fully developed will serve as a hub for several regional trails, including the Wallkill Valley Rail Trail, the O&W Rail Trail, and the Empire State Trail; the majority of elements of the Greenline are expected to be completed by 2020.

- **The O&W Rail Trail/ D&H Heritage Corridor** is a partially completed rail trail/ canal trail running nearly 35-miles through the Rondout Valley from Kingston to Ellenville and including various local rail trail segments, many of which have planned extensions to fill current gaps. The longest existing segment currently runs more than 12-miles along the Hurley and Marbletown Rail Trail segments. Descriptions of major segments are as follows:

  - The Hurley Rail Trail is a shared- use rail trail open for non-motorized uses, including walking, running, bicycling, horseback riding, inline skating (on the northern section), cross-country skiing and snowshoeing. The Hurley Rail Trail connects to the Marbletown Rail Trail and currently runs 3-miles (2.2-miles of 10-feet wide paved trail) along NYS Route 209 in Hurley. Trail connections into the City of Kingston are now in final design and right-of-way acquisition stages.

  - The Marbletown Rail Trail continues the Hurley Rail Trail southward for approximately 9-miles to the Town of Rochester. The cinder/ stone dust trail is open for walking, running, bicycling, horseback riding, cross-country skiing and snowshoeing.

  - A short extension of the O&W in the Town of Wawarsing and Village of Ellenville is under final design.

- **Ashokan Rail Trail (ART) –** Opened in the fall of 2019, the ART is a shared-use recreational trail running 11.5 miles along the northern edge of the Ashokan Reservoir between Basin Road in West Hurley and Route 28A in Boiceville. The ART was developed by the County of Ulster through an historic partnership with the New York City Department of Environmental Protection ("DEP"), which owns and operates the Ashokan Reservoir and adjacent lands. Open from sunrise to sunset year-round, the ART has provided public access to the County's scenic abandoned Ulster & Delaware Railroad corridor without a DEP Access Permit for the first time since the Reservoir was constructed in 1911. The ART trail surface is highly compacted crushed stone ranging from 10 to 12 feet in width, and this flat trail is ADA compliant and accessible for persons with disabilities. The ART is open for non-motorized uses, including hiking, bicycling, running, nature observation, cross-country skiing, and snowshoeing and offers three large public trailheads from which the trail can be accessed.

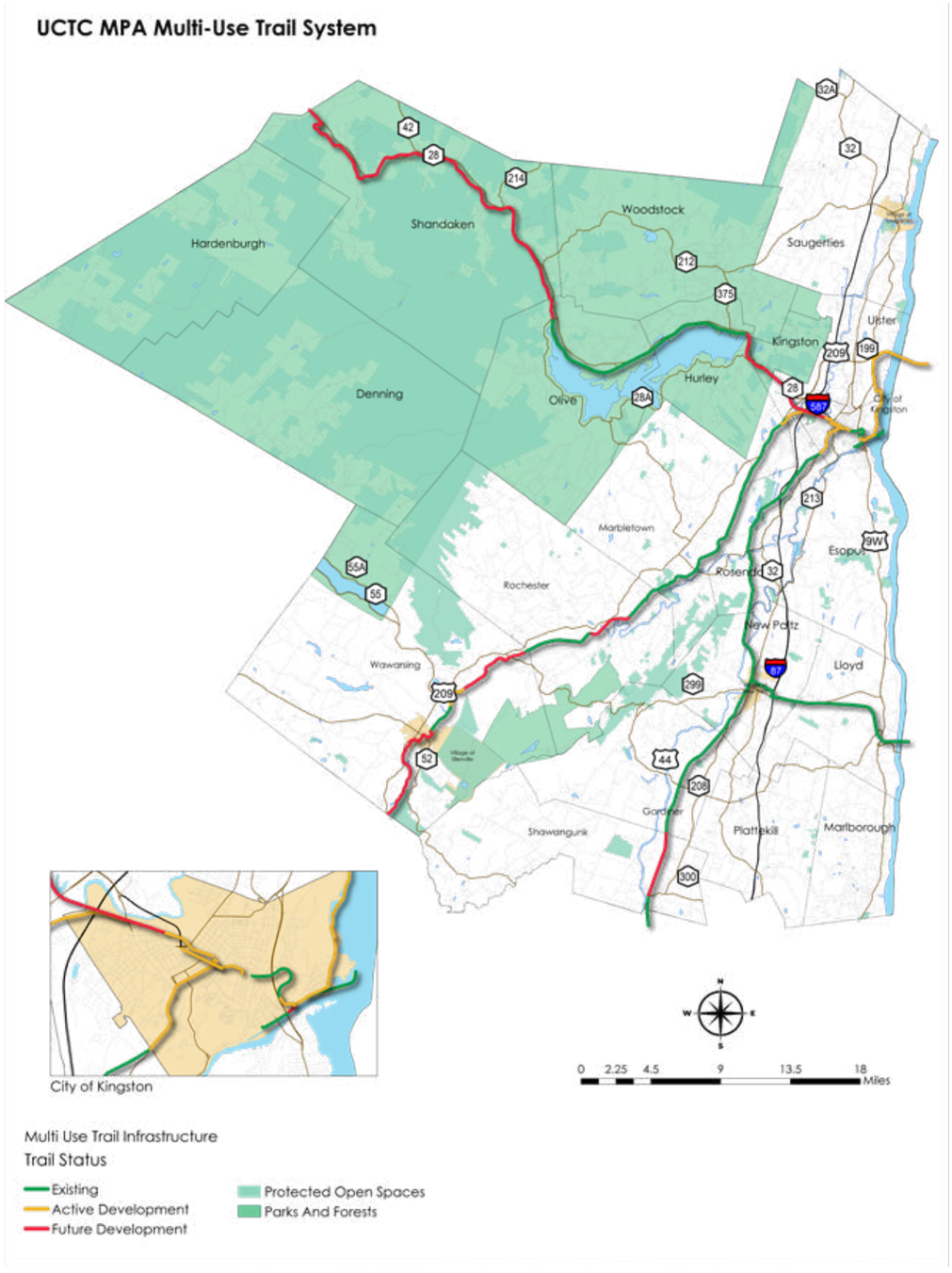
- **The Wallkill to Walden Rail Trail** is located a few miles south of the current end of the Wallkill Valley Rail Trail in the Town of Shawangunk. The 3.2-mile paved trail runs from the hamlet of Wallkill to the Town of Montgomery and Village of Walden in Orange County. The Trail is open for non-motorized uses, including walking, running, bicycling, inline skating, cross-country skiing and snowshoeing.

Figure 4.20 on the next page provides a geospatial reference of these trails.

SYSTEM USE

Uniform data is not generally available for non-motorized system use in most locations, although the UCTC as well as other trail users groups are beginning to recognize the value of reliable count data and are beginning to develop approaches to provide regular, uniform trail user counts. A recent sample of use on the Hurley portion of the O&W Trail suggests that approximately 80,000 people per year visit the facility. The Ashokan Rail Trail integrated its own counter system into its design and construction, providing them with a dynamic mechanism to instantly report and analyze pedestrian and cyclist count data. As of June 2020, after just over 9 months of continued operation, the ART managers reported 100,000 users.

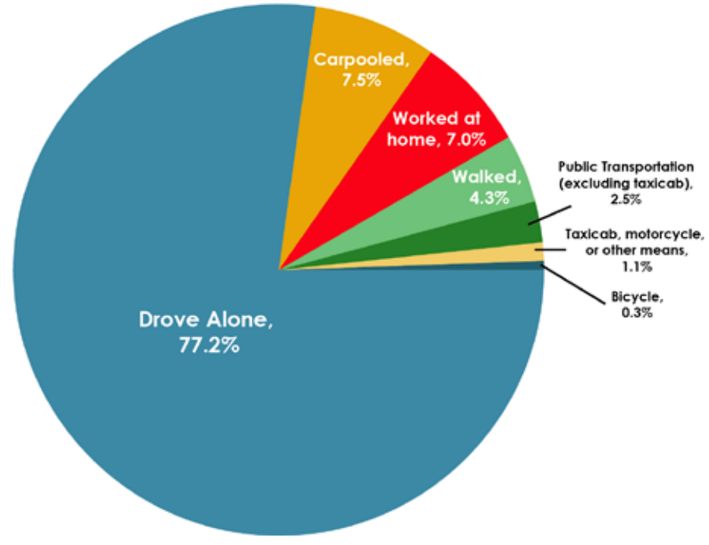
Figure 4.20: Non-Motorized System in Ulster County



MODAL SPLIT: HOW PEOPLE TRAVEL

The American Community Survey (ACS) is a product of the U.S. Census Bureau. It uses annual sampling to discover many facts about Americans, including travel patterns. According to the 2010 to 2018 ACS for Ulster County, 77% of work trips are made by a single-occupant automobile. Carpooling and working from home each comprise 7% while bicycling/walking follows at just under 5%. Only 1% of the population uses transit to reach work destinations, and another 1% represents "other" methods of commutation. Figure 4.21 illustrates Ulster County's modal breakdown.

Figure 4.21: Journey to Work Modal Distribution, 2018 [iv]



AUTO OWNERSHIP

According to the 2018 ACS, about 7.5% of all occupied housing units (both owned and rented) in Ulster County do not have a vehicle available to make daily trips. The majority (72%) of households have either one or two vehicles available to make daily trips; however, over 14,000 households have access to three or more cars. Figure 4.22 summarizes auto ownership by household. The high accessibility of vehicles contributes to the high volume of drive-alone commuting by Ulster residents. Ownership rates are much lower in urbanized areas, with 17.4% of Kingston households estimated to have no vehicle available. Comparatively, 15.7% of New Paltz Village households, 18.1% of Ellenville households and 13.3% of Saugerties Village households have no vehicle available.

Figure 4.22: Auto Ownership by Household in Ulster County, 2018 [v]

Auto Ownership	Vehicle Availability	Percent of Vehicle Ownership
No Vehicle Available	5,230	7.5%
1 Vehicle Available	23,375	33.6%
2 Vehicles Available	26,356	37.9%
3 Vehicles Available	14,578	21%
Total	**69,539**	**100%**

SYSTEM-WIDE SAFETY

Safety is of principle concern to all transportation agencies and the public, and the Ulster County Transportation Council (UCTC) believes improving transportation safety is a shared responsibility of the owners and operators of transportation facilities and services, travelers, law enforcement, and emergency responders. The major safety goals of this plan are to reduce fatalities and serious injuries in the UCTC planning area. Strategies to address safety, security, public health and other risks are key to achieving this goal, as well as others. Improving safety in transportation systems can increase efficiency and reliability of the system, encourage use across alternative transportation modes and improve quality of life for the public.

UCTC also understands that safe transportation systems are created by focusing on identifying, reducing and mitigating risks. Transportation facilities and services must be implemented using proven safety standards and be properly maintained, as well as consider multi-faceted strategies to improving safety.

These include:

- Appurtenances like signals, signs, pavement markings, rumble strips and barriers;
- Pedestrian, bicycle and transit facilities that follow current safety and accessibility standards;
- Education and enforcement actions that address driver behavior, a documented contributing cause in the large majority of fatal and serious injury crashes; and
- Prompt emergency response for crash victims.

Crash data is examined for long-term trends and averages to avoid short-term statistical anomalies and outlier datapoints that can lead to improper conclusions. In New York, police agencies submit a standard report after all crashes to the Department of Motor Vehicles (DMV). DMV in turn makes the coded data available to New York State Department of Transportation (NYSDOT), which uses a GIS-based application called the Accident Location Information System (ALIS) as its database. MPOs and other agencies may query ALIS for crash information by location, type, and other factors.

Figure 4.23 shows fatalities and serious injuries from 2010 to 2018. Serious Injuries and fatalities both declined between 2010 and 2016. However, the highest number of fatalities (24) occurred in 2017, and serious injuries increased by 25% between 2017 and 2018, hitting their highest total since 2010. Spikes in recent years highlight the importance of reviewing long-term data and addressing consistent safety impacts.

Figure 4.23 Fatalities and Serious Injuries by Year (2010-2018)

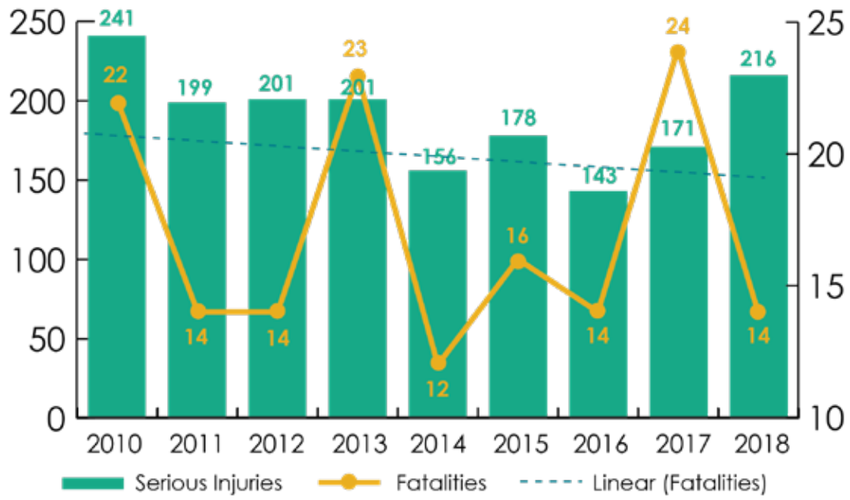


Figure 4.24: Fatalities and Serious Injuries by Crash Type (2010-2018)

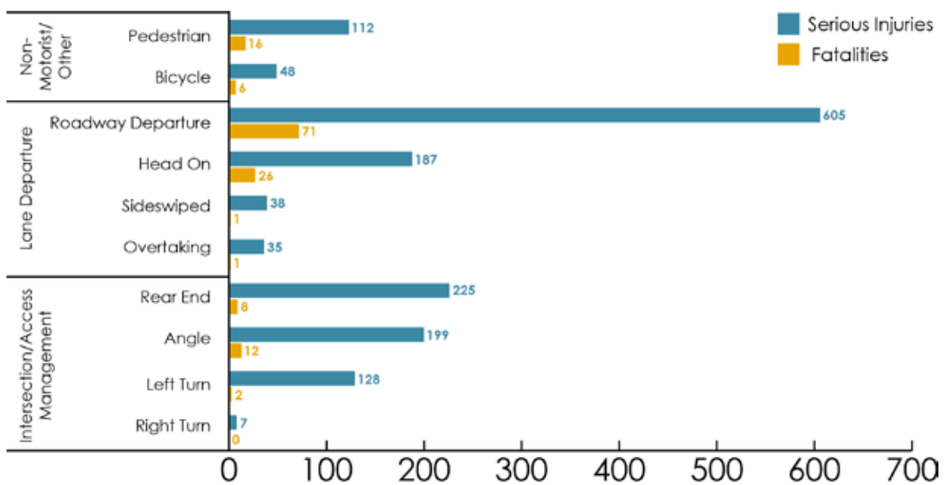


Figure 4.24 depicts fatalities and serious injuries by crash type. The leading crash type in both fatalities and serious injuries is roadway departure. However, major contributions to fatalities and serious injuries come from collisions with non-motorists and collisions at intersection/driveway conflict points.

Ulster County roadway departure fatalities are overrepresented, even compared to New York. While roadway departure crashes account for 46 percent of New York's fatalities, roadway departure contributes to 48 percent of UCTC fatalities. Systemic safety infrastructure treatments are implemented statewide following the guidance of the New York Roadway Departure Safety Action Plan and are an effective strategy for reducing fatalities and serious injuries, especially those in roadway departure crashes. Similarly, UCTC will utilize infrastructure safety countermeasures systemically to address physical risk characteristics found on roadways where severe roadway departure crashes occur the most frequently.

Figure 4.25: Fatalities and Serious Injuries by Emphasis Area (2010-2018)

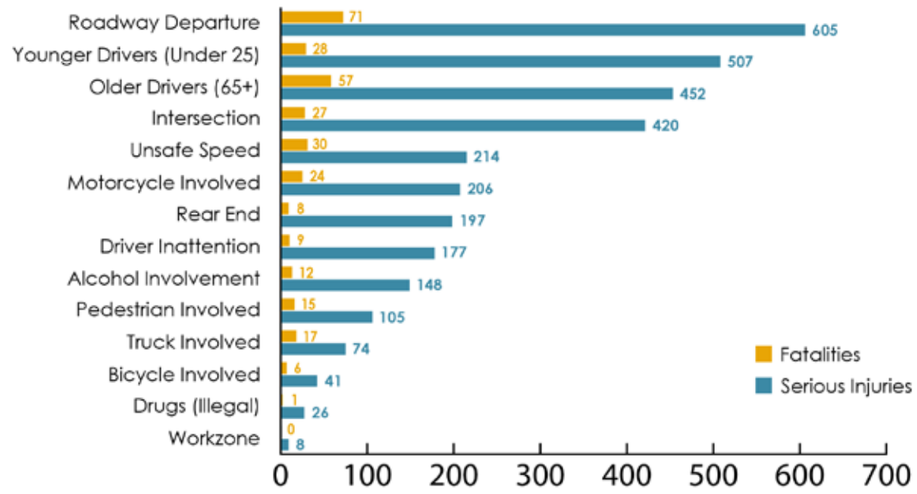


Figure 4.25 depicts fatalities and serious injuries by UCTC Safety Plan Emphasis Areas. Roadway departure, again, leads the way in contribution for both fatalities and serious injuries in the planning area. However, this graph also identifies several leading contributing factors in crashes resulting in fatalities and serious injuries that are focused on driver behavior, such as crashes involving younger drivers (under 25 years of age), aging drivers (65 and up), speeding drivers, and distracted drivers. Figure 4.25 also identifies vulnerable users that contribute significantly to fatality and serious injury totals, including motorcycle, pedestrian and bicyclist fatalities. This supports the need for a multi-pronged approach, utilizing enforcement, education, and emergency services, to supplement engineering and infrastructure improvement strategies.

Figure 4.25 summarizes crash data by severity in each jurisdiction from 2010-2018. The two largest municipalities in the county have the highest crash and injury totals: the City of Kingston and Town of Ulster. However, Lloyd and Saugerties have the highest fatality totals at 18 and 19 respectively.

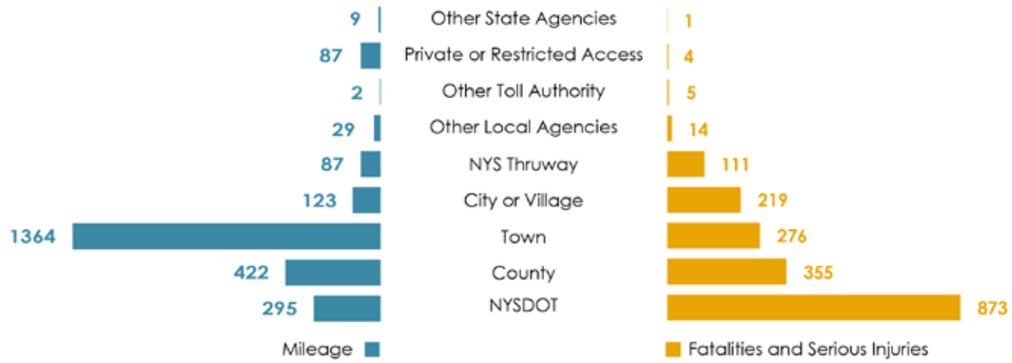
When considering for the relatively lower vehicle miles traveled (VMT) and population, an even more disproportionate number of fatalities have occurred in Lloyd, and though Kingston shows the highest total for serious injuries over the time-frame, Denning is significantly overrepresented in serious injuries when considering the smaller population.

Figure 4.26: Crash Severity by Jurisdiction (2010-2018)

	CRASH SEVERITY BY JURISDICTION			
Jurisdiction	Fatalities	Serious Injuries	All Injuries	Total Crashes
Catskill	0	1	2	16
Denning	0	10	27	65
Ellenville	0	28	237	809
Esopus	7	88	675	2,309
Gardiner	5	61	365	1,569
Hardenburgh	0	2	11	28
Hurley	7	46	365	1,282
Kingston, City	7	210	2,009	8,720
Kingston, Town	1	18	116	307
Lloyd	18	133	1,273	4,165
Marbletown	4	85	512	2,020
Marlborough	6	86	619	1,862
New Paltz, Town	5	72	1,022	3,903
New Paltz, Village	0	21	261	1,398
Olive	10	42	238	854
Pattekill	13	86	747	2,443
Rochester	13	80	470	1,808
Rosendale	5	53	451	1,775
Saugerties, Town	14	154	1,127	3,672
Saugerties, Village	5	15	221	1,007
Shandaken	2	27	245	825
Shawangunk	5	68	673	2,036
Ulster	14	165	2,310	8,737
Warwarsing	11	117	769	2,696
Woodstock	1	38	324	1,292
Total	**153**	**1,706**	**15,069**	**55,598**

Figure 4.27 depicts fatalities and serious injuries by roadway ownership, showing mileage of each roadway ownership type throughout the county planning area from 2010 to 2018. While most of the mileage in Ulster County is made up locally-owned roadways, state-owned roadways contribute the highest total of fatalities and serious injuries. However, county facilities have the highest total of fatalities and serious injuries locally, despite accounting for only a third as much roadway mileage as town roadways. VMT, speeds and other factors do contribute to these totals, as shown in other crash datasets, but this does help highlight the need for targeted local roadway strategies and improvements.

Figure 4.27: Fatalities and Serious Injuries by Roadway Ownership and Centerline Mileage (2010-2018)



THE FREIGHT SYSTEM

SYSTEM CHARACTERISTICS

As previously noted, the safe and efficient movement of freight is important to economic prosperity. As is true across the country, the largest share of goods movement is by truck. Trucking offers direct origin to destination movement for both long haul and local delivery.

As part of the FAST Act, FHWA has developed a National Highway Freight Network (NHFN) to prioritize the distribution of Federal resources and policy for the betterment of the highway portions of the freight transportation system in the nation. While Ulster County does not include any roads identified in the NHFN, New York State recognizes that the mileage limitations on the national network precluded a number of critical statewide and regional highway freight corridors from designation in these networks. Interstate 87 provides a significant north-south connection through the state. Other major truck corridors in Ulster County include:

- US 9W paralleling the Hudson traversing the eastern portion of the county
- US 44 providing an east-west connection through the southern portion of the county
- US 209 running from the southwest portion of the county north to Kingston
- NY 28 connecting Kingston to the northwest portion of the county
- NY 32 paralleling I-87 as a north-south connector and accessing downtown New Paltz
- NY 212 providing an east-west connection from Saugerties to the Catskill Mountains
- NY 213 providing a connection from I-87 in Rifton north to Kingston
- NY 299 running east-west in the southern portion of the county through New Paltz

Figure 4.28 summarizes truck counts where available in the Ulster County freight network.

The major industries in Ulster County are construction, manufacturing, financial, professional/business services, education, and healthcare. Of these industries, construction and manufacturing will generate the highest amount of freight traffic to and from Ulster County. The NYS Thruway runs through the county, Ulster is the major source of the high level of through traffic coming from New York City and the Mid-Atlantic to areas further upstate and west to Buffalo. The retail sector generates continuous urban delivery truck movements.

In terms of waterborne cargo, the Hudson River is also designated as “Marine Highway 87”. The harbors at Kingston and Saugerties utilize this highway as do docking facilities for oil transfer along the Hudson within Ulster County. The most significant volume of freight is associated with the connection between Albany to New York City.

CSX owns the only freight rail line in Ulster County, formerly known as the West Shore line which runs north-south along the Hudson River, connecting New York City to Albany. This Class 1 line carries high volume goods to, from, and through Ulster County. A secondary switching yard exists in Kingston. Most of this line is single track with a recently installed double track location in the Town of Esopus.

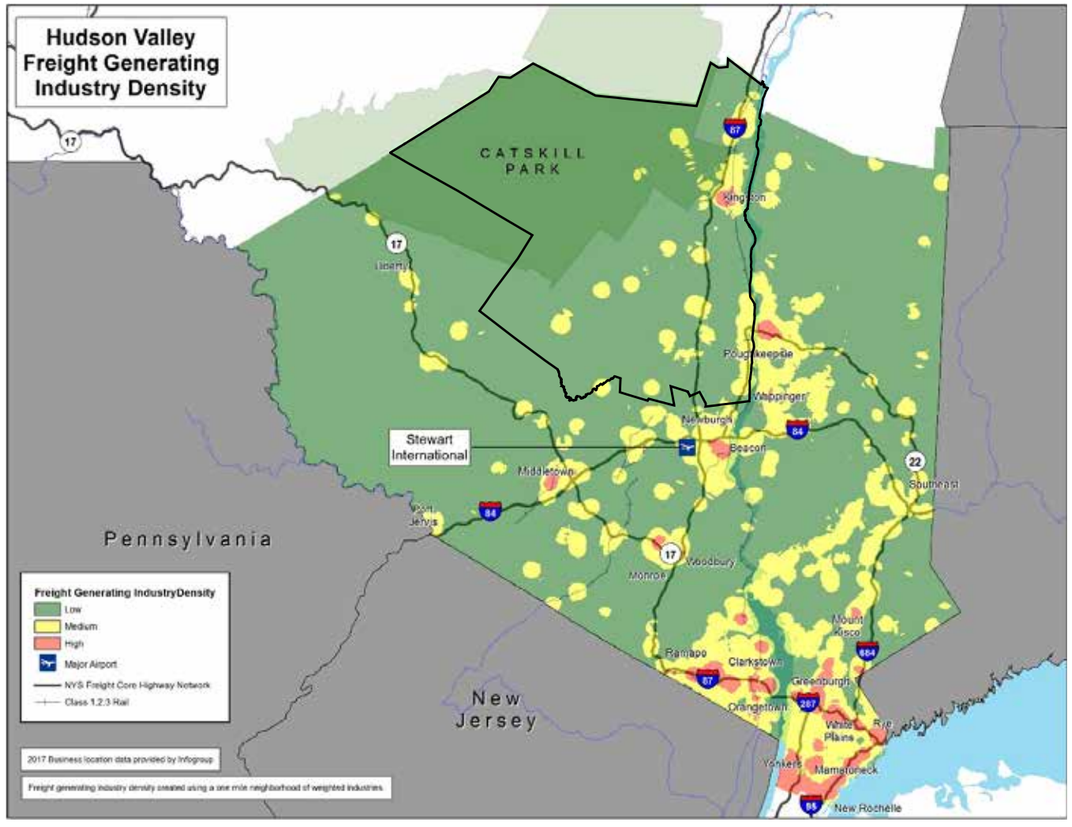
Figure 4.28: Truck Counts on Significant Freight Facilities [vi]

Road Name	Count Location	From	To	Count Year	Traffic Count	Trucks Count (Daily)	Percent Trucks (Daily)	Station
US 9W	Town of Esopus	RT 299	CR 24 North JCT	2015	11,744	2,079	17.70%	0018
US 9W	Town of Marlborough	Ulster CO Line	Milton Turnpike	2011	17,519	3,372	19.25%	0036
US 44	Town of Plattekill	CR 10 Milton Tpk	CR 22 Maple Ave	2016	4,469	843	18.86%	0278
US 209	Town of Hurley	CR 8 Wyncoop Ave	RT 28	2015	14,293	2,831	19.81%	0540
NY 28	Town of Ulster	RT 209	Ulster/ Kingston T/L	2015	18,867	3,717	19.70%	0226
NY 28	Town of Shandaken	RT 212 MT Temper	RT 214 Phoenicia	2015	5,628	1,185	21.06%	0230
NY 32	Town of New Paltz	CR 154 Horsenden Rd	Start 32/213 OLAP	2016	8,909	1,753	19.68%	0270
NY 32	Town of New Paltz	Start RT 32 OLAP at Chestnut	CR 154/ Horsenden rd	2013	10,087	1,110	11.00%	0025
NY 32	Town of Plattekill	RTS 44 55 Modena	Ulster Co LN	2016	5,038	827	16.42%	0244
NY 212	Town of Woodstock	CR 47A Rock City Rd	RT 375	2016	9,611	1,582	16.46%	0551
NY 213	Town of Rosendale	CR 26A	Start 32/213 OLAP	2015	6,531	1,342	20.55%	0592
NY 299	Town of New Paltz	Springtown rd	Start RT 32 OLAP at Chestnut	2015	12,968	1,760	13.57%	0573

SYSTEM USE

The majority of Ulster County's top trade partners on the state/international level are within the northeast. Pennsylvania, New Jersey, Massachusetts, and Connecticut are all major export and import trade partners.

Figure 4.29: Hudson Valley Region Freight-Generating Industry Density [vii]



Source: NYSDOT

Through the review of local and national trade partners, it is clear that much of the traffic entering and exiting Ulster County utilizes major interstates, like the NY Thruway. The CSX rail line carries high volume freight cargo to, from, and through the Ulster County, while various low-volume, high-value commodities may arrive via Albany International Airport, north of Ulster County in Albany, or Stewart International Airport, south of Ulster County in Newburgh, and travel to Ulster County via truck.

RAIL FREIGHT

The West Shore Railroad is the only active rail freight line in Ulster County. The line runs from Weehawken, New Jersey, across the Hudson River from New York City, north along the west shore of the river to Albany, New York and then west to Buffalo. Passenger service on the line ended completely by 1960. The line now serves as CSX Transportation's principal freight route from Western points to New Jersey, via the former NYC Selkirk Yard. West of the Hudson Palisades, beginning at North Bergen Yard in Bergen, NJ, the line is now referred to as the River Subdivision of CSX Transportation and passes directly through Ulster County as shown in Figure 4.30.

Local trains delivering freight to businesses and industries located along the River Subdivision operate out of yards located at North Bergen, NJ; Kingston, NY and Selkirk, NY. Other than local freight, commodities include grain, oil, ethanol, trash, and other mixed intermodal and commodity freight. Bakken crude oil shipments are also travelling more frequently on the corridor as well, with full shipments generally heading south for refinement in New Jersey and empty tank cars returning north.

RAIL TRAFFIC AND RAIL SAFETY

The most recent count data available for the West Shore Rail Line in Ulster County was compiled in 2012 as part as the Boices Lane Rail Road Crossing Safety Assessment. Daily regularly scheduled trains that cross the at-grade railroad crossing on Boices Lane were provided by CSX for the month of August 2012 as part of that study. Weekday and weekend data is shown below. Consultation with NYSDOT Region 8 Rail staff in 2020 indicated that these 2012 volumes continue to be representative of more recent observations.

Crude oil shipments heading south through Kingston for refinement.

Figure 4.30: CSX West Shore Line

Figure 4.31: West Shore Line Train Movements (as provided by CSX September 2012)

Day of the Week	Total/Day	South/Day	North/Day
Monday	23	12	11
Tuesday	27	12	15
Wednesday	30	14	16
Thursday	31	15	16
Friday	29	14	15
Saturday	27	14	13
Sunday	24	13	11
Week Totals	**191**	**94**	**97**

A mother with three children traverses the uneven gap between sidewalk segments at the CSX track on Foxhall Ave. in Kingston. The City of Kingston has secured funding to provide new sidewalks in this location and is working with NYSDOT to secure HSIP Rail funds to improve the crossing. Source: UCTC July 2018.

The issue of rail safety has become a topic of increasing concern among residents and officials, after several tragic collisions between CSX trains and automobiles and pedestrians in Saugerties and the City of Kingston. In 2019, UCTC joined a panel of staff from agencies including CSX, Federal Railroad Administration, local law enforcement and safety, and NYSDOT to discuss possible measures to reduce these types of collisions in the City and beyond. Education and enforcement of respecting private property where rail operations occur was chief among the suggested recommendations. This was followed by a focused effort to reach out through face to face contact, lectures and educational materials to area residents and students that interact directly with CSX properties.

From 2010 to 2019 there have been 9 crashes involving trains in the UCTC planning area. However, this statistic only examines crashes along the roadway reported through the typical crash reporting methods and does not typically included incidents involving pedestrian trespass along CSX properties. Over the same 2010 to 2019 period there were 18

reported incidents involving trespassers on CSX property resulting in 11 fatalities and 9 injuries. Figure 4.32 shows the location of crashes and casualties as reported through crash and Federal Rail Administration data. The majority of crashes and trespass incidents occur in the City of Kingston.

SYSTEM OPERATIONS

MAP-21, followed through in the FAST Act, shifted the focus of the metropolitan transportation planning process to a performance-based, outcome-oriented perspective. As discussed in the Introduction, this means that UCTC must select projects, actions, and strategies in the long-range plan that will result in a regional transportation system that best meets the needs of the traveling public across a variety of dimensions. These include not only asset management and safety, but also mobility and the reliability of travel.

"F) Operational and management strategies.

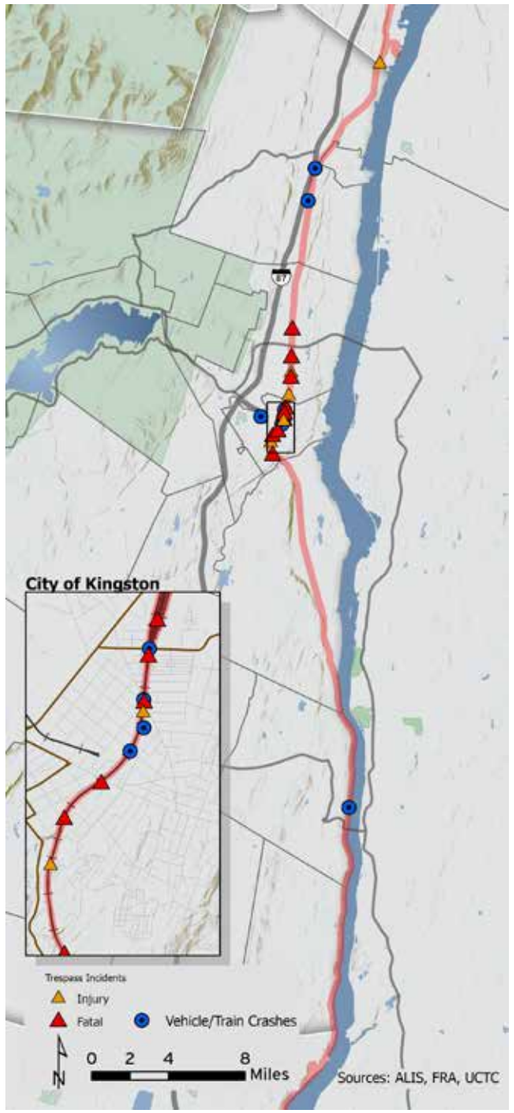
Operational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods."

23 U.S. Code § 134. (h)(i)(2)(F)

TRAFFIC OPERATIONS MANAGEMENT

Ulster County is served by a network of roadways ranging from interstate expressways to local town and village streets. Recent traffic volume counts and network analyses show that, for the most part, there is little traffic congestion in Ulster County and travel within the region occurs without excessive delay. However, there are isolated areas where intersections or roadway segments experience moderate to severe recurring delays. One such area is the Route 28 Corridor in the Town of Ulster at the roundabout area. Traffic congestion in this area is caused by the confluence of State Routes 28, 209, Interstate 587, and the NYS Thruway. Other areas experiencing recurring traffic delays in Ulster County include the Kingston Broadway Corridor,

Figure 4.32: Rail Safety Incidents



Kingston Uptown Stockade District, Route 9W in the Towns of Ulster and Marlborough, Route 299 in New Paltz and Lloyd, and the Mid-Hudson Bridge.

In addition to recurring traffic congestion, several areas in Ulster County experience moderate to severe nonrecurring traffic congestion. Nonrecurring congestion is congestion caused by nonrecurring events such as crashes, disabled vehicles, blocked railroad crossings, work zones, adverse weather events, and planned special events. Areas in Ulster County experiencing significant nonrecurring congestion include the NYS Thruway and the West Shore Railroad Corridor area in Kingston. Nonrecurring congestion can occur anywhere at anytime and is difficult to measure or predict.

Figure 4.33 shows existing traffic congestion in 2014. This data was obtained from the UCTC's travel demand forecast model, which computes current and future roadway volume-to-capacity (V/C) ratios using various data inputs such as household, employment, posted speeds, roadway functional classification and the physical characteristics of the roadways.

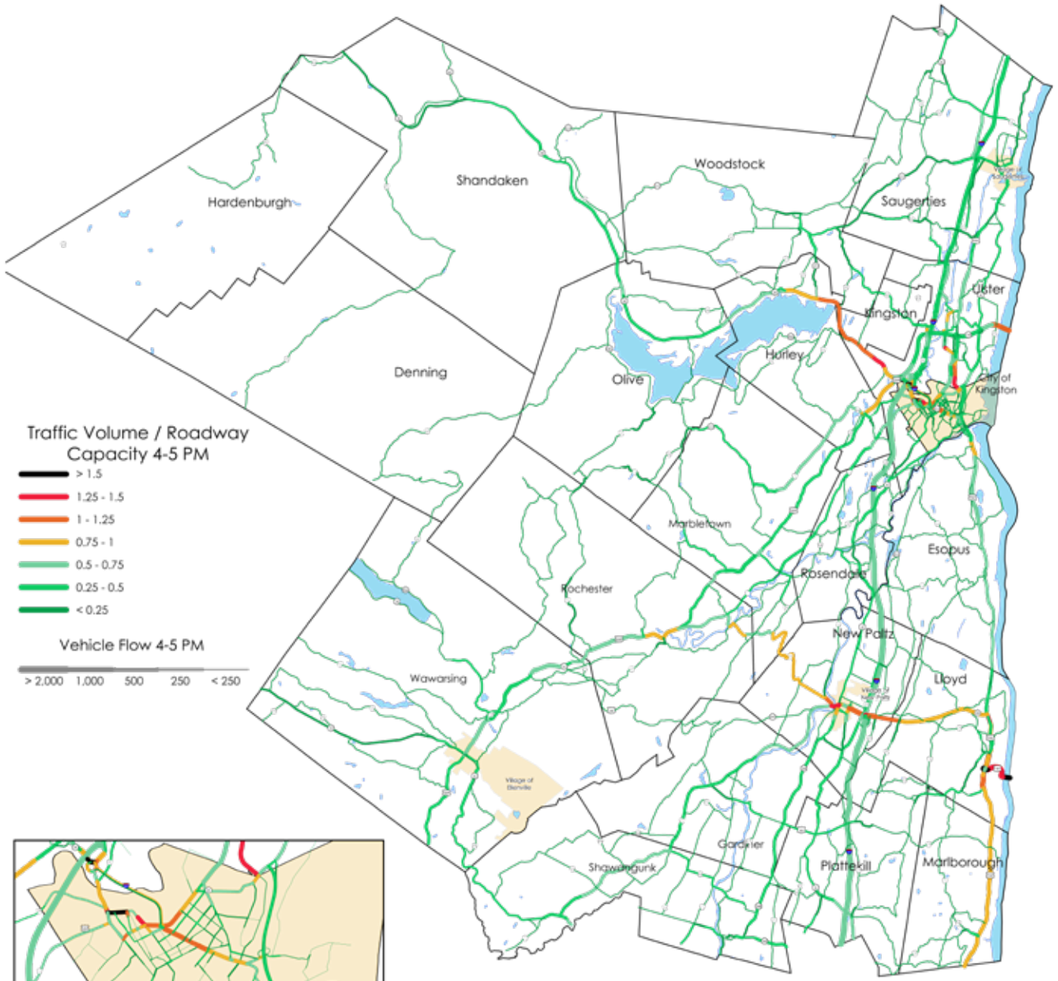
Future growth with no system improvements is expected to exacerbate existing areas of congestion with few new areas of congestion appearing. Instead, congestion will expand to adjacent segments along existing areas of congestion.

Since 2006 there has been a steady downward trend in Vehicle Miles Traveled (VMT) at the local level. This trend has continued as evidenced in Figure 4.34. Statewide VMT follows a similar trend, with current levels Continuing to decline. Keeping these trends in mind, VMT and congestion are expected to increase at a slower rate than previous models have shown but are still expected to grow.

FROM PLANNING TO PROJECTS: BROADWAY IMPROVEMENTS

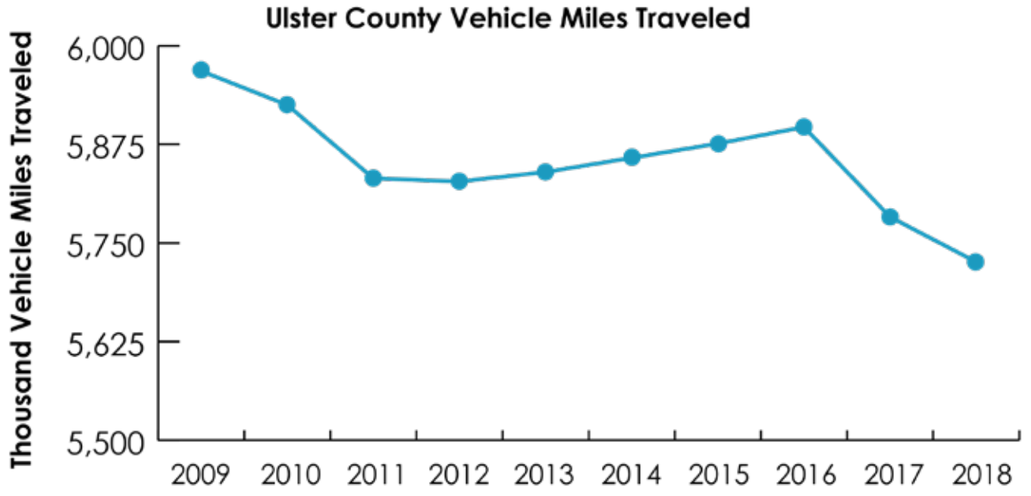
The metropolitan planning process seeks to foster a collaborative and cooperative framework to guide transportation investment decisions. There is perhaps no better example of this process than on Broadway Avenue in Kingston. As far back as 2008, UCTC – at the request of NYSDOT and City of Kingston – began a planning process to address congestion and safety concerns at the I-587 intersection with Broadway and Albany Avenue. The process included an interactive charrette with local residents who were asked to explore street traffic safety configurations with NYSDOT, county staff and design experts. The final series of recommendations included a preference to convert this complicated intersection into a modern roundabout. Later, in 2015, UCTC was again approach by the City to begin examining the entire Broadway corridor to address pedestrian and cycling safety concerns, traffic flow, and aesthetics, resulting in the "Build a Better Broadway" corridor study. Since that time, UCTC staff have worked closely with local sponsors and NYSDOT to ensure that funding was secured for project implementation, including nearly $13 million in combined federal, state and local aid. Today in 2020, the major components of these two landmark studies are under construction, resulting in improvements that will last for decades to come.

Figure 4.33: Year 2014 Volume/Capacity and Total Traffic Flow



City of Kingston

Figure 4.34: Yearly VMT in Ulster County



Mohonk Road, County Route 6, Town of Marbletown

Our transportation system has evolved from something that is static and provides a defined level of service to something that can be actively managed to optimize the level of service in real time. Technology, generally under the terminology of Intelligent Transportation Systems (ITS), has done a great deal to enable regional transportation system management and operations. This can typically be accomplished at a significantly lower cost than a capital project that constructs new roadway capacity. This approach does result in ongoing annual costs for staffing traffic management centers, software licenses, and the like. Application of management and operations strategies can be grouped in these areas:

- **Traffic Management –** Actively managing traffic flow results in more efficient mobility. This can be accomplished in a number of ways. Computer controlled traffic signal systems do a much better job of optimizing signal timing, avoiding unnecessary delay. The most advanced of these systems is known as traffic adaptive signal control that optimizes signal timing continuously in response to the volume of traffic, pedestrians, and other users. An arterial signal system can be equipped with transit signal priority, which enables buses to trigger a green light to stay on schedule. In situations where there is high peak volume and very directional flow in opposite directions in the AM and PM periods, reversible lanes can be used. In this case, a center lane is reversed to provide added capacity for the predominant direction. Variably priced toll lanes, often known as High Occupancy Toll (HOT) lanes because they usually are available to other than single-occupant vehicles, can be created on expressway facilities. The price is adjusted dynamically in response to traffic volume to maintain free flow conditions. The ability to display variable speed limits is another tool that can be used to improve safety and traffic flow on congested freeways.

- **Incident Management –** This is a subset of traffic management whose objective is to improve response to highway incidents to restore traffic flow more quickly. This requires promptly detecting the incident, both through 911 calls and use of closed-circuit television cameras and other devices, and accurately dispatching the appropriate emergency services resources. It also means response agencies, including police, fire, EMS, transportation or public works departments, and towing companies sharing standard operating procedures and training. The Strategic Highway Research Program (SHRP2) developed a multidisciplinary training course for these responder groups. The course is now available through New York State DOT. The National Unified Goal for Traffic Incident Management addresses safe, quick clearance; responder safety; and interoperable communications.

NYSDOT provides free roadside emergency services on major highways throughout the state.

- **Traveler Information –** Informed travelers make better decisions regarding their mode, route, and time of travel. When information about transportation system conditions is transmitted in real time, the entire system can operate more efficiently. For example, when an incident occurs that closes lanes on a roadway, upstream drivers can be informed to find alternate routes or use preplanned detours, reducing the traffic queue. Similarly, people can be informed ahead of time of severe weather and road conditions, and be provided with routing information for large special events. This can also benefit tourists who are not as familiar with the roadway system as local residents. Systems can also be put in place to assist those who want to use public transit, with applications to plan their trip, see the schedule, and be informed at stops when the next bus or train will arrive. There are a number of techniques and devices that are used to facilitate traveler information. In 2000, the Federal Communications Commission designated 511 as a national traveler information number. In the intervening years, state and local governments developed 511 systems. 511NY can be accessed both by phone and through the Internet at www.511ny.org. It provides both real time information and trip planning services for a variety of modes across the state. Dynamic or variable message signs (DMS/VMS) have become commonplace on our highways, as has Highway Advisory Radio (HAR) to inform motorists of road conditions. In recent years, there has been a shift from public agency to private sector provision of traveler information. There are a number of Internet applications that perform these functions, including Google™ maps that show current traffic and assist with route selection; and Waze©, which collects data from smart phones of users who are logged on to determine traffic conditions.

511
Traffic, Travel and Transit Info
www.511ny.org

- **Electronic Toll Collection (ETC) –** Systems like E-Z Pass® New York create multiple benefits. By automating toll collection on the New York State Thruway and various bridges, ETC speeds traffic flow through toll barriers, thereby reducing congestion. Toll tags are required for the HOT lane pricing technique discussed above. Finally, tags can be used as traffic probes to monitor traffic flow and speed through a series of roadside readers. In that instance, identifying information is stripped from the data to ensure privacy of account holders.

- **Commercial Vehicle Operations –** This is a subset of ITS that is dedicated to making truck transport safer and more efficient. It involves such techniques as electronic verification of a truck's credentials, and weigh-in-motion where appropriately equipped trucks do not have to stop at weigh stations. One of the newer techniques involves electronic logbooks that are transmitted to the trucking company's dispatcher to verify the truck's location and the driver's compliance with federal hours-of-service rules. This is not yet a publicly accessed function, but may become so.

- **Other Management Systems –** Parking management systems are typically deployed in central business districts. They can be used to notify drivers via the Internet of the availability of parking spaces in garages and lots. This can save both time and cost associated with people circulating around a downtown looking for parking. Port and terminal management systems can control the flow of trucks in and out of a facility to maximize mobility and efficiency.

The U.S. DOT connected vehicle research program is a multimodal initiative that aims to enable safe, interoperable networked wireless communications among vehicles, infrastructure, and personal communications devices. Connected vehicle research is sponsored by the DOT and others to leverage the potentially transformative capabilities of wireless technology to make surface transportation safer, smarter, and greener. Research has resulted in a considerable body of work supporting pilot deployments, including concepts of operations and prototyping for more than two dozen applications.

http://www.its.dot.gov/pilots/

The use of technology has great potential to expand beyond these applications in order to improve safety and efficiency of travel. The U.S. Department of Transportation has been sponsoring the Connected Vehicle research program (see box). This has a dual focus on vehicle-to-infrastructure communication (V2I) and vehicle-to-vehicle communication (V2V). One example of using this technology to improve safety is the Cooperative Intersection Collision Avoidance System (CICAS). When connected vehicles talk to each other and the traffic signal, crashes caused by red light running may be eliminated. Drivers may receive active warnings of pedestrians waiting to cross the street, or cyclists in a bike lane.

The ultimate success of the Connected Vehicle program will require commitments from public agencies to instrument the infrastructure, and from automobile and truck manufacturers to instrument their vehicles according to communications standards promulgated by U.S. DOT.

CONGESTION MANAGEMENT PROCESS

Congestion continues to be an issue that UCTC has worked to measure and define, locate, manage, and integrate and evaluate in the planning process. Member agencies of the Mid-Hudson TMA including UCTC, OCTC, and DCTC, have undertaken efforts to address congestion concerns in the region through the Congestion Management Process (CMP). As part of the work completed, a macro analysis was conducted to identify key congested areas in the region on the National Highway System (NHS) utilizing data from the National Performance Management Research Data Set (NPMRDS) and the assistance of AVAIL Labs. These areas were identified using a number of congestion measures including Level of Travel Time Reliability (LOTTR), Truck Travel Time Reliability (TTTR), Travel Time Index (TTI)), and Total Excessive Delay per Mile (TED/mile).

Hairpin turn on Route 44/55.

Each of the congestion measures—LOTTR, TTTR, TTI, and TED/mile—employs a threshold of acceptability for road segments on the NHS.

For LOTTR, there is a national threshold of 1.5, indicating that travel time during the worst period fluctuates by 50 percent. This threshold was set by FHWA in their performance measure reporting and adopted by all three Mid-Hudson MPOs. For TTTR the CMP analysis used 3.99, which is the threshold established for the Upstate region (including the Mid- Hudson TMA) in the NYS Freight Plan[viii]. For TTI, there is no such national standard. The CMP analysis used a threshold of 2.0, meaning that it takes twice as long to traverse a segment during the most congested period as it does during a free-flow period. There is also no national threshold for TED/mile, and values range widely across different areas. The CMP analysis used 40,000, which is the same figure chosen by the Syracuse Metropolitan Transportation Council and results in a similar passing rate to the LOTTR and TTI thresholds.

Figure 4.35 provides a summary of NHS roadways in the Mid-Hudson TMA and their relation to the threshold values for the identified congestion measures.

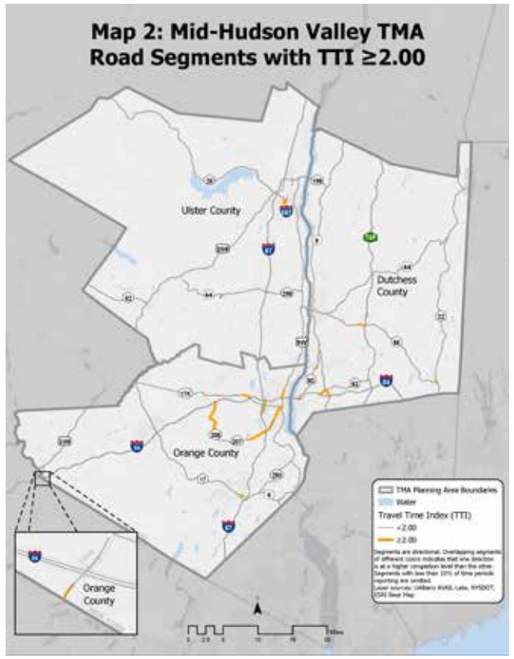
Figure 4.35: TMA – Overall Congestion & Reliability

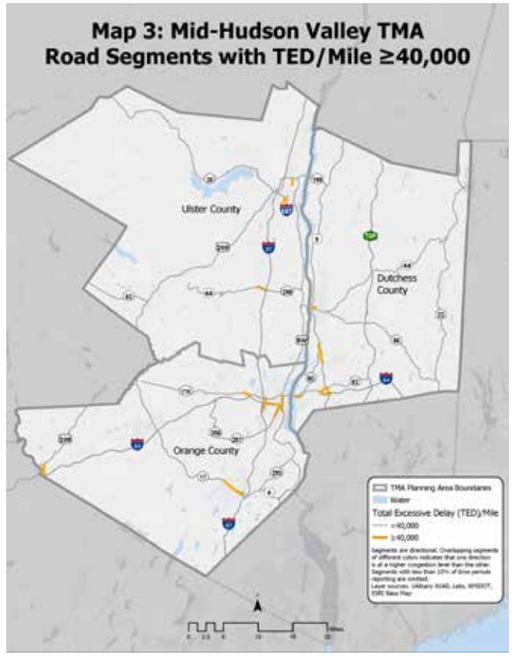
Measure	Threshold	% of Segments Passing	% of Roadway Miles Passing
TTI – Peak Period Congestion	2.0	94%	97%
TED/mile – Total Congestion	40,000	90%	96%
LOTTR – Reliability	1.5	89%	94%
TTTR – Freight Reliability (Interstates Only)	3.99	95%	98%

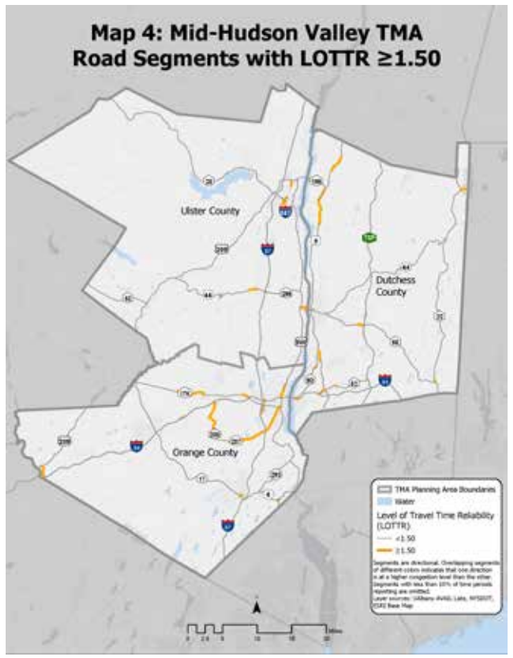
Based on 2018 data, 94% of Traffic Message Channels (TMCs) that meet the data completeness threshold 'passed' the peak period congestion (TTI) threshold of 2.0. For reliability (LOTTR), 89% of segments 'passed' the threshold of 1.5, while 90% of segments 'passed' the threshold of 40,000 for total congestion (TED/mile), and 95% of interstate segments 'passed' the threshold of 3.99 for truck reliability (TTTR). Because many of the failing segments are small fragments near intersections and interchanges, the percentage of roadway miles that pass these thresholds is even higher. The majority of the roadway mileage that does not meet the threshold values in the TMA occurs outside of the UCTC planning area. Figure 4.35 provides the locations of segments not meeting the thresholds set out in the CMP.

The Mid Hudson Valley Bridge.

Figure 4.36: Mid-Hudson TMA CMP Segment Threshold Analysis [ix]







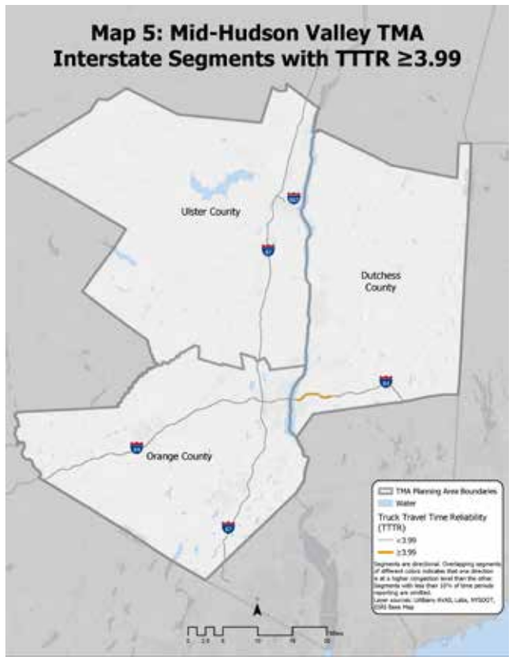
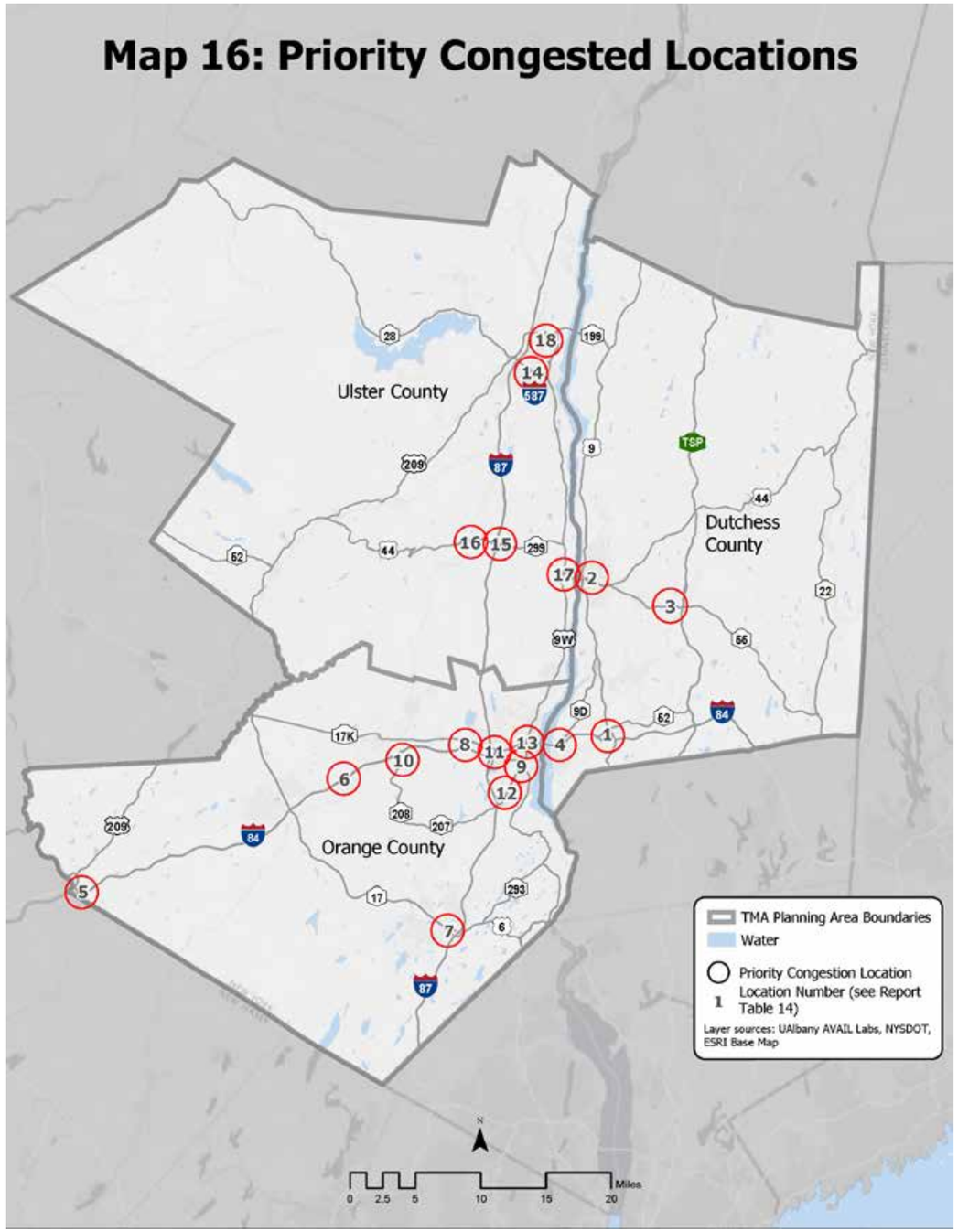


Figure 4.37: Mid-Hudson TMA Priority Congestion Locations [x]



In addition to the threshold analysis, the CMP also established a list of Priority Analysis Locations of the worst performing segments in the TMA for further review. Through the next step of the CMP, these locations will be examined to identify the underlying issues and consideration will be given to projects that alleviate those conditions contributing to congestion. Figure 4.37 contains the Priority Congestion Locations identified in the CMP.

The Priority Locations identified in Ulster County include I-587 and Route 32 (14), Route 299 near I-87 (15), Route 299 near Route 32 (16), Route 44/55 near the Mid-Hudson Bridge (17), and Route 9W near Route 199 (18). Construction is currently underway in at the intersection of I-587 and Route 32 to install a roundabout to help alleviate some of the congestion experienced at the location. UCTC will continue to advocate for the advancement of plans and projects to address congestion throughout the planning area and region, with a specific focus on those locations cited above.

[i] New York State Department of Transportation Road Inventory System (RIS)
[ii] New York State Department of Transportation Road Inventory System (RIS)
[iii] Statewide Mass Transportation Operating Assistance Program (STOA)
[iv] American Community Survey, 2018. Commuting Characteristics by Sex. Table S0801
[v] US Census, Table S2504: Physical Housing Characteristics for Occupied Housing Units, Ulster County, ACS 5 Year.
[vi] New York State Department of Transportation Traffic Data Viewer, https://www.dot.ny.gov/tdv
[vii] New York State Department of Transportation New York State Freight Transportation Plan 2019
[viii] New York State Department of Transportation New York State Freight Transportation Plan 2019
[ix] Congestion Management Process for the Mid- Hudson Valley Transportation Management Area: Technical Memo 1: TMA-wide Macro-Level Screening
[x] Congestion Management Process for the Mid- Hudson Valley Transportation Management Area: Technical Memo 1: TMA-wide Macro-Level Screening