



# MOVING OUR FUTURE FORWARD

**2045** BINGHAMTON METROPOLITAN  
TRANSPORTATION PLAN



### BINGHAMTON METROPOLITAN TRANSPORTATION STUDY POLICY COMMITTEE RESOLUTION 2020-06

Resolution approving the Draft Long Range Transportation Plan, *Moving our Future Forward 2045*.

WHEREAS the Binghamton Metropolitan Transportation Study Policy Committee has been designated by the Governor of the State of New York as the Metropolitan Planning Organization responsible, together with the State, for the comprehensive, continuing, and cooperative transportation planning process for the Binghamton Urban Area, and

WHEREAS Federal regulations ([23 CFR §450.324](#)) require that the urban transportation planning process shall include development of a long range regional transportation plan that shall have a twenty year horizon and in air quality attainment areas be updated no less frequently than every five years

WHEREAS there has been developed a Draft Long Range Plan, *Moving our Future Forward 2045*, that has met Federal requirements for content, public outreach, and cooperative development, and

WHEREAS the BMTS Policy Committee has adopted the required financial plan and the Draft Plan is fiscally constrained to that plan, and

WHEREAS the BMTS Policy Committee has created a Planning Committee of technical representatives to advise it on matters concerning the implementation of the urban transportation planning process, and

WHEREAS the BMTS Planning Committee has reviewed and approved the Draft Long Range Plan *Moving our Future Forward 2045*

NOW BE IT RESOLVED that the BMTS Policy Committee approves *Moving our Future Forward 2045* as the long range transportation plan for the BMTS Region.

#### CERTIFICATION OF RESOLUTION 2020-06

I, the undersigned, duly elected Chair of the Binghamton Metropolitan Transportation Study Policy Committee, do hereby certify that the foregoing is a true and correct copy of BMTS Policy Committee Resolution 2020-06, adopted by consensus this 26<sup>th</sup> day of October 2020.



Michael Marinaccio, Chair  
BMTS Policy Committee



Date

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Adopted by the Binghamton Metropolitan  
Transportation Study Policy Committee:

October 26, 2020

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# INTRODUCTION

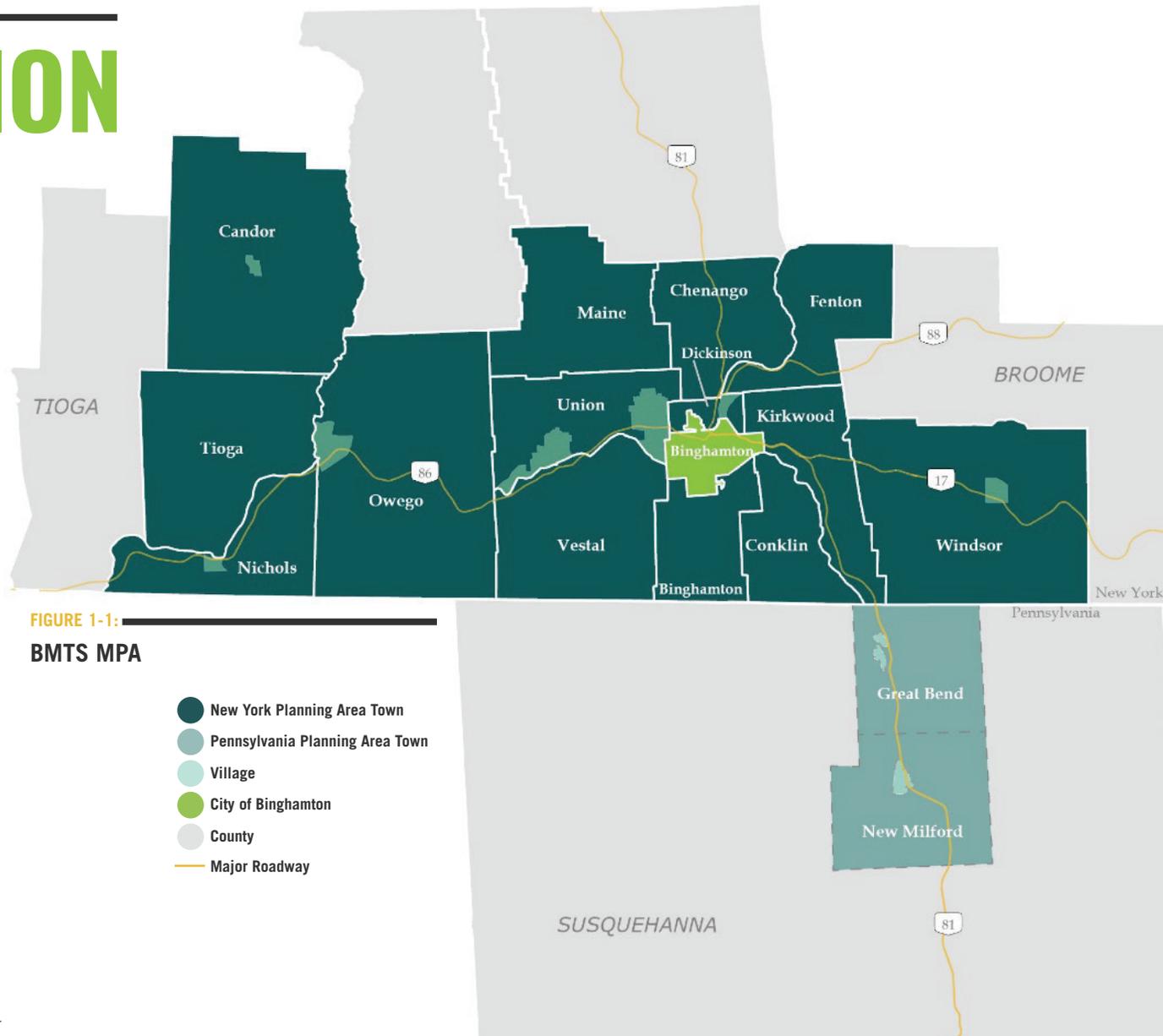
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# CHAPTER 1

# INTRODUCTION

Federal law<sup>1</sup> established metropolitan planning organizations (MPOs) to conduct the transportation planning process for US Census Bureau-defined urbanized areas with more than 50,000 people. The Binghamton Metropolitan Transportation Study (BMTS) was designated by the Governor of the State of New York as the MPO for the Binghamton NY-PA Urbanized Area. BMTS has fulfilled this function since 1964. MPOs formally adopt a Metropolitan Planning Area (MPA) that must include the area expected to become urbanized within 20 years and may follow municipal, rather than census, boundaries. Based on the demographic trends presented in Chapter 4, BMTS does not expect the boundary to change over the life of this plan. That assumption will be revisited with each LRTP update. Using the MPA makes MPO representation and decision-making more rational. The BMTS MPA boundary is shown in Figure 1-1.



<sup>1</sup> 23 USC 134.



## **BMTS POLICY COMMITTEE**

- Broome County
- Tioga County
- City of Binghamton
- Village of Endicott
- Village of Johnson City
- Village of Owego
- Town of Chenango
- Town of Dickinson
- Town of Kirkwood
- Town of Owego
- Town of Union
- Town of Vestal
- Southern Tier 8 (regional planning agency)
- New York State Department of Transportation
- Empire State Development

### **ADVISORY (NON-VOTING)**

- New York State Department of Transportation Region 9
- Pennsylvania Department of Transportation
- Federal Highway Administration
- Federal Transit Administration

The BMTS Policy Committee is the governing board of the MPO. By law, it must include representatives of at least 75% of the local governments that comprise the region. The Policy Committee relies on cooperative decision-making to address the needs of the region.

The Policy Committee is supported by the BMTS Planning Committee, whose members are primarily planning, engineering, and public works staff from member municipalities. They provide technical review of plans and programs prior to Policy Committee action.

The Pennsylvania Department of Transportation (PennDOT) is responsible for planning activities and transportation projects in the Pennsylvania portion of the BMTS planning area. The Northern Tier Regional Planning & Development Commission (N. Tier) provides local context for this area. N. Tier has adopted a Long-Range Transportation Plan<sup>2</sup> and a Transportation Improvement Program (TIP)<sup>3</sup> for their five county region, of which the portion in the BMTS MPA is a small part. BMTS includes federally funded transportation projects located within the Pennsylvania portion of the BMTS planning area in their Transportation Improvement Program (TIP) for information purposes. PennDOT serves as an advisory member of the Policy Committee.

The development of this Long-Range Transportation Plan (LRTP) is also supported by an LRTP Steering Committee and an LRTP Stakeholders Working Group (member directory in Appendix B). The Steering Committee was created to provide guidance for the development of the plan prior to engaging the Planning and Policy Committees. The Stakeholders Working Group provided a forum for direct input by key stakeholders including representatives of persons with disabilities, underserved communities, and transport modes like freight and aviation.

<sup>2</sup> <http://www.ntrpdc.com/upload/Northern%20Tier%20RPO%202020-2045%20LRTP.pdf>

<sup>3</sup> <https://www.northern-tier.org/upload/2021%20-%202024%20Northern%20Tier%20RPO%20TIP%20Document.pdf>

## THE LONG-RANGE TRANSPORTATION PLAN

The Long-Range Transportation Plan is important to BMTS. It provides the basis for setting transportation policy in response to forecasted needs of the region. It also provides the basis for selecting investments in transportation projects and programs to help achieve the desired performance of the transportation system for all users. Looking forward 25 year brings an increasing level of uncertainty over time, but also the opportunity to consider strategic actions to move toward the desired future.

The LRTP is guided by data (see Appendix E) and also by input from decision makers, stakeholders, and the public. Both are important sources of information. Specific outreach was directed to federal, state, and local environmental resource agencies. Intercity bus companies were also contacted directly (see Appendix C). BMTS engaged the public throughout the LRTP process (see Appendix D) including event outreach in June 2019. As a result of the COVID-19 pandemic in 2020, an online survey related to transportation needs was conducted in May 2020 and a virtual town hall in June 2020 to discuss solutions.

To meet federal requirements,<sup>4</sup> this plan must:

- Have a time horizon of at least 20 years into the future.
- Be updated at least every five years to reflect changing conditions and assumptions. (BMTS' previous LRTP, *Looking Forward 2040: The Greater Binghamton Transportation Plan*, was adopted by the BMTS Policy Committee on September 30, 2015).
- Be multimodal, recognizing all modes of travel for people and goods.
- Address performance-based planning through the inclusion of a system performance report
- Incorporate a financial plan that demonstrates fiscal constraint for the recommended projects and programs.
- Consider a set of 10 planning factors (see below) in a manner that reflects the scale and complexity of the MPO planning area.

<sup>4</sup> 23 CFR 450.324.

## FEDERAL LRTP PLANNING FACTORS

- 1 Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
- 2 Increase the safety of the transportation system for motorized and non-motorized users;
- 3 Increase the security of the transportation system for motorized and non-motorized users;
- 4 Increase accessibility and mobility of people and freight;
- 5 Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;
- 6 Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
- 7 Promote efficient system management and operation;
- 8 Emphasize the preservation of the existing transportation system;
- 9 Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation; and
- 10 Enhance travel and tourism.

23 CFR 450.306(b)

The Transportation Improvement Program (TIP) is a five-year program of projects within the MPA funded by programs of the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). It is a key product of BMTS, since it includes specific commitments to advance projects from planning to completion. A TIP requirement is that “each project or project phase included in the TIP shall be consistent with the approved metropolitan transportation plan.”<sup>5</sup> When the BMTS Policy Committee adopts the TIP, they create consistency across the investment strategy as near-term decisions reflect the same priorities that guide the LRTP.

Transportation plays a role in everyone’s daily life. People travel to work, send their children to school, go to medical appointments, and enjoy a meal at a restaurant or a movie. Businesses ship products, receive deliveries, and rely on access by both workers and customers. Many of these trips are within the Broome-Tioga region, but both people and goods travel around the country and even globally. Transportation contributes to the region’s quality of life, its sense of place, and its ability to thrive. A sound transportation plan can play an important role in how the BMTS region achieves its larger goals. *Moving Our Future Forward 2045* fulfills that role.

<sup>5</sup> 23 CFR 450.324(h)(i).

## IMPACT OF THE COVID-19 PANDEMIC

The COVID-19 pandemic began affecting the United States in early 2020 during this plan's preparation. New York City was hard hit early on, resulting in a statewide response that affected the BMTS region. All but essential workers were directed to stay at home. Those whose jobs allowed them to do so could work from home. Schools, colleges, and universities switched to remote learning, sending students and faculty home. Grocery stores remained open, and restaurants offered delivery and curbside pickup. People were directed to remain physically distant from one another and to wear masks when they were out.

All of this had an immediate impact on transportation. Travel declined sharply as people remained home. Many ordered food and other essentials online, resulting in an uptick in home deliveries. Those who had to travel avoided shared modes when possible, causing sharp declines in transit and transportation network company (TNC) use. Broome County continued to operate BC Transit, providing transport for essential workers without cars. However, fare collection stopped to reduce contact with the driver. Intercity bus service was also suspended.

**BMTS conducted an online survey in June 2020 as part of public outreach conducted for this plan; these data are not statistically valid but offer some insights. In response to a question about how the pandemic altered their travel, respondents could give more than one answer. These answers are from 111 people:**



**33%**

**are working  
from home**



**21%**

**still drive but  
make fewer trips**



**18%**

**rely more on  
online/phone  
ordering & delivery**



**20%**

**reported  
no changes**



**10%**

**walk more**

While attitudinal surveys have since sought to quantify long-term effects, the pandemic is still ongoing at the time of this writing in August 2020 so hard data do not yet exist on whether travel habits will permanently change. This adds another layer of uncertainty to the LRTP. BMTS will need to monitor travel behavior, goods movement, and e-commerce to quantify any changes attributable to the pandemic. Additional discussion of the pandemic's impacts is provided in Chapter 9 and Chapter 10.

# VISION, GOALS & OBJECTIVES

2



## CHAPTER 2

# VISION, GOALS & OBJECTIVES

The Vision Statement below was developed with input from the Steering Committee and Stakeholder Committee and spells out what community members want this region to be in 2045. The foundation of the LRTP centers around supporting the economy, improving communities, protecting the environment, and utilizing new technology. Achievement of the vision is supported by a series of goals, each with specific objectives.

The statement of goals is the first step by which BMTS shows how the vision can be achieved over the life of the LRTP. Goal statements are not meant to be specific; instead, these demonstrate broad priorities for future investments in the region's transportation system. These goals will guide *Moving Our Future Forward: 2045*.

Each goal is supported by several objectives. While goals are broad statements of intent, objectives are more specific and offer a means by which progress can be measured over time. This specificity provides insight to decision-makers and the public by linking actions to the vision. Objectives are also designed to be realistic. Figure 2-1 depicts the framework of the LRTP.

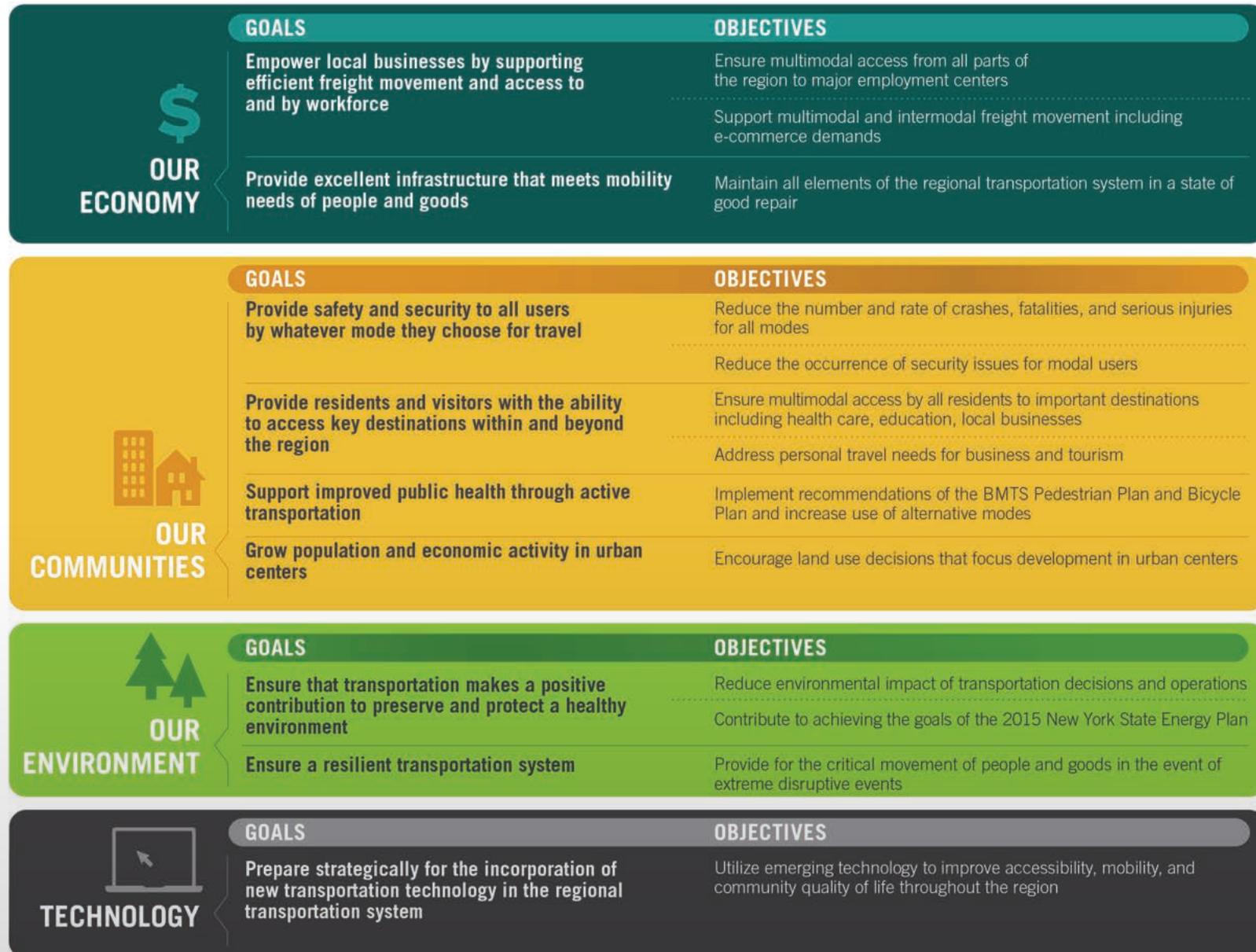


## VISION STATEMENT

In 2045, the BMTS region will be recognized as a great place to live. People of all ages and abilities will be able to travel safely and reliably throughout and beyond the region with access to destinations that meet their needs and desires. Technology and public policy will make transportation services available to all and provide efficient mobility for people and goods by whatever mode they choose.

FIGURE 2-1:

**BMTS LRTP FRAMEWORK**





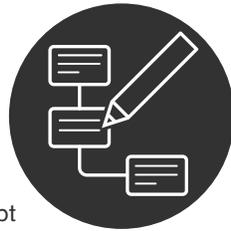
# PERFORMANCE-BASED PLANNING

3



# CHAPTER 3

# PERFORMANCE-BASED PLANNING



Federal law<sup>6</sup> requires that states and MPOs adopt a performance-based planning and programming methodology. This requirement makes organizations accountable for how their investment choices affect the condition and performance of the regional transportation system. People who use the transportation system can see that projects are being completed and how those projects are improving their travel. By requiring targets for each performance measure, there is a timebound means of measuring how well project and program investments are achieving desired results. The process is anchored by these national goals:

## NATIONAL GOALS

- 1 Safety.** To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- 2 Infrastructure condition.** To maintain the highway infrastructure asset system in a state of good repair.
- 3 Congestion reduction.** To achieve a significant reduction in congestion on the National Highway System.
- 4 System reliability.** To improve the efficiency of the surface transportation system.
- 5 Freight movement and economic vitality.** To improve the National Highway Freight Network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- 6 Environmental sustainability.** To enhance the performance of the transportation system while protecting and enhancing the natural environment.
- 7 Reduced project delivery delays.** To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

<sup>6</sup> 23 USC 150(b)

## FEDERAL PERFORMANCE MEASURES



### INFRASTRUCTURE

- Pavement on the Interstate Highway System: % good, % poor
- Pavement on the non-Interstate NHS: % good, % poor
- Bridges on the NHS: % good, % poor
- Transit state of good repair



### SAFETY (applies to all public roads)

- Number and rate of fatalities
- Number and rate of serious injuries
- Number of fatalities and serious injuries in nonmotorized modes
- Transit safety performance



### SYSTEM PERFORMANCE

- Travel time reliability on the Interstate Highway System: % person-miles traveled reliable
- Travel time reliability on non-Interstate NHS: % person-miles traveled reliable
- Truck Travel Time Reliability Index on the Interstate Highway System
- Annual hours of peak-hour excessive delay per capita on the NHS in TMA MPOs classified as air quality nonattainment areas
- Percent of nonsingle occupant vehicle travel on the NHS in TMA MPOs classified as air quality nonattainment areas
- Total emissions reduction resulting from projects funded by FHWA Congestion Mitigation Air Quality (CMAQ) program in air quality nonattainment areas

*Note that the final three System Performance measures do not apply to BMTS.*

A performance-based planning and programming methodology centers on the prescribed federal process that recognizes specific performance measures and offers a methodology for calculating performance targets and submission schedules for each.

Highway metrics typically focus on the National Highway System (NHS) and its Interstate Highway System component. But safety is different because the FHWA Highway Safety Improvement Program (HSIP) funds can be spent on any public road that has a documented safety problem, not just highways. NHS roadways are one component of the highway systems in the BMTS region. The ability to spend HSIP funds on any road, regardless of classification, is crucial to BMTS' efforts to improve safety. An MPO may set its own quantifiable targets or choose to support targets set by the state with appropriate investments. BMTS has chosen the second option for all federal targets.

FIGURE 3-1:

### PERFORMANCE-BASED PLANNING PROCESS

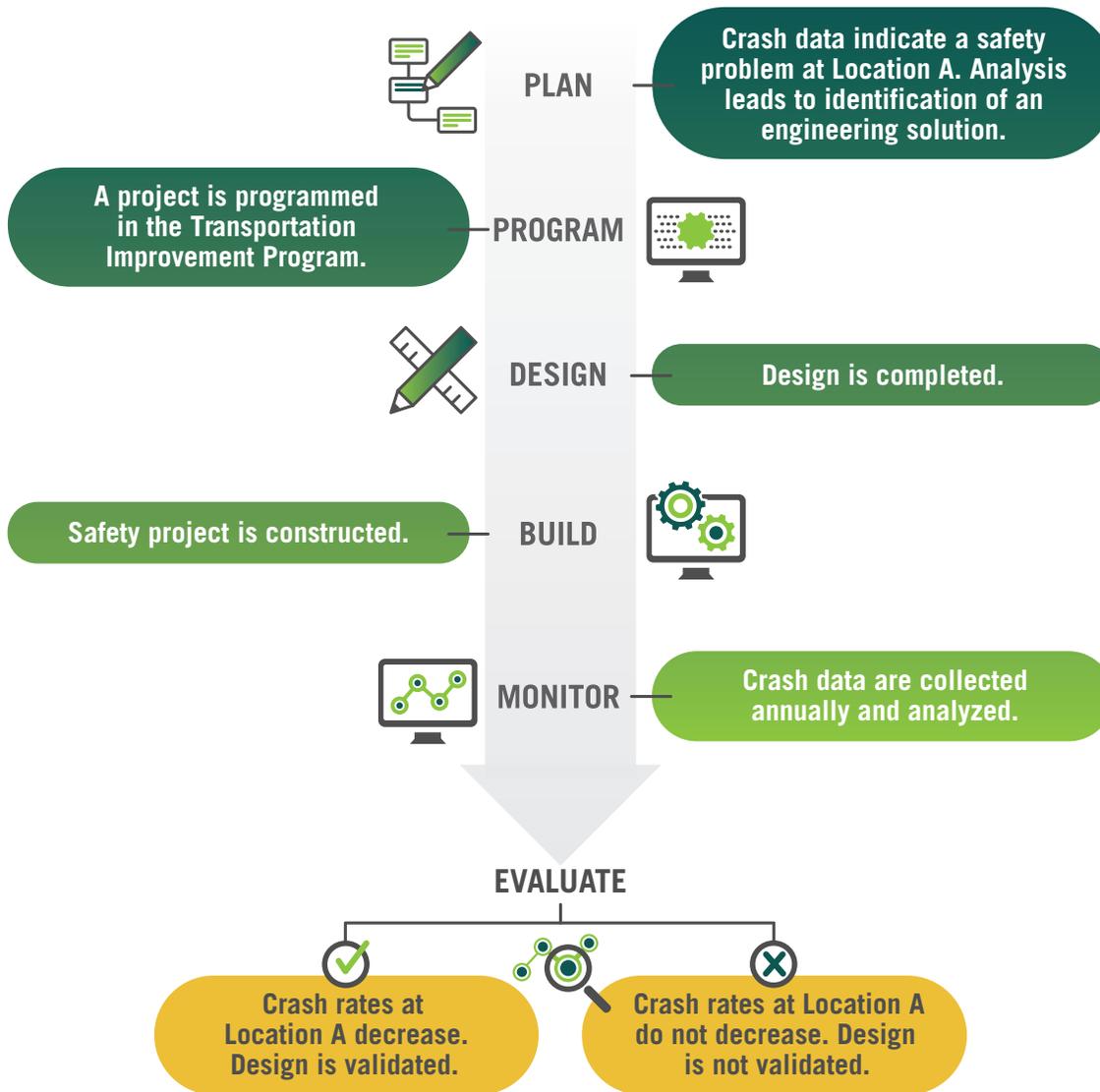


Figure 3-1 illustrates an example of the performance-based planning process as it may be applied to roadway safety.

Completing a project is often not the best or only measure of success. Instead, the information gained by performance monitoring and analysis often helps guide future project choices in a process that will support the achievement of both short-term targets and long-range objectives. The more robust the performance measurement program, the greater success BMTS may have in programming projects in the TIP that help achieve the LRTP goals and objectives.

The system performance report required by federal law<sup>7</sup> is found in Appendix F. It includes the current targets for all the FHWA and FTA performance measures.

<sup>7</sup> 23 CFR 450.324.

# REGIONAL PROFILE

4

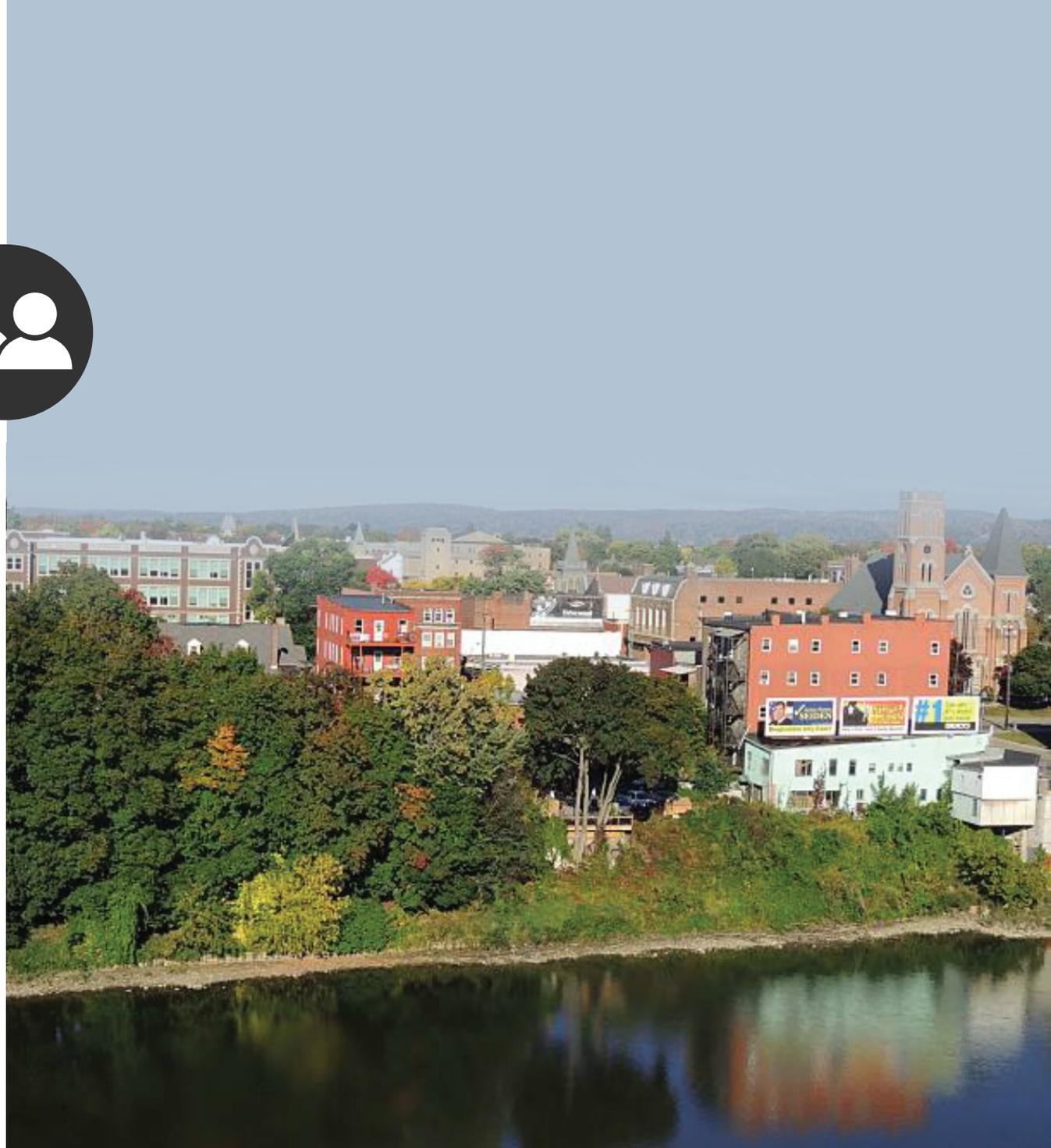


## CHAPTER 4

# REGIONAL PROFILE



A necessary step in relation to the LRTP framework is to forecast changes in the basic demographics of the region over the planning time horizon. Population and employment are the key drivers of travel demand. This information bears a direct relation to the LRTP framework presented in Chapter 2. In order to support Our Communities, BMTS must understand what the data shows in terms of a modest decline in population accompanied by growth in the percentage of senior citizens. In order to enhance Our Economy, BMTS must know what is happening to employment in the region and to employers both large and small. The baseline of how people travel, which mode they select for a given trip, and the attendant impacts on congestion and travel time reliability affects both Our Communities and Our Economy. Note that these forecasts do not include the small part of Pennsylvania in the MPA. Appendix E includes all data used to inform the development of the LRTP.



## POPULATION

The BMTS region population grew from 1950 to 1970 but began to decline in 1980; Tioga County grew through 1990 (Figure 4-1) while Broome County's population has been declining since 1970. The rate of decline over the past several decades has fluctuated since then but shows no growth.



**FIGURE 4-1:**  
**POPULATION TRENDS 1950–2018**

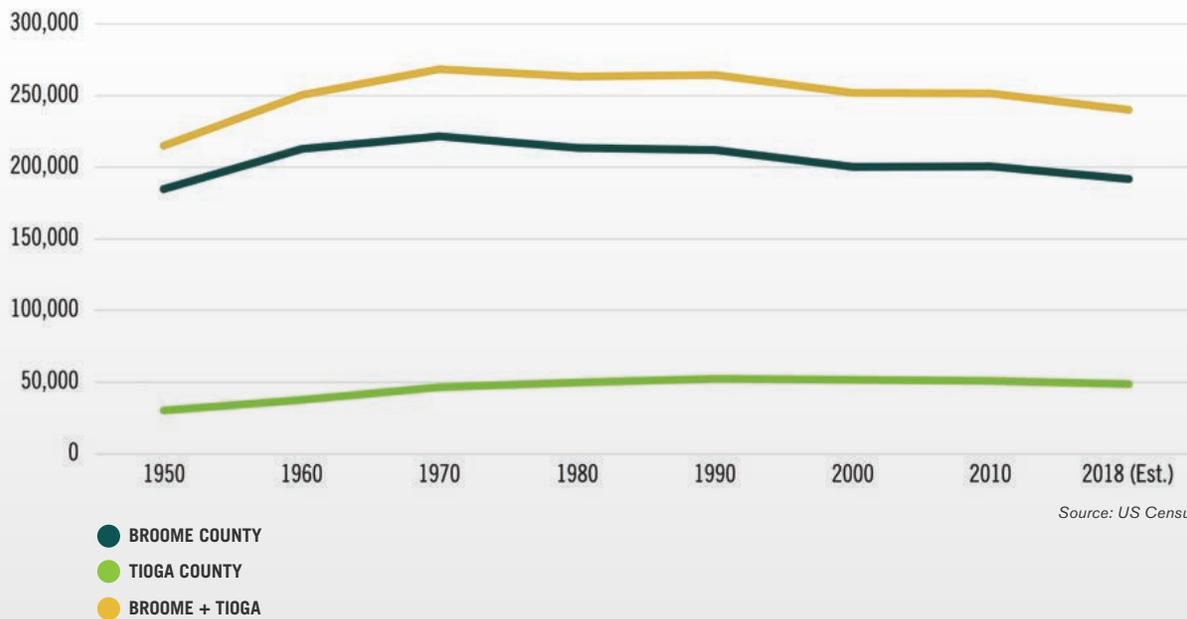
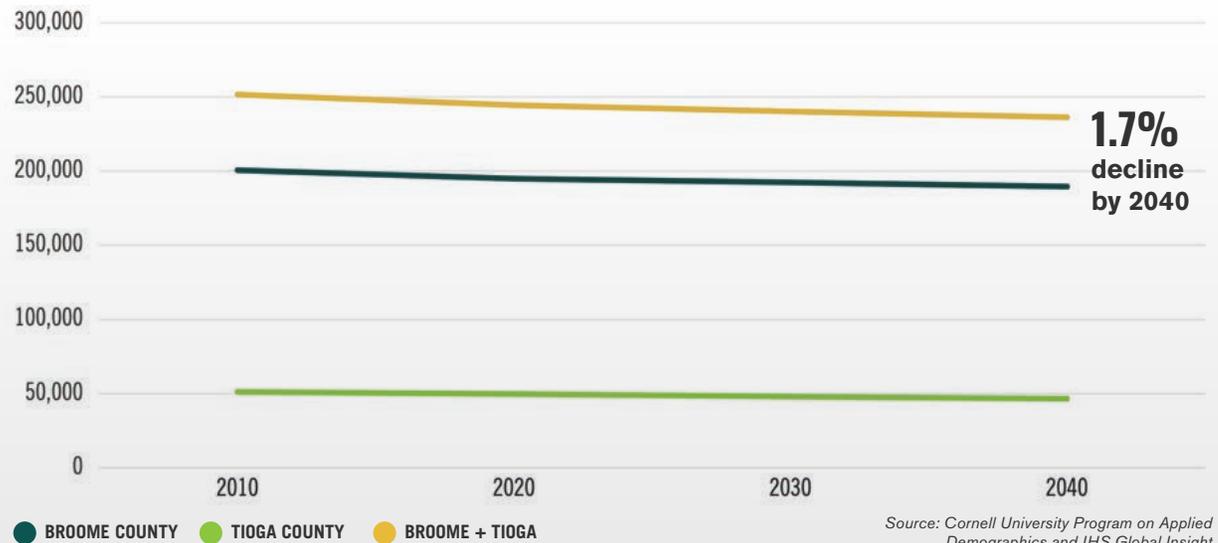


FIGURE 4-2:

### POPULATION FORECAST 2010–2040

To forecast population changes for the LRTP, BMTS used two data sources: the Cornell University Program on Applied Demographics and IHS Global Insight.<sup>8</sup> Because these sources use different methodologies, BMTS averaged the forecasts. As shown in Figure 4-2, the forecast shows the population of the two-county region will decline by 1.7% over the next two decades.

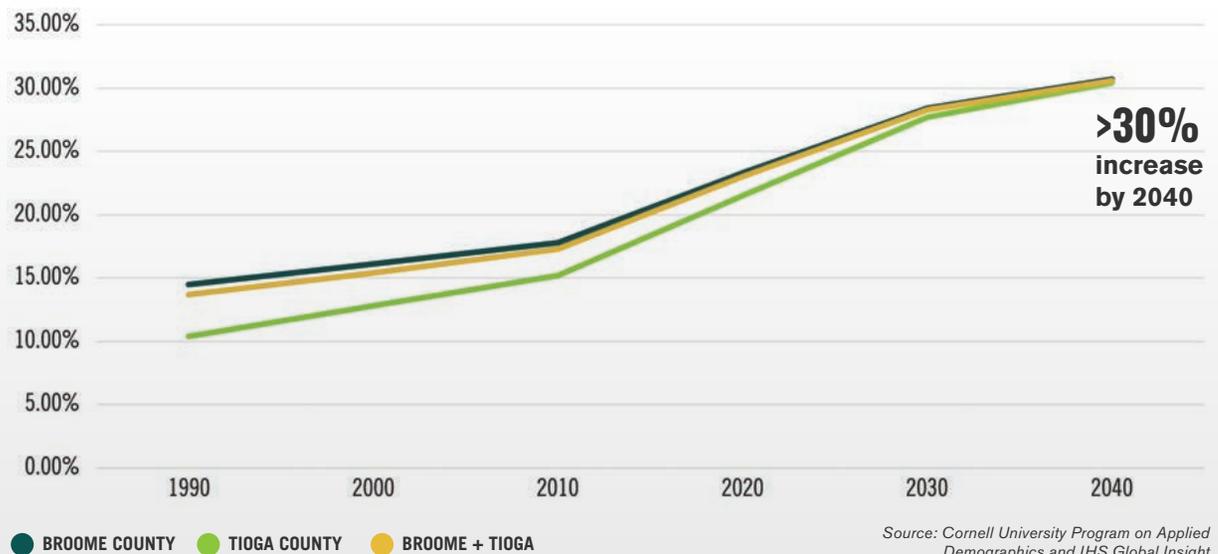


Source: Cornell University Program on Applied Demographics and IHS Global Insight

FIGURE 4-3:

### POPULATION GREATER THAN AGE 65

An aging population is also of concern since people have different transportation needs as they age. Figure 4-3 shows the percentage of the population older than 65 is projected to increase to more than 30% by 2040.



Source: Cornell University Program on Applied Demographics and IHS Global Insight

<sup>8</sup> IHS Global Insight provides population and economic data. NYSDOT periodically purchases data, most recently in 2012, and shares it with the MPOs.

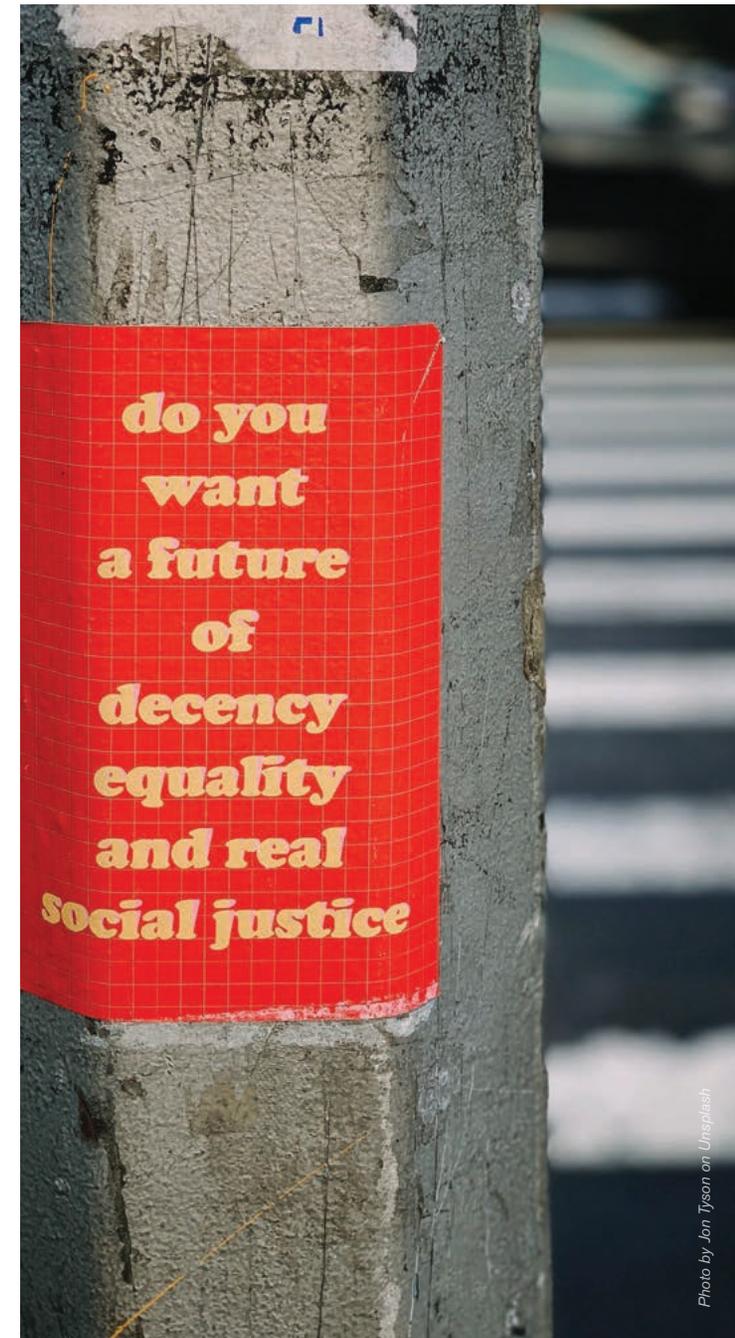
## EQUITY AND ENVIRONMENTAL JUSTICE

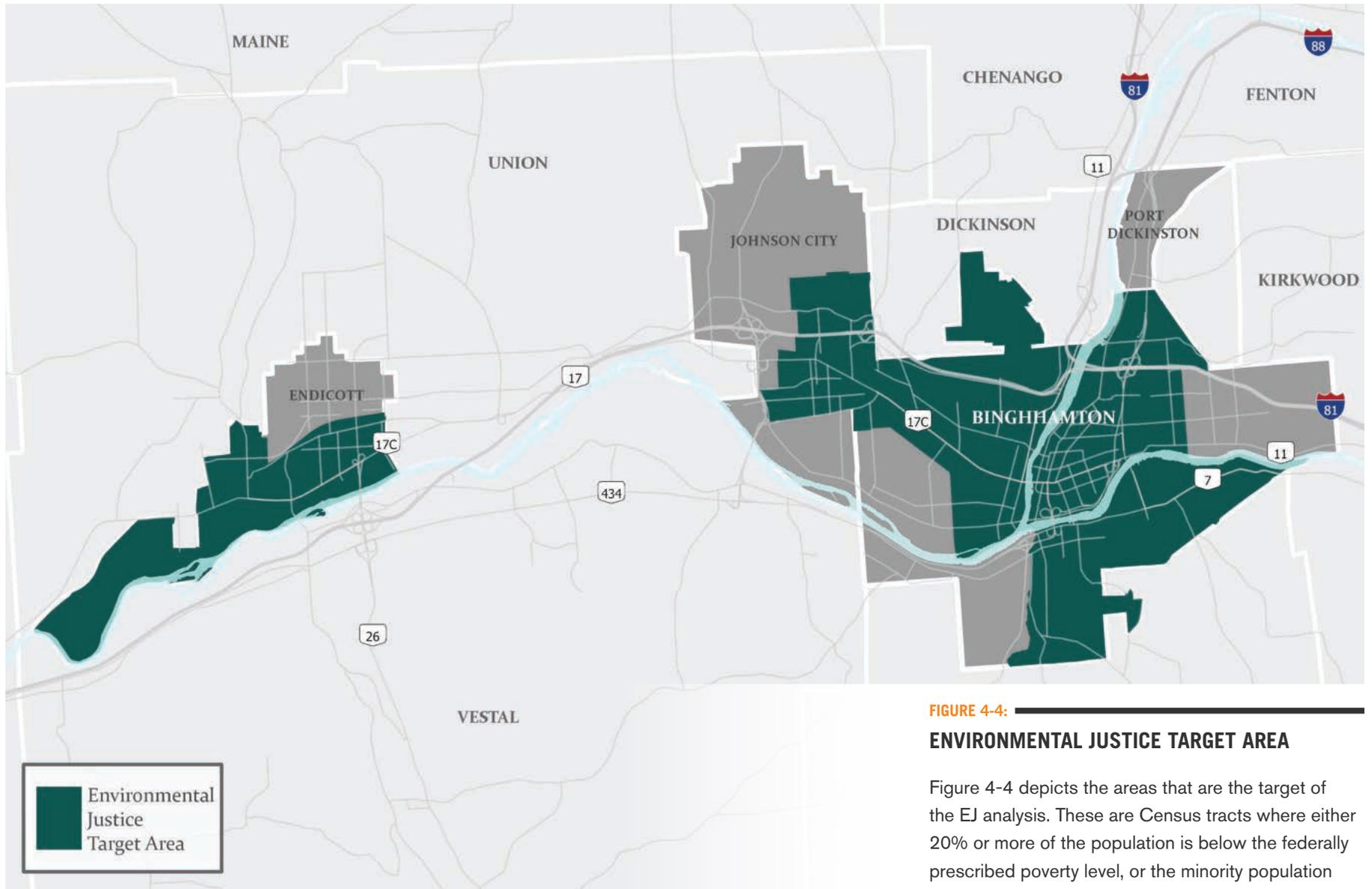
Providing equitable access and transportation services to low-income and minority communities and neighborhoods is important to BMTS. Too often people in these areas are not served well. If they cannot afford to own and maintain a car, they may find that public transit routes and schedules do not meet their travel needs. They may not have the means to access ridehailing services like Uber or Lyft because they do not have a smartphone or credit card. They may find bikeshare helpful if it were available.

Environmental justice is a concept that explores equity. It became a mandate for federal agencies with the issuance of Executive Order 12898. The intent is to make sure that programs of the federal government, including those of FHWA and FTA, do not disproportionately deny benefits or impose negative impacts on low-income and minority communities. BMTS has completed an Environmental Justice (EJ) analysis that is found in Appendix H.

BMTS incorporates these EJ principles in its planning work, including the LRTP and TIP:

- 1 To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects on low income and minority populations.
- 2 To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- 3 To prevent denial of, reduction in, or significant delay in the receipt of benefits by low income and minority populations.



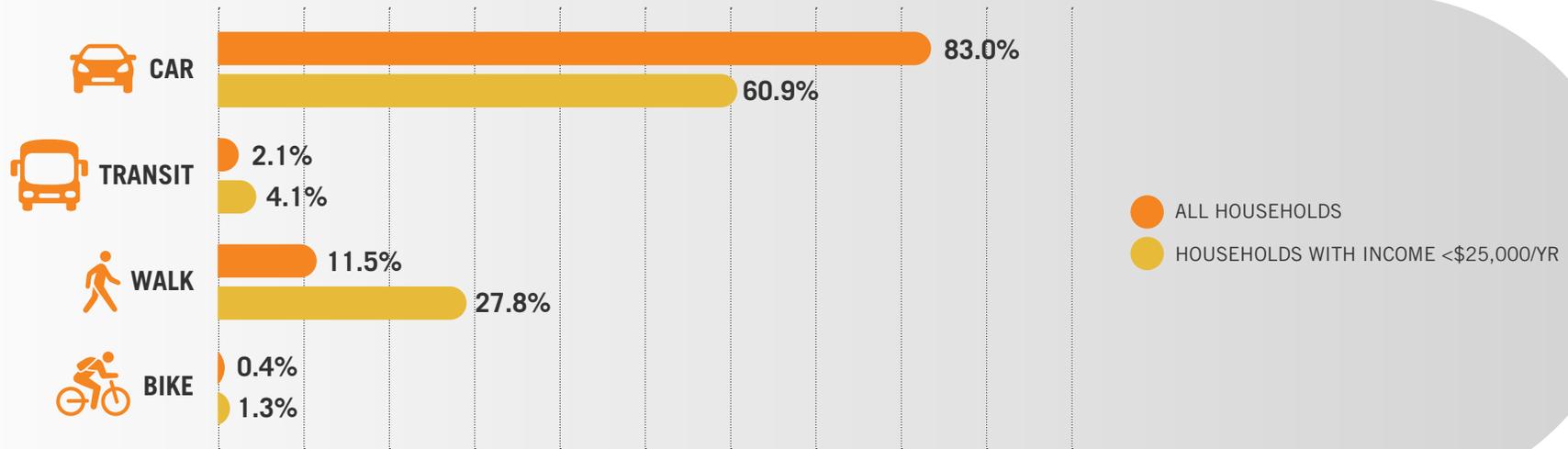


**FIGURE 4-4:** ENVIRONMENTAL JUSTICE TARGET AREA

Figure 4-4 depicts the areas that are the target of the EJ analysis. These are Census tracts where either 20% or more of the population is below the federally prescribed poverty level, or the minority population is greater than the national average of 37%. This includes much of the City of Binghamton as well as portions of Johnson City and Endicott.

FIGURE 4-5:

## HOUSEHOLD TRAVEL MODE SHARE



According to the Broome Tioga Transportation Study household travel survey, mode of travel is different for low-income households. As shown in Figure 4-5, low-income households drive less, walk and use transit more. This means it is important for BMTS to make sure the target areas are well served by BC Transit, and have safe and connected sidewalk networks.

As discussed in later chapters of the LRTP, the EJ target areas are well served by BC Transit routes, although there are limitations to service hours that can make it challenging to access employment other than during weekday daytime.

Because there is no regional bikeshare program, people in these areas must have their own bicycles. This may contribute to the low percent of trips made by bike, but low-income households still have more than three times the use of this mode than the overall region. The LRTP recommends development of an expanded bikeshare program.

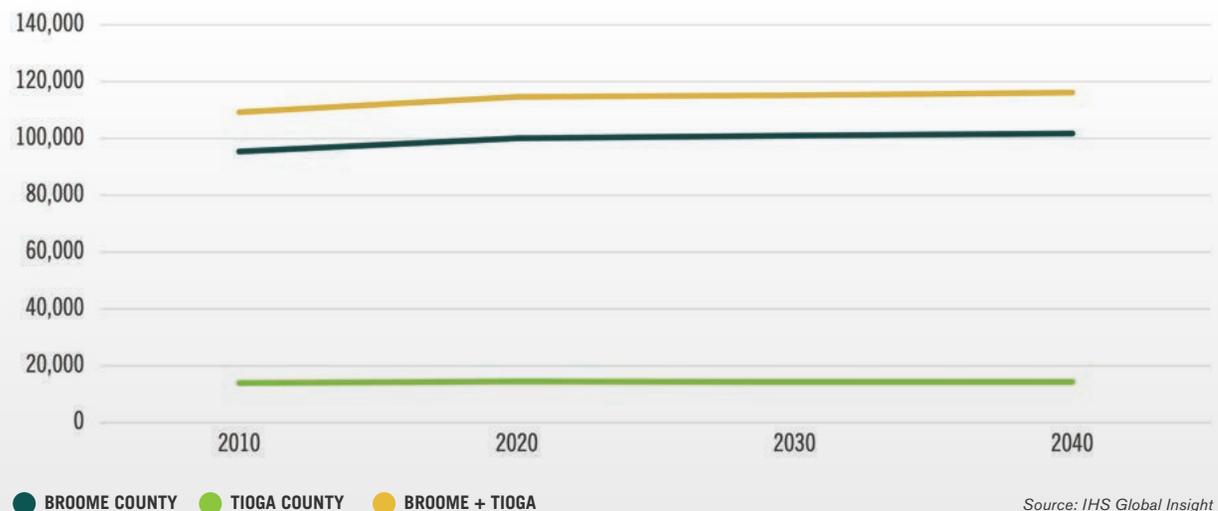


## EMPLOYMENT

Forecasting employment is more complex than forecasting population. These forecasts require underlying data on the activity of each sector of the regional economy (Figure 4-5). Education and health care, especially Binghamton University and UHS Healthcare, are significant employers in Broome County. While total employment shows little growth from 2020 to 2040, these sectors show a slight increase (Figure 4-6). The same is true of the service sector, which accounts for more than half the region's jobs (Figure 4-7).

Key industries in the Southern Tier Region include advanced manufacturing, agriculture, food processing, and warehousing and distribution. While advanced manufacturing has seen some declines in the region with the departure of IBM, Lockheed Martin has a significant presence in Owego; BAE Systems has a similarly large presence in Endicott. Warehousing, distribution, and food processing have been sources of growth across the region. Dick's Sporting Goods built a warehouse in the Broome Corporate Park in the Town of Conklin with direct access to I-81. Best Buy operates a warehouse facility at the Lounsbury interchange of I-86 in Tioga County. Frito-Lay owns a significant food processing facility in Conklin. Another significant freight generator is Upstate Shredding/Weitsman Recycling, headquartered in Owego. It is the largest scrap metal business on the East Coast, with locations across New York.

**FIGURE 4-6:** TOTAL NONFARM EMPLOYMENT, 2010–2040



Source: IHS Global Insight



FIGURE 4-6:

### EDUCATION AND HEALTH CARE EMPLOYMENT, 2010–2040

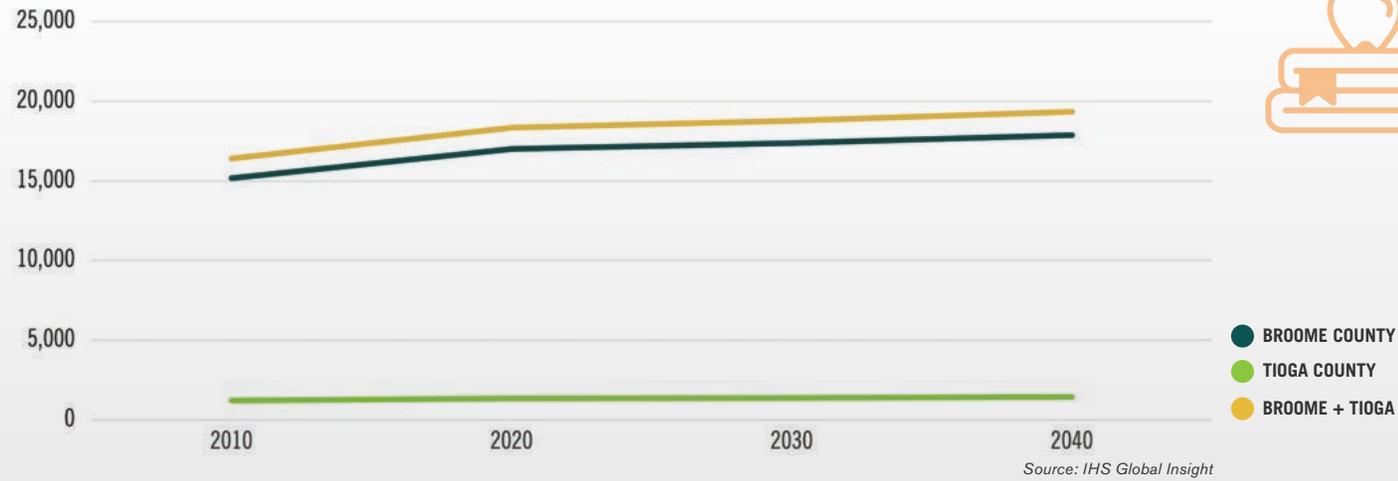
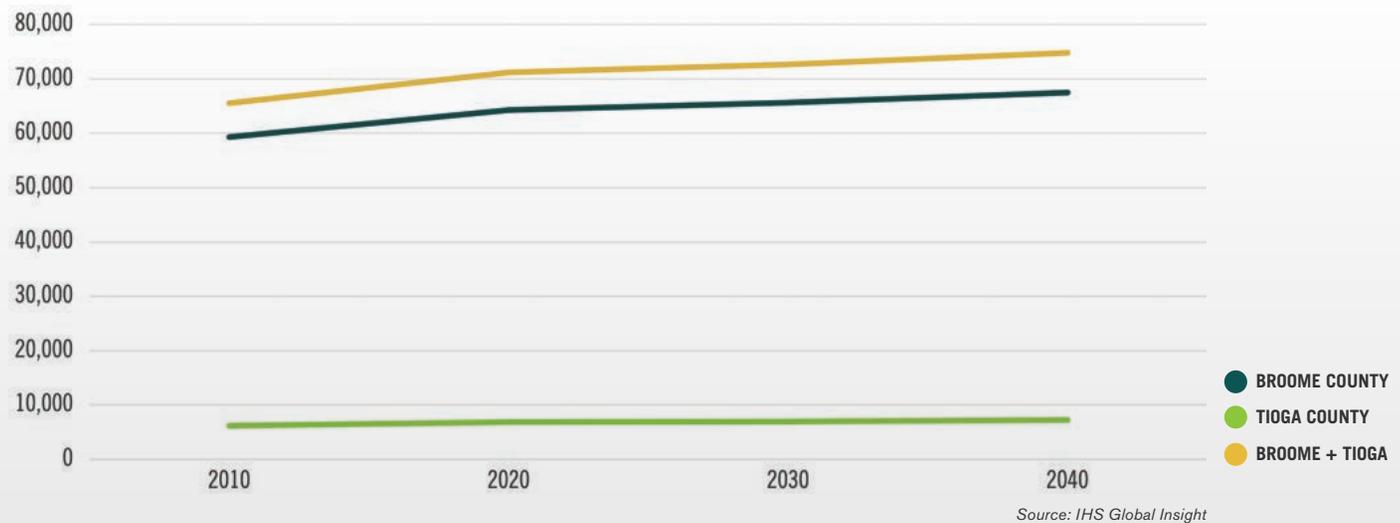


FIGURE 4-7:

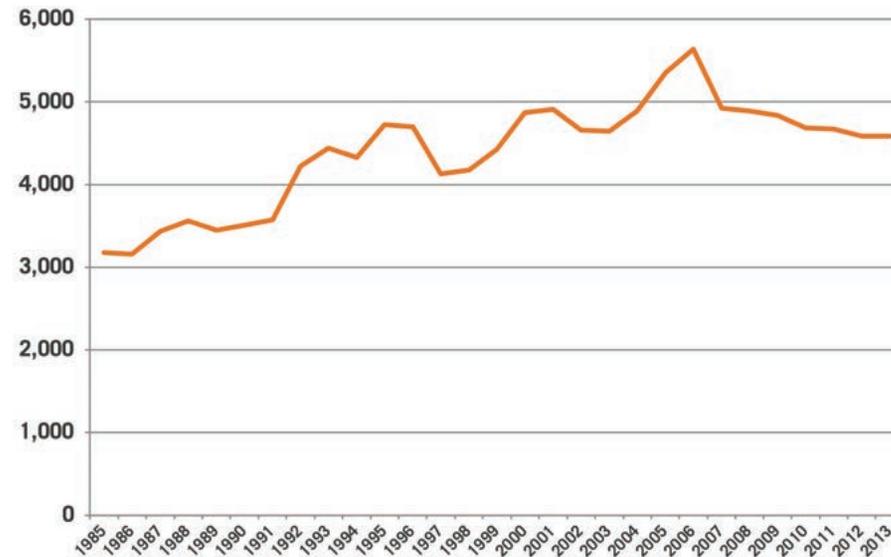
### SERVICE SECTOR EMPLOYMENT, 2010–2040



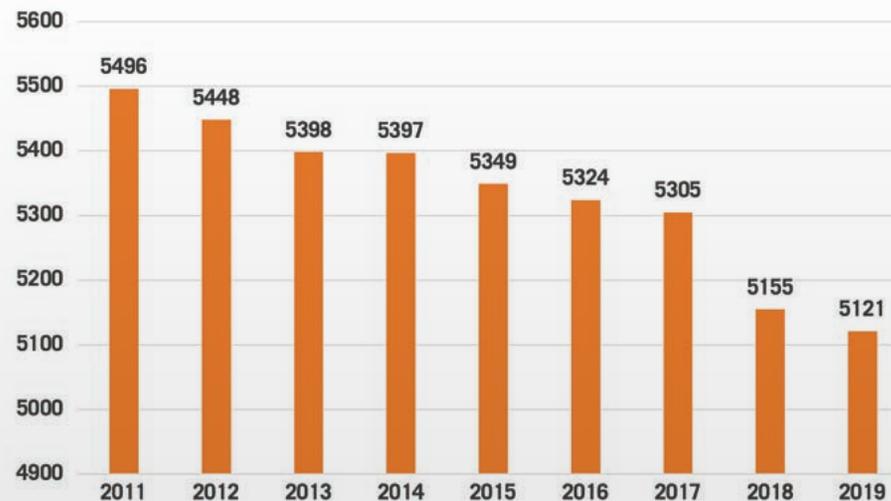
## TRAVEL

Understanding how residents travel, including the mode they choose and the volume of traffic created, is important for planning purposes. BMTS maintains a travel demand model for the BMTS planning area. It is a traditional model that uses population and employment data on a zonal basis to forecast travel after it is calibrated to current traffic volumes on the roadway network. Vehicle-miles of travel (VMT) is the key measure of utilization of the region's roadways. BMTS has VMT for the census-defined urban area from 1985 – 2013 as shown in Figure 4-8. During that time period VMT fluctuated, but since 2006 has shown a modest decline. NYSDOT Highway Service Data Bureau has provided VMT for the BMTS planning area from 2011 through 2019 as shown in Figure 4-9. Although the data is not directly comparable since they include different geographic areas, each data set shows a small, but steady decline in recent years.

**FIGURE 4-8:**  
**VEHICLE MILES OF TRAVEL, BMTS CENSUS DEFINED URBAN AREA 1985 - 2013**



**FIGURE 4-9:**  
**DAILY VEHICLE MILES OF TRAVEL, BMTS REGION**



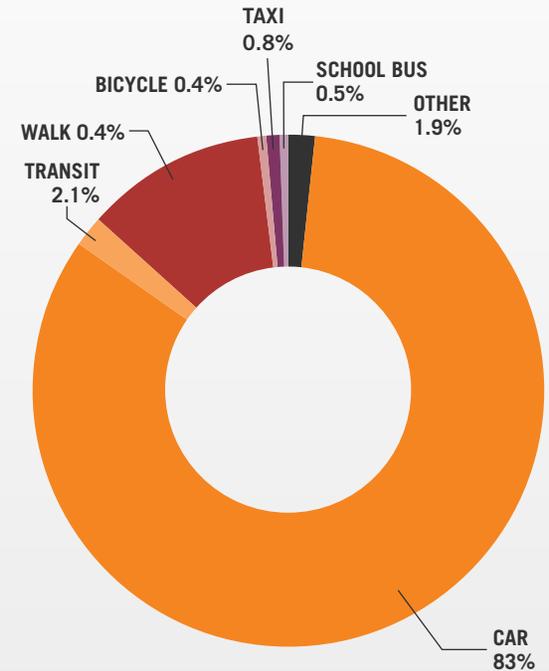
Information from BMTS' travel demand model used in the previous LRTP has been used to inform this plan. The BMTS travel demand model uses a variety of data to forecast future trip generation rates and project land use inputs, which are then used to estimate the levels of traffic and travel demand projected for the future. VMT projections from BMTS' previous long range plan, *Looking Forward 2045*, included data from IHS Global Insight, input from local area planning departments, and land use projections developed for that long range plan,

The BMTS travel model projects an increase of approximately 20% by the year 2040. The model figures represent a compromise between projecting VMT based on long-term growth rates and a relatively short-term trend of decline. As such, it is a relatively conservative estimate of growth in VMT for the Binghamton area, with a good amount of that growth projected to occur on the Interstate system, as a product of intercity travel and freight movements. Based on the projected downward trend in population, the upward trend in average age, and, according to the census, a relatively stable household size of 2.4 persons in 2000 and 2.34 persons in 2018, even a projected 20% increase in VMT over the next 20 years may be too high. However, the recent tendency in reduction/flattening in VMT is still a relatively short-term trend, and it is difficult to discern whether it represents a profound change in travel behavior, or whether it is more of a short-term reaction to changing economic conditions.

The model does not include a transit component, since this mode accounts for just over 2% of person-trips in the region according to the household travel survey that BMTS' completed in 2018. The Broome County Department of Public Transportation forecasts ridership based upon historical data coupled with growth patterns in higher education (Binghamton University as the largest factor) and changes in local demographics. Binghamton University has a significant but seasonal impact on travel in the region. The University has a total enrollment of over 18,100 students, of which more than 14,000 are undergraduates. While many graduate students stay year-round, undergrads tend to leave for the summer and school vacations. Students use transit and have access to Zipcar and bikeshare, but they also drive. When school is in session there are increases in transit ridership and car travel.

BMTS household travel survey yielded a great deal of information about personal travel by residents of the region. As shown in 4-10, car travel is the predominant mode, accounting for 83% of trips. Survey respondents reported on each segment of a trip. The raw data show a large proportion of walk trips are people walking to or from a bus stop or other mode. "Other" may include carpool or scooter.

**FIGURE 4-10:**  
**PERSON TRIPS, BY MODE**



## CONGESTION

The BMTS region is relatively free of congestion as the primary roadway network can accommodate the average travel demand. The principal highways, I-81, I-86/NY 17, and I-88 experience congestion only as a result of incidents or work zones that create lane closures. There are specific locations that are congested primarily during peak periods. Some of these were confirmed by respondents to public outreach opportunities.

- Route 434/Vestal Parkway serves some of the most concentrated land use in the region, and also provides direct access to and from downtown Binghamton. Traffic generators include Binghamton University and the U Club student housing development east of campus, numerous shopping centers from west of the campus, and large residential neighborhoods to the south. Although Route 434 is a four-lane arterial with access control provided by a median, traffic generated by these uses often creates congestion during weekday PM peaks and Saturday midday at intersections in the shopping area. Advanced traffic signal control does optimize capacity.
- Route 201 is a limited-access connector between Route 17 and Route 434 at Binghamton University. Access to the campus is indirect via Glenn Bartle Drive and Bunn Hill Road, and is a source of congestion. Its northern terminus is a signalized intersection with Reynolds Road and Harry L Drive in a highly developed retail commercial area with residential neighborhoods to the north. This intersection experiences weekday afternoon peak period congestion.
- Front Street in the Town of Dickinson provides the sole access to SUNY Broome. The college reported over 6,700 students enrolled in the 2019 fall semester. A small amount of on-campus housing is now offered, but the majority of students are commuters. While Front Street is four lanes with a dual left turn lane at the campus' south entrance, there is congestion at morning arrival time at the signalized intersections between the I-81 ramps and the college when school is in session.
- Upper Front Street in the Town of Chenango is another densely developed retail commercial corridor, especially between the I-81 northbound off-ramp and the intersection with Route 12A. There are signalized intersections at Northgate Plaza, I-81 SB on-ramp, Fuller Rd, and Route 11/Lowe's entrance. The road also provides access to nearby residential neighborhoods. The signalized intersections are often congested during the morning and afternoon peak period.

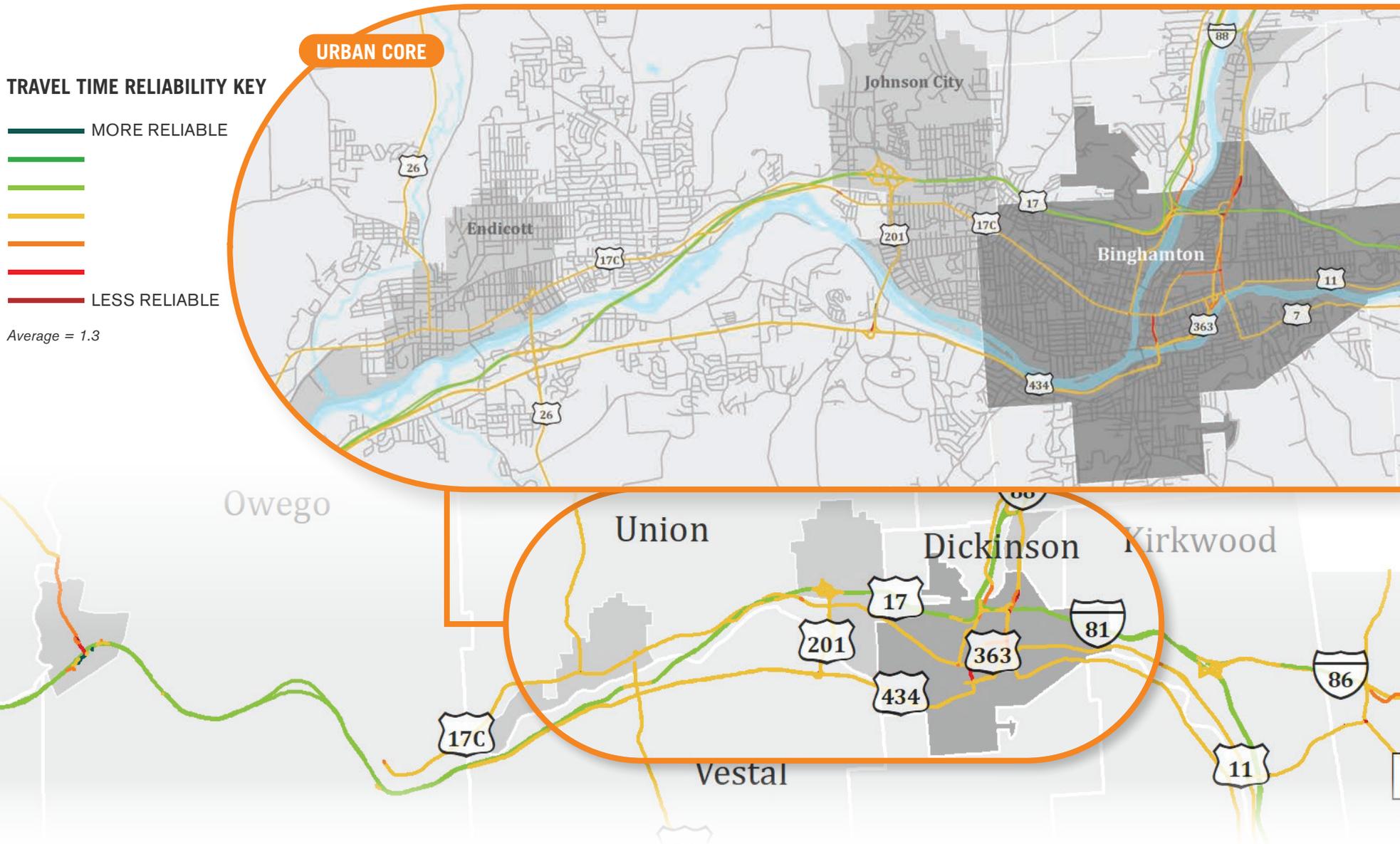
## TRAVEL TIME RELIABILITY

As noted in Chapter 2, an important measure of travel is reliability. While people understand that unexpected events like a crash will sometimes cause delay, they want to estimate the time required for a trip with a high level of probability.

Figure 4-11 shows the level of travel time reliability on key roadways in the region, which is the ratio of the 80th percentile travel time to the normal (or 50th) percentile. Ideally, the 80th and 50th percentile travel times are very similar, indicating little variance in travel times and therefore an acceptable level of reliability on a roadway. Most key regional roads offer acceptable travel time reliability, with a few roadway segments providing unreliable travel.

One of the primary means of improving reliability without major capital investment in new roadway capacity is the implementation of transportation systems management and operations (TSMO). Transportation agencies can actively manage roadways by utilizing ITS tools discussed in Chapter 5. These include realtime detection of incidents to shorten dispatch and response time of emergency services and DOT resources, and provision of traveler information so people can avoid problem areas. Other techniques that are applied to very congested facilities, like freeway ramp metering, are not needed in the BMTS region.

**FIGURE 4-11:**  
**LEVEL OF TRAVEL TIME RELIABILITY**



# ASSET MANAGEMENT

5



# CHAPTER 5

## ASSET MANAGEMENT

The physical assets of the BMTS region's transportation system represent an enormous investment of public and private capital. These assets include roadways, bridges, culverts, traffic signals, sidewalks, trails, rail lines, buses, terminals, and airports.

BMTS spends money on new construction to meet emerging needs and to maintain existing infrastructure and keep it in a state of good repair. Limited funding requires striking a balance between new construction and maintenance. Deteriorated assets cannot properly serve their purpose and impose costs on users in the form of increased travel times, decreased vehicle fuel efficiency (rough pavement), and vehicle repairs necessitated by damage caused by potholes or other hazards.

In responding to BMTS' online survey in June 2020, residents assigned "fixing roads and bridges" as their highest investment priority. In addition, 65% of respondents to a Broome County Comprehensive Plan survey in 2019 indicated that "keeping roads and bridges in good condition" was their highest priority for transportation investment.

When investing in assets, taking a system approach results in a better return on the capital investment. A system approach shows how state and local roads function *together* to meet travel needs. For instance, paving a roadway that provides access to the interstate system is as important as keeping the interstate in a state of good repair. When designing pavement projects, safety and accessibility needs for all users should also be identified.

This approach is in line with New York State Department of Transportation's (NYSDOT's) approach to managing the assets it owns. Their central philosophy of improving safety is achieved by following their "Forward Four" principles (Figure 5-1).



### FEDERAL PLANNING FACTORS

- 6 Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight
- 8 Emphasize the preservation of the existing transportation system

FIGURE 5-1: FORWARD FOUR PRINCIPLES



## CURRENT CONDITIONS AND PERFORMANCE

### ROADWAYS

Roadways are the core of the transportation system. Maintaining them in a state of good repair is reflected in the objectives of the LRTP. New York State, Broome and Tioga counties, the City of Binghamton, and the urban towns and villages are each responsible for the roads and streets they own. Table 5-1 shows the distribution of roadway lane mileage for each jurisdiction with the column highlighted in blue showing the 1,403 lane-miles (or 32%) that are considered part of the Federal Aid System and are the focus of this plan. The rest of the roadways must rely on nonfederal funds for repairs and maintenance. While lane widths are not uniform, lane-miles are the best proxy for the total pavement area to be maintained.

**TABLE 5-1:**  
**BMTS REGION LANE MILES AND FEDERAL AID LANE MILES, BY OWNERSHIP**

MAINTENANCE JURISDICTION	BROOME COUNTY (BMTS PLANNING AREA) LANE MILES	% BY OWNER	TIOGA COUNTY (BMTS PLANNING AREA) LANE MILES	% BY OWNER	COMBINED TOTAL LANE MILES	% BY OWNER	TOTAL FEDERAL AID LANE MILES	% BY OWNER
NYSDOT	635.38	20.90%	235.14	17.58%	870.52	19.88%	<b>865.76</b>	<b>61.7%</b>
County	441.35	14.52%	162.96	12.18%	604.31	13.80%	<b>300.42</b>	<b>21.4%</b>
Town	1,414.64	46.53%	894.31	66.86%	2,308.95	52.74%	<b>103.28</b>	<b>7.3%</b>
City or Village	509.93	16.77%	40.82	3.05%	550.75	12.58%	<b>134.89</b>	<b>9.6%</b>
State Parks	11.06	0.36%	0.00	0.00%	11.06	0.25%	-	-
Local Parks	0.12	-	1.34	0.10%	1.46	0.03%	-	-
Other State Agencies	18.42	0.61%	0.00	-	18.42	0.42%	-	-
Private or Restricted Access	9.17	0.31%	3.11	0.23%	12.48	0.29%	-	-
<b>Total</b>	<b>3,040.27</b>	<b>100.00%</b>	<b>1,337.68</b>	<b>100.00%</b>	<b>4,377.95</b>	<b>100.00%</b>	<b>1,403.45</b>	<b>100%</b>

Source: NYSDOT<sup>9</sup>

<sup>9</sup> New York State Department of Transportation. 2020. Roadway Inventory System, New York State GIS Clearinghouse, Engineering Division. Available at: <https://gis.ny.gov/gisdata/inventories/member.cfm?organizationID=539>.

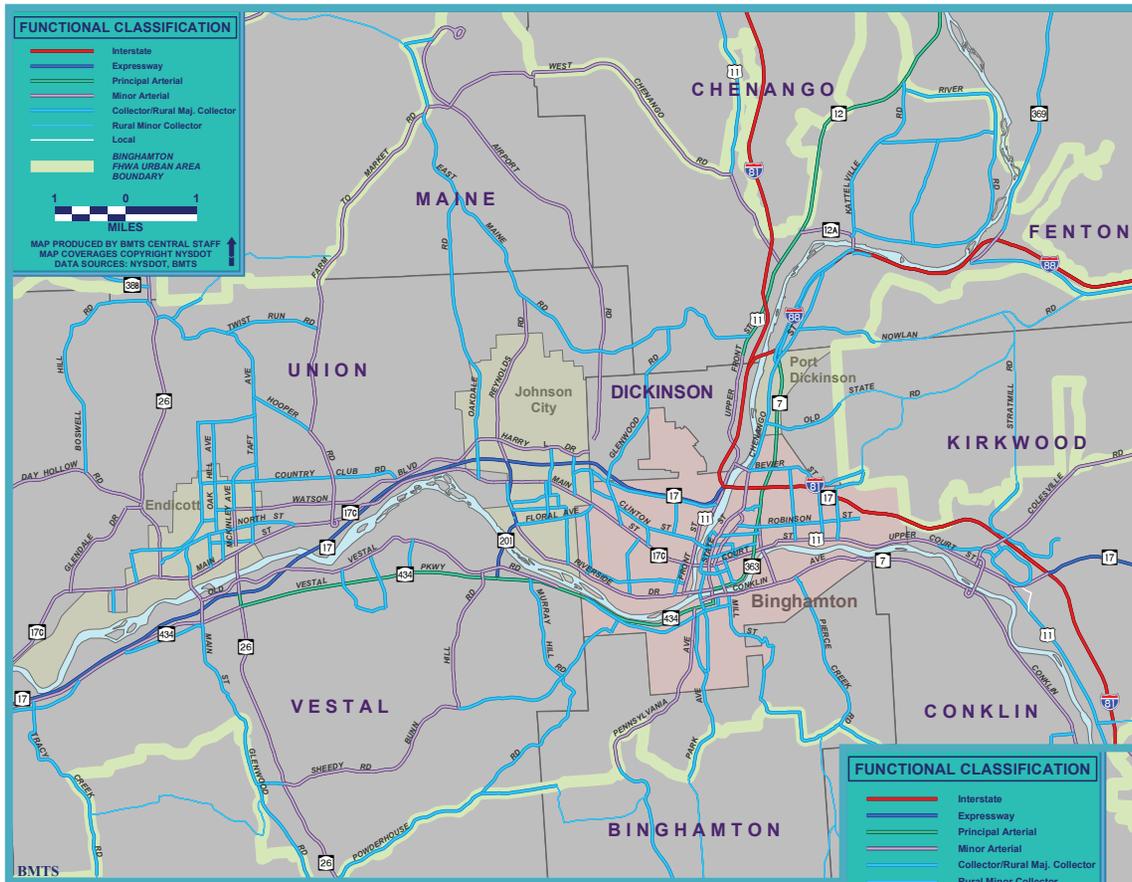
**TABLE 5-2:**  
**ROADWAY FUNCTIONAL CLASS PER FHWA**

ROADWAY TYPE	URBAN	RURAL
Interstate	●	●
Freeway or Expressway	●	●
Principal Arterial	●	●
Minor Arterial	●	●
Major Collector	●	●
Minor Collector	●	●
Local	●	●

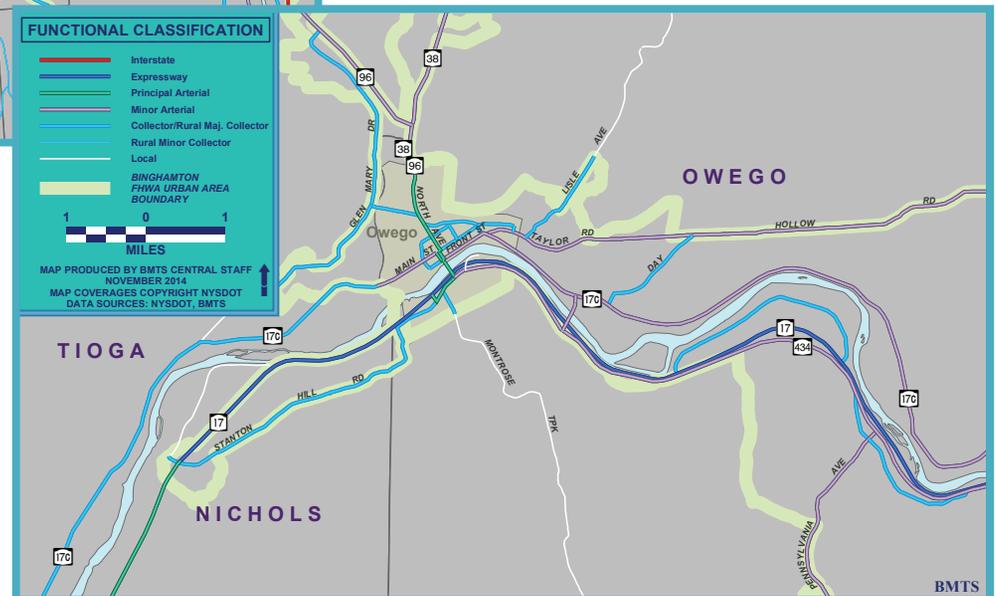
- On Federal Aid System
- Off Federal Aid System

Federal aid can be used to fund projects located on the Federal Aid System. Roadways are divided into groups called functional classes (Table 5-2). These functional classes are based on use and the role they play in the roadway network. Higher functional classes serve more through traffic, while collectors and local roads provide direct access to land parcels (Figure 5-2 and Figure 5-3).





**FIGURE 5-2:**  
**FHWA FUNCTIONAL CLASSIFICATION OF ROADWAYS, BROOME COUNTY**

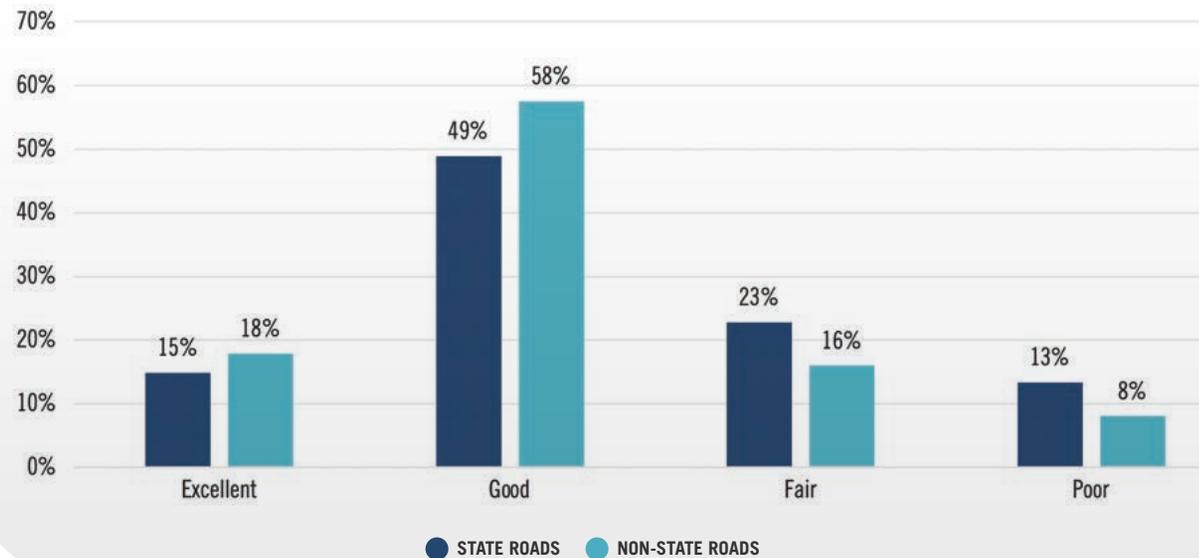


**FIGURE 5-3:**  
**FHWA FUNCTIONAL CLASSIFICATION OF ROADWAYS, TIOGA COUNTY**

NYSDOT collects data on pavement conditions for state-owned roadways. During 2019, they began using an automated system for pavement scoring. This system uses vehicle-mounted detection equipment. It is able to collect data on roughness, rutting, faulting, and cracking; and geometric data on grade, curvature, and cross-slope. The system will convert the output to a 1-10 scale that is compatible with the visual scoring system that has been used previously. This information is used for managing pavement assets on the state system. Pavement conditions of local federal-aid-eligible roads have been rated by BMTS using the NYSDOT visual scoring method. NYSDOT assumed this task in 2019, but those data are not yet available. This information is shared with local governments to use when developing their annual paving programs.

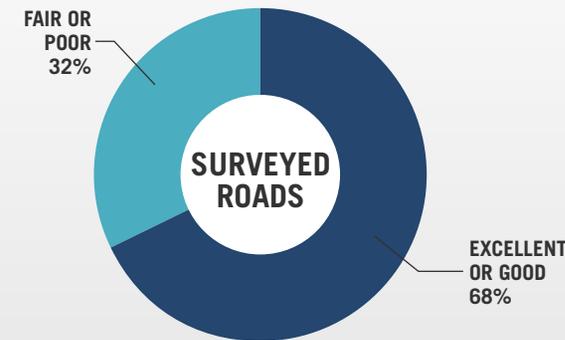
**FIGURE 5-4: PAVEMENT CONDITIONS BY LANE-MILE FOR STATE AND NONSTATE FEDERAL-AID-ELIGIBLE ROADS WITHIN BMTS (2018)**

Summary of surveyed pavement conditions that are detailed in Appendix E.



**TABLE 5-3: TOTAL MILEAGE OF EACH RATING CLASSIFICATION**

PAVEMENT CONDITION	STATE ROADS (Lane-Miles)	NON-STATE ROADS (Lane-Miles)
EXCELLENT	130	97
GOOD	398	312
FAIR	199	86
POOR	113	43



In total, out of all surveyed roads, the majority (68%) were rated as either excellent or good, while 32% were rated as either fair or poor. On the Federal Aid System, state highways are in poorer condition than local roads. This may reflect the greater traffic volume and higher percentage of heavy vehicles on state highways.

Since non-federal-aid-eligible local roads are not inspected and rated, the condition is difficult to determine. Local governments manage their own paving programs.

Overall, most roadways on the Federal Aid System are in fair or better condition, although there is still a need for ongoing maintenance and repair. The “preservation first” approach underlies proper maintenance strategies for fair pavements that can extend their service life and prevent them from deteriorating to a poor rating. Once a pavement is in poor condition, treatments to restore it are more costly.

## BRIDGES

Bridges are a key infrastructure asset that need to be maintained in a state of good repair. A load-posted or closed bridge may create a significant detour. A bridge may be posted with a maximum weight limit when it can no longer carry trucks of a legal load designation<sup>10</sup>. If the operating capacity of the bridge drops below 3 tons, it must be closed to all traffic.

Bridge inspectors also assign federal ratings based on overall average condition assessments of each bridge’s three or four major components and do not require the multi-element evaluations. These federal ratings are used to identify bridges that are considered “Poor” (previously known as “Structurally Deficient”). The fact that a bridge is in poor condition does not imply that it is unsafe or likely to collapse. A poor bridge, when left open to traffic, typically requires posting for weight limits, significant maintenance and repair to remain in service and eventual rehabilitation or replacement to address deficiencies.<sup>11</sup>

Bridges are rated on a numerical scale of 1 to 7 (Table 5-4). The condition rating is a composite of scores for different elements of the bridge comprising the deck, substructure, and superstructure. The inspection also accounts for different bridge designs, including steel girder with concrete deck, prestressed concrete, and steel truss. This makes the condition ratings comparable, although the causes of deficiencies and the work required to correct them will vary.

<sup>10</sup> <https://www.fhwa.dot.gov/federal-aidessentials/companionresources/119bridgeload.pdf>

<sup>11</sup> From NYSDOT “New York State Bridge Program in Brief” at <https://www.dot.ny.gov/main/bridgedata>

TABLE 5-4:

<b>BRIDGE CONDITION DEFINITIONS</b>	<b>Rating of 7: Excellent</b> no work required
	<b>Rating of 5.8 - 7: Good</b> preventive maintenance candidate
	<b>Rating of 4.9 - 5.8: Fair</b> preservation candidate
	<b>Rating of 4.4 - 4.9: Fair</b> repair candidate
	<b>Rating of &lt;4.4: Poor</b> rehabilitation or replacement candidate

TABLE 5-5:

**BMTS BRIDGE CONDITIONS, BY OWNER (2019)**

The BMTS planning area includes 511 bridges (Table 5-5). Of these, 74% are within Broome County and 26% are within Tioga County. In terms of ownership, 50% are NYSDOT-owned structures, 23% are county-owned, 19% are locally owned, and 8% are owned by railroads or other private industries.

OWNER	# OF BRIDGES	AVERAGE CONDITION RATING	# POOR	% POOR
<b>NYSDOT</b>	257	5.50	56	21.79%
<b>City</b>	15	4.57	4	26.67%
<b>County</b>	117	5.62	24	20.51%
<b>Town</b>	73	5.12	28	38.36%
<b>Village</b>	8	5.68	2	25.00%
<b>Other</b>	1		Unreported	
<b>Private-Industrial</b>	4		Unreported	
<b>Railroad</b>	36		Unreported*	
<b>TOTAL</b>	<b>511</b>	<b>5.30</b>	<b>114</b>	<b>22.31%</b>

Source: New York State GIS Clearinghouse, NYSDOT Bridges and Culverts 2019

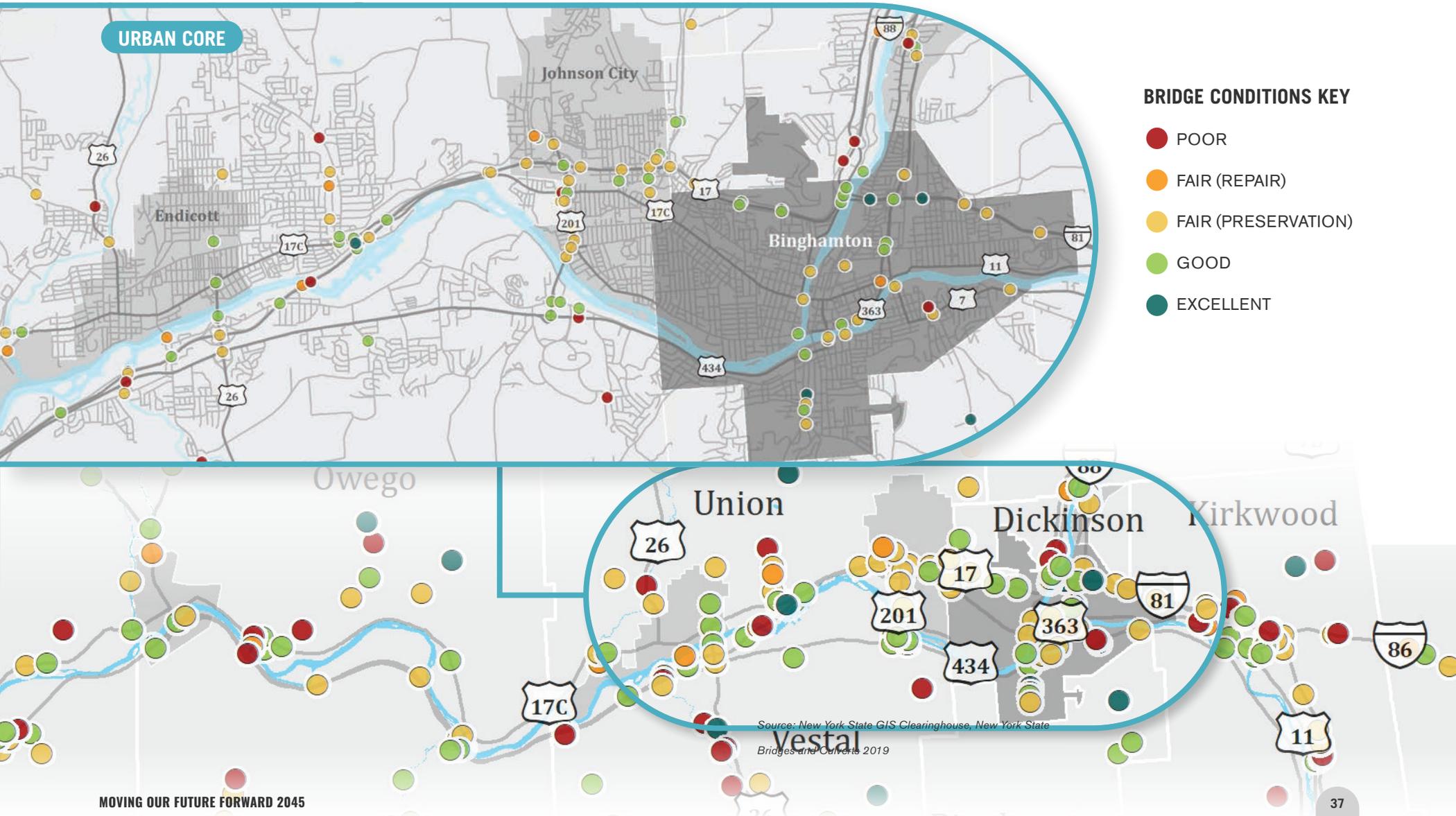
\*Railroads are responsible inspecting their own bridges, including those over public roads. Local governments can request access to inspection reports from the Federal Railroad Administration.

Of concern are the over 22% of the bridges in the region that are rated Poor (formerly “structurally deficient”), approximately half of which are on state highways. FHWA defines this bridge condition as one in which specific elements of substructure, deck, or superstructure are in poor or worse condition. They note that this does not necessarily make a bridge unsafe, but these bridges are candidates for repair or rehabilitation work or replacement.

BMTS also recognizes the importance of bridge maintenance as a critical factor in having a safe and efficient transportation system. Over the years, numerous bridge projects have received funding through the TIP. BMTS will continue to include bridge maintenance as an important component of project development efforts.

**FIGURE 5-5:**  
**BRIDGE CONDITIONS (2019)**

Figure 5-5 maps the condition of bridges in the BMTS area in 2019.



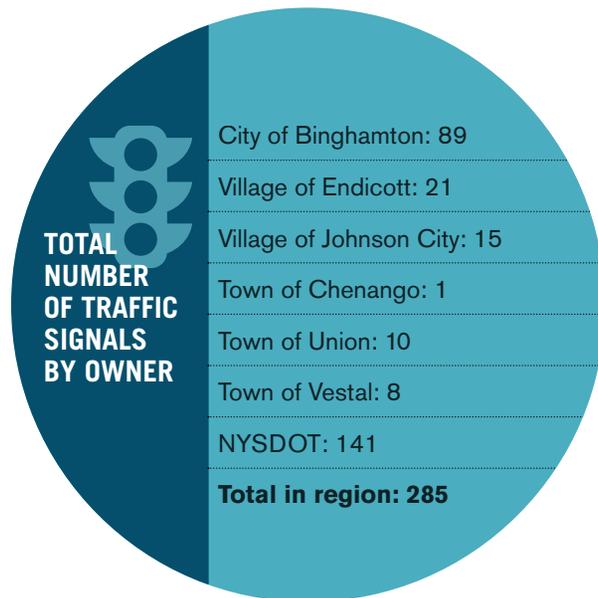
Source: New York State GIS Clearinghouse, New York State  
 Bridges and Culverts 2019

## TRAFFIC SIGNALS

Traffic signals play a key role in the mobility and safety of all users of the highway network. They assign right-of-way of movement for motor vehicles as well as pedestrians and bicyclists. Traffic signals also affect efficiency of travel. Signal timing determines the amount of average delay on each approach or turn lane at an intersection. Signal technology continues to improve, having gone from fixed-time control to actuated control to traffic-adaptive control that adjusts the timing in response to traffic demand. Most signals include pedestrian displays with countdown timers to guide pedestrians in safely crossing at an intersection. Newer signals also include bicycle actuation to enhance the safety of users.

NYSDOT and the municipalities within the BMTS region have routinely invested in replacing aging signals with new technology. Signals are expensive, and with limited funding available, BMTS has adopted a policy of only using federal funds to replace signals that meet signal warrants as outlined in the Manual of Uniform Traffic Control Devices (MUTCD). BMTS staff has worked with local officials to evaluate the signals in their jurisdiction to eliminate traffic signals that are no longer warranted due to changes in demographics, land use, and traffic volumes. When signals are removed, they can be replaced with signage, thus reducing maintenance costs. Limited funds can then be strategically invested in the remaining signalized intersections. The BMTS region includes 285 signals (Table 5-6). The signal owners are responsible for maintaining their signals. All of these signals are located on the Federal Aid System, with at least one leg of the intersection being classified as a Collector or above and are eligible for federal aid.

TABLE 5-6:



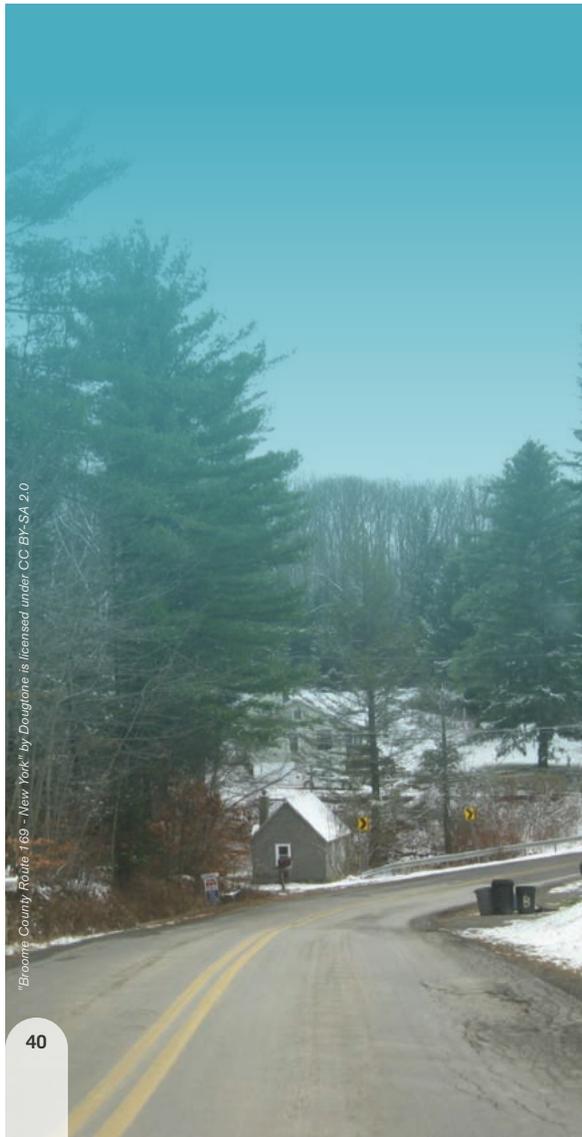
In addition to traffic signal upkeep, signs and pavement markings must be visible in various environmental conditions. Many signs are individual postings that can be easily replaced when necessary. Large signs mounted on structures (Figure 5-6) require a significant effort for maintenance and replacement. FHWA has created a rule in the MUTCD on minimum retroreflectivity of signs, noting that while nighttime travel accounts for only 25% of VMT, 50% of crashes occur at night.<sup>12</sup> Signs must be tested and replaced when they no longer meet the standard. Studies<sup>13</sup> have found that older drivers need signs and pavement markings that are clearly visible throughout the day. This is especially true at intersections, where the FHWA study found nearly half of fatal crashes involving older drivers occur. Complex intersections can be confusing for all drivers. Pavement markings deteriorate over time, especially in the winter with the use of salt and sand. Highway owners typically have an annual maintenance program to cover such upkeep.

**FIGURE 5-6: LARGE OVERHEAD SIGN**



## INFRASTRUCTURE NEEDS

An objective of the LRTP is to strategically invest resources in the regional transportation system to move toward a state of good repair for pavements and bridges. This is a continuous challenge due to the large gap between needs and available funding, but accomplishing it is of great importance to BMTS, as is evidenced by the proposed investments in the LRTP Financial Plan (Chapter 11). A well-maintained system supports Our Communities by providing people with safe and reliable access to their destinations by all modes. It is a safer system without disruptions to traffic flow or signal malfunctions. A well-maintained system supports Our Economy because businesses cannot thrive when roads are damaged, or bridges are closed. A system that is in a state of good repair supports community resilience by being better able to meet critical travel needs during and after disruptive events.



"Broome County Route 169 - New York" by Douglass is licensed under CC BY-SA 2.0

### PAVEMENTS

FHWA developed a methodology for estimating the cost per lane mile of moving a system of pavements to a state of good repair.<sup>14</sup> The methodology considers the life cycle needs for pavements with beginning condition ratings ranging from excellent to poor. Poor pavements require major rehabilitation to return them to excellent condition, starting a new life cycle. Good and fair pavements require periodic treatments that include preventive maintenance like crack sealing; and pavement treatments, including mill and resurfacing or overlays. Achieving a system-wide state of good repair means that there would be few if any miles of pavements in poor condition, while those rated fair and good would be on a standard cycle of treatment to extend their service life. The FHWA methodology is based on a 50-year service life for newly constructed pavements. It is also understood that the treatment cycle will not be uniform because it is influenced by traffic volume and the percentage of heavy vehicles. While weather is an important factor, it is considered uniform across the BMTS region.

Applying the methodology to current roadway conditions in Table 5-7 yields a 10-year cost estimate of approximately \$436 million and a 20-year cost of approximately \$994 million.

**TABLE 5-7: TOTAL LANE-MILEAGE OF EACH RATING CLASSIFICATION**

ROAD TYPE	EXCELLENT	GOOD	FAIR	POOR	TOTAL
State Roads	129.9	412.0	207.4	116.4	<b>865.8</b>
Nonstate Roads	96.9	312.1	85.5	43.5	<b>537.7</b>

*\*Does not include roadways under construction (1.06 miles) and segments of Endicott/Vestal Bridge and S. Washington Bridge, which are not rated.*

<sup>14</sup> Federal Highway Administration. 2010. "Performance Evaluation of Various Rehabilitation and Preservation Treatments." Available at: <https://www.fhwa.dot.gov/pavement/preservation/pubs/perfeval/perfeval.pdf>.

## BRIDGES

Bridge needs are more difficult to estimate because of the variability of bridge design, deck area, and inspection history. Achieving a state of good repair is much less dependent on a fixed cycle of treatments than for pavements because of these unique features. Preventive maintenance may include regular washing to remove road salt and debris, periodic painting of steel members, deck repairs, and repair or replacement of bridge bearings. Longer-term needs, based on inspection findings, include repair or replacement of specific elements such as the deck, substructure, superstructure, and approach roadways. As the bridge reaches the end of its useful life, total replacement will be necessary.

Like pavements, the rate at which elements of a bridge deteriorate is also reflective of traffic volume and percentage of heavy trucks. The estimated cost of each of these types of repairs will vary from one bridge to another.

Some guidance is offered by FHWA, using data from the National Bridge Inventory to calculate the cost of replacement or rehabilitation of all structurally deficient bridges by state.<sup>15</sup> Data are provided for bridges on and off the NHS. The New York average cost estimates, shown in Table 5-8, can be used for planning-level determination of the bridge need in the BMTS region.

Table 5-5 shows that there are 58 structurally deficient (poor) locally owned bridges in the region and 56 owned by NYSDOT. Assuming 75% of the local bridges can be rehabilitated, and no others become poor, it would cost an estimated \$46.8 million for this work. With the majority of poor NYSDOT bridges being on the NHS, the cost estimate for those is \$354.3 million. This could be spread out over five or more years, depending on actual bridge condition. Additional funds would be required for preventive maintenance and work on bridges rated fair and good to extend their service life.

This estimate also excludes large culverts, which NYSDOT defines as having internal measurement of between 5 and 20 feet. These structures under roadways require maintenance and periodic repair or replacement.

Many assets are eligible for certain categories of federal aid, but limited funding for TIP projects makes it difficult to address many of these needs. To best utilize the available funding, investments in bridges and pavements must be strategic and done in a manner that strives to move the regional transportation toward a state of good repair

Locally owned assets not located on the Federal Aid System are a category of need that is also of concern to BMTS. It is this network that delivers personal and freight mobility to residents and businesses, commonly referred to as first mile/last mile, and it is an important part of the transportation system.

**TABLE 5-8: BRIDGE REPLACEMENT AND REHABILITATION COST ESTIMATES (NY AVERAGE) FOR BRIDGES RATED POOR, 2019 NATIONAL BRIDGE INVENTORY**

TYPE	REPLACEMENT	REHABILITATION
NHS	\$10.236 million <i>(\$337/sq ft deck area)</i>	\$6.691 million <i>(\$229/sq ft deck area)</i>
Non-NHS	\$1.035 million <i>(\$342/sq ft deck area)</i>	\$0.704 million <i>(\$233/sq ft deck area)</i>

Source: FHWA

<sup>15</sup> Federal Highway Administration "National Bridge Inventory, Bridge Replacement Costs 2019." Available at <https://www.fhwa.dot.gov/bridge/nbi/sd2019.cfm>.

TABLE 5-9:

## CHIPS AND PAVE NY ALLOCATIONS (\$ MILLIONS)

BMTS LOCAL GOVERNMENTS		CHIPS	PAVE NY
<b>Broome County</b>	–	2.497	0.570
<b>City of Binghamton</b>	–	1.003	0.229
<b>Towns</b>	Chenango	0.137	0.031
	Conklin	0.094	0.021
	Dickinson	0.025	0.006
	Fenton	0.111	0.025
	Kirkwood	0.095	0.022
	Union	0.253	0.058
	Vestal	0.311	0.071
<b>Villages</b>	Endicott	0.231	0.053
	Johnson City	0.256	0.058
	Port Dickinson	0.024	0.005
<b>Tioga County</b>	–	1.187	0.271
<b>Towns</b>	Candor	0.318	0.073
	Nichols	0.119	0.027
	Owego	0.440	0.100
	Tioga	0.221	0.500
	Candor	0.014	0.003
<b>Villages</b>	Nichols	0.011	0.002
	Owego	0.086	0.020

Source: NYSDOT

Local governments receive New York State Consolidated Local Street and Highway Improvement Program (CHIPS) and PAVE NY funds on an annual formula basis. Neither of these NY State funding sources are guaranteed but have historically been provided. These programs fund capital projects and equipment purchases, with the latter being limited to pavement rehabilitation and reconstruction.

CHIPS funds may also be used to purchase equipment with a service life of at least 10 years. Municipalities must otherwise rely on local revenue sources to pay for road and bridge projects. Table 5-9 shows the allocations each municipality received in New York State during fiscal year 2018–19. These amounts are small compared to both need and the cost of construction. Table 5-7 shows 18.5 miles of federal aid local streets rated poor and 36.4 miles rated fair. In order to achieve a state of good repair, these streets would require paving work, especially since the “preservation first” approach includes extending the life of fair pavements before they deteriorate to poor.

In Table 5-10, data from NYSDOT Region 9 shows how much a typical paving project would cost. Mill and resurface is a common treatment for fair pavements; a street with two 11-foot lanes would cost nearly \$300,000 per mile. New concrete curbs would more than double that cost. Even a pavement overlay without milling would cost approximately \$267,000 per mile. A street rated poor may require full reconstruction at an estimated cost of more than \$1.6 million per mile without curbs or other improvements.

TABLE 5-10:

**PROJECT COST ESTIMATES**

PAVING	PER SQ YARD	PER LANE MILE		
		10-ft lane	11-ft lane	12-ft lane
MILL AND RESURFACE, 2-IN. PAVEMENT	\$23	\$135,500	\$148,500	\$161,500
OVERLAY, 2-IN. PAVEMENT	\$21	\$121,700	\$133,600	\$145,500
FULL RECONSTRUCTION	\$115	\$675,000	\$742,500	\$810,000

OTHER	PER UNIT
Sidewalk, 4 ft. wide	\$36/linear ft.
Sidewalk, 5 ft. wide	\$43/linear ft.
Multiuse path, asphalt, 10 ft. wide	\$80/linear ft.
Concrete curb	\$48/linear ft.
ADA curb ramp	\$4,000 each

Source: NYSDOT Region 9  
 Note: ADA – Americans with Disabilities Act





## TRAFFIC SIGNALS

Because traffic signals are key elements for both the safe and efficient operation of the transportation system, there are ongoing needs related to them.

BMTS has periodically evaluated signals to determine if they continue to meet MUTCD warrants as traffic conditions change. Those that do not are recommended for removal. Leaving unwarranted signals in operation creates a safety hazard, as drivers may come to not respect a red light. It also contributes to the maintenance burden of the owner. Similarly, increased vehicle traffic or pedestrian use may warrant installation of a signal at a new location.

Signal malfunctions can create an immediate safety hazard. Each signal owner should keep their signals in working order.

Traffic signal equipment has evolved. LEDs (light-emitting diodes) have replaced incandescent lamps, pedestrian indicators include countdown timers and are accessible to the visually impaired, and controllers are more advanced. It will be important that signal owners replace obsolete equipment to maximize safety benefits that these improvements bring.

## INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

Finally, part of the evolution of traffic control equipment is driven by computer technology and advances in intelligent transportation system (ITS). This includes devices that monitor traffic, like vehicle detectors and video cameras; devices that communicate conditions to drivers, like variable message signs (VMS), highway advisory radio, and apps like 511NY; and the communications channels that link them. BMTS has created an ITS Regional Architecture<sup>16</sup> that details the functions that are served, and the communications channels and centers. BMTS will continue to examine emerging technology (discussed in Chapter 10) to identify opportunities that will result in clear improvements to the safety and mobility of all users.

<sup>16</sup> <http://www.bmtsonline.com/sites/default/files/Reports%20and%20Documents/Binghamton%20Regional%20ITS%20Architecture%202018%20FINAL.pdf>

# MOBILITY & ACCESSIBILITY

6



## CHAPTER 6

# MOBILITY & ACCESSIBILITY



### FEDERAL PLANNING FACTORS

- 4 Increase accessibility and mobility of people and freight;
- 6 Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
- 7 Promote efficient system management and operation;
- 10 Enhance travel and tourism

Mobility and accessibility mean that people of all ages, abilities, and economic statuses can travel safely and reliably throughout and beyond the region with access to destinations that meet their needs and desires.

Complete Streets are designed to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities. Complete Streets also encourage the development of neighborhood-scale commercial and mixed land use. Complete Street design elements are context sensitive. For instance, while bicycle lanes and sidewalks might be appropriate in an urban setting, shoulders may be better suited along a rural roadway.

The Complete Streets Act<sup>17</sup> became law in New York in 2011. It requires that all projects that use federal or state funds must consider Complete Streets elements in their design. BMTS adopted a Complete Streets policy in 2016, which ensures that the needs of all modes are considered at the initial project proposal stage and during project design and budget estimates. Many of BMTS' municipal partners have since adopted their own Complete Streets policies, including the City of Binghamton, Village of Johnson City, Town of Union, Town of Fenton, Village of Endicott, Town of Dickinson, and the Village of Deposit.

The City of Binghamton recently completed the State Street Gateway project, which includes many Complete Streets elements. The before-and-after photos of the State Street Gateway Project are shown in Figure 6-2.



FIGURE 6-1: TWO RIVERS GREENWAY

<sup>17</sup> Chapter 398, Laws of New York.



Source: Google Street View

**FIGURE 6-2:  
STATE STREET GATEWAY PROJECT—  
BEFORE (ABOVE) AND AFTER (RIGHT)**





## PEDESTRIAN AND BICYCLE FACILITIES

Walking and cycling are recognized as important modes of transportation and recreation in the region. Continued engineering improvements to the transportation system to safely accommodate pedestrians and cyclists, including elements such as bike lanes and sidewalks, high-visibility crosswalks, and the latest pedestrian crossing signal technology, must be combined with education, encouragement, and enforcement.

Since their adoption in 1996, much of the regional progress in active transportation policies and projects has been guided by BMTS' Pedestrian and Bicycle Plans. The most recent updates to the Pedestrian and Bicycle Plan occurred in 2013 and 2015, respectively.

### TWO RIVERS GREENWAY

What has become the Two Rivers Greenway (Figure 6-1) was first outlined in 1999 in the *Binghamton Metropolitan Greenway Study*. The greenway is intended to be a contiguous multiuse trail system that parallels the Susquehanna and Chenango rivers and leverages existing facilities like the trail system in Otsiningo Park. Table 6-1 shows the sections of the Two Rivers Greenway that have been completed to date. Figure 6-3 shows the location of existing, planned, and proposed greenways in the BMTS region.

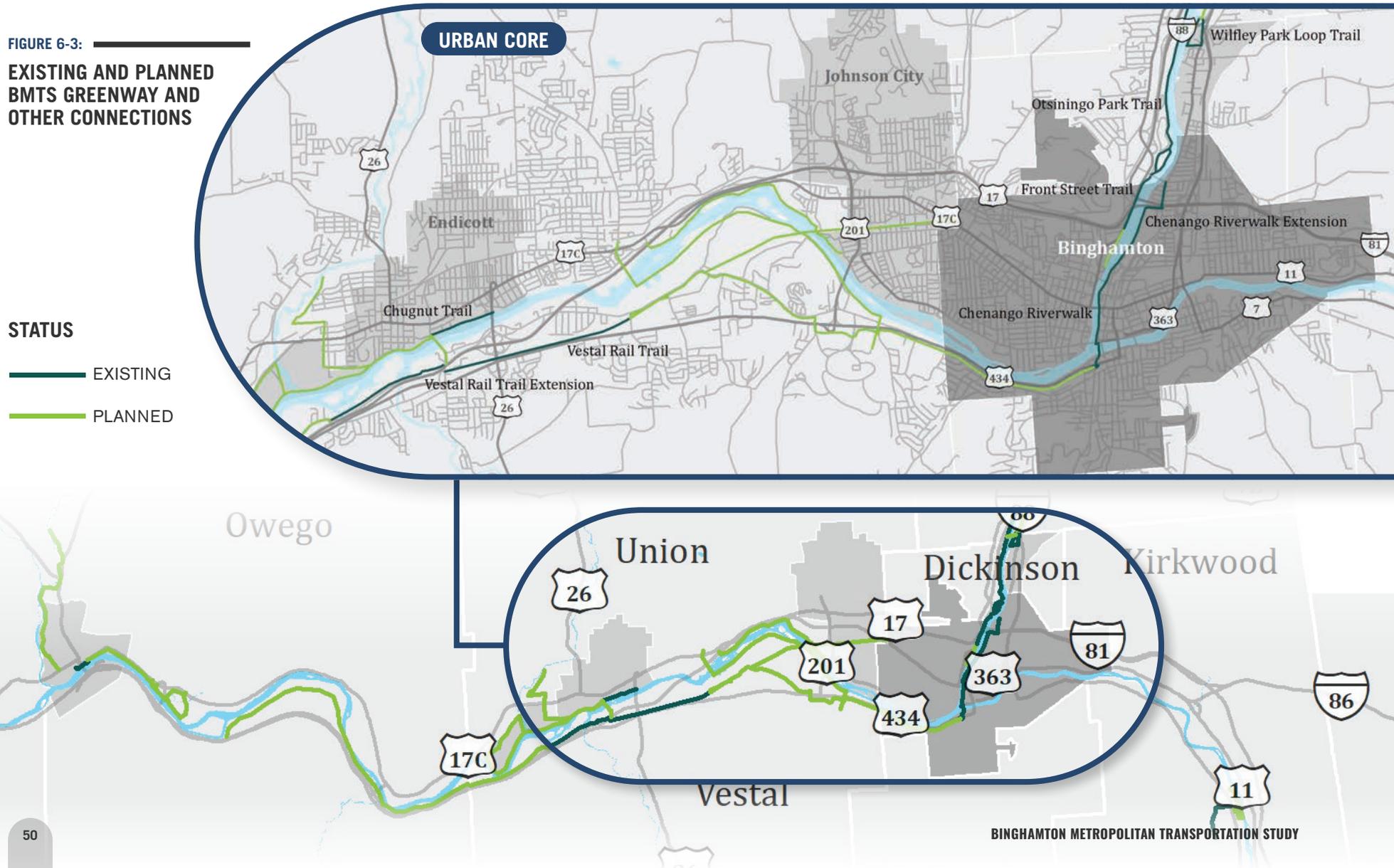
TABLE 6-1:

## EXISTING TWO RIVERS GREENWAY SEGMENTS

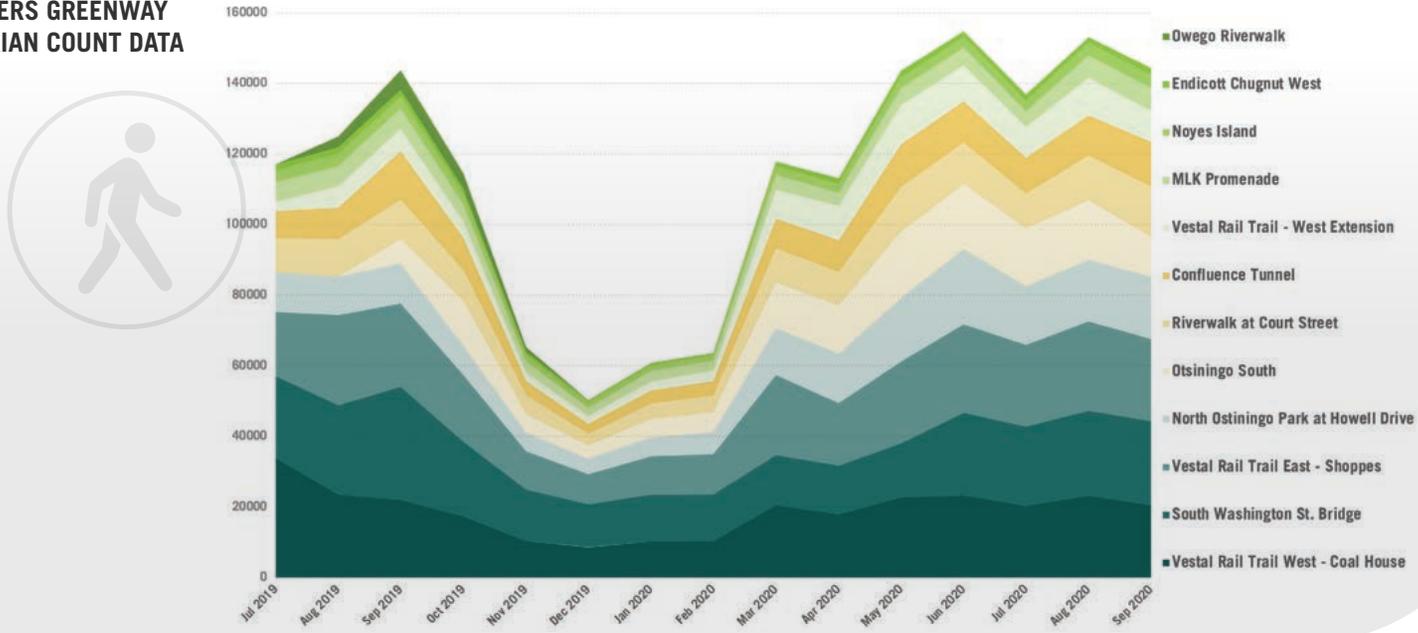
TRAIL NAME	JURISDICTION	LENGTH (MILES)
Owego Riverwalk	Village of Owego	0.25
Chugnut Trail—River Terrace to Riverview Dr.	Village of Endicott	0.70
Vestal Rail Trail—Main St. to African Rd.	Town of Vestal	2.09
Vestal Rail Trail—Phase 2 Castle Gardens to Main St.	Town of Vestal	1.62
South Washington Street Pedestrian & Bicycle Bridge City	City of Binghamton	0.10
Confluence Park	City of Binghamton	0.10
Chenango Riverwalk—Confluence Park to Court St.	City of Binghamton	0.39
Chenango Riverwalk—Court St. to East Clinton St.	City of Binghamton	0.28
Chenango Riverwalk—Water St. to Eldredge St.	City of Binghamton	0.40
Chenango Riverwalk—Eldredge St. to Cheri Lindsey Park	City of Binghamton	0.50
Chenango Riverwalk—Cheri Lindsey Park to Bevier St.	City of Binghamton	0.41
Otsiningo Park/Otsiningo Park Ext.	Broome County	3.50
Port Dickinson Community Park	Village of Port Dickinson	0.75
Conklin Multiuse Trail	Broome County/ Town of Conklin	1.40
Route 434 Greenway—South Washington St. Bridge to Murray Hill Rd. Phase 1 (S. Washington St. Bridge to Vestal Ave./Pennsylvania Ave.)	NYSDOT	0.40
Route 434 Greenway – South Washington St Bridge to Murray Hill Rd. Phase 2	NYSDOT	2.55
<b>TOTAL EXISTING MILES</b>		<b>12.89</b>

Having data on trail use is important for supporting decisions on constructing additional segments. BMTS began its Bicycle and Pedestrian Counting Program in the summer of 2019 with the installation of 12 permanent counting units along trails within the region. BMTS manages the counting units and the count data and has made data available online. Data reveal substantial use, even in winter months. These data also highlight the more popular trails, such as the Vestal Rail Trail and Otsiningo Park trails. Figure 6-4 and Figure 6-5 depict 15 months of count data, from July 2019 through September 2020. Figure 6-6 shows the cumulative combined use by pedestrians and cyclists for that period was nearly 1.7 million trips. This level of use confirms how valuable the Two Rivers Greenway is for the community and its quality of life.

**FIGURE 6-3:**  
**EXISTING AND PLANNED**  
**BMTS GREENWAY AND**  
**OTHER CONNECTIONS**



**FIGURE 6-4:**  
**TWO RIVERS GREENWAY**  
**PEDESTRIAN COUNT DATA**



**FIGURE 6-5:**  
**TWO RIVERS**  
**GREENWAY BICYCLE**  
**COUNT DATA**

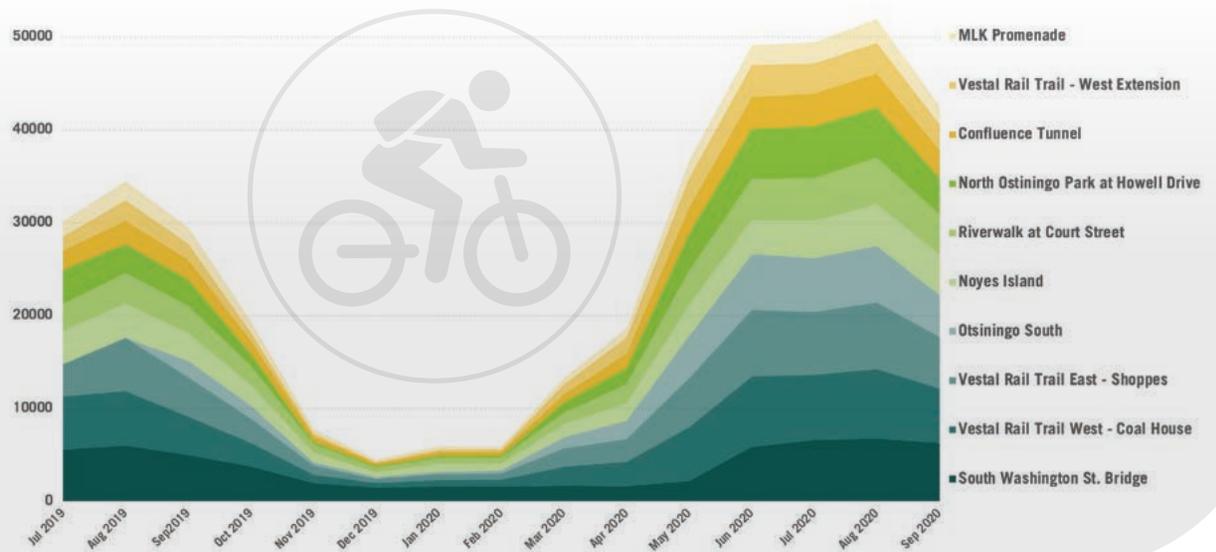
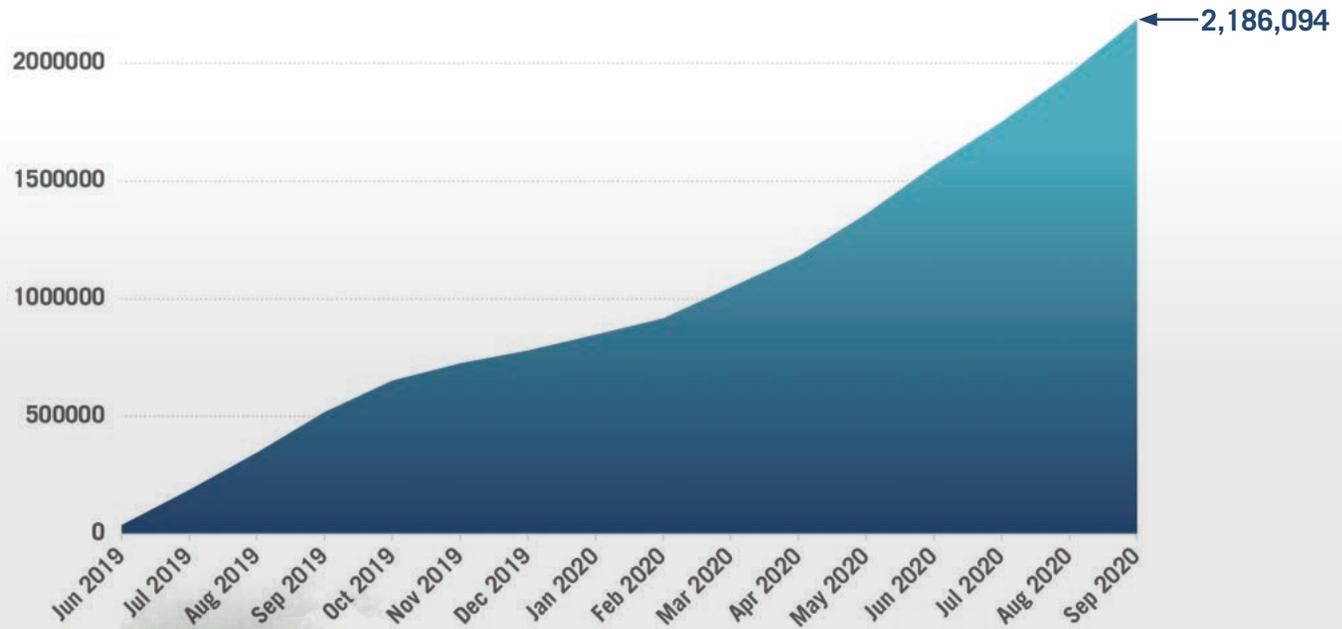


FIGURE 6-6:

**RUNNING TOTAL OF COMBINED BICYCLIST AND PEDESTRIAN COUNTS**



**NEEDS**

- Complete segments proposed in the Binghamton Metropolitan Greenway Study and/or other segments that fulfill the purpose of the Greenway Study.
- Continue to install bicycle and pedestrian counters along new trail segments.

## PEDESTRIAN FACILITIES

Sidewalks are present in the urban core communities, but significant gaps remain. Some are in critical locations such as along BC Transit routes and near schools. Many municipalities make sidewalk maintenance the responsibility of the abutting property owner. This can result in poor maintenance over time. Further, sidewalks often become impassable when snow and ice is not removed by property owners. Many curb ramps are also in poor repair, making them difficult to navigate.

With technical support from BMTS, the City of Binghamton, Village of Johnson City, and the towns of Union and Vestal have each completed an Americans with Disabilities Act (ADA) Transition Plan for Pedestrian Facilities in the Public Right-of-Way. These plans, completed in 2016 and 2017, inventory the level of compliance of sidewalks and curb ramps with the ADA accessible design guidelines and sets a plan to bring these facilities into compliance. At the time of data collection for these plans, sidewalks in most municipalities were at least partially accessible, with only Binghamton scoring well on curb ramps and crossings. Since then, each municipality has been working to improve the conditions identified in the plans. NYSDOT adopted its ADA Transition Plan<sup>18</sup> in 2016.

Enhancements are being made to improve pedestrian safety at intersections and midblock crossings. As signals are being replaced, most locations now include countdown pedestrian signals. In some locations, audible pedestrian signals are also being installed.

Rectangular rapid flashing beacons (RRFB) and pedestrian hybrid beacons (PHB) are being installed at unsignalized or midblock crossings where greater safety measures for pedestrians are needed. For example, as shown in Figure 6-7, Main Street in the City of Binghamton is a busy arterial. The commercial district between Jarvis St and Laurel Ave has restaurants and other stores on both sides of the street between signalized intersections. The RRFB was installed to allow pedestrians to push a button and activate the beacons, thus alerting motorists to their presence. Continuous evaluation may lead to the installation of additional pedestrian safety devices based on need.



FIGURE 6-7: RRFB—MAIN STREET NEAR JARVIS STREET, BINGHAMTON

<sup>18</sup> New York State Department of Transportation, "ADA Transition Plan", 2016. <https://www.dot.ny.gov/programs/adamangement/ada-transition-plan>



## PEDESTRIAN NEEDS

- **Form a continuous sidewalk network in urban areas.** Immediate needs include improving sidewalk access to schools, parks, commercial areas, and BC Transit stops.
- **Conform to the ADA Accessibility Guidelines.** These guidelines dictate key factors such as width, slope, and intersection treatments that make the system usable for people with mobility or visual impairments.
- **Support ongoing maintenance, including removal of ice and snow.** New York State Highway Law places the responsibility for sidewalk maintenance on the roadway owner. Local governments are permitted to adopt ordinances that transfer that responsibility to the abutting property owner; this is most frequently the case. This was cited as a problem during BMTS public outreach activities because property owners may not make repairs or clear sidewalks in the winter. There are alternatives that transfer the responsibility from the property owner to the municipality. One example is the Town of Chenango winter maintenance program. They defined a commercial district in which property owners pay a fee and the Town performs snow removal. The City of Ithaca created a program of Sidewalk Improvement Districts<sup>19</sup> where property owners are assessed an annual fee. There is a lower fee for one- and two-family residences, and a higher fee that adds lot frontage and building size for others. The City collects the fees and funds an annual sidewalk repair program.
- **Provide the appropriate level of traffic control device where pedestrians are crossing streets.** This may be uncontrolled, as on a low-volume residential street, a crosswalk, or a pedestrian signal at signalized intersections. Another option is unique signal installations for midblock crosswalks on busy streets, including RRFBs or PHBs that are activated via push button.
- **During routine pavement rehabilitation projects, incorporate low-cost Complete Streets elements, such as painted crosswalks or signage, where appropriate.**
- **During new construction or reconstruction of roads and bridges, more extensive Complete Street improvements should be included, where appropriate.**
- **Complete the Two Rivers Greenway System.**

<sup>19</sup> <https://www.cityofithaca.org/219/Sidewalk-Policy>

## BICYCLE FACILITIES

While bicyclists can ride on any street except where prohibited by law, street design, traffic volume, and speed limit contribute to a rider's safety. Several facility design methods give bicyclists the space they require:

- Lanes that are wide enough to accommodate a car and bicycle. "Wide curb lanes are shared use facilities where motor vehicles and bicycles are both accommodated in a wider travel lane. AASHTO's "Guide for the Development of Bicycle Facilities" states a usable pavement width of 14 ft. (4.2 m) is desired."<sup>20</sup>
- Bicycle lanes designated by pavement markings, sometimes with colored pavement.
- Multiuse trails shared with pedestrians and other users.

Bicycle lanes, sharrows, and shoulders can be found throughout the BMTS region, although there is no consistent application. The maintenance of these facilities, including street sweeping, is key to their usability and effectiveness.

Cyclists also need secure and convenient parking for their bikes. If there is no parking, they may choose not to ride. Bike racks can be installed by both public entities and private businesses. This has been done in downtown Binghamton and other urban area locations (Figure 6-8).

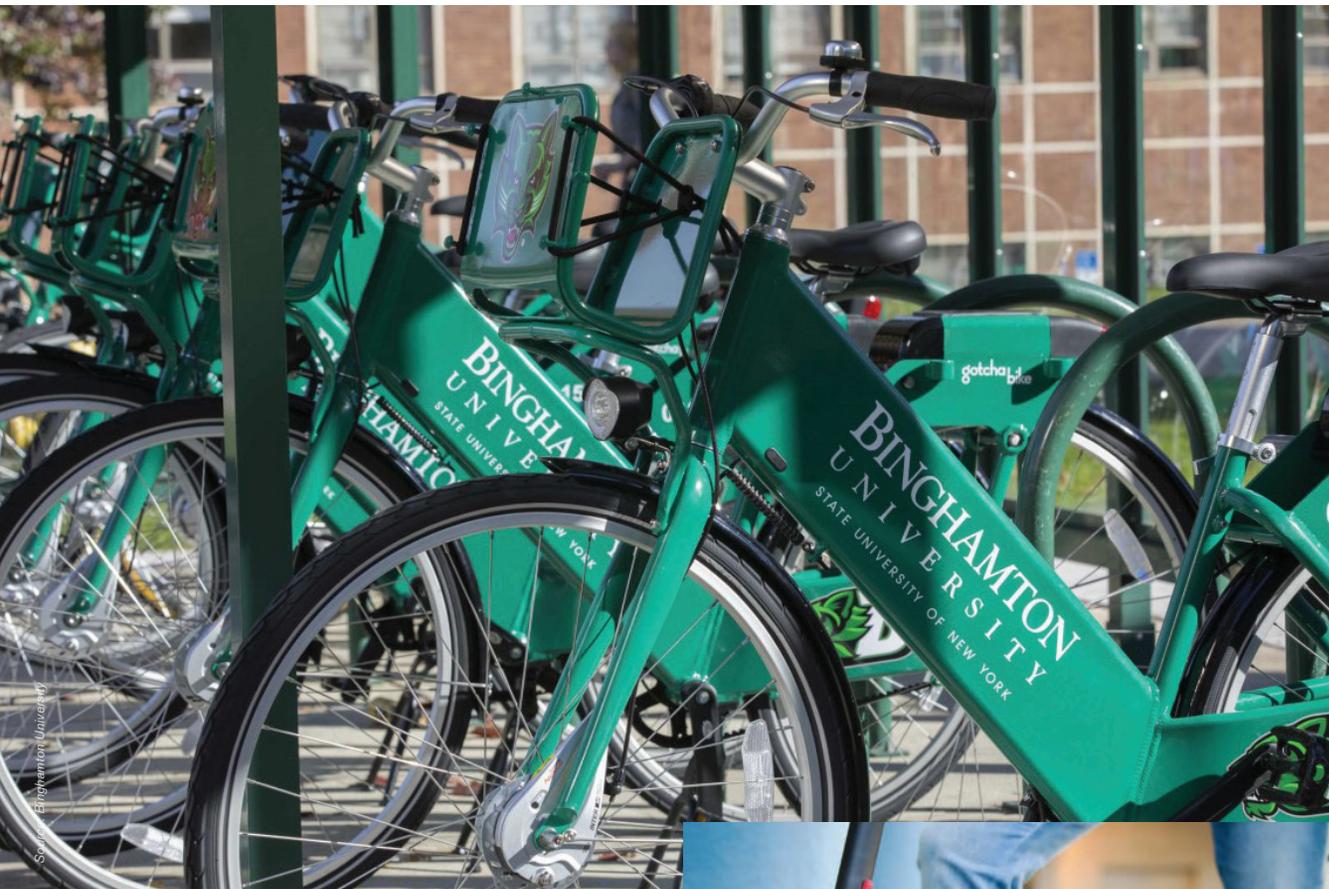
To enable cyclists to connect to transit for longer trips, BC Transit and Off Campus College Transport (OCCT) have installed bicycle racks on all their buses. These racks permit riders to use bikes to connect to the bus, effectively enlarging the transit service area (Figure 6-9). The racks each accommodate two bikes. Riders have shown that they are easy to use and that it takes little time to place or remove the bike. There have been no documented instances to date where the rack has been full and a cyclist has to wait for the next bus.

**FIGURE 6-8:**  
**EXAMPLE OF ARTISTIC DOWNTOWN BIKE RACKS IN BINGHAMTON**



**FIGURE 6-9:**  
**BIKE RACK ON BC TRANSIT BUS**

<sup>20</sup> New York State Department of Transportation, "Highway Design Manual Chapter 17 Bicycle Facility Design" Section 17.4.6, June 24, 2015



## Bikeshare and E-Scooters

Bikeshare systems first provided mobility to urban residents without the need for bicycle ownership. Docked systems feature bikes locked in special racks throughout an urban area. Subscribers must pick up and drop off bikes at the docks, somewhat reducing the convenience of the service. Dockless systems use GPS trackers to locate bikes. Subscribers must find a bicycle but are not constrained in where they leave it.

The BMTS region has one bikeshare program, which is run by Binghamton University (Figure 6-10). It offers free bicycle use to students, faculty, and staff. The program currently has 30 bikes and four docking stations on the Vestal campus. With the University having expanded to Binghamton and Johnson City, there is interest in having bikeshare services that are open to the public and available in the Binghamton, Johnson City, Endicott, and Owego areas.

Sharing services for battery-operated scooters have also become popular in the past two years. These services were prohibited in New York until a budget agreement in April 2020 included language that authorized e-scooters and electric bicycles used in bikeshare services.<sup>21</sup> Scooters are used primarily for short trips, sometimes for first-/last-mile connection to transit. These services may be regulated by the municipality in which they operate. Because they are not docked, scooters sometimes create obstacles for pedestrians.



<sup>21</sup> Christine Fisher. "New York finally legalizes e-bikes and e-scooters statewide." Engadget, April 2, 2020. Available at: <https://www.engadget.com/new-york-legalizes-e-bikes-scooters-171413835.html>.

FIGURE 6-10: BINGHAMTON UNIVERSITY BIKESHARE



## BICYCLE NEEDS

- **Inventory existing bicycle facilities and identify opportunities for new facilities.** This includes bicycle parking.
- **Encourage a consistent, system-wide application for bike lanes, sharrows, and shoulders, and identify a system of bicycle-safe streets so that cyclists can navigate safely and drivers become more aware of the likelihood of cyclists on certain roadways.**
- **Complete the Two Rivers Greenway system.**
- **Support additional trail development that will create a fully regional trail network.**
- **Expand bikeshare beyond the Binghamton University system with allowances for the safe inclusion of e-bikes that serve new customers and expand the effective range of bicycle trips.**
- **Explore opportunities to support effective and safe e-scooter operations.** Well-designed guidelines now exist for the regulation of scooter programs that allow cities to avoid some of the problems that occurred in the early phases of their deployment.
- **During routine pavement rehabilitation projects, incorporate low-cost Complete Streets elements, such as painted bike lanes or shoulders, where appropriate.**
- **During new construction or reconstruction of roads and bridges, include more extensive Complete Street improvements, where appropriate.**

TABLE 6-2:

### IDENTIFIED MOBILITY AND ACCESSIBILITY PROJECTS

Table 6-2 shows mobility and accessibility projects where a planning study or an Initial Project Proposal have been completed. These projects would be good candidates for future funding.

DESCRIPTION	OWNER	COST (\$ Millions)
Grand Blvd. Traffic Calming <sup>22</sup>	City of Binghamton	\$0.750
Chugnut Trail Extension	Town of Union, Village of Endicott	\$1.044
Johnson City Rail Trail <sup>23</sup>	Village of Johnson City	\$5.900
Vestal Rail Trail—African Rd. to Shippers Rd.	Town of Vestal	\$0.750
Henry Street Corridor Improvements	City of Binghamton	\$5.700

<sup>22</sup> <http://www.bmtsonline.com/sites/default/files/Grand%20Boulevard%20Mini-Roundabout%20Study-Final.pdf>

<sup>23</sup> <http://www.bcgis.com/website/Planning/JC/JCRailTrailFeasibilityStudy.pdf>



Binghamton New York Bus Station by pascooper98392 is licensed under CC BY-NC 2.0

## TRANSIT

Broome County operates three public transit services: BC Transit, BC Lift/Office for Aging (OFA) Mini-Bus, and BC Country. Public transit fills an important need for personal mobility. Many transit riders have limited transportation options and use transit for many or most of their trips; these people are often referred to as transit dependent. Low-income households may not be able to afford to own and operate a car. Many individuals with disabilities cannot drive. Older adults often reach a point when they no longer feel safe driving, whereas children typically rely on their families for transportation but may also use transit. Other people may choose to use transit because of the environmental benefits of a shared-ride service.



Broome County Transit bus by Can-Pac Service is licensed under CC BY-NC 2.0

### BC TRANSIT

BC Transit is a fixed-route bus service that comprises 18 routes. Some of these routes are limited in terms of service hours and frequency, including the K and Corporate Park Commuter and the Shoppers Special runs. BC Transit uses primarily 40-foot transit coaches, all of which are wheelchair accessible in compliance with the ADA design standards. They also have front-mounted bicycle racks that can accommodate two bicycles. The standard fare is \$2 with a free transfer. A reduced fare of \$1 is charged for senior citizens (65+) and persons with disabilities. Per funding contracts with BC Transit, students at Binghamton University and SUNY Broome ride for free, as do Binghamton High School students traveling to and from school.

Table 6-3 shows a decline in BC Transit ridership since 2015. Some uncertainty exists as to how to interpret this trend. Public transit services across the state were impacted by a change in how New York provides

nonemergency Medicaid transport. The New York State Department of Health contracts with a private company, MAS, to schedule trips in much of the state, including Broome and Tioga counties. This change in the DOH Medicaid transportation model dramatically effected both demand service and urban ridership as a MAS booked trips often with cabs, utilizing public transit services much less than was previously the case. Revenue miles and hours of service are based on the route structure and operating hours and are not ridership dependent, which means the service becomes less efficient.

**TABLE 6-3:**

**BC TRANSIT OPERATING DATA**

MEASURE	2015	2016	2017	2018
Ridership—Unlinked Trips	2,264,073	2,054,806	1,984,941	1,952,682
Passenger Miles	7,802,254	7,297,643	7,195,868	7,028,557
Vehicle Revenue Miles	1,193,322	1,168,425	1,141,494	1,157,919
Vehicle Revenue Hours	102,392	98,540	97,507	97,462
Operating Expense	\$8,045,801	\$8,101,757	\$7,640,579	\$8,447,777
Fare Revenue	\$1,543,406	\$2,383,675	\$2,551,381	\$2,474,022
Farebox Recovery Ratio	19.2%	29.4%	33.4%	29.3%

Source: FTA National Transit Database

The farebox recovery ratio is a key measure of the financial health of the system. This measures the percentage of total operating expenses that are paid for by fare revenue. Public transit systems in the United States do not earn enough at the farebox to pay for operating costs.

According to a report by FTA,<sup>24</sup> the national average farebox recovery for bus systems in the United States is 23.9%. Broome County instituted a fare increase in 2016 that improved the farebox recovery ratio, bringing it above the national average. The gap between expense and farebox recovery is paid for by FTA assistance, the New York State Transit Operating Assistance program, and local funds.

Current conditions also consider the physical assets of the transit operation, including buses and facilities. Part of performance-based planning is the FTA requirement for a Transit Asset Management Plan. This plan, which is submitted by Broome County Department of Public Transportation, documents the inventory and sets annual targets for achieving state of good repair for rolling stock, equipment, and facilities. FTA provides guidance on

<sup>24</sup> Federal Transit Administration. 2017. "2016 National Transit Summary and Trends." Available at: <https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/ntd/66011/2016-ntst.pdf>.

TABLE 6-4:

BC TRANSIT BUS INVENTORY		
YEAR/MAKE	NUMBER	AGE
2019 Gillig	5	0
2019 Orion Hybrid	3	0
2017 Gillig	7	3
2014 Gillig	7	6
2010 Orion	6	10
2009 Orion	5	11
2003 Gillig	3	17
2000 Nova	7	20
<b>Total</b>	<b>43</b>	<b>—</b>

Source: Broome County Department of Public Transportation

the “useful life benchmark” of various categories of rolling stock<sup>25</sup>. BC Transit buses have a useful life of 14 years. With proper preventive and responsive maintenance, a bus is expected to meet the benchmark. Table 6-4 lists the BC Transit bus fleet inventory. Thirty-six buses are needed to meet peak fleet requirement, or when the most buses are in operation. This means that at least three buses that are past their useful life must be used. As noted in Chapter 11, Broome County will have the BC Transit fleet entirely meeting the FTA guideline by 2022.

Broome County owns two transit facilities: the Department of Public Transportation administrative and bus maintenance facility in Vestal (“Vestal facility”) and the Greater Binghamton Transportation Center (“the Center”) (Figure 6-11) in downtown Binghamton. The Vestal facility was constructed 37 years ago and has been well maintained. The Center was constructed in 2012. It incorporated the façade of the former Greyhound bus terminal for historic preservation purposes but was otherwise all-new construction.

The Center serves as the primary BC Transit transfer point and is where fixed routes converge. It replaced a series of on-street locations, making transfers safer and more convenient for riders. The Center also serves intercity bus carriers Greyhound, Coach USA/Shortline, Trailways, MegaBus, and OurBus. It provides a large waiting area, ticket booths, and passenger services.

<sup>25</sup> <https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA%20TAM%20ULB%20Cheat%20Sheet%202016-10-26.pdf>



Source: Wendel Companies—Project designer

FIGURE 6-11: BINGHAMTON INTERMODAL TRANSPORTATION CENTER

A final physical element of BC Transit is bus stops and shelters. As with most fixed-route services, BC Transit buses stop only at designated stops. BMTS completed an analysis in 2020 (Figure 6-12) of bus stops that evaluated signage and accessibility per ADA guidelines<sup>26</sup>. The findings are as follows:



Of **734** bus stops  
along **14** routes

POOR OR  
DAMAGED  
CONDITION



GOOD  
CONDITION



**83%** have signs



**7%** have shelters and signs



**10%** unmarked

“Unmarked” means that signs are missing or damaged most often due to vandalism. These signs will be replaced as the Bus Stop Sign Plan is implemented.



**20%** Stops lack any  
sidewalk connection

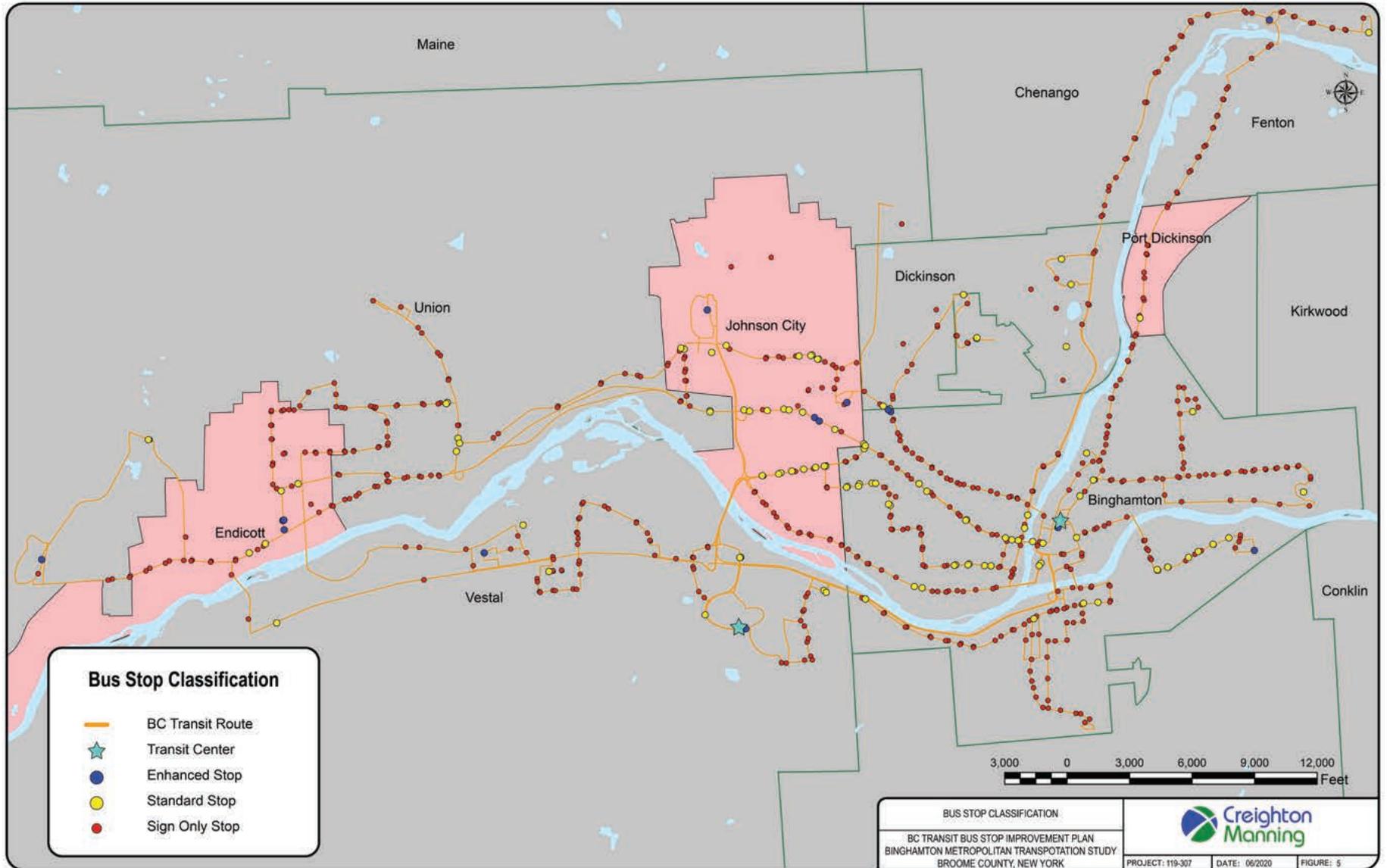


**24%** meet all ADA  
accessibility requirements

The study developed a hierarchy of bus stop types. At a minimum, all bus stops should be identified by a pole mounted sign and an ADA 5' x 8' loading zone that is connected to the sidewalk network. Stops with higher ridership may be classified as “Standard Bus Stops” which include additional amenities including a shelter with a bench. The highest ridership stops in the BC Transit system can be classified as “Enhanced Bus Stops” which receive a higher profile sign type, bus shelter with a bench, and passenger amenities like a trash can and bike rack. The findings indicate 84% of stops require the standard treatment, while the remainder would benefit from some enhancements.

<sup>26</sup> [http://bmtsonline.com/sites/default/files/119307\\_BC%20Transit%20BSIP%20and%20Sign%20Design%20Guide-Final\\_20201026.pdf](http://bmtsonline.com/sites/default/files/119307_BC%20Transit%20BSIP%20and%20Sign%20Design%20Guide-Final_20201026.pdf)

**FIGURE 6-12:**  
**BC TRANSIT BUS STOP ACCESSIBILITY**



## BC LIFT

Federal law requires that operators of fixed-route bus services also provide a complementary paratransit service for persons with disabilities who cannot access the fixed-route service. BC Lift provides this service in the region. Although BC Transit is accessible to people with disabilities, there are reasons some people cannot use it. Eligibility for BC Lift includes an evaluation of a person's functional limits and barriers in the environment that are either physical or weather related, and how these limits prevent them from using BC Transit.

BC Lift serves trip origins and destinations within a three-quarter mile radius of all BC Transit routes and operates during the same hours. Eligible riders must reserve a trip by phone or online from one to seven days in advance. The fare is \$3 per one-way trip. Personal care attendants may ride for free with the eligible individual.

BC Lift is considered an origin-destination demand-response service. That means that it offers curb-to-curb and not door-to-door service. While this aspect presents a challenge for some individuals, the driver cannot leave the vicinity of the bus to assist a passenger to or from the door. People needing the higher level of service must utilize other means.

The same service operates as OFA Mini-Bus. Clients of the Broome County Office for Aging, regardless of disability, may receive an identification card to access the service. They do not pay a fare but are asked for a \$2 per trip donation.

BC Lift is operated by a private company under contract to Broome County. The vendor provides the buses, which must meet contract standards for age and condition. These are cutaway-style minibuses with two wheelchair positions.

Annual ridership on BC Lift is shown in Table 6-5. Declines in ridership are primarily related to the MAS Medicaid transportation model discussed previously.

BMTS leads the Coordinated Public Transit – Human Services Transportation Plan, most recently updated in 2018<sup>27</sup>. This FTA planning requirement involves collaboration with transportation providers and human service agencies that provide transportation to their clients, especially those that have received FTA grants to purchase vehicles. The intent of the plan is to use vehicles most efficiently by identifying both gaps and duplication of service. Barriers may be identified, such as the requirement for client confidentiality that prohibits some agencies from transporting non-clients. BMTS has developed very effective partnerships through this planning process. The current plan notes the importance of Mobility Management of South Central New York as a resource. They manage the *Getthere Call Center* that provides trip planning and referral, education about travel options, and travel training for individuals with disabilities.

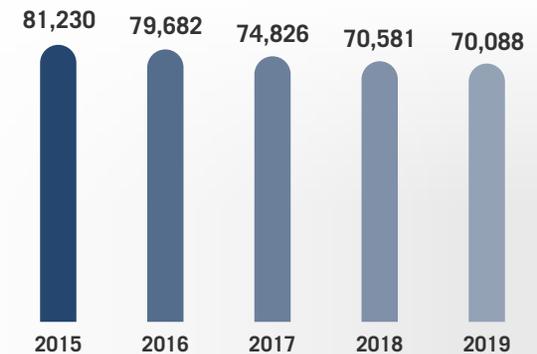
<sup>27</sup> <http://www.bmtsonline.com/sites/default/files/FINAL%20Coordinated%20Transportation%20Plan%202018.pdf>



FIGURE 6-13: BC LIFT

TABLE 6-5:

### BC LIFT ANNUAL RIDERSHIP



Source: Broome County Department of Public Transportation

TABLE 6-6:

**BC COUNTRY ANNUAL RIDERSHIP**



Source: Broome County Department of Public Transportation

**BC COUNTRY**

Broome County also operates a paratransit service that is open to the general public. Individuals must register prior to their first use. It covers most but not all of the rural parts of the county. It is a limited service that provides trips between six rural zones and destinations in the urban core, but not from one rural zone to another. Inbound trips are scheduled in the morning with return trips in the afternoon. Like BC Lift, this is a curb-to-curb demand-response service. Rural residents must register with the Department of Public Transportation to use BC Country. Trip reservations must be made between two and seven days in advance. The fare is \$3.50 per one-way trip. Persons with disabilities pay \$2.50, and those with OFA identification cards are asked for a donation of \$2.00 per trip.

As shown in Table 6-6, BC Country has experienced a significant drop in ridership, having lost more than half of its ridership between 2015 and 2019. This is a consequence of both loss of nonemergency Medicaid trips because of the MAS service model referenced earlier, and the limitations on travel time described above.

The minimum fleet is six cutaway-style minibuses that can accommodate wheelchairs. As shown in Table 6-7, there are eight buses that meet the FTA useful life benchmark of 10 years.

TABLE 6-7:

BC COUNTRY FLEET INVENTORY		
YEAR/MAKE	NUMBER	AGE
2015 Ford	6	5
2013 El Dorado	2	7
2009 El Dorado	7	11

Source: Broome County Department of Public Transportation

**OFF CAMPUS COLLEGE TRANSPORT**

OCCT serves Binghamton University students, faculty, and staff. It is operated by students and uses buses owned and maintained by the university. Drivers must have proper credentials and New York State bus driver certification. OCCT operates on a fixed-route basis, with five routes that connect the main campus in Vestal to downtown Binghamton, site of the University Center and various student housing developments; and to other destinations on the south side and west side of Binghamton, Johnson City, and Vestal. The service also has five shuttle routes, one of which is internal to the campus, and the others that are near student housing sites and shopping malls. Some overlap exists with BC Transit routes. OCCT operates late night and weekend service that meets the needs of students.

## TIOGA COUNTY

Tioga Public Transit operated a fixed-route service in Owego with a connection to BC Transit in Endicott. They also operated demand-responsive paratransit service throughout the county. All transit service was suspended in 2014 because of financial concerns. This arose primarily from the change in nonemergency Medicaid transport. The only transit service currently operating in eastern Tioga County is Chemung County's C Tran service that operates a single fixed route between Elmira and Owego. It serves a limited number of destinations, including one in Nichols and three stops in Owego. It operates on a limited schedule of three runs each day.



**FIGURE 6-14:** **PERSONAL TRANSIT CHOICES**



## TRANSIT NEEDS

Forecasting transit use is uncertain. The personal decision to use transit results from several factors (Figure 6-14). These factors may be different with each trip and may also change over time. Destinations change over time as businesses or services relocate. Perceived affordability can be affected by changes in household income. Walking to or waiting at a bus stop may change with age. As noted in Chapter 1, the COVID-19 pandemic has heightened the level of uncertainty about transit use. Much uncertainty remains regarding when people will feel comfortable riding a bus again.

BC Transit has some limitations that influence use. These generally are a consequence of budget constraints. As noted, fares cover approximately one-third of the operating budget, with government subsidies filling the gap. FTA and New York State subsidies are limited by formula and depend on authorizations and annual appropriations. This uncertainty necessitates cost controls wherever possible while still providing acceptable service.

BC Transit operates on a hub-and-spoke model with most routes converging at the Center. While this introduces operational efficiencies, it means many riders must transfer buses to complete their trip, adding to their travel time. The other limitation is on service hours. For most routes, the last run of the day begins at 9:00 p.m., while others end as early as 6:00 p.m. Weekend service is also limited through reductions in hourly service frequency. BC Lift is required to operate during the same hours.

## Access to Employment Centers

Although transit's mode share is small, it still provides essential access to employment for many who do not own a car or cannot drive. A difficult balance must be struck between meeting these needs and providing service where ridership is low. The two dimensions of this need are route coverage and hours of operation. Lower-wage workers in health care and retail often work shifts outside of regular business hours. BC Transit's current hours of operation do not allow a worker whose shift ends in the evening to ride home, or a third-shift worker to ride to work. Limited weekend service exacerbates this need.

Routes serve much of the urbanized area in Broome County, offering access to the downtowns of Binghamton, Johnson City, and Endicott, as well most healthcare facilities, Binghamton University, and SUNY Broome. But employers may build facilities in suburban or exurban locations where land is less expensive. While employers may assume adequate access to the workforce, they may also soon discover that some potential employees do not drive. It is unlikely that a transit route can be extended to serve a single employer, but other shared transport strategies could meet these needs. The Agency's *Broome County Job Access Study*<sup>28</sup> notes that vanpooling and microtransit should be considered to meet workforce access needs.

<sup>28</sup> The Agency, "Broome County Job Access Study" August 2018.

The absence of transit service in Tioga County means that employers in that part of the BMTS region including downtown Owego and Lockheed-Martin do not have access to workers who rely on transit. This is a serious need both for the employers and people seeking jobs.

Broome County has received discretionary grant funding for bus purchases that will result in the fixed-route and demand-responsive fleet being fully in compliance with FTA guidelines in 2021. A policy is also in place to move the bus fleet to clean energy—but to do so prudently. Alternative-fuel buses cost more than conventional diesel buses. The hybrid buses that were delivered to Broome County in 2020 cost more than 50% more than the clean diesel buses purchased at the same time. Battery-electric buses in service elsewhere in the United States have a similar cost premium.

Balancing the need to keep buses in a state of good repair with the desire to reduce the environmental impact may depend on the continued availability of discretionary and formula grant funding. Broome County will need to plan for periodic bus purchases over time to enable buses that exceed the FTA useful life benchmark to be taken out of service.

## **INTERREGIONAL TRAVEL**

People travel to and from the BMTS region for business, recreation and tourism, and personal visits. The region has unique attractions. It is known as the Carousel Capital because of the six ornate wooden carousels donated by businessman George F Johnson in the early part of the twentieth century. Located in public parks, these carousels are all operational and free to ride. There are also numerous events that attract visitors, including the Spiedie Fest & Balloon Rally, the Dick's Sporting Goods Open on the PGA Champions Tour, the Owego Strawberry Festival, and others. People may visit to play golf at the Links at Hiawatha Landing or EnJoie Golf Course or visit Tioga Downs Casino Resort.

Visitors travel by car, intercity bus, and air. Because the region is transected by interstate highways I-81, I-86, and I-88, there is excellent highway access to other parts of New York State and beyond. These highways are uncongested and in reasonably good repair.

Five intercity bus carriers operate from the Center in downtown Binghamton:

- Coach USA/Shortline serves New York City and Long Island, with buses connecting through to Ithaca and Elmira. Express buses make a single stop between Binghamton and New York City.
- Greyhound serves Albany, Syracuse, Buffalo, Scranton, and New York City with further connections to its national network.
- Megabus serves New York City.
- OurBus serves Washington, DC.
- Trailways serves New York City.

These companies provide several options for travel to and from the region. The Port Authority Bus Terminal in Manhattan is convenient for trips to and from New York City. The Center also serves as a hub for BC Transit and has convenient automobile parking.



Other options for interregional travel include car rental, carshare, or rideshare. Carshare services provide a vehicle to subscribers, but that service does not yet exist in this region. 511 NY Rideshare facilitates matching trip requests between those who are driving and those looking for a ride.

The Greater Binghamton Airport (BGM) has excellent facilities. The terminal was recently remodeled, there is adequate parking, and access is good. The airside infrastructure is also in good condition. Nonetheless, air travel has become more problematic in recent years. BGM had three national carriers: American Airlines connected to Philadelphia, United Airlines to Dulles/Washington, and Delta Airlines to Detroit. As a result of market conditions, United terminated service in late 2016, and American did the same in early 2017. The only passenger carrier remaining is Delta, with round-trip service to Detroit. Consequently, people traveling to and from the region also use alternative airports in Elmira, Ithaca, Syracuse, and Scranton.

In sum, these facilities and services for intercity travel, whether for business or tourism, appear likely to be adequate for the foreseeable future.

### MOBILITY MANAGEMENT

Mobility management is an approach to designing and delivering transportation services that starts and ends with the customer. It begins with a community vision in which the entire transportation network—public transit, private operators, cyclists and pedestrians, volunteer drivers, and others—works together with customers, planners, and stakeholders to deliver the transportation options that best meet the community's needs.<sup>29</sup>

*Getthere* is the primary provider of mobility management services in Broome and Tioga counties. It is a program of the Rural Health Network of South Central New York serving Broome, Tioga, Chenango, Otsego, and Delaware counties.<sup>30</sup> Along with its partners, it seeks to improve transportation access and coordination in the region—particularly its rural communities. *Getthere* provides trip-planning and referral services, transportation education, and travel training for individuals.

The Broome County Department of Public Transportation and Tioga Opportunities, Inc. also perform mobility management services by providing information and referring consumers to other transportation providers when their respective services are not able to meet the consumer's needs.

### NEEDS

- Sustain and increase available funding to enable current mobility management services to continue and expand.
- Expand current mobility management services to provide a (MaaS) function.

<sup>29</sup> National Center for Mobility Management. 2018. "What is Mobility Management?" Available at: <https://nationalcenterformobilitymanagement.org/for-mobility-managers/>.

<sup>30</sup> See <http://www.gettherescny.org/>.

## SENIOR POPULATION

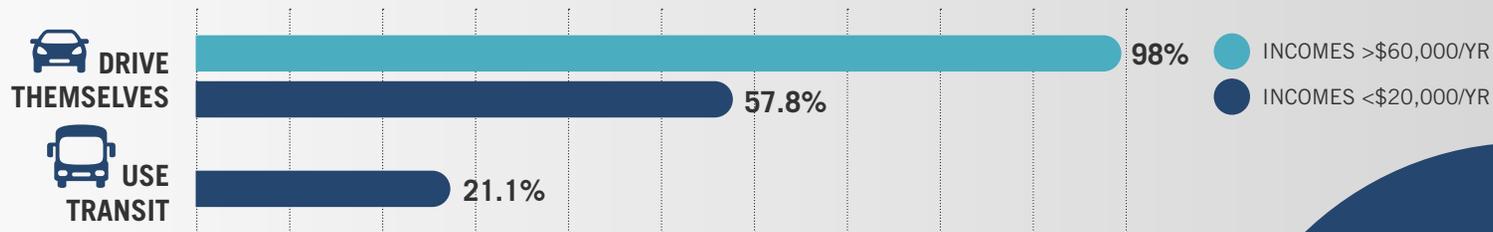
People over the age of 65 will comprise a growing segment of the region's population (see Chapter 4, Figure 4-3). Seniors have special transportation needs, especially as they grow older. The Broome County Office for Aging completed a survey of older adults as part of its Age Friendly Broome County project.<sup>31</sup>



### Reporting on normally used modes of travel,



### Differences are more profound when sorted by household income.



As people age past 85, they are less likely to drive and more likely to rely on family or friends for personal mobility. When asked about difficulties in getting the transportation they need, 75.6% reported no difficulties, while 16.5% reported that transit is either unavailable, inconvenient, or they cannot get to a bus stop.

### Senior Population Needs

As people age, their transportation needs change, regardless of how they travel. Older pedestrians walk more slowly, need more time to cross Main Street, and are more likely to use mobility aids. Older drivers may have difficulty seeing at night and become more easily confused at complex intersections and in work zones. With so many people driving well into their 80s, it is important that street design and maintenance recognize the need to improve the visibility of signs and pavement markings and to simplify roadway and intersection design so that it is easily understood by older drivers. With nearly one in five seniors walking for some of their trips, signal timing may need to be adjusted to allow for adequate crossing time. Sidewalk maintenance may also need to be addressed to reduce trip hazards.

**“There will be a steadily increasing proportion of drivers and pedestrians who experience declining vision; slowed decision-making and reaction times; exaggerated difficulty when dividing attention between traffic demands and other important sources of information; and reductions in strength, flexibility, and general fitness.”**

*FHWA Handbook for Designing Roadways for the Aging Population, p. iv*

<sup>31</sup> Broome County Office for Aging. 2020. "Community Report, Results of the 2019 Survey of Older Adults." Available at <https://www.gobroomecounty.com/sites/default/files/dept/senior/OFA%20Masters/Age-Friendly%20Community%20Survey%20Data%20Report.pdf>

Those who use transit find it harder to stand at a BC Transit stop and may be reluctant to use the OFA Mini-Bus service because of scheduling constraints or because they simply do not know how to access the service. A longstanding concern exists about BC Lift being a curb-to-curb rather than door-to-door service. While the need for door-to-door service may grow in tandem with an aging population, a solution may be in other transport services, including taxi and ride-hailing.

While many older people continue to drive, there is also a need to provide transit service for those who do not. People at the Broome County Senior Picnic (Appendix D) noted several concerns with transit services. They were especially sensitive to the limitations of the paratransit services, both BC Lift and BC Country. Elderly people living in rural areas are prone to isolation when there are few transportation options. To that end, seniors who took the survey identified the following needs:

- Increase BC Country service in terms of service area and hours.
- Increase capacity on BC Lift/OFA Mini-Bus when needed for fewer trip refusals.
- Increase the number of BC Transit routes and increase the frequency of operation.
- Improve information and communication about transit services.
- Add BC Transit bus stops and shelters and improve bus stop signage.
- Add direct bus services at senior housing locations (e.g., Hooper Road/Marion apartments).
- Increase availability of travel training to encourage use of transit services, especially among the aging population.



**SAFETY**

**7**



# CHAPTER 7

# SAFETY



Safety is a high priority for BMTS. All users of the transportation system must be able to travel by whatever mode they choose while remaining safe. This is important to all the facets of this LRTP: improving communities and the economy and enhancing the environment. Motor vehicle crashes take lives, cause injuries both serious and minor, and impose large economic costs. Crashes involve occupants of vehicles and nonoccupants, including pedestrians and cyclists. On rare occasions, crashes involve public transit buses.

Solving safety problems can be complex but should always be data driven. Crashes are caused by the roadway, the vehicle, and the driver, often in combination. The National Highway Traffic Safety Administration found from examining crash reports that driver error is a contributing cause in 94% of crashes.

The traffic safety community has developed the concept of the 4Es to improve safety:

- **Engineering**, addressing deficiencies in roadway design. BMTS conducts safety studies and supports NYSDOT and others who do the same.
- **Enforcement**, identifying those who create hazardous situations by violating the law.
- **Education**, informing the public of ways they can improve safety by changing behavior. BMTS finds opportunities to partner with other organizations such as public health agencies to support public information messaging.
- **Emergency medical services**, because improving the speed and quality of crash response can save lives.

Because crashes are random events, safety engineers and planners look back over five years to smooth out statistical anomalies. The present retrospective review of current conditions in the BMTS region is for the period of 2015–2019 and is based on data from the Accident Location Information System.

## FEDERAL PLANNING FACTORS

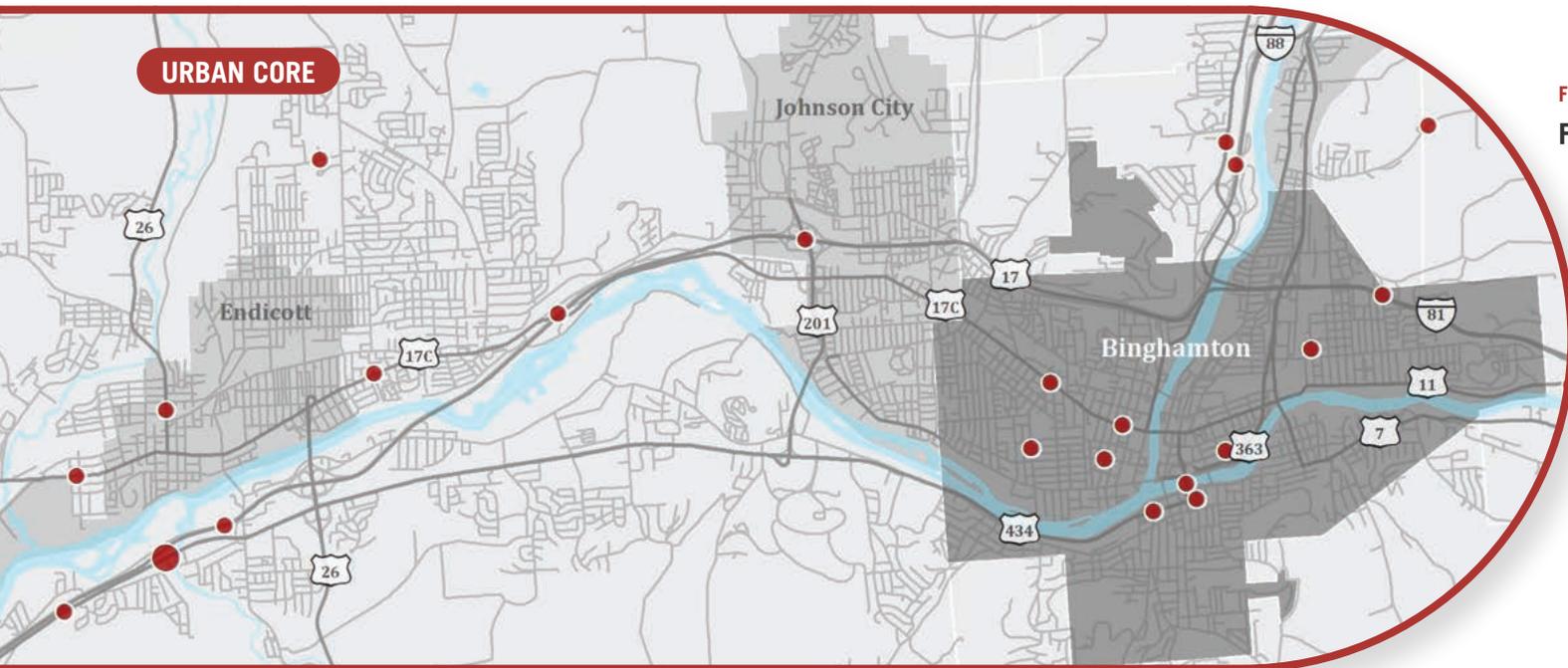
- 2 Increase the safety of the transportation system for motorized and non-motorized users;
- 3 Increase the security of the transportation system for motorized and non-motorized users

TABLE 7-1:

**TOTAL CRASHES AND OUTCOMES, 2015–2019**

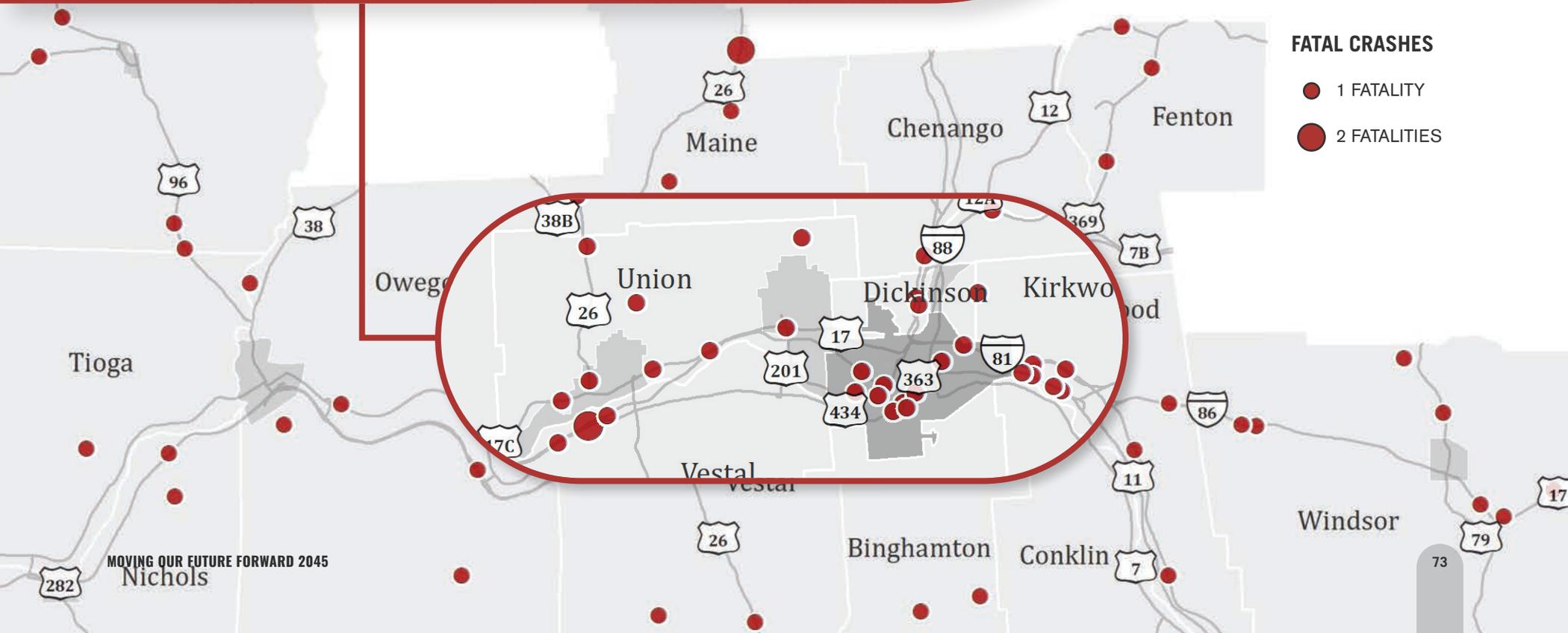
Table 7-1 shows the number of crashes and victim outcomes.

	2015	2016	2017	2018	2019
<b>Total crashes</b>	5,382	5,562	5,905	6,604	6,445
<b>Fatalities</b>	15	21	11	11	13
<b>Serious injuries</b>	133	152	115	134	133
<b>All injuries</b>	1,396	1,411	1,205	1,249	1,144



**FIGURE 7-1:**  
**FATAL CRASHES, 2015-2019**

Figure 7-1 shows the location of fatal crashes, which indicates these are often random events and frequently attributable to driver behavior.



**FATAL CRASHES**

- 1 FATALITY
- 2 FATALITIES

Safety analyses focus on the location and crash causation factors. Crash rates describe the number of crashes in a given period as compared to the traffic volume. Because traffic volumes were not available for all roadways, Table 7-2 shows local roadways with the highest crash density per mile for all crashes, or crash frequency. These locations can be possible sites for a more detailed investigation or Road Safety Audit (RSA). NYSDOT evaluates the state roadway system on an annual basis.



TABLE 7-2:

**HIGH CRASH LOCATIONS, NON-STATE FEDERAL AID SYSTEM**

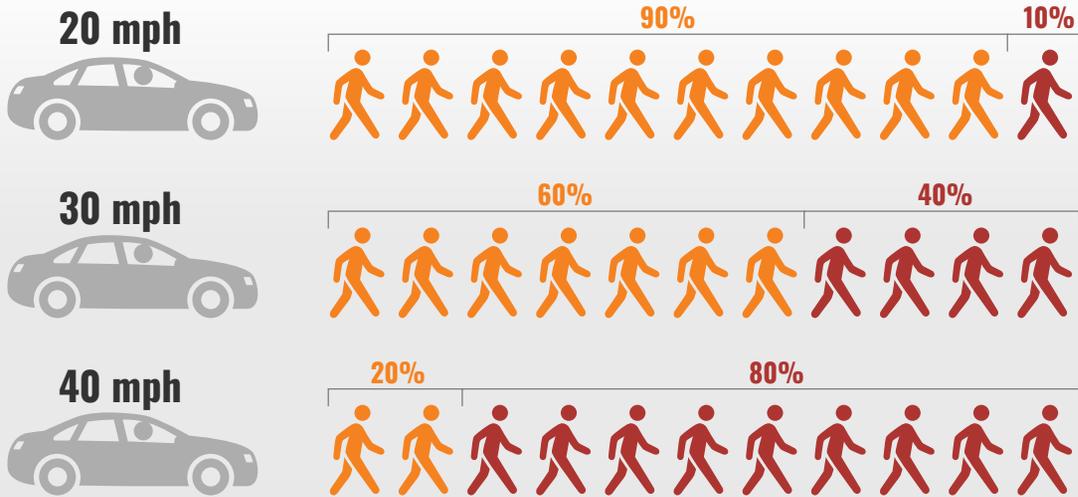
<b>Road segments 2000-5000 AADT</b>	<b>Segment</b>	<b>Length</b>	<b>Owner</b>	<b>Location</b>	<b>Notes</b>
Robinson Street	Bigelow St-Broad Ave	0.41	City of Binghamton	Binghamton	Signalized and unsignalized intersection crashes.
Beethoven Street	Riverside Dr-Leroy St	0.21	City of Binghamton	Binghamton	Mostly intersection accidents at Leroy and Riverside.
Robinson Street	NYS 7-Chenango St	0.31	City of Binghamton	Binghamton	Mostly crashes at the signalized intersections.
Vestal Avenue	Mill St-South Washington St	0.35	City of Binghamton	Binghamton	Almost all intersection crashes.
Kirkwood Industrial Park S Entrance	CR 52-Industrial Park Loop	0.21	Broome County	Kirkwood	Many non-intersection accidents.
<b>Road segments above 5000 AADT</b>					
Front Street	Main St-Leroy St	0.28	City of Binghamton	Binghamton	Mostly intersections at Leroy and Main. Three pedestrian accidents at Main.
Jarvis Street	Main St-Clinton St	0.26	City of Binghamton	Binghamton	Crashes at signalized and non-signalized intersections. Five pedestrian
Glenwood Avenue	Main St-Clinton St	0.29	City of Binghamton	Binghamton	Mostly intersection accidents at Main and Clinton. Some mid-block.
CFJ Boulevard	Airport Rd-Lester Ave	0.24	Village of Johnson City	Johnson City	Mostly intersection accidents at Airport, with some at Lester or Gannett.
African Road	NY434-Old Vestal Rd	0.21	Town of Vestal	Vestal	Mostly intersection accidents at NY 434.
Robinson Street	Broad Ave-NYS 7	0.49	City of Binghamton	Binghamton	Mix of hitting RR overpass, signalized and unsignalized intersection crashes.
Leroy Street	Front St-Murray St	0.21	City of Binghamton	Binghamton	A lot of accidents at Oak and Murray.
Broad Avenue	East Frederick St-Robinson St	0.28	City of Binghamton	Binghamton	Mostly intersection crashes at Robinson. Two ped accidents; one at George St.
Sycamore Road	NY434-Old Vestal Rd	0.35	Town of Vestal	Vestal	Mostly accidents at NY 434 and Old Vestal intersections, with a few at
Lester Avenue	Main St-Erie Lackawanna	0.20	Village of Johnson City	Johnson City	Almost all were accidents at Main Street. Three ped accidents at Main.
McKinley Avenue	North St-Columbus St	0.26	Village of Endicott	Endicott	Mostly rear-end and right-angle crashes at the Monroe and North intersections.
Prospect Street	Airport Rd-City of Binghamton Line	0.25	Broome County	Dickinson	Mostly accidents at CFJ and unsignalized intersections.
Harry L Drive	Airport Rd-Lester Ave	0.22	Village of Johnson City	Endicott	Almost all intersection accidents. 2/3 at Airport Road; the rest at Lester,
Airport Road	Lewis Rd-Town of Union Line	0.30	Broome County	Union	Mostly non-intersection accidents; many are collisions with deer or FO.
North Street	McKinley Ave-Jefferson Ave	0.31	Village of Endicott	Endicott	Mostly intersection accidents all along the length of segment.

*\*Only includes roadways with 100 or more crashes during the 5-year period.*

# PEDESTRIAN AND BICYCLE SAFETY

**FIGURE 7-2: RISK OUTCOME IN PEDESTRIAN CRASH, BY VEHICLE SPEED**

People traveling on foot, in wheelchairs, and by bicycle or scooter are vulnerable users of the transportation system. Being struck by a vehicle, even at low speeds, can cause serious injury; at typical speeds on streets, it can be fatal, as shown in Figure 7-2.



Source: Institute of Transportation Engineers

Figure 7-3 and Table 7-3 show pedestrian crash data for the region. Table 7-4 shows roadways with the highest crash frequency for bicycle and pedestrian crashes. The average number of crashes for pedestrians over the five-year period is 86 crashes, 3 fatalities, and 10 serious injuries. When compared to the national average of 18.4 fatalities per million population<sup>32</sup>, the rate in the BMTS region of approximately 14 per million is better but still cause for concern.



**TABLE 7-3: PEDESTRIAN CRASHES AND OUTCOMES, 2015–2019**

	2015	2016	2017	2018	2019
<b>Crashes</b>	85	97	75	79	73
<b>Fatalities</b>	4	5	2	3	1
<b>Serious injuries</b>	8	14	8	9	13

Source: NYSDOT Accident Location Information System

<sup>32</sup> The League of American Bicyclists. 2018. "Bicycling & Walking in the United States: 2018 Benchmarking Report" p. 200. Available at: [https://bikeleague.org/sites/default/files/Benchmarking\\_Report-Sept\\_03\\_2019\\_Web.pdf](https://bikeleague.org/sites/default/files/Benchmarking_Report-Sept_03_2019_Web.pdf).

**TABLE 7-4: ROADWAYS WITH THE HIGHEST CRASH FREQUENCY FOR BICYCLE AND PEDESTRIAN CRASHES\*, NON-STATE FEDERAL AID SYSTEM**

TOTAL CRASHES 2015–2019	ROADWAY	MUNICIPALITY	FIVE YEAR AVERAGE CRASH RATE/MILE	MILES
105	Main St.	City of Binghamton	5.86	3.58
13	Washington Ave.	Village of Endicott	5.41	0.48
12	Front St.	City of Binghamton	4.91	0.49
10	Jarvis St.	City of Binghamton	4.09	0.49
11	Tompkins St.	City of Binghamton	4.06	0.54
18	Floral Ave.	Village of Johnson City	3.47	1.04
15	Chenango St.	City of Binghamton	3.29	0.91
12	Oak St.	City of Binghamton	2.54	0.95
14	Clinton St.	City of Binghamton	2.31	1.21
11	Helen St.	City of Binghamton	2.27	0.97

\*Only includes roadways with 10 or more crashes during the 5-year period.



**TABLE 7-5: BICYCLE CRASHES AND OUTCOME, 2015–2019**

	2015	2016	2017	2018	2019
<b>Crashes</b>	56	52	58	41	41
<b>Fatalities</b>	8	4	4	4	8
<b>Serious injuries</b>	0	0	0	0	1

Source: NYSDOT Accident Location Information System

Table 7-5 shows bicycle crash numbers and outcomes for the region. The five-year average is just under 50 crashes annually, 0.2 fatalities, and 3.6 serious injuries. The national average of bicycle fatalities per capita is 2.4 per million population.<sup>33</sup> The rate for the BMTS region is significantly lower, with only a single fatality in 5 years.

<sup>33</sup> Ibid., p.197

## **SAFETY NEEDS**

BMTS is committed to using its resources to improve safety and reduce the number and rate of crashes and those that cause fatalities and serious injuries. Strategies are both short term and long term. BMTS will partner with NYSDOT and local government agencies, conducting safety studies in high-crash locations. These include road safety audits (RSA), a technique that involve stakeholders in identifying hazardous situations. BMTS conducts RSAs on a regular basis, collaborating with local law enforcement agencies, advocates experienced in pedestrian and bicycle safety, and community members. Safety studies and RSAs may find that engineering solutions are appropriate. These may include redesign of an intersection or installation of new pedestrian features. The study may also identify an opportunity for specific educational outreach, such as how to interpret pedestrian signal indications. If there is a specific user group such as senior citizens or people with visual impairments, recommendations will be focused on their needs.

One means of identifying longer-term needs is through the NYSDOT Strategic Highway Safety Plan (SHSP), which uses crash data to enumerate emphasis areas. Some of these, like intersection crashes, are applicable to the BMTS region. An outcome of the 2017 SHSP was the creation of the NYSDOT Pedestrian Safety Action Plan, which includes actions that can be provided on a systems basis, like installing countdown timers on pedestrian signals. Because the population in the BMTS region is aging, the needs of older drivers and pedestrians must be addressed over time. Signal timing may be adjusted to allow for a longer pedestrian crossing time for slower walkers. Visibility of road signs during both day and night is also needed for older drivers.

# FREIGHT MOBILITY

8



## CHAPTER 8

# FREIGHT MOBILITY



### FEDERAL PLANNING FACTORS

- 1 Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
- 4 Increase accessibility and mobility of people and freight;
- 6 Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight

The movement of goods is central to the BMTS region's economy and wellbeing. Freight moves to, from, through, and within the BMTS region.

In the BMTS region, freight moves primarily by truck, with some rail and air cargo. Many moves are intermodal, involving transfers at one or more terminals. Freight moves are often classified as long haul or local, with the latter also described as first/last mile. The term supply chain refers to a product or commodity and its network of transportation connections from suppliers to producer to customers.

Freight moves with new technologies. E-commerce is that segment of the business that relies on online ordering and fulfillment and includes both business-to-business (B2B) and business-to-consumer (B2C) relationships. The urban delivery segment of e-commerce is unique in that it involves deliveries to individual residences or businesses, often of single small parcels or even prepared meals from a restaurant. The demand for same-day delivery is causing pressure on retailers to develop small microwarehouse fulfillment centers in urban locations. In addition to e-commerce, new technology will affect many facets of freight movement in the coming years. Fully automated trucks may eventually complete long-haul moves without a driver. Urban delivery trucks may be partially replaced by unmanned aerial vehicles (drones) or small robots that travel in the street or on sidewalks.



## CURRENT CONDITIONS AND PERFORMANCE

The New York State Freight Transportation Plan,<sup>34</sup> completed in 2019, provides robust information about much of the freight movement in the BMTS region. However, that plan did not address local urban goods movement.

Most freight-generating industry in the BMTS planning area is located along the three Interstates: NY17/I-86, I-81, and I-88. The Broome Corporate Park and Kirkwood Industrial Park have direct access to I-81. The Best Buy warehouse-distribution center is at the Lounsberry interchange of I-86. Others like Upstate Shredding-Weitsman Recycling in Owego must use state and local roadways to access the interstate system.

### TRUCK-BASED FREIGHT

Within the BMTS region, trucks carry the most freight in terms of both tonnage and value. This aligns with trends across the United States and within New York. According to the Freight Transportation Plan, 88% of freight (by tonnage) moves by truck. The following corridors that cross or terminate in the BMTS region are identified by the Freight Transportation Plan as part of the State Freight Core Highway Network:

- I-81 Syracuse-Binghamton-Pennsylvania Corridor.
- I-88 Albany-Binghamton Corridor.
- I-86/NY 17 Harriman-Binghamton Corridor.
- I-86 Binghamton-Erie Corridor.

TABLE 8-1:

#### SUMMARY OF BINGHAMTON CORRIDORS, BY AVERAGE DAILY VOLUME, VALUE, AND TONNAGE FOR 2012

Table 8-1 summarizes the annual average daily truck traffic (AADTT), value, and tonnage along each of the corridors for 2012.<sup>35</sup>

BINGHAMTON CORRIDORS	AADTT	VALUE	TONNAGE
Syracuse-Binghamton-Pennsylvania	1,168,206	\$20,965,445,854	17,702,362
Albany-Binghamton	533,210	\$5,397,740,141	8,192,209
Harriman-Binghamton	657,591	\$8,340,626,756	8,715,630
Binghamton-Erie	1,008,848	\$19,879,005,392	16,402,831
<b>Total</b>	<b>3,367,855</b>	<b>\$54,582,818,143</b>	<b>51,013,032</b>

BINs 1063161 & 1063162 carrying NYS Route 17 over Route 17C in the town of Union, Broome County are a freight limiting factor for Route 17. These bridges cannot carry vehicles over legal weight (overloads) and require that traffic be diverted from the expressway.

<sup>34</sup> New York State Department of Transportation. 2019. "New York State Freight Transportation Plan." <https://www.dot.ny.gov/freight-plan/?website=freight-plan>.

<sup>35</sup> NYSDOT used IHS/Global Insight TRANSEARCH data for 2012 base year and 2040 forecast year.



## Truck Safety

Crashes involving commercial vehicles most often have consequences for people in other vehicles and non-occupants. NHTSA<sup>36</sup> found that in New York State in 2018, of 99 people killed in crashes involving large trucks, 10 were in the truck, 56 were in other vehicles, and 33 were pedestrians or cyclists. The New York State Freight Transportation Plan measured truck crash density (per centerline mile) rather than crash rate; it found I-88 to have the third lowest fatal crash density in the state, and I-86 west of Binghamton to have the lowest injury crash density.

A significant number of tractor trailers enter the urban core. This presents a challenge when trying to increase pedestrian accommodations and safety, as truck traffic poses an issue when considering traffic-calming measures. The BMTS region has horizontal and vertical clearance issues in numerous locations. Additionally, there are a significant number of trucks driving on urban roads, which contributes to the deterioration of pavement and curbing that were not designed to withstand heavy freight traffic.

## URBAN DELIVERY

Delivery trucks of all sizes contribute to traffic on streets in commercial districts and residential areas. These include deliveries to businesses as well as offices and residences. Business deliveries are typically of a larger scale.

E-commerce has also increased urban delivery volumes. While specific data are not available for the BMTS region, the volume of e-commerce deliveries is increasing substantially. The three primary parcel delivery services are the United States Postal Service (USPS), UPS, and FedEx. All three have distribution sites in the Binghamton region to facilitate overnight delivery and parcel pickup. Amazon is the corporate leader in e-commerce. Their offer of same-day delivery is not yet available in the Binghamton area, but may happen as the company considers its business strategy in medium-sized markets. If it does, their distribution network and the regional transportation network will be affected.

Another facet of e-commerce is the offer to consumers to “buy-online, pick up in store” (BOPIS). Seen in grocery, retail, and home improvement stores, this service does not alter the number of trips to the store location, but it reduces the duration of the visit as consumers park in a specified location and have the order placed in their vehicle.

E-commerce also influences land use in terms of location of warehouses. A local example is that Dick’s Sporting Goods has set aside a portion of their new warehouse in the Broome Corporate Park in Conklin as a B2C fulfillment center. Over time this trend may create a demand in the urban core for what have become known as microwarehouses. These are relatively small spaces, sometimes shared by multiple vendors, where goods are brought in from outlying warehouses and assembled into delivery orders. Amazon same-day delivery would

<sup>36</sup> NHTSA, “Truck Safety Facts 2018” DOT-HS-812-891

contribute to this trend. This approach creates additional truck trips on the network, including local streets. Unused retail space in area shopping malls may be well suited for this purpose.

## Rail Freight

The region includes facilities of three freight railroads:

- Class I: Norfolk Southern (NS) Southern Tier line from Buffalo through Binghamton to Port Jervis; and the former Delaware & Hudson (D&H) line from north of Albany through Binghamton into Pennsylvania.
- Class II: New York, Susquehanna & Western (NYS&W) Syracuse Branch. The NYS&W Utica Branch from Binghamton to Sherburne is out of service (in service north of Sherburne).
  - > Annual carloads: 21,700
- Class III: Owego & Harford (O&H). As a shortline railroad, the O&H depends on interchanging cars with NS. Scheduling these movements can be an impediment to accommodating customer needs.
  - > Annual carloads: 2,050
- Terminals/yards: NS East Binghamton yard, NYS&W Bevier Street yard, O&H Owego yard.

Most of the rail traffic in the BMTS region is through traffic, as there are few rail-dependent industries. However, railroad access is important to industries' ability to remain competitive. Binghamton also lacks a rail-truck intermodal terminal where shipping containers are transferred from one mode to another. A business in the Binghamton area that relies on inbound or outbound containerized shipments must pay to have them trucked to or from an intermodal terminal in Syracuse, Scranton, or Mechanicville, or directly from the Port of New York and New Jersey. The Binghamton Regional Freight Study (2008)<sup>37</sup> found there was insufficient demand to justify constructing an intermodal terminal in Binghamton.

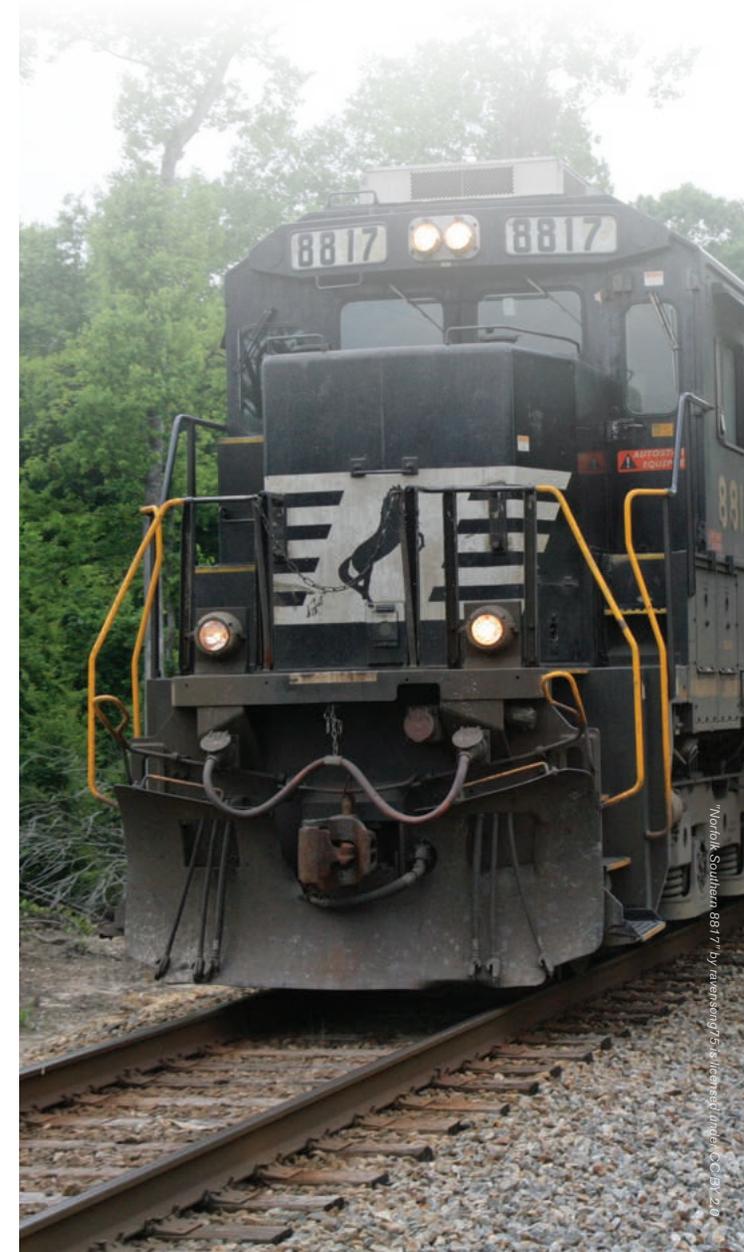
## AIR CARGO FACILITIES

BGM has modest cargo-handling capabilities. Mail and small parcels are accommodated on commercial passenger flights, but as of early 2020 Delta is the only commercial carrier serving the airport. The Broome County Department of Aviation reports that there are daily flights carrying parcels for UPS.

## PIPELINE FACILITIES

The BMTS planning region has three tank truck/pipeline-connected petroleum terminals. Pipelines are used to transport several petroleum products, including motor fuels, heating oil, and propane. These products are moved by truck from the terminals to wholesale distribution sites or retail locations. These trips contribute to truck traffic on BMTS-area roadways.

<sup>37</sup> Cambridge Systematics. 2008. "Binghamton Regional Freight Study." Binghamton Metropolitan Transportation Study, Available at [http://www.bmtsonline.com/sites/default/files/Reports%20and%20Documents/Binghamton%20Regional%20Freight%20Study\\_Final%20Report\\_Complete.pdf](http://www.bmtsonline.com/sites/default/files/Reports%20and%20Documents/Binghamton%20Regional%20Freight%20Study_Final%20Report_Complete.pdf)



## FREIGHT NEEDS

### TRUCKING

Currently, 88% of freight in the BMTS region moves by truck. As shown in Table 8-2, an increase of between 37% and 57% in these movements is forecast through 2040.

- While the State Core Freight Highway Network roadways are on the NHS, first-/last-mile delivery requires attention to state-owned non-NHS roadways and the local street network.
- A need exists to address vertical bridge clearance issues throughout the BMTS region. (See Table 8-3) Minimum vertical clearance requirements over highways help accommodate the movement of large vehicles for maintenance operations, utility work, and the transport of people, products, construction equipment, military equipment for national defense, etc. New York State Vehicle and Traffic Law require posting of signs informing persons of the legal overhead clearances of bridges and elevated structures when the measured clearance is less than 14 feet; legal clearance is one foot less than measured clearance. Vertical clearance restrictions can be disruptive to users of the highway system, causing some trucks to travel additional time and distances. Truck drivers that do not see or do not comply with vertical clearance restrictions can cause damage to trucks, cargo, and bridges.

TABLE 8-2:

#### TRUCK FREIGHT, BY CORRIDOR 2040 FORECAST AND CHANGE FROM BASE

CORRIDORS	2040			% CHANGE (2012–2040)		
	AADTT	Value	Tonnage	AADTT	VALUE	TONNAGE
Syracuse-Binghamton-Pennsylvania	1,743,966	\$40,329,690,946	25,570,852	49%	92%	44%
Albany-Binghamton	732,457	\$8,511,550,679	10,731,730	37%	58%	31%
Harriman-Binghamton	1,030,463	\$15,070,397,048	12,720,294	57%	81%	46%
Binghamton-Erie	1,506,204	\$45,921,423,896	24,044,728	49%	131%	47%
<b>Total</b>	<b>5,013,090</b>	<b>\$109,833,062,569</b>	<b>73,067,604</b>	<b>49%</b>	<b>101%</b>	<b>43%</b>

Source: New York State Freight Transportation Plan

TABLE 8-3:

**BRIDGES WITH VERTICAL CLEARANCE ISSUES**

BIN	POLITICAL UNIT	DESCRIPTION	OVER	POSTED VC UNDER (FT)
7218980	0828 - Town of TIOGA	NORFOLK SOUTHERN	BARTON ROAD	10
7218990	0828 - Town of TIOGA	NORFOLK SOUTHERN	BARTON ROAD	10
1014359	0855 - Town of VESTAL	201 201 91011004	PRIVATE ROAD	11
1014359	0855 - Town of VESTAL	201 201 91011004	BOLAND DRIVE	11
1014359	0855 - Town of VESTAL	201 201 91011004	SUSQUEHANNA RIVER	11
1054821	0855 - Town of VESTAL	17 17 91011046	CR 44 - Old Vestal Road	12
1054822	0855 - Town of VESTAL	17 17 91011046	CR 44 - Old Vestal Road	12
7018440	1158 - Village of ENDICOTT	NORFOLK SOUTHERN MP. 222.73	26 26 91011090	12
7014360	1248 - Village of JOHNSON CITY	NORFOLK SOUTHERN	RIVERSIDE DRIVE	10
7003630	2006 - City of BINGHAMTON	NORFOLK SOUTHERN MP.191.17	7 7 91012020	11
7003640	2006 - City of BINGHAMTON	NY Susq & Western RR MP 614.02	7 7 91012020	11
7003650	2006 - CITY OF BINGHAMTON	NY SUSQ & WESTERN RR MP 192.12	7 7 91012020	11

Bridges are also particularly important because of the gross vehicle weight of trucks, which may be 80,000 pounds (40 tons) without an overweight permit. Parcel delivery trucks may weigh between 7 and 13 tons when loaded, while trucks delivering groceries or fuel oil may be more than 17 tons.

A bridge with a rating of Poor may remain open for vehicle traffic but may be load posted with a weight limit as low as 5 tons. This is both a safety measure and a means of extending the life of the bridge by eliminating the impact of heavy vehicles. This means that only truck traffic is impacted, resulting in truck detours that range from minor to significant. According to the NYSDOT's Posted Bridges Interactive Map,<sup>38</sup> there are bridges in the BMTS region with weight limits from 4 to 22 tons (Table 8-43). While these bridges may not carry trucks that are normally thought of as transporting freight, they may be needed for heating oil delivery, refuse collection, and fire apparatus. All but one of these are locally owned, underscoring the importance of including bridges off the NHS in BMTS' metrics.

**TABLE 8-4:**  
**LOAD-POSTED BRIDGES**

DESCRIPTION	OWNER	POSTING (TONS)
Harnick Rd. over Apalachin Creek	Tioga County	18
Valley Rd. over Pumpelly Creek	Town of Owego	12
Valley Rd. over Pumpelly Creek	Town of Owego	8
Valley Rd. over Pumpelly Creek	Town of Owego	15
Youngs Rd. over Little Nanticoke Creek	Town of Owego	4
Diamond Valley Rd. over Neiger Hollow Creek	Town of Tioga	10
Diamond Valley Rd. over Diamond Valley Creek	Town of Tioga	22
Washington Dr. over Fuller Hollow Creek	Town of Vestal	10
Exchange St. over Susquehanna River	City of Binghamton	15
County Rd. 93 over Little Choconut Creek	Broome County	20

Source: NYSDOT

<sup>38</sup> New York State Department of Transportation. "Posted Bridges." Available at: <https://gis.dot.ny.gov/html5viewer/?viewer=postedbridges>.

Truck parking is provided at public rest areas on I-81 NB near the Pennsylvania state line and on I-81 SB north of Whitney Point, as well as the Owego and Nichols rest areas on NY Route 17. Privately owned truck stops are also on I-86 in Lounsberry, I-81 near Exit 3 in Kirkwood, and I-88 in Harpursville. Based on anecdotal evidence, the amount of truck parking available in the region appears to be adequate now, although this can only be determined by actual parking occupancy counts, which have not been performed. With the forecasted growth in truck freight, there may be a need for additional public or private truck parking areas. Overnight parking does not correlate with truck traffic volume, as it is specific to routing and scheduling.

With respect to e-commerce and urban goods delivery, the need is to accommodate inevitable growth in a way that minimizes negative impacts on streets, sidewalks, and curbs. BMTS may consider developing a curb space management plan for its municipal members.

Trucking can have a negative environmental impact because of the inefficiency of trucks. While technology developed in response to federal regulations has significantly reduced emissions from diesel trucks, fuel economy for tractor trailers averages about 6 mpg. Parcel delivery trucks are also diesel powered, and average about 8 mpg.<sup>39</sup>

The truck-building industry has been developing alternative-fuel trucks, including compressed and liquified natural gas (CNG/LNG), battery-electric vehicles (BEVs), and hydrogen fuel cell electric vehicles (FCEVs). A barrier that is present in application of these approaches to cars is developing the fueling or charging infrastructure that is as robust as the network of gasoline stations. This is less of an issue with truck fleets because owners can invest in installing the systems at their terminals.

For example, both FedEx and UPS have contracted for the purchase of BEV delivery trucks.<sup>40</sup> Lower operating costs help offset the cost of installing charging equipment at their terminals. Several manufacturers of heavy trucks have developed prototypes of both BEV and FCEV tractor trailers.

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<sup>39</sup> US Department of Energy. "Average Fuel Economy by Major Vehicle Category." Alternative Fuels Data Center, February 2020. Available at: <https://afdc.energy.gov/data/10310>.

<sup>40</sup> Jason Mathers. "Electric package trucks are (almost) ready for delivery." GreenBiz, March 10, 2020. Available at: <https://www.greenbiz.com/article/electric-package-trucks-are-almost-ready-delivery>.

## **RAIL**

Assessing needs of rail transport differs from trucking in that private companies own the infrastructure and operations. Government has little influence on decisions on capital projects and operational strategies.

Rail weight capacity and clearances relate to both infrastructure and capacity. Single versus double track is another capacity issue. All the lines serving the BMTS region are cleared for double-stack operation and are single track with passing sidings. This can be a limiting factor in the ability to accommodate a growing number of trains on a line, which is of special concern for intermodal container trains as these operate on a time-sensitive schedule not true for other freight.

The Freight Transportation Plan did not identify specific needs on the rail corridors serving the Binghamton region to accommodate predicted growth in traffic. The Freight Transportation Plan also did not identify any specific project needs on these corridors.

## **AIR CARGO**

Air cargo is a niche business, especially in small markets like Binghamton. The volume at BGM will reflect growth in e-commerce parcel volume unless there is a new business with a specific need to ship by air. The airport will not require any upgrades to serve this market.

# ENVIRONMENT & RESILIENCY

9



## CHAPTER 9

# ENVIRONMENT & RESILIENCY



Sustainable communities are those that look to the needs of future generations in crafting policies and create strategic plans that address uncertainty in a positive manner. Transportation plays an important role in sustainable communities. Transportation investments and improvements should protect the health of the natural environment while supporting and contributing to the built environment in a manner that improves the health of communities and the economy.

Resilience contributes to sustainability. Resilience is the ability to anticipate, prepare for, and adapt to changing conditions and to withstand, respond to, and recover from disruptive or unexpected events. Because Binghamton and its neighbor communities grew along the Susquehanna and Chenango rivers, the risk of flooding from extreme storms is high. Because of this, resiliency planning has been focused primarily on extreme weather events. Figure 9-1 shows an example of flooding in Binghamton.

Communities must also be resilient in the face of disruptive events beyond weather. These other events can include economic disruption in global or local markets, technology-based disruptions, or failure of cybersecurity that results in the disruption of traffic control networks, particularly as vehicles become more connected and automated.

When individual components like a bridge, large culvert, or roadway fail or require closure, or when a traffic management center needs to be taken offline, a resilient system can still provide access to and from critical facilities.

Multimodal characteristics of the transportation system also contribute to resilience. Buses can be used to transport more people and meet the critical needs of communities. Resilient freight movement also benefits from availability of multiple modes. If roads are closed, can emergency supplies be brought in by rail? Siting of manufacturing facilities and warehouse/distribution centers is often influenced by the reliability and resilience of highway and rail access. The same may be true of last-mile deliveries. If people cannot go out to grocery stores, is the system resilient enough to bring food to them?

### FEDERAL PLANNING FACTORS

- 5** Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;
- 9** Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation





Source: National Weather Service

**FIGURE 9-1: FLOODING FROM TROPICAL STORM LEE IN BINGHAMTON**

## CURRENT CONDITIONS AND PERFORMANCE

Broome County<sup>41</sup> and Tioga County<sup>42</sup> have each recently updated their Hazard Mitigation Plans. These plans provide a well-documented baseline of conditions in each county and the means to address multiple hazards. Prepared initially in response to the Disaster Mitigation Act of 2000, and updated as required, these plans help state and local governments prepare for and reduce the potential impacts of natural hazards. Each plan speaks to the goals for the county. Most relevant to this LRTP is Broome County Goal 5 that addresses the resilience of the built environment and Tioga County Goal 1 to “protect critical facilities and infrastructure.” Corridors that provide access to critical facilities are identified as critical infrastructure. Because of its cooperative structure, BMTS can also help develop partnerships, a goal of both counties.

### GOALS OF THE TIOGA COUNTY HAZARD MITIGATION PLAN

Protect life and property.

- 1 Increase public awareness and preparedness/understanding of natural hazards and their risks.
- 2 Reduce hazard impact on the economy.
- 3 Protect open space, agricultural land, the environment, and natural resources.
- 4 Promote and support partnerships.
- 5 Enhance emergency management, preparedness, response, and recovery.
- 6

### GOALS OF THE BROOME COUNTY HAZARD MITIGATION PLAN

Protect life, property, and economy.

- 1 Increase public awareness and preparedness.
- 2 Encourage partnerships.
- 3 Provide for enhanced emergency services.
- 4 Improve the resilience and strength of the built environment and communities to reduce impacts of natural hazard events.
- 5

Another planning effort related to regional resilience is the New York Rising Community Reconstruction Program (NYRCR). This program was created in response to severe damage resulting from Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy in 2011 and 2012. Broome<sup>43</sup> and Tioga<sup>44</sup> counties each completed a NYRCR Plan in March 2014.

Figure 9-2 shows the current Federal Emergency Management Agency (FEMA) flood hazard area map for the region. Several roadways are in the high-risk areas, including NY Route 17, US 11/Front Street, US 11/Upper Court Street, NY Route 7/Brandywine Highway, NY Route 7/Conklin Road, NY State Route 17C, NY State Route 363, and NY Route 434/Vestal Parkway. These all carry significant volumes of both local and regional traffic and provide key routes for emergency response and movement of goods. When the roads in the urban core area flood, alternate routes are more likely to be available than in outlying areas like Conklin.

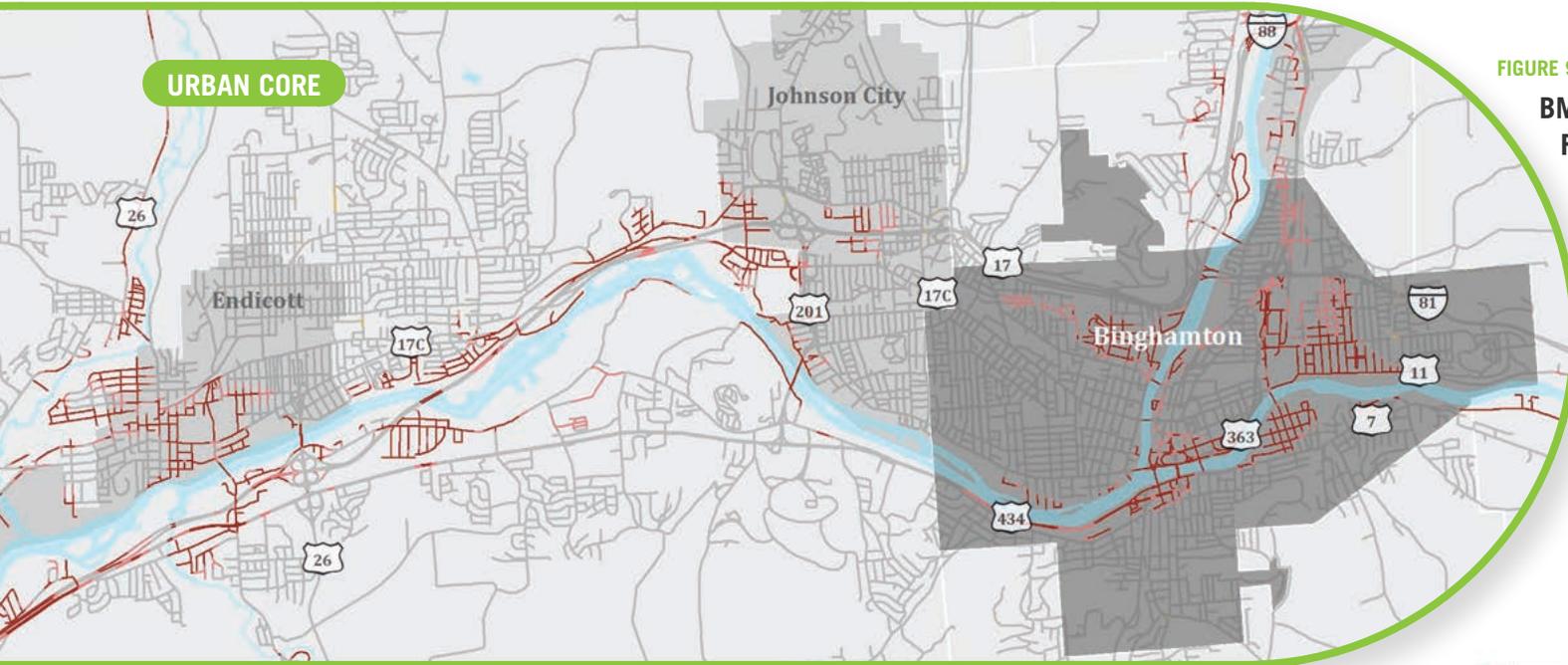
<sup>41</sup> Broome County, New York. 2019. “2019 Broome County Hazard Mitigation Plan.” Available at: <http://gobroomecounty.org/planning/2019HMP>.

<sup>42</sup> Tetra Tech. 2018. “Tioga County Hazard Mitigation Plan Update: Volume 1.” Tioga County. Available at: <https://www.tiogacountyny.com/media/6804/tioga-county-hazard-mitigation-plan-2018-vol-1.pdf>.

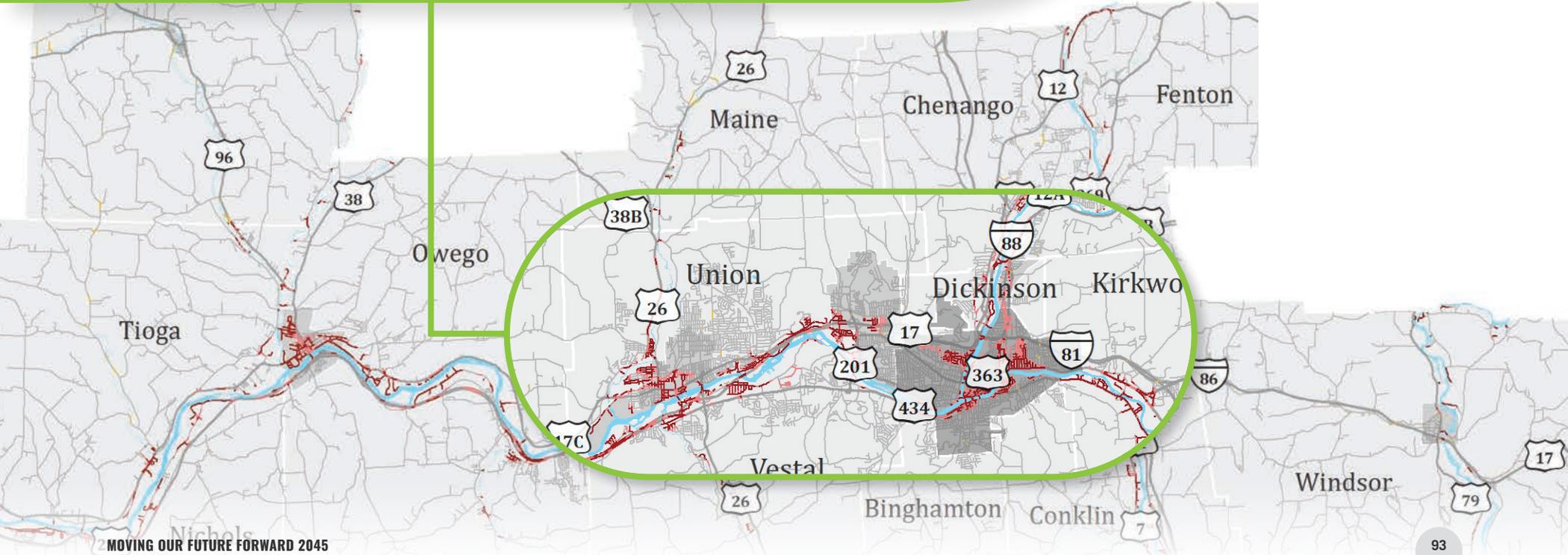
<sup>43</sup> NYRCR Broome Planning Committee. 2014. “NYRCR Broome: NY Rising Community Reconstruction Plan.” Available at: [https://stormrecovery.ny.gov/sites/default/files/crp/community/documents/broomecounty\\_nyrcr\\_plan.pdf](https://stormrecovery.ny.gov/sites/default/files/crp/community/documents/broomecounty_nyrcr_plan.pdf)

<sup>44</sup> NYRCR Tioga Planning Committee. “NYRCR Tioga: NY Rising Community Reconstruction Plan.” Available at: [https://stormrecovery.ny.gov/sites/default/files/crp/community/documents/tiogacounty\\_nyrcr\\_plan.pdf](https://stormrecovery.ny.gov/sites/default/files/crp/community/documents/tiogacounty_nyrcr_plan.pdf).

**FIGURE 9-2:**  
**BMTS ROADWAYS IN FEMA FLOOD ZONES**

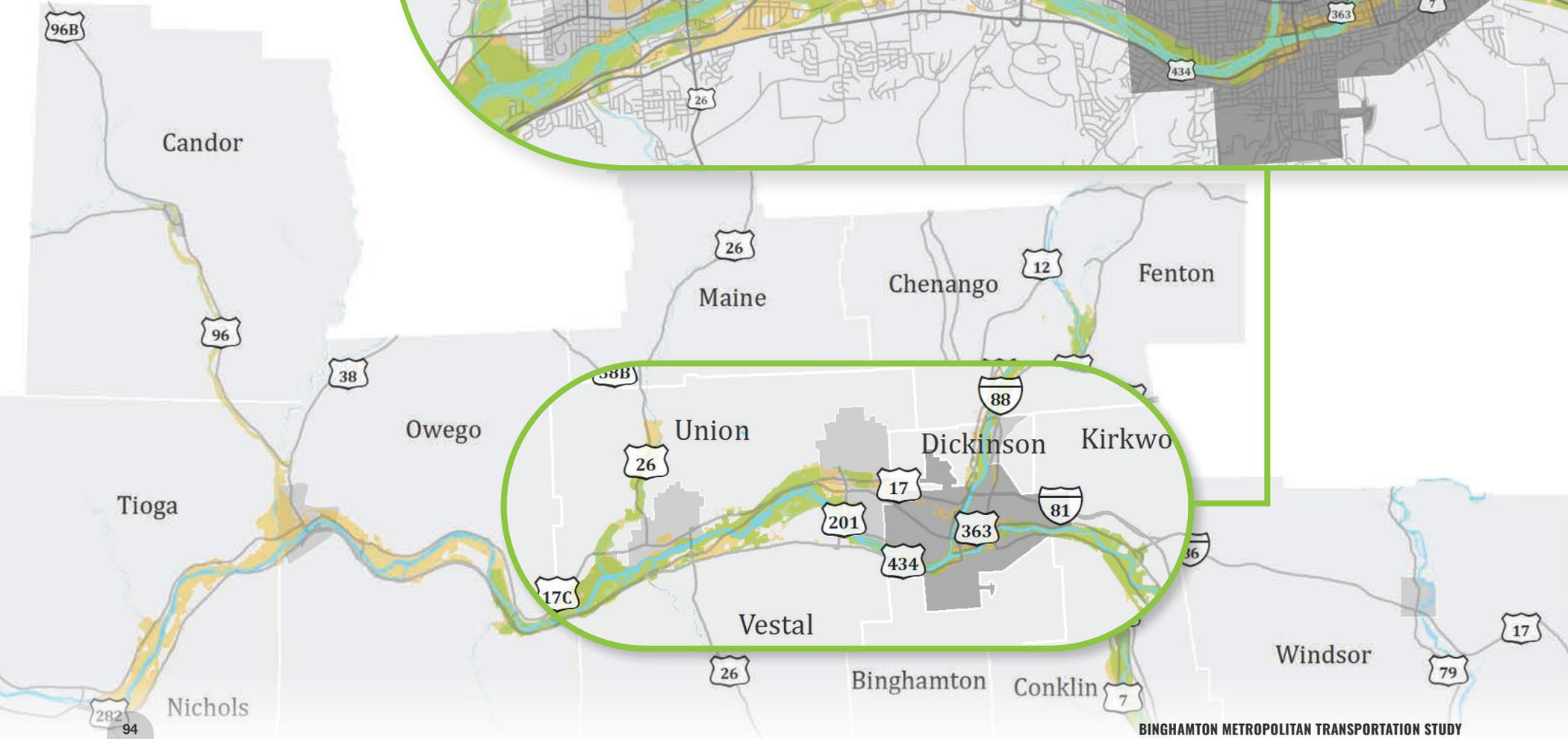
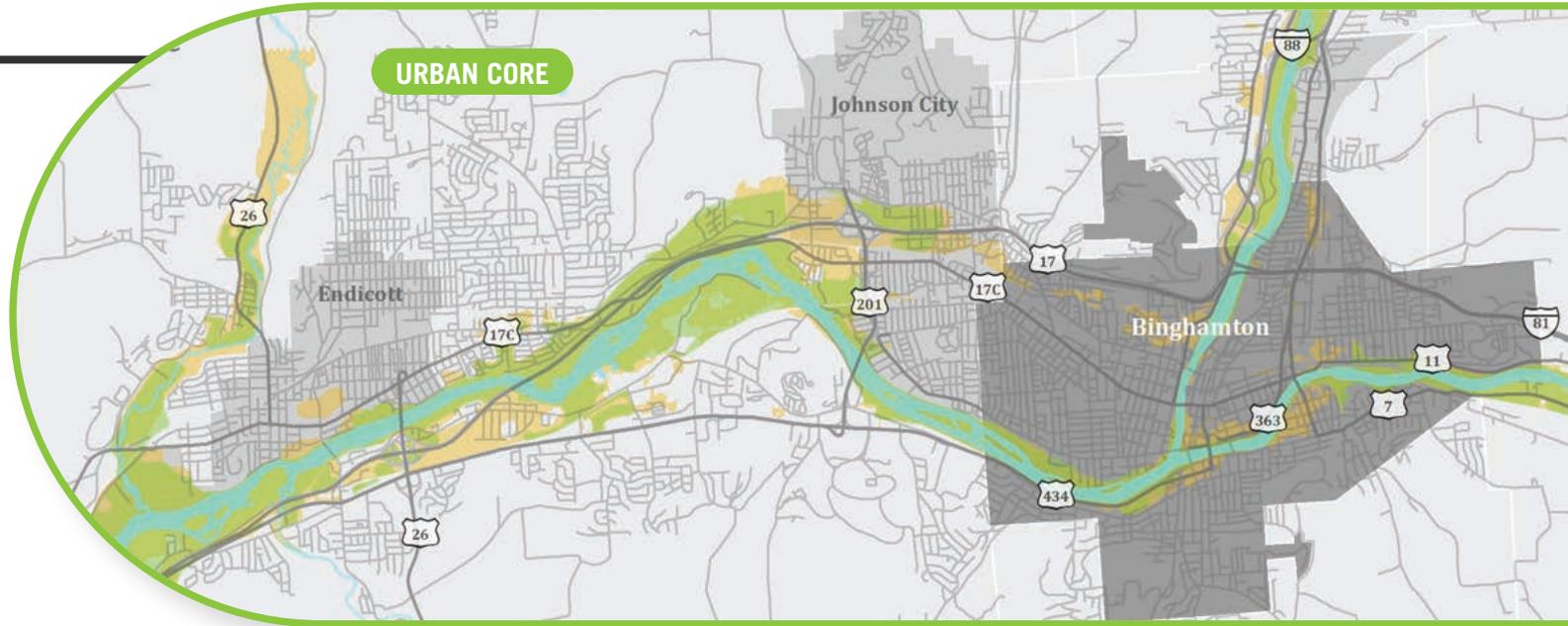


- MODERATE RISK
- HIGH RISK
- HIGHEST RISK
- RIVER



**FIGURE 9-3:**  
**BMTS FLOOD BOUNDARY**

- 2006 FLOOD BOUNDARY
- 2011 FLOOD BOUNDARY



FEMA differentiates between high and moderate to low risk areas. Table 9-1 describes the FEMA floods zones levels visualized in Figure 9-2. This can be compared to the actual inundation from the 2006 and 2011 floods depicted in Figure 9-3. The two events were somewhat different in their impact but resulted in numerous road closures from downtown Binghamton west to Owego. This provides a guide for resiliency actions and updating of flood boundaries.

**TABLE 9-1:**

**FEMA FLOOD ZONE DEFINITIONS**

MAPPED	FEMA ZONE	ZONE TYPE	DESCRIPTION
Highest Risk	Zone A	AE	Areas inundated by 1% annual change flooding or 100-year flood zone, for which a base flood elevation has been determined.
High Risk	Zone A	A	Areas inundated by 1% annual change flooding or 100-year flood zone, for which no base flood elevation has been determined.
Moderate Risk	Zone X	X500	Areas with a 0.2% chance of annual flooding or 500-year flood zone.

*Source: FEMA*

Certain aspects of environmental health and community sustainability extend beyond resilient response to extreme weather events. Amendments to the Clean Air Act in 1991 required MPOs in air quality nonattainment areas to conform their LRTP and TIP to the motor vehicle emissions budget in the State Air Quality Implementation Plan. The Binghamton urbanized area has never fallen into nonattainment status and therefore does not evaluate motor vehicle emissions for compliance with the State Air Quality Implementation Plan; this is not expected to change.

Greenhouse gas (GHG) emissions are also a concern because of their contribution to global climate change. According to NYSERDA,<sup>45</sup> the transportation sector accounted for 37% of GHG emissions in New York in 2016. BMTS can contribute to reducing GHG emissions by encouraging the purchase of clean energy vehicles and use of nonmotorized modes of travel.

Water quality is another environmental concern in the BMTS region, made more important because of its key location in the Susquehanna River Basin and Chesapeake Bay Watershed. Transportation plays a role because of stormwater runoff from impervious surfaces, such as roadways, sidewalks, and parking structures and lots.

<sup>45</sup> New York State Energy Research and Development Authority. "New York State Greenhouse Gas Inventory: 1990–2016." July 2019. Available at: <https://www.nyserdera.ny.gov/-/media/Files/EDPPP/Energy-Prices/Energy-Statistics/greenhouse-gas-inventory.pdf>.



The Broome County Stormwater Management Plan<sup>46</sup> includes Pollution Prevention and Good Housekeeping for Municipal Operations. This measure addresses stormwater impacts of street and bridge maintenance, winter road maintenance, stormwater drainage system maintenance, and vehicle and fleet maintenance. This measure focuses on maintenance but includes a strategy to incorporate runoff reduction techniques and green infrastructure designs.

The Tioga County and Town of Owego Stormwater Management Program Plan<sup>47</sup> includes the same control measures but does not cite green infrastructure strategies.

The Climate Smart Community program<sup>48</sup> is jointly sponsored by seven New York State agencies including NYSDOT and NYSERDA. Communities can apply for certification based on achieving goals that include enhancing community resilience to climate change and implementing climate smart land use and materials. Broome County has achieved Climate Smart Community Bronze certification.

<sup>46</sup> Broome County Department of Public Works. 2018. "Stormwater Management Program Plan." Available at: <http://www.gobroomecounty.com/sites/default/files/dept/dpw/pdfs/Broome%20County%20SWMP%20-%202018.pdf>.

<sup>47</sup> Tioga County. 2015. "Tioga County and Town of Owego Stormwater Management Program Plan: 2015-2020." Available at: <https://www.tiogacountyny.com/media/3116/tioga-county-stormwater-management-plan-2015-2020.pdf>.

<sup>48</sup> <https://climatesmart.ny.gov/about/>

## ENVIRONMENTAL NEEDS

BMTS needs to know more about how disruptive events will impact the regional transportation system to respond.

A Critical Infrastructure Resiliency Plan for the region would include an in-depth examination of the multimodal transportation network that identifies vulnerable facilities, functions, and operations. The proposed Critical Infrastructure Resiliency Plan would use a perspective of the transportation system to identify what facilities may need adaptation treatments to provide access to critical destinations like hospitals, utility terminals, and highway maintenance and fuel depots. The goal is to maintain access during pre-storm evacuation, emergency response, and short-term recovery for flooding and related events. A priority list of adaptation projects may then be considered for incorporation into the LRTP and programming in the TIP. In addition to capital projects, programmatic actions can be taken to address resilience. Many of these are noted in the county Hazard Mitigation Plans, including agency partnerships, support for emergency services, and open space management and preservation.

Better stormwater management needs to be incorporated for municipal projects and local development projects to improve stormwater quality and reduce runoff. Green infrastructure (Figure 9-4) can contribute to a community's resiliency. Green infrastructure is defined by the Environmental Protection Agency<sup>49</sup> and others as a resilient approach to managing the impacts of wet weather. Municipalities should be encouraged to use the BMTS Green Infrastructure Guide<sup>50</sup> to help plan their transportation projects, where appropriate.



**FIGURE 9-4: GREEN INFRASTRUCTURE RAIN GARDEN**

<sup>49</sup> US Environmental Protection Agency, 2019. "What is Green Infrastructure?" Available at: <https://www.epa.gov/green-infrastructure/what-green-infrastructure>.

<sup>50</sup> BMTS, "Where the Water Meets the Road: A BMTS Green Streets Guide"

## CYBERSECURITY

Cybersecurity will play a greater role in ensuring sustainable and resilient communities as more and more services become connected and more functions are automated. An increasing number of devices are connected using the Internet of Things (IoT), including the management of many urban systems, from the electric grid to waste collection, lighting, parking, and curb space. As shown in Table 9-2, there are direct transportation functions and other systems that affect the mobility of people and goods that become vulnerable to cyber intrusion as a consequence of IoT connections.

TABLE 9-2:

### CYBERSECURITY CONCERNS

SECTOR	FUNCTIONS
ITS	Communications networks
	Input devices (roadside units, sensors, CCTV)
	Output devices (dynamic message signs, traveler information systems, traffic signal systems)
Public Safety	PSAP operations (911 calls, emergency services dispatch)
	Emergency services radio communications and operations
	Medevac helicopter services
Transport Technology	Vehicle on-board systems
	Connected vehicle systems
	Automated vehicle operation
	Unmanned aerial vehicle (UAV) operations
Utilities	Supply chain logistics and e-commerce
	Electricity
	Cellular communications

Note: CCTV – Closed-Circuit Television / PSAP – Public Safety Answering Point (911 dispatch center) / UAV – Unmanned Aerial Vehicle • Source: Transportation Security Administration



The importance of developing partnerships among federal, state, and local government agencies and private sector organizations is a critical means to continuously update protections and monitor potential intrusions. Smaller communities are often more at risk because they typically have fewer information technology resources. BMTS can play an important role in organizing and developing these partnerships to ensure that all the member municipalities have access to necessary resources.

## **TRANSPORT TECHNOLOGY**

As explained in more detail in Chapter 10, the evolution of transportation technology promises to introduce disruptions into established patterns of mobility for people and goods. Resilient communities need to prepare for both expected and unexpected changes. Some operations are already established, such as ride-hailing services. For others, like shared e-scooters, that are not yet available in the Binghamton area, there is a large amount of experience from other cities on how best to regulate to avoid issues. But there are many operations that are in the early testing stages, including urban air mobility and drone delivery, delivery robots that operate in the street (Nuro) or on the sidewalk (Starship), and highly automated cars and trucks.

The private sector is taking the lead on all these technologies and operations. It is important that BMTS plan for these technological changes. It can do so through future mobility planning that monitors the state of practice and leverages the experience of other communities or regions that may be earlier adopters.

If the vehicle fleet shifts substantially to electric power, pipelines may become less important and the electric grid more critical. If residents and businesses depend, to an increasing extent, on e-commerce, then resilient supply chains and methods of last-mile delivery become more important.

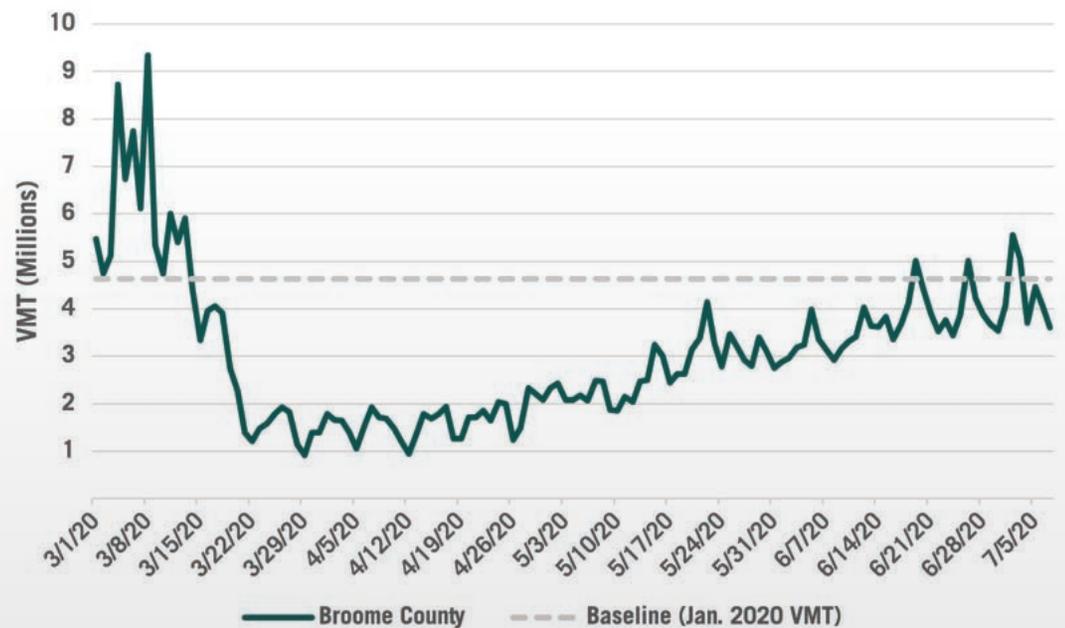
BMTS can plan for these changes and address the impacts on the local transportation network as they develop. In short, as transportation technology evolves, resilience may take on new meanings and future mobility planning can track those challenges and opportunities.

## THE COVID-19 PANDEMIC AND RESILIENCE

The COVID-19 pandemic that began in early 2020 has proven to be the most disruptive event in decades. The impacts on transportation from COVID-19 have been immediate and significant. Because of social distancing guidelines, shared modes of personal travel initially lost ridership. Broome County continued to operate BC Transit, requiring all passengers to wear masks, suspending fares to eliminate touching of farebox equipment/close contact with the driver, and providing space between passengers and physical barriers around the driver. All intercity bus service to and from Binghamton was suspended on March 27, 2020. BC Transit reinstated fare collection on June 15, 2020.

According to data released by StreetLight and shown in Figure 9-5 and Figure 9-6, both Broome and Tioga counties experienced an estimated 90% reduction in VMT as stay-at-home orders went into effect and all but essential workers began to work remotely and no longer commute. By July 2020, as the area moved through phased reopening, traffic volume returned to near-normal levels. Shopping trips were also minimized and discretionary travel for social and recreational trip purposes essentially ceased. Conversely, trips by walking and cycling appear to have increased.

**FIGURE 9-5:**  
**BROOME COUNTY VMT ESTIMATES DURING COVID-19**



Source: StreetLight Data

Goods movement in many respects remained unchanged in some commodity sectors while declining in others. Shipping food remained strong, although the restaurant sector suffered sharp declines, so those companies involved in direct deliveries lost business. Evidence exists that supermarket business increased as people who had eaten at restaurants ate at home. Trucking companies involved in shipping durable goods like appliances and automobiles saw large reductions in traffic. Because of the general reduction in traffic, long-distance truck trips became faster and more reliable than under previous conditions.

There have also been significant increases in Business to Consumer (B2C) e-commerce. In an online survey conducted by BMTS in June 2020, 18% of respondents reported that they more often ordered groceries and consumer goods as well as restaurant-prepared meals. While other employers were laying workers off, Amazon hired more than 150,000 new employees to meet growing demand.

**FIGURE 9-6: TIOGA COUNTY VMT ESTIMATES DURING COVID-19**



Source: StreetLight Data

At the time of this writing, questions about longer-term changes in behavior remain unanswered, including the following:



▪ **Work from home.** Businesses may choose to continue remote work due to associated cost savings on office space ownership or rental, and demand for it from employees. Conversely, many have found working from home challenging and want to return to an office setting. One estimate is that 25-30% of newly remote workers will continue to do so.<sup>51</sup>



▪ **Education.** Nearly all education shifted to online instruction beginning in March 2020. Reopening of K-12 schools and colleges and universities remains in flux at the time of this writing in August 2020, with various models combining in-person and remote teaching being explored and piloted.



▪ **Shared transport.** It is uncertain how long it will take before people feel comfortable riding a bus or using a ride-hailing service. BC Transit and the local operations of Uber and Lyft may experience long-term reductions.



▪ **E-commerce.** There has been a long, upward trend in business-to-consumer e-commerce followed by exceptional growth during the pandemic. Retailers in that market are not predicting a decline, except potentially in groceries and meal delivery.



▪ **Active transportation.** People who have begun walking or cycling for some of their travel needs may want to continue the benefits they gained in personal health.

It will be important for BMTS and its member municipalities and agencies to track travel trends in personal and freight mobility if or when the pandemic resolves. Doing so may lead to identifying different projects, strategies, and actions moving forward. A retrospective analysis that examines how resilient the local communities were will also be useful for planning purposes.

<sup>51</sup> <https://globalworkplaceanalytics.com/work-at-home-after-covid-19-our-forecast>

# FUTURE MOBILITY & TECHNOLOGY

10



## CHAPTER 10

# FUTURE MOBILITY & TECHNOLOGY



The past few years have been characterized by a rapid transformation in mobility. New technology has precipitated changes in how people travel and how freight moves. The nature of future mobility technology suggests these changes will continue for years, with uncertain timelines for development or deployment and often unpredictable outcomes for how people and goods move.

### FEDERAL PLANNING FACTORS

- 7 Promote efficient system management and operation



## MOBILITY ON DEMAND

All the services described below can be referred to as Mobility on Demand (MoD). MoD means that a person can have access to mobility without having to own a vehicle—a car or even a bike. Users pay per trip. If a trip is multimodal, like using a scooter to ride to a bus stop, then each segment is dealt with separately.

Carshare programs emerged in the early 2000s as an alternative to car ownership. They give subscribers access to a vehicle on a per-hour and per-mile basis. These programs appeal primarily to urban residents whose need for a car is infrequent.

Ride-hailing via Transportation Network Companies (TNCs) such as Uber and Lyft began operating in the BMTS region in 2017. Uber shared some data after their first full year of service on common destinations, identifying Binghamton University, the Binghamton Transportation Center, and SUNY Broome as the top three locations served.

Microtransit is an emerging shared mode. This is a service that uses vans or small buses to transport groups of people. In the BMTS planning area, Getthere offers a vanpool service, partnering with employers in the region, to transport employees to and from work.

A final category of shared mode is called micromobility. This encompasses bikeshare programs and the more recent e-scooter operations.

Riders pay a time-based fee to utilize these services. An initial model for e-scooters was to place scooters around a city, and have people download an app to use them. Cities found this model to be problematic, with people riding on sidewalks and leaving scooters anywhere, both of which interfered with pedestrian safety. Cities addressed these problems by creating regulatory structures. This often included a limit on the number of scooters, a per-unit registration fee, and a time limit on pick up and relocation of scooters.

New York State prohibited both shared e-bikes and e-scooter programs until the passage of a law in April 2020.

Currently, the only micromobility operation in the BMTS region is a bikeshare program at Binghamton University for students and employees. As these services expand into the BMTS area, municipalities will need to regulate their operations.



FIGURE 10-1: GETTHERE VANS



FIGURE 10-2: FIRST GENERATION GOOGLE CAR

## MOBILITY-AS-A-SERVICE

MaaS is the integration of various forms of transport services into a single mobility service, accessible on demand. A customer subscribes to the MaaS service rather than the individual applications. Setting up a trip involves submitting origin, destination, and departure time. The MaaS system offers trip options. They may be offered a single mode (e.g., TNC from start to end) or a combination of modes. Once selected, they pay a single fee. The benefit of MaaS is the ability to compare trip options and to pay once. MaaS platforms may be operated by a governmental entity as a mobility provider, or by a private nonprofit or business. Currently, Getthere provides trip-planning and referral services with the goal of moving toward a MaaS platform.

## CONNECTED VEHICLES

An area of emerging technology called connected vehicles (CVs) has been in development for several years. ITS is generally used to describe the application of advanced technology to the operation of transportation systems. The goal of ITS deployment is to improve the efficiency, reliability, and safety of travel. CVs are viewed as a new component of ITS.

CV technology allows vehicles to communicate directly to traffic operations centers (TOCs), roadside devices, and with each other. A message may appear in the vehicle that the traffic signal ahead will turn red, or that there is a crash two miles ahead and diversion routes are available. Numerous safety benefits can occur once there are many CVs in the fleet.

The BMTS region is served by a Transportation Operations Center operated by NYSDOT in cooperation with the Broome County emergency services dispatch center where they manage the ITS system for the region. NYSDOT's TOC has not yet deployed any CV technology.

## AUTOMATED VEHICLES

### CARS

Numerous companies, both vehicle builders and technology providers, have been testing various features of automated vehicles (AVs) since the Google car was unveiled a decade ago. These technologies span the spectrum from now-common driver-assist features like lane-departure warning, adaptive cruise control, and parking assist to full automation using cameras, lidar, and radar sensors in concert with artificial intelligence programming. While great advances have been made, and companies including Waymo have deployed driverless cars in Arizona, the timeline for fully driverless vehicles on most public roadways remains highly uncertain. Estimates range from the middle of this decade to several decades out.

The primary benefits of AV technology are significant improvements to safety and mobility. Research by the National Highway Traffic Safety Administration found that driver behavior is cited as a cause in 94% of crashes.<sup>52</sup> While AVs are not expected to avoid all crashes, the expectation is that the crash rate will drop by a large margin once there are many AVs on the road. AVs are also expected to be connected, taking advantage of the CV technology described above. The access benefit results from providing safe, convenient travel to those who cannot drive, including the young, old, and persons with disabilities.

AV technology also brings challenges. The most immediate is what is expected to be decades of mixed traffic with AVs and conventional vehicles sharing the road. AVs are programmed to obey all traffic laws, including speed limits; human operators often do not, whether intentionally or due to impairment/intoxication, distraction, or drowsiness. Consideration is being given to AV-only lanes on freeways, but this does not address mixed operation on urban streets.

Companies are also testing AV trucks. These trucks use technology like that of AV cars and have the potential to solve many challenges specific to long-haul trucking.

## ELECTRIC VEHICLES

This technology includes both Battery Electric Vehicles (BEVs) and Fuel Cell Electric Vehicles (FCEVs). Plug-in hybrids are often considered EVs, but they still rely on internal combustion motors for charging. The primary benefit of the EV is a reduction in air emissions. While there are no emissions from the vehicle itself, the overall savings considers the generation of the electricity. Savings also accrue to the owner. The cost of electricity is often less than gasoline. EVs also have much simpler drivetrains than conventional internal combustion vehicles, so maintenance costs are reduced.

The limitation on EVs has been battery cost, short driving range, and recharging time. However, battery technology continues to improve, so that the newest generation of BEVs have an advertised range exceeding 300 miles. The cost of BEV batteries has been on a downward trend. Charging technology continues to improve as well.

Registration data from the New York State Department of Motor Vehicles accounts separately for BEVs and plug-in hybrid electric vehicles (PHEVs). A total of 118 BEVs and 325 PHEVs are registered in Broome and Tioga counties.



FIGURE 10-3: EV CHARGING STATION, RECREATION PARK

<sup>52</sup> US Department of Transportation, National Highway Traffic Safety Administration. "Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey," February 2015. Available at: <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115>.

## ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

Private businesses have been placing charging stations in parking lots and garages as a convenience for their customers. Chargers have also been built in public parking lots and garages, and in some highway rest areas.

However, this does not address the issue of urban core residents and apartment dwellers who park on the street. To support private and public construction of on- and off-street charging stations, local municipalities must review and update zoning codes, as necessary.

EV infrastructure must also be accessible and identifiable on long road trips. Increasing the number of EV charging stations at traditional fueling stations and identifying their locations on highway informational signage may address this need. Figure 10-3 shows an EV charging station located in Recreation Park.

**TABLE 10-1:**

### BMTS REGION EV CHARGING STATIONS

As seen in Table 10-1, the number of public charging stations in the region remains small.

CHARGER LOCATION	CHARGER TYPE <sup>53</sup>	NUMBER OF OUTLETS
City of Binghamton, Collier St. public parking	Level 2	2
City of Binghamton, Doubletree Hotel for customers	Tesla Level 2	1
City of Binghamton, ScottTech, Court St.	Level 2	1
	Tesla Level 2	1
City of Binghamton, Recreation Park	Level 2	2
City of Binghamton, Price Chopper Glenwood Ave.	Level 2	2
Town of Dickinson	Level 2	2
Town of Dickinson, Fairfield Inn for customers	Tesla Level 2	3
Town of Dickinson, The Spot Restaurant	Tesla Supercharger	8
Town of Vestal, Serafini auto dealership	Level 2	1
Village of Owego, Temple St.	Level 2	10

Source: NYSDERDA EV Station Locator

<sup>53</sup> Level 2 chargers (240 V) deliver a faster charge (10 to 20 miles of range per hour) than Level 1 chargers, which use a standard 120 V AC plug outlet. Tesla Superchargers, also called DC Fast Charge or Level 3, provide much faster charging speeds and use 480 V connections.

## Fleet Applications

Both public and private vehicle fleet owners and operators have considered the benefits of purchasing BEVs. This includes cars, medium-duty trucks, heavy-duty trucks, and buses. Savings on the cost of operation include not only the relative cost of electricity versus fuel, but also the cost of maintenance. USPS, FedEx, and UPS have all placed orders for substantial numbers of BEV delivery trucks. Municipalities are considering BEV refuse trucks and other medium-duty applications. In these cases, the battery driving range can be matched to routes, and charging can be done overnight at fleet terminal locations.

The City of Binghamton purchased two EV cars for its fleet in 2019 and will be evaluating additional purchases.

BEV buses have been put in service in a few locations around the country. Range remains the primary issue, which makes diesel-electric hybrids more popular. BEV buses also cost more—approximately 70% more than a standard diesel bus.

As noted in Chapter 46, Broome County will consider adding BEV buses to its fleet as future purchases are made. Purchase decisions will depend on matching driving range to route demands, and on the ability to fund the additional cost.

## OTHER TECHNOLOGY CONSIDERATIONS

### E-COMMERCE

Technology may also play a significant role for first-/last-mile delivery. With the growth of consumer-based e-commerce and demand for shorter delivery times, fulfillment centers and delivery services are seeking opportunities for efficiency. Delivery robots are being tested that operate on the street or sidewalk and can carry food deliveries, small parcels, and even cargo. One example is the Nuro robot (Figure 10-4). This operates on the street, has compartments for multiple deliveries, is automated and electric. Nuro is operating a pilot program in Houston TX with CVS and Kroger supermarket.

Drone delivery is another option that is being tested. A small number of operations have received approval from the Federal Aviation Administration (FAA), including UPS Flight Forward. Parcel weight and size are limiting factors for this delivery mode, as is the monitoring and utilization of airspace. The FAA also loosened some regulatory requirements placed on drone operators during the COVID-19 pandemic.

Some companies such as Amazon and food delivery services have adopted the TNC model of using contract drivers with their own vehicles to make deliveries. In fact, some drivers work both transporting passengers and deliveries to maximize their utilization and revenue.



FIGURE 10-4: NURO R2 DELIVERY ROBOT

## **Land Use**

The potential impacts of technology on land use are complex. Some are modest, like the siting of new EV charging stations on both public and private land. Others are larger, like the possible repurposing of downtown parking structures and lots to more productive uses since AVs can remain in use or travel to more remote parking sites.

Growth in TNC use, micromobility, and e-commerce have increased the competition for the public right-of-way, including the street, curb front, and sidewalks. At times, loading zones may not be able to accommodate passenger pickup and drop-off activities in addition to delivery vehicles. Sidewalk space may already be used for scooter and bicycle storage; further, if use of delivery robots becomes commonplace, locations in densely populated mixed-use areas may become even more congested. As noted previously, this activity creates a need for BMTS to monitor demand and conflicts. They can respond by developing a model curb space management plan for consideration and adoption by local municipalities.

E-commerce is also changing the warehouse part of the delivery supply chain. Companies that relied on large warehouse/distribution centers in greenfield locations are now looking for space for fulfillment centers in urban locations to meet shorter delivery windows. This includes “microwarehouses” in which several retailers and delivery services may share space. If the demand for such locations occurs in the BMTS region, it will be important that local zoning codes include a requirement not only for a traffic impact study to forecast and identify the impact of new truck trips on the surrounding street network.

## **Cybersecurity**

Cybersecurity is a cross-cutting issue that affects nearly all the components of emerging and future mobility. CV technology is based on communication among vehicles, to roadside devices, and through those devices to TOCs. Using 5G cellular or dedicated short-range radio, traffic signals and other control features can be managed in real time. Traveler information such as real-time route deviation may also be transmitted. Hacking or interfering with any part of the CV environment is a concern.

It is likely that AVs will be connected, so the CV concerns noted above also apply to these vehicles and may be magnified in importance since there is no driver to potentially interpret or disregard erroneous messages.

The outcomes and implications of hacking app-based systems such as TNCs, microtransit, and micromobility may not be immediately hazardous, but such threats could be extremely disruptive. The same is true of trucking apps, from route guidance to hours-of-service notifications.

In all cases and across all these technologies, a need exists for constant vigilance to maintain a secure cyber environment. This can be accomplished through partnerships between transportation agencies and government computer specialists. BMTS may find a role by convening a group of its members to address transportation cybersecurity concerns and solutions.

## LOOKING AHEAD

The LRTP technology goal is to “prepare strategically for the incorporation of new transportation technology in the regional transportation system,” and the related objective is to “Utilize emerging technology to improve accessibility, mobility, and community quality of life throughout the region.” A high level of uncertainty exists about much of the future technology discussed here, including its impact on mobility and the timeline for adoption. Some applications such as micromobility may grow in the BMTS region soon, while others such as AV operation may be toward the end of the LRTP timeframe or beyond. For these reasons, a strategic approach based on short-horizon planning is beneficial.

Actions and recommendations should be limited to those that BMTS and its member agencies have control or influence over, including capital investments (e.g., intelligent transportation system upgrades, electric vehicle charging infrastructure) and operational activities. Implementation may require amending the BMTS ITS Regional Architecture. Regulatory initiatives (e.g., curb space management, management of nonmotorized transport and micromobility, zoning/parking requirements) can also permit BMTS to coordinate approaches among the member municipalities. Strategies will identify performance measures and trends that can be tracked. For example, if new bikeshare or scooter programs were put in place, usage trends would be tracked. Similarly, investments in charging stations could be matched to regional trends in EV ownership.

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## CAVEAT: Impact of Covid-19 Pandemic on Future Mobility

The first few months of 2020, which included the early response to the COVID-19 pandemic, have had an impact on personal and freight mobility that include some of the facets of new mobility services. Little research exists on the potential longer-term impacts.

Shared transport use declined by a large amount due to COVID-19 and fears among passengers and some drivers of transmitting the virus. Further, stay-at-home orders and the closures of schools and workplaces meant that nearly all personal travel was reduced. As noted in Uber's own data, the most popular destinations for its services included Binghamton University and SUNY Broome, whose campuses closed, and the Binghamton Transportation Center, where intercity bus travel was suspended. The phased reopening that followed early closures and restrictions on travel has meant that the full residual and longer-term effects of these measures and fears remain uncertain.

Conversely, e-commerce use for home delivery has increased due to COVID-19 since many people preferred to have goods delivered rather than go out. This is particularly true for at-risk populations, including senior citizens. Many who would not have previously considered buying groceries online or having a restaurant meal delivered have since changed their attitude and behaviors. After the phased reopening, some may be eager to return to stores while others may continue to rely on delivery services

# FINANCIAL PLAN

11



# CHAPTER 11

## FINANCIAL PLAN



Federal law requires that the BMTS LRTP include a financial plan. This plan addresses both the future revenues and expenditures. It establishes the foundation for fiscal constraint, a key concept that states that the estimated cost of all of the projects and programs in the LRTP may not exceed the reasonably expected forecast of revenues available to implement the plan (see box to the right). The result is that the plan is a realistic assessment of how goals and objectives can best be met.

The revenue estimates are developed cooperatively by BMTS, NYSDOT, and Broome County as the public transportation operator. These estimated revenues are programmed to fund construction and ongoing operation and maintenance of the existing Federal Aid System.

The LRTP is required to show programmed expenditures in year-of-expenditure dollars. This means that costs must be adjusted for inflation. Like with revenue, the partners in the planning process must agree on inflation forecasts.

### **(f) The metropolitan transportation plan shall, at a minimum, include:**

- 11 A financial plan that demonstrates how the adopted transportation plan can be implemented.
  - (i) For purposes of transportation system operations and maintenance, the financial plan shall contain system-level estimates of costs and revenue sources that are reasonably expected to be available to adequately operate and maintain the Federal-aid highways as defined by 23 U.S.C. 101(a)(5)) and public transportation (as defined by title 49 U.S.C. Chapter 53).
  - (ii) For the purpose of developing the metropolitan transportation plan, the MPO(s), public transportation operator(s), and State shall cooperatively develop estimates of funds that will be available to support metropolitan transportation plan implementation, as required under § 450.314(a). All necessary financial resources from public and private sources that are reasonably expected to be made available to carry out the transportation plan shall be identified.

*23 CFR 450.324(f)*

## METHODOLOGY: REVENUE

Revenue forecasts were developed for five 5-year time periods or “blocks” to cover the entire 25-year LRTP timeframe. The first block (2021–2025) uses BMTS’ current TIP plus one additional year of funding. For each subsequent five-year program block, the agreed-upon revenue forecast methodology increases revenue by 3% for each of the formula programs of FHWA and FTA. The New York State Dedicated Highway and Bridge Fund is not inflated.

Listed below are the FHWA and FTA formula-based programs that are included in the current federal FAST Act. These are the core revenue sources shown in Table 11-1.

### ▪ Federal Highway Administration

- > **National Highway Performance Program (NHPP).** Funds projects on the NHS. Projects are selected by NYSDOT.
- > **Surface Transportation Block Grant Program (STBGP).** This is the most flexible FHWA fund source and can be used on any facility that is part of the Federal Aid System. This program also includes the following set asides:
  - » **Transportation Alternatives Program.** Prior to 2012, this was funded separately, but it is now a set aside of the state’s STBGP apportionment based on the state’s share of the total funding of the Transportation Enhancement Program in 2009. Project selection is based on a competitive process.
  - » **Off-System Bridges.** This fund source is for use on bridge projects off the Federal Aid System
- > **Highway Safety Improvement Program (HSIP).** Funds may be used on any public road for purposes that reflect the priority actions of the state’s Strategic Highway Safety Program.

### ▪ Federal Transit Administration

- > **Urbanized Area Formula Grant (§5307).** This is the primary source of FTA funds for urban transit systems. Eligible uses include capital projects like bus purchases and preventive maintenance of buses purchased with FTA funds. In metropolitan areas of population less than 200,000, like BMTS, these funds may also be used for operating assistance.
- > **Buses and Bus Facilities Formula Program (§5339(a)).** Funds may be used to purchase buses and for bus facilities.
- > **Enhanced Mobility of Seniors and Individuals with Disabilities (§5310).** Funds are used for projects to purchase and operate vehicles that serve the transportation needs of the target populations. Projects are selected by the state with input from the MPO.

Several discretionary programs may also fund transportation projects. All of these are highly competitive.

- **US Department of Transportation**

- > **Better Utilizing Investments to Leverage Development (BUILD).** BUILD invests in highway, rail, transit, and port projects that meet high-priority national objectives for the movement of people and freight and support the nation's economy.

- **Federal Highway Administration**

- > **Nationally Significant Freight and Highway Projects program, now known as Infrastructure for Rebuilding America grants (INFRA).** This program funds a wide range of highway, bridge, and intermodal projects. At least 25% of the annual apportionment must be spent on projects in rural areas.

- **Federal Transit Administration**

- > **Grants for Buses and Bus Facilities (§5339).** This is a companion to the formula program noted above. It provides competitive grants for the same purposes.

New York State also provides funding for MPO transportation purposes through the New York State Dedicated Highway and Bridge Fund. Part of this is through the provisioning of matching funds for federal aid. Most of the FHWA and FTA programs are 80% federally funded. NYSDOT provides the nonfederal share of state system projects. The State Dedicated Highway and Bridge Fund may also be used to fully fund capital projects on state highways.

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### **CAVEAT: Federal Authorization**

The programs of the FHWA and FTA are currently authorized in the FAST Act. These authorizations were to expire on September 30, 2020; Congress approved an extension of current law through September 30, 2021. When a new authorization is signed into law, the Financial Plan and LRTP may subsequently be amended to account for changes in programs or apportionments. In the two prior authorizations, MAP-21 and the FAST Act, some existing programs were eliminated, and new programs added.

### **CAVEAT: Discretionary and Nontraditional Funding**

While BMTS and its members may seek federal discretionary grants (described above) and explore opportunities for private funding through public-private partnerships, these are not included in the Financial Plan. If any such funding is obtained, the LRTP will be amended to include it.

TABLE 11-1:

## BMTS LRTP FINANCIAL PLAN REVENUE FORECAST (\$ IN MILLIONS)

FUND SOURCE		TIME BLOCKS (3% INCREASE BEGINNING 2026-2030)					PLAN TOTAL
		2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	
<b>Formula Funds</b>							
	NHPP	\$83.032	\$85.523	\$88.089	\$90.731	\$93.453	\$440.828
<b>FHWA</b>	STBGP	\$48.206	\$49.652	\$51.142	\$52.676	\$54.256	\$255.932
	HSIP	\$8.895	\$9.162	\$9.437	\$9.720	\$10.011	\$47.225
	STP-OFF	\$6.438	\$6.631	\$6.830	\$7.035	\$7.246	\$34.180
	<b>FHWA Total</b>	<b>\$146.571</b>	<b>\$150.968</b>	<b>\$155.497</b>	<b>\$160.162</b>	<b>\$164.967</b>	<b>\$778.165</b>
<b>FTA</b>	Sec 5307	\$19.205	\$19.781	\$20.375	\$20.986	\$21.615	\$101.962
	Sec 5339(a)	\$6.406	\$6.598	\$6.796	\$7.000	\$7.210	\$34.010
	Sec 5310	\$1.700	\$1.751	\$1.804	\$1.858	\$1.913	\$9.026
<b>FTA Total</b>	<b>\$27.311</b>	<b>\$28.130</b>	<b>\$28.974</b>	<b>\$29.843</b>	<b>\$30.739</b>	<b>\$144.998</b>	
<b>Federal Total</b>						<b>\$923.163</b>	
<b>New York State Funds</b>	<b>State Dedicated Funds (SDF)</b>	<b>\$56.375</b>	<b>\$56.375</b>	<b>\$56.375</b>	<b>\$56.375</b>	<b>\$56.375</b>	<b>\$281.875</b>
<b>Total Funds Available for LRTP</b>		<b>\$230.257</b>	<b>\$235.473</b>	<b>\$240.846</b>	<b>\$246.381</b>	<b>\$252.081</b>	<b>\$1,205.038</b>

BMTS will invest in system preservation and asset management, mobility, and safety as shown in Table 11-2. While these categories are useful for planning purposes, projects can meet multiple objectives. For example, a pavement or bridge rehabilitation project that is classified as system preservation may also address identified safety considerations and may also improve mobility by adding sidewalks or bike lanes.

Appendix A includes a list of illustrative projects that are not able to be programmed within a fiscally constrained plan. If additional funds become available, these projects will be considered by the BMTS Planning and Policy Committees for programming.

**TABLE 11-2:**  
**FHWA FUNDED LRTP INVESTMENTS**

Project Type	Percentage for life of LRTP	2021 - 2025	2026-2030	2031-2035	2036-2040	2041-2045	TOTAL
		146.571	150.968	155.497	160.162	164.967	778.165
<b>System Preservation/ Asset Management</b>	85%	124.585	128.323	132.172	136.138	140.222	661.440
<b>Highway</b>	31%	38.621	39.780	40.973	42.203	43.469	205.046
<b>Bridge</b>	41%	51.080	52.612	54.191	55.816	57.491	271.191
<b>Other Assets</b>	12%	14.950	15.399	15.861	16.337	16.827	79.373
<b>Mobility</b>	7%	10.260	10.568	10.885	11.211	11.548	54.472
<b>Safety</b>	8%	11.726	12.077	12.440	12.813	13.197	62.253

TABLE 11-3:

**FTA FUNDED INFRASTRUCTURE AND OPERATIONS (SECTION 5307 AND 5339 PROGRAM)**

Projected FTA funds are anticipated to be programmed as shown in Table 11-3.

DESCRIPTION	COST (\$ MILLIONS)
<b>2021–2025 Available funding: \$25.611 million</b>	
BC Transit bus replacement (3 diesel, 2 hybrid)	\$3.065
BC Country bus replacement (7 minibuses)	\$0.450
Preventive maintenance and operating assistance	\$19.330
<b>2026–2030 Available funding: \$26.379 million</b>	
BC Transit bus replacement (7 buses)	\$4.250
BC Country bus replacement	\$0.00
Preventive maintenance and operating assistance	\$22.000
<b>2031–2035 Available funding: \$27.171 million</b>	
BC Transit bus replacement (15 buses)	\$9.000
BC Country bus replacement (7 minibuses)	\$0.550
Facility improvements	\$1.000
Preventive maintenance and operating assistance	\$16.550
<b>2036–2040 Available funding: \$27.986 million</b>	
BC Transit bus replacement (5 buses)	\$3.750
BC Country bus replacement	\$0.000
Facility improvements	\$1.000
Preventive maintenance and operating assistance	\$23.100
<b>2041–2045 Available funding: \$28.825 million</b>	
BC Transit bus replacement (7 buses)	\$5.600
BC Country bus replacement (7 minibuses)	\$0.750
Facility improvements	\$2.000
Preventive maintenance and operating assistance	\$20.500



# PLAN SUMMARY

*Moving Our Future Forward 2045* is driven by a vision of the future of the BMTS region that rests on enhancing communities, improving the economy, and protecting the environment. This plan will guide the investment of public funds in projects, programs, and strategic actions to make progress toward these goals.

BMTS is committed to a performance-based planning process. They will work with partner agencies, including NYSDOT, to monitor the condition and performance of the regional transportation system across all modes. As NYSDOT submits performance targets for federally prescribed performance measures of safety, asset management, and system performance, BMTS will consider its options to support those targets or create its own. The degree to which progress is made on achieving the targets will guide selection of candidate projects for each successive TIP update.

BMTS is committed to equity, performing analyses that ensure that transportation investments result in services that meet the travel and access needs of underserved communities, and that those communities do not experience disproportionate negative impacts of projects or services.



# LIST OF ABBREVIATIONS

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<b>AADTT</b>	Annual Average Daily Truck Volume
<b>ADA</b>	Americans with Disabilities Act
<b>ALIS</b>	Accident Location Information System
<b>AV</b>	Automated Vehicle
<b>B2B</b>	Business-to-Business
<b>B2C</b>	Business-to-Consumer
<b>BEV</b>	Battery Electric Vehicle
<b>BGM</b>	Binghamton Airport
<b>BMTS</b>	Binghamton Metropolitan Transportation Study
<b>BOPIS</b>	Buy-Online, Pick Up In Store
<b>BUILD</b>	Better Utilizing Investments to Leverage Investments
<b>CCTV</b>	Closed-Circuit Television
<b>CHIPS</b>	Consolidated Local Street and Highway Improvement Program
<b>CMAQ</b>	Congestion Mitigation and Air Quality Improvement Program
<b>CNG</b>	Compressed Natural Gas
<b>CV</b>	Connected Vehicle
<b>D&amp;H</b>	Delaware & Hudson
<b>EV</b>	Electric Vehicle
<b>FAA</b>	Federal Aviation Administration
<b>FAST Act</b>	Fixing America's Surface Transportation Act

<b>FCEV</b>	Fuel Cell Electric Vehicle	<b>NYRCR</b>	NY Rising Community Reconstruction Program
<b>FEMA</b>	Federal Emergency Management Agency	<b>NYS&amp;W</b>	Susquehanna & Western
<b>FHWA</b>	Federal Highway Administration	<b>NYSDOT</b>	New York State Department of Transportation
<b>FTA</b>	Federal Transit Administration	<b>O&amp;H</b>	Owego & Harford
<b>GHG</b>	Greenhouse Gas	<b>OCCT</b>	Off Campus College Transport
<b>GIS</b>	Geographic Information Systems	<b>OFA</b>	Office for Aging, Broome County
<b>HSIP</b>	Highway Safety Improvement Program	<b>PennDOT</b>	Pennsylvania Department of Transportation
<b>INFRA</b>	Infrastructure for Rebuilding America	<b>PHB</b>	Pedestrian Hybrid Beacons
<b>IoT</b>	Internet of Things	<b>PHEV</b>	Plug-in Hybrid Electric Vehicle
<b>ITS</b>	Intelligent Transportation System	<b>PSAP</b>	Pedestrian Safety Action Plan
<b>LED</b>	Light-Emitting Diode	<b>PSAP</b>	Public Safety Answering Point
<b>LNG</b>	Liquefied Natural Gas	<b>RRFB</b>	Rectangular Rapid Flashing Beacons
<b>LRTP</b>	Long-Range Transportation Plan	<b>SHSP</b>	Strategic Highway Safety Plan
<b>MaaS</b>	Mobility-as-a-Service	<b>STBGP</b>	Surface Transportation Block Grant Program
<b>MoD</b>	Mobility on Demand	<b>SUNY</b>	State University of New York System
<b>MPA</b>	Metropolitan Planning Area	<b>TIP</b>	Transportation Improvement Program
<b>MPO</b>	Metropolitan Planning Organization	<b>TNC</b>	Transportation Network Company
<b>MUTCD</b>	Manual of Uniform Traffic Control Devices	<b>TOC</b>	Traffic Operations Centers
<b>NHFP</b>	National Highway Freight Program	<b>UAV</b>	Unmanned Aerial Vehicle
<b>NHPP</b>	National Highway Performance Program	<b>USPS</b>	United States Postal Service
<b>NHS</b>	National Highway System	<b>VMT</b>	Vehicle Miles Traveled
<b>NHTSA</b>	National Highway Traffic Safety Administration		
<b>NS</b>	Norfolk Southern		



## **BINGHAMTON METROPOLITAN TRANSPORTATION STUDY**

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