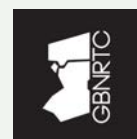# MOVING FORWARD 2050

A Regional Transportation Plan for Buffalo Niagara

May 2018

GBNRTC

Greater Buffalo-Niagara Regional Transportation Council

MOVING
FORWARD
2050

PREPARED FOR

Greater Buffalo-Niagara Regional Transportation Council

PREPARED BY

University at Buffalo
The State University of New York

School of Architecture and Planning
UB Regional Institute

WITH

CAMBRIDGE SYSTEMATICS

TY-LIN INTERNATIONAL

The Buffalo Niagara region consists of Niagara and Erie counties. The region is located on the western edge of New York State.

The Greater Buffalo-Niagara Regional Transportation Council (GBNRTC) is a partnership of local and state governments working together to make decisions about transportation planning in the Buffalo-Niagara region.

GBNRTC members include:

- City of Buffalo
- City of Niagara Falls
- Erie County
- Niagara County
- Niagara Frontier Transportation Authority (NFTA)
- New York State Department of Transportation (NYSDOT)
- New York State Thruway Authority (NYSTA)

The Empire State Development Corporation, the Buffalo Niagara Partnership, and the Seneca Nation of Indians serve formally as Regional Strategic Stakeholders.

Working together, GBNRTC members carry out a continuing, cooperative, and comprehensive planning process to develop transportation plans and programs for the Buffalo Niagara region.

Seneca Nation Leading the Way to Build a Healthier, More Sustainable Future

From an early age, Seneca and the other Haudenosaunee people recognize the importance of our surrounding environments, noting the delicate balance of every aspect. The Ganö:nyök or Thanksgiving address is recited regularly at any gathering of people as a reminder of all there is to be thankful for and to bring about a Good Mind encouraging responsible actions.

It has been said that you can't know where you're going until you know where you've been. Through cultural teachings, the Seneca Nation adheres to a philosophy that incorporates seven generations into its approach to providing for the welfare of its people. This generational approach includes the past, the present and the future. The Nation is putting this philosophy into action with services, programs and projects aimed at encouraging healthy lifestyles, and promoting renewable uses of our precious resources.

SEVEN GENERATIONS

THOSE WHO HAVE PASSED

GRANDPARENTS

PARENTS

YOU

CHILDREN

GRANDCHILDREN

THOSE YET TO BE BORN

GLOSSARY OF TERMS

Active transportation
Any form of human-powered, non-motorized transportation.

Automated vehicles
Human-driven vehicles with automated safety features like parking and braking assist and lane departure correction.

Autonomous vehicles (AVs)
Completely "driverless" vehicles capable of driving themselves without human intervention.

AV truck platoons
Lines of autonomous trucks separated by as little as 30 feet, likely with a human driver in the first truck. These can improve fuel efficiency, and may initially run during off-peak hours, possibly in a separate dedicated lane.

Bi-national Autonomous Green Freight Corridor
Supports autonomous freight vehicles, alternative fuels, green infrastructure, and faster border crossings between the US and Canada.

Communities of Concern
Areas with significant concentrations of residents with low incomes, people of color, foreign born residents, individuals with disabilities, senior citizens and children, and limited English proficiency (LEP) speakers.

Connected vehicles
Vehicles that communicate with other vehicles, infrastructure, and occupants via wireless technology.

Coordinated and priority traffic signals
Signals that are coordinated along corridors and across jurisdictions using real-time traffic information to limit stop-and-go traffic, and give priority to buses and other mass transit vehicles.

Electric vehicles (EVs)
Vehicles powered by electricity (rather than an internal combustion engine).

Flexible curb space
Allows curbs to be used differently at different times of the day, including for passenger pick-up/drop-off, deliveries, and special events.

Green infrastructure
Cost-effective, resilient approach to managing stormwater that uses vegetation, soils, and other elements to minimize water run-off from paved surfaces into sewer systems and waterways.

Integrated traffic management
Strategically manage traffic in order to ease congestion and alert drivers to traffic incidents through signs and in-vehicle messaging.

Microtransit
Shared vehicles to transport multiple commuters in one vehicle, limiting the number of cars on the road. These may be on-demand (via a smartphone) or on a set route, and work in conjunction with transit buses and trains.

Mobility as a service (MaaS)
Provides a platform that treats transportation as a customizable, on-demand service with "à la carte" mobility, real-time travel information and smart payment systems across transportation options.

Mobility hub
Designated location that offers connections to and from transit buses, transportation network companies, carshare, bikeshare, real-time travel information, and other services and amenities.

Next Generation Freeways	The traditional "ring" of freeways circling the City of Buffalo and the first-ring suburbs with technology upgrades to make travel safe, timely and efficient.
On-demand trip planning	The ability to schedule travel as needed, usually via a smartphone app. May be through a private transportation provider or public transit agency.
Ramp metering	Signals control the frequency of cars entering highways to help balance the flow of traffic and minimize congestion.
Shared vehicles and shared mobility	Transportation services that are shared among users, including public transit, taxis, bikesharing, carsharing, carpooling, and shuttle services.
Smart cities and smart region	Electronic data collection sensors supply information to efficiently manage assets and resources, and ultimately improve the quality of life for residents. Includes traffic sensors, public wi-fi, energy grids, and gas leak detection.
Smart corridors	Select roads that use new technologies like sensors, coordinated signals, smart lighting, upgraded street features and emerging transportation services.
Smart ecosystem of data	The ability to securely acquire and share data among public agencies, residents, and trusted private sector entities.
Smart lighting	Energy efficient, cost-effective lighting that improves visibility.

Smart pavement	May be embedded with fiber-optic cable for high-speed Internet, sensors to count vehicles, technology to support connected and autonomous vehicles, or electromagnetic coils to charge electric vehicles as they drive.
Smartly Enhance Multi-modal Arterials (SEMAs)	Select radial roads and other corridors designed to efficiently move people and goods using new technologies, upgraded street features and emerging transportation services.
Traffic incident management	The coordination of resources to detect, respond to, and clear vehicle collisions, disabled vehicles, and other incidents.
Transportation network companies (TNCs)	Typically use smartphone apps to quickly connect drivers with people who need a ride. TNCs can include shuttle vans and carpools, and could eventually use autonomous vehicles.
Variable speed limits	Speed limits are adjusted based on traffic and weather conditions to improve traffic flow and safety, and are displayed on digital signs.
Vehicle-to-Infrastructure (V2I) communications	Exchange of information between vehicles and road infrastructure.
Vehicle-to-vehicle (V2V) communications	Exchange of information between vehicles.

The Background

Metropolitan Transportation Plans (MTPs) are a region's primary tool for laying out significant, long term improvements in their transportation system. Metropolitan Planning Organizations (MPOs) like the Greater Buffalo Niagara Regional Transportation Council (GBNRTC) are required to develop MTPs to allocate federal, state and local dollars to transportation projects across the region. By grounding the process in shared community values and consulting with local decision makers and national experts, the plan will serve our communities while making us more globally competitive.

The Process

More than just a transportation plan

Metropolitan transportation plans do much more than improve transportation, they give regions an opportunity to leverage transportation investments to achieve goals for their economy, environment and quality of life.

Moving Forward 2050 will take a holistic look at where we are and where we are headed to get us to our shared vision for the region's future. This understanding gives us a framework to identify the big moves we need to accomplish the goals we set for our economy, communities and environment. As we implement these strategies, we will continually reassess our progress and adjust our approach through an adaptive planning process that manages future risk.

So this is more than just a plan, and it's about more than just transportation – it is a regional vision for Buffalo Niagara, a better way for us to be Moving Forward to 2050.

State Departments
of Transportation,
MPOs,
and Transit
Agencies

*GBNRTC is our
region's MPO*

**Congress and
U.S. Department
of Transportation**

**Coordinating
with local
planning
efforts**

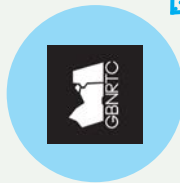**Engaging
the public
and local
stakeholders**

**Establish federal
policies via laws
and regulations**

*The U.S. Congress
drafts and
enacts surface
transportation
"authorization
bills," which is
how Congress
revises existing
laws, establishes
new federal
transportation
policies, and
**"authorizes" the
level of funding that
will be available** over
a period of several
years.*

**Update Buffalo
Niagara's
Metropolitan
Transportation
Plan every four
years.**

*Build off of One
Region Forward
which translated
the shared values
of over 160 existing
local plans into
a vision for our
region's collective
future. Look to
other important
regional strategies
expressed in the
**WNY Sustainability
Plan** and **Regional
Economic
Development
Council**, as well
as local plans, for
recommendations
and implications
that shape the
ways in which
we will improve
our region's
transportation
system.*

*Ensure the plan
is grounded
in community
values. Through
One Region
Forward, citizens
shaped the
regional vision.
This plan forms
strategies to
achieve our vision
by engaging a
diverse group of
stakeholders and
representatives
from local
municipalities
in in-depth
discussions on the
challenges facing
our transportation
system and how
to address them.*

Big moves to get us there

Taking action and measuring progress

CHAPTER 1

| **Where we want to be in 2050** | Where we are today | A framework for moving forward | Big moves to get us there | Taking action and measuring progress |

Today marks a turning point for our region, and the future looks brighter now than it has in decades for the things we value—our economy, our communities and our environment.

Transportation is what connects our economy, our communities and our environment. What we choose for our region's transportation system, and how we make those decisions, will determine whether or not we make the most of a seemingly bright but uncertain future.

OUR ECONOMY

OUR COMMUNITIES

OUR ENVIRONMENT

TRANS

A NEW WAY OF PLANNING FOR TRANSPORTATION

We share a vision for the region's future, and our transportation system will need to pave the way to get us there.

We need new, *innovative ways of planning, building and financing our transportation system* that can adapt to change and get us to a future where our economy, communities and environment all thrive.

INNOVATION

PORTATION

Why do we need a new way of planning for transportation in Buffalo Niagara?

Our old ways of planning for transportation won't get us to where we want to go.

Today, our region's future looks brighter than it has in decades.

	Our old ways of planning for transportation won't get us to where we want to go.	Today, our region's future looks brighter than it has in decades.
Our Economy	**Our economy became stagnant as public services grew more costly.**	**We are growing our economy.**
Our Communities	**We sprawled while population declined, and divested ourselves from existing communities.**	**We are reinvesting in our existing communities.**
Our Environment	**We consumed more energy and natural land.**	**We are restoring our environment.**

What does it mean for our transportation system?

If transportation investments are not coordinated across jurisdictions and aligned with land use decisions, sprawling development patterns will continue to consume natural land and hollow out neighborhoods. This adds infrastructure, which in turn increases maintenance costs and drives up the bill for local governments and tax payers.

Our transportation system is driving this momentum by connecting more people to more places with more ways of getting around and moving goods to market.

But we need to plan for future uncertainties.

So, we will plan, finance and implement our transportation system in innovative ways.

A New Way of Planning for Transportation

We need to keep pace with an increasingly global and high-tech 21st century economy, making strategic investments that capitalize on the changing economic landscape and ensure shared prosperity for residents.

We will form flexible, creative and diverse governance arrangements and financing mechanisms while ensuring a competitive business climate that keeps our economy growing.
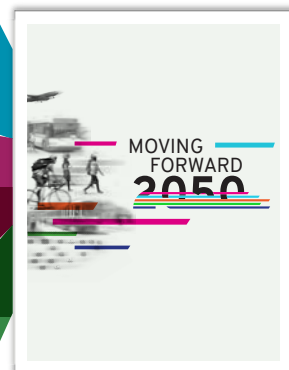
We need to adapt to changing and diverse lifestyle preferences.

We will improve coordination between urban, suburban and rural communities through collaborative planning efforts that tie transportation investments to land use decisions.

We need to adapt to a changing climate and prepare for extreme weather to keep our region resilient.

We will improve our capacity to anticipate, withstand and adapt to the impacts of climate change and adverse weather by embracing technology and coordination.

We need to make forward-looking decisions for our transportation system that let us make the most of these changes.

We will adapt to future uncertainties and harness technological advances as we use our transportation system to shape our region's future.

INNOVATION

MOVING FORWARD 2050

Where we want to be in 2050

Our Economy

In 2050, our economy will be globally competitive with shared prosperity that spreads economic opportunities and benefits to all residents in the region.

Our Communities

In 2050, our communities will be brimming with opportunities, providing residents with various lifestyle choices and attracting new, diverse residents, businesses and investments from all over the world.

Our Environment

In 2050, our environment will be ecologically healthy and easily accessible so that all residents and visitors have abundant opportunities to enjoy our region's world class waterways and open spaces.

Innovation

By 2050, we will be making transformative changes to the way we plan, fund and implement the region's transportation investments through harnessing technological advances, making data-driven decisions and utilizing creative and diverse partnerships and funding sources.

HOW
TRANSPORTATION
GETS US THERE

To get there, we will need transportation that connects our region with a variety of convenient options to promote opportunity, health and safety for all. At the same time, the system will bolster a globally competitive economy with shared prosperity by encouraging efficient use of our resources and collaborating to make smart, forward-looking decisions that harness changes in the future.

MOVING
FORWARD
2050

Where we are starting from.

ONE REGION FORWARD
A New Way to Plan for Buffalo Niagara
2010-2015
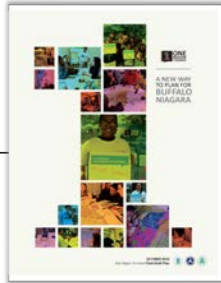
One Region Forward, a federally-recognized Regional Plan for Sustainable Development, creates a new story for our region's future rooted in shared community values.

In the process of engaging more than 700 organizations and thousands of citizens through One Region Forward, we learned what we as a region want out of our transportation system in broad terms. **This vision for regional transportation is evident in the plan's big ideas, common priorities, and recommended strategies. One Region Forward also formed a strong, dedicated and collaborative group of organizations to carry forward this vision and implement the plan.**

Moving Forward 2050 built upon One Region Forward, identifying specific transportation policies, strategies, and investments that will help us achieve the region's goals. This work is the foundation that will guide how we implement the future we want to see.

5 BIG IDEAS

Connect our places by expanding and diversifying our transportation options

Create great places and a thriving economy through efficient land use

Provide housing choices in neighborhoods that are great places to live

Conserve our energy, promote renewables and prepare for the impacts of climate change

Strengthen our food systems for a healthier population and economy

115 MAPS

Through One Region Forward, citizens mapped a shared vision of the region's future.

In a series of public workshops, citizens mapped a future approach to land use and transportation for our region—what types of places to invest in and what strategies to pursue to get us closer to a shared vision for the region's future. The common themes and approaches that citizens used in these maps were combined to produce a vision for our region's future.
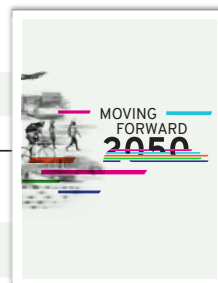
For more information visit One Region Forward online at oneregionforward.org

MOVING FORWARD 2050
A New Way to Plan for Transportation
2016-2018

MOVING
FORWARD
2050

MOVING
FORWARD
2050

This input guides our transportation investments, today and into the future.

Our transportation system ties our region together and keeps our economy moving.

Focusing transportation investments in strategic areas can spur additional development and reinvigorate the places we live and work today, while deterring development on open spaces and reducing infrastructure maintenance costs.

We must align our transportation investments with land use decisions so that our communities can be better connected, our environment can be better protected and our economy can grow.

One Region Forward and the Western New York Regional Economic Development Council laid the groundwork for collaboration between municipalities, and between land use and transportation decisions.

We must also improve equity in our communities, so that residents of all diverse neighborhoods across the region have equal access to opportunities.

Individuals living in poverty, with disabilities or without a car, face challenges accessing basic needs and services. Residents with these challenges are often concentrated in certain neighborhoods across the region. We need to target alternative approaches to transportation that improve access to, from and within communities of concern.

The future of our region hinges on the success of key places—our region's current and emerging centers of employment, population, education and activity, and the transportation corridors that connect these places.

Investing in these areas will grow our economy, strengthen our communities, and also conserve natural open spaces.

A new way of planning for transportation in Buffalo Niagara is grounded in values and based on performance.

A vision **for our economy, communities, environment, and innovation in transportation**

Where we want to be in 2050

Our regional **vision** is grounded in the community values of One Region Forward.

What the data says about **our economy, communities, environment, transportation and innovation**

Where we are today

We use **performance measures** to evaluate how we are doing today.

Defining our goals and objectives for **our economy, communities, environment, and innovation**

Developing how we'll measure progress on our goals and objectives.

A framework for moving forward

To achieve our vision, we set **goals** for our **economy**, **communities** and **environment** and for **innovation** in transportation.

Our **performance measures** tell us how close we are to reaching our goals.

MOVING FORWARD 2050

Big moves to get us there

Future transportation strategies are identified by engaging stakeholders and consulting subject matter experts.

Taking action and measuring progress

As we carry out the work of the plan, we will track our progress and adapt our approach to move us closer to our goals.

Monitoring performance

Tracking our progress in meeting our goals.

Implementing projects

Coordinating across the region, allocating resources, planning and construction.

Adapting

Working with the community to refine our approach and move us closer to our vision.
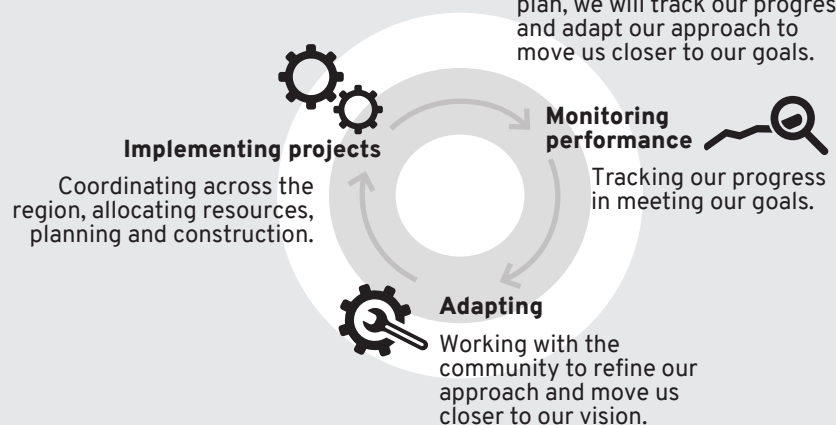
CHAPTER 2

Where we want to be in 2050

Where we are today

A framework for moving forward

Big moves to get us there

Taking action and measuring progress

WHERE WE ARE TODAY

Transportation has big impacts on our economy, communities and environment. These factors also affect our transportation system in important ways. As we plan for our transportation system, taking a close look at these dynamics is critical.

Understanding land use patterns helps predict traffic flows and travel modes. Knowing what industries are growing and where they are located can tell us where infrastructure improvements may be needed. Learning where public access to natural assets is being improved can help connect more people with recreational opportunities.

22
OUR ECONOMY

30
OUR COMMUNITIES

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OUR ENVIRONMENT

36
TRANSPORTATION AND INNOVATION
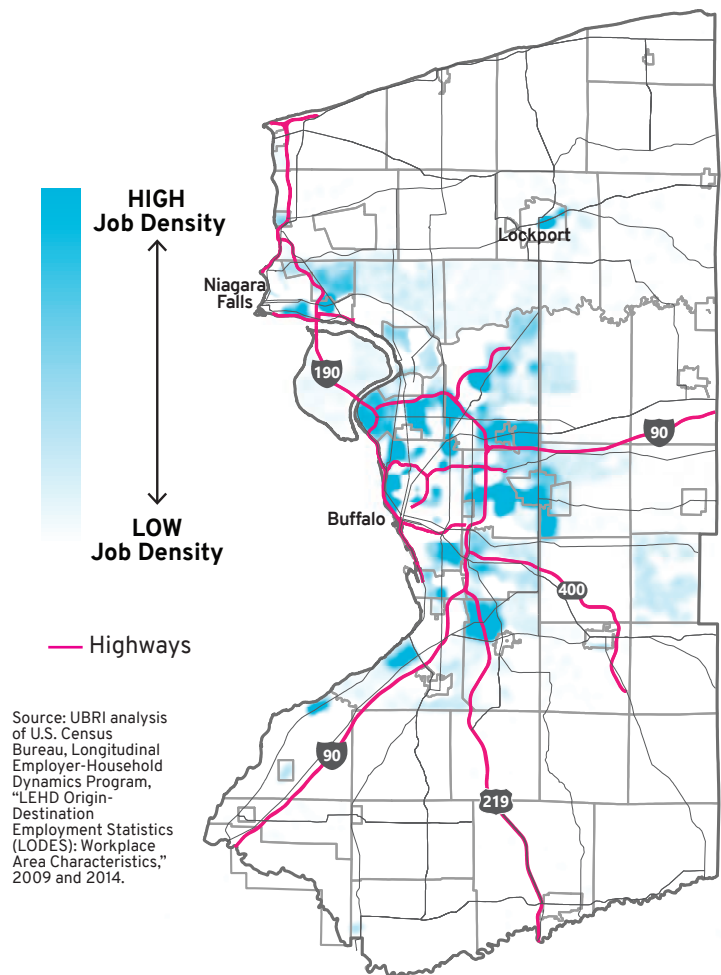
WHERE WE ARE TODAY
OUR ECONOMY

We've seen the most job growth in a generation.

We are growing jobs and attracting new businesses in a wider range of industries to build a 21st century economy and make our region competitive in an increasingly global marketplace. Our transportation system can be a catalyst for this growth and can help us share economic opportunities and prosperity with all residents in the region.
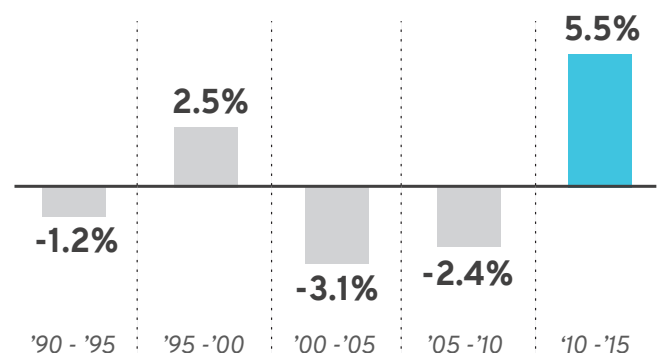
After decades of job loss, our economy had more private sector employment growth from 2010 to 2015 than at any other period since 1990. This job growth is taking place across many parts of the region, particularly near former industrial areas along the waterfront, in downtowns, and the suburbs closest to Buffalo.

Our transportation system needs to ensure that today's workers have access to these emerging employment centers, along with those that already exist, via multiple, reliable modes. Our system also needs to keep goods and services flowing to, from and throughout our region, while helping to attract new workers and businesses to keep our economy growing.

New Private Sector Jobs Since 2009

HIGH Job Density

LOW Job Density

— Highways

Source: UBRI analysis of U.S. Census Bureau, Longitudinal Employer-Household Dynamics Program, "LEHD Origin-Destination Employment Statistics (LODES): Workplace Area Characteristics," 2009 and 2014.

% Change in Private Sector Jobs in Buffalo Niagara, 1990 - 2015

'90 - '95	'95 - '00	'00 - '05	'05 - '10	'10 - '15
-1.2%	2.5%	-3.1%	-2.4%	5.5%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 1990-2015.

Our dependence on vehicles has big economic impacts for households and the entire region.
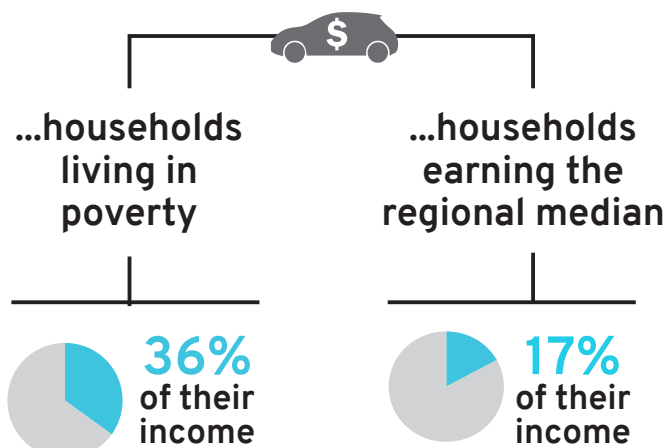
To keep our economy moving, our transportation system needs to get workers to jobs and goods to consumers. Our region is noted for having some of the quickest commutes in the U.S., but this only truly applies to those who drive. For those that do not own a car, either by choice or for other reasons, access can be limited. There are a growing number of households, including those without a car, living in auto-dependent places where vehicles are required to get to most jobs and services.

The costs of owning a car far exceed the costs to take transit, bike or walk, and can make up a sizable portion of household income, especially for those in poverty. Many jobs and residents are in car-dependent places where most destinations are beyond walking distance.

As we become more spread out, we add roads which adds costs to local taxpayers. And the more we spread out, the less viable other transportation modes become, like biking and taking public transit. People move away from neighborhoods with walkable main streets. Transit stops in automobile-dependent places do not have the concentrations of people and jobs needed to make transit economically feasible, reliable or frequent. The net result is that transit use goes down. This makes the system harder to fund which in turn limits our ability to improve or expand transit service.

$8,698
National average annual cost to own a car

What that means for...

...households living in poverty

36% of their income

...households earning the regional median

17% of their income

Source: AAA, 2015; U.S. Department of Health & Human Services, 2015; U.S. Census, American Community Survey, 5-year estimates, 2015.

From 1990 to 2010, over 525 miles of new roads were built in the region, costing $26M per year to maintain.

Annual transit trips in the region declined by 18% from 1991 to 2015.

Source: UBRI analysis of data from the U.S. Census Bureau, 1990 and 2010, and the NYS Office of the State Comptroller, 2011; Niagara Frontier Transportation Authority, 2016.

Our region's economic development strategies are focusing on key sectors to support economic prosperity.

Our region is investing in a diverse range of industries to build off of local strengths and make us more competitive in a global economy. Our transportation system must ensure that these businesses have access to the transportation services they need in the places they are needed most.
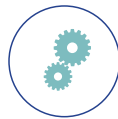
NEW YORK STATE OF OPPORTUNITY.

Western New York Regional Economic Development Council

Agriculture
Agriculture depends on multiple modes, like rail and commercial trucks, to move food locally and beyond. We need to maintain and enhance rural roads, railways, and intermodal distribution hubs.

Advanced Manufacturing
Manufacturers today use advanced technology to make high-tech goods. Connecting firms with experts, researchers, and skilled workers is essential for innovation.

Energy
Recent developments in solar, wind and biomass can help put our region at the forefront of renewable energy development. We need smart infrastructure and robust coordination to promote this sector.

Health & Life Sciences
Our region is home to many firms involved in pharmaceuticals, medical devices, and related products. We need to enable the transport of industry components and products for continued growth.

Logistics
Our region is a hub for logistics on the U.S.-Canada border. This will require coordinated, cross-border planning that expands multi-modal capacity to move, store and process foreign and domestic goods.

Professional Services
Low operating costs, like rents, labor and energy, can attract data centers and other firms to the region. Connected and diverse transportation options are vital to ensuring employers can draw from a large pool of skilled labor.

Tourism
Hotels, restaurants and local assets depend on transportation. We need new technologies and mobility services so visitors can get around the region efficiently, encouraging extended stays.

Western New York Regional Economic Development Council (REDC) Target Industries

- 🟢 *Agriculture*
- 🔵 *Advanced Manufacturing*
- 🟡 *Energy*
- 🟣 *Health & Life Sciences*
- 🟡 *Logistics*
- 🟣 *Professional Services*
- 🔴 *Tourism*

Employees per firm, 2017

- ∘ *0-50*
- ◯ *50+*

* Tourism includes food service, accommodations, retail and other tourism support services.

Source: InfoGroup, ReferenceUSA Business Database, 2017.

Niagara Falls

Lockport

Buffalo

Orchard Park

Springville
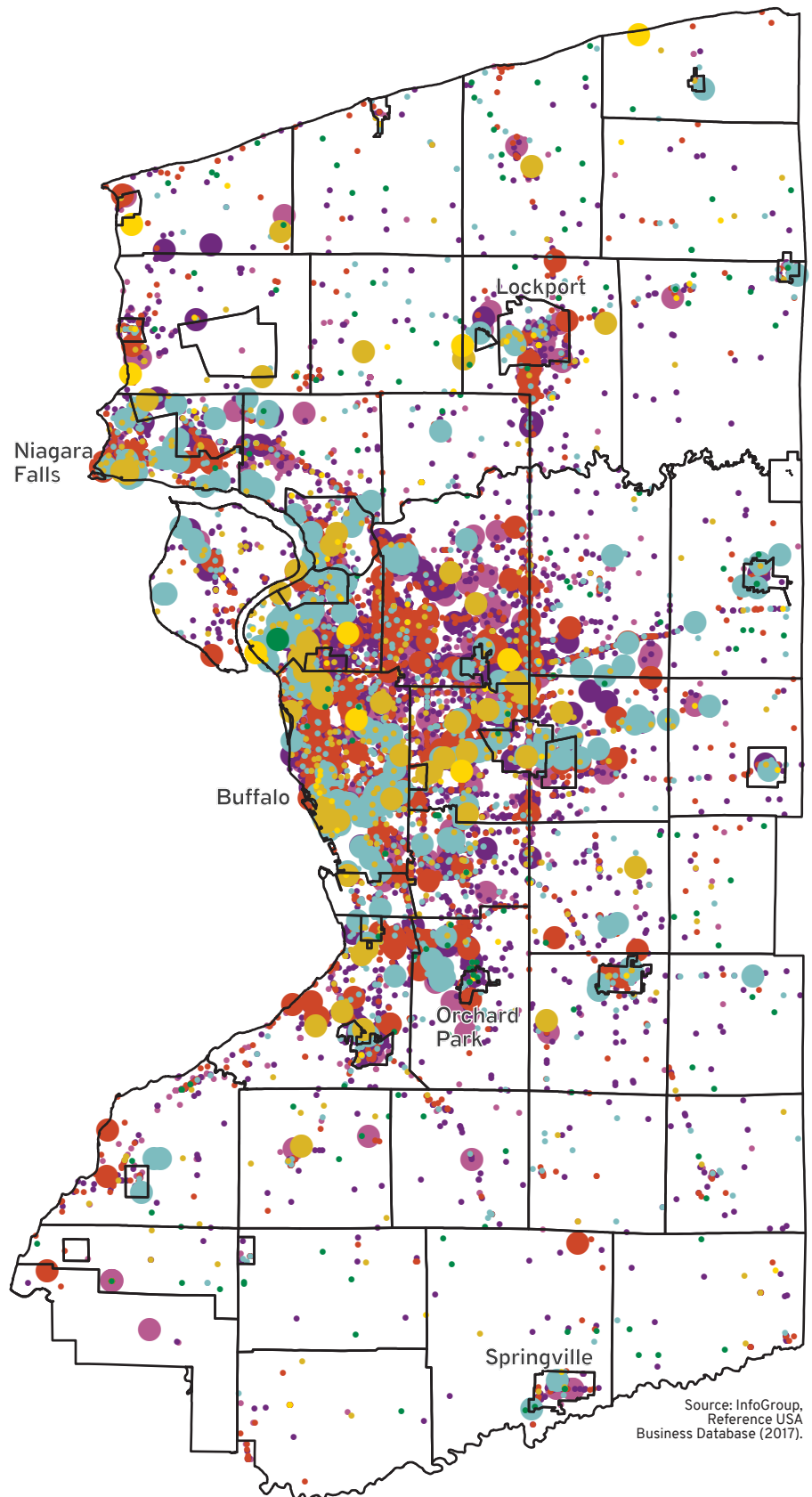
Source: InfoGroup, Reference USA Business Database (2017).

We need bi-national transportation planning to support a bustling border economy.

The Greater Golden Horseshoe region that stretches around Lake Ontario and connects Toronto, Hamilton, Niagara Falls and Buffalo, represents one of the largest concentration of people in North America with a population of over 9 million.

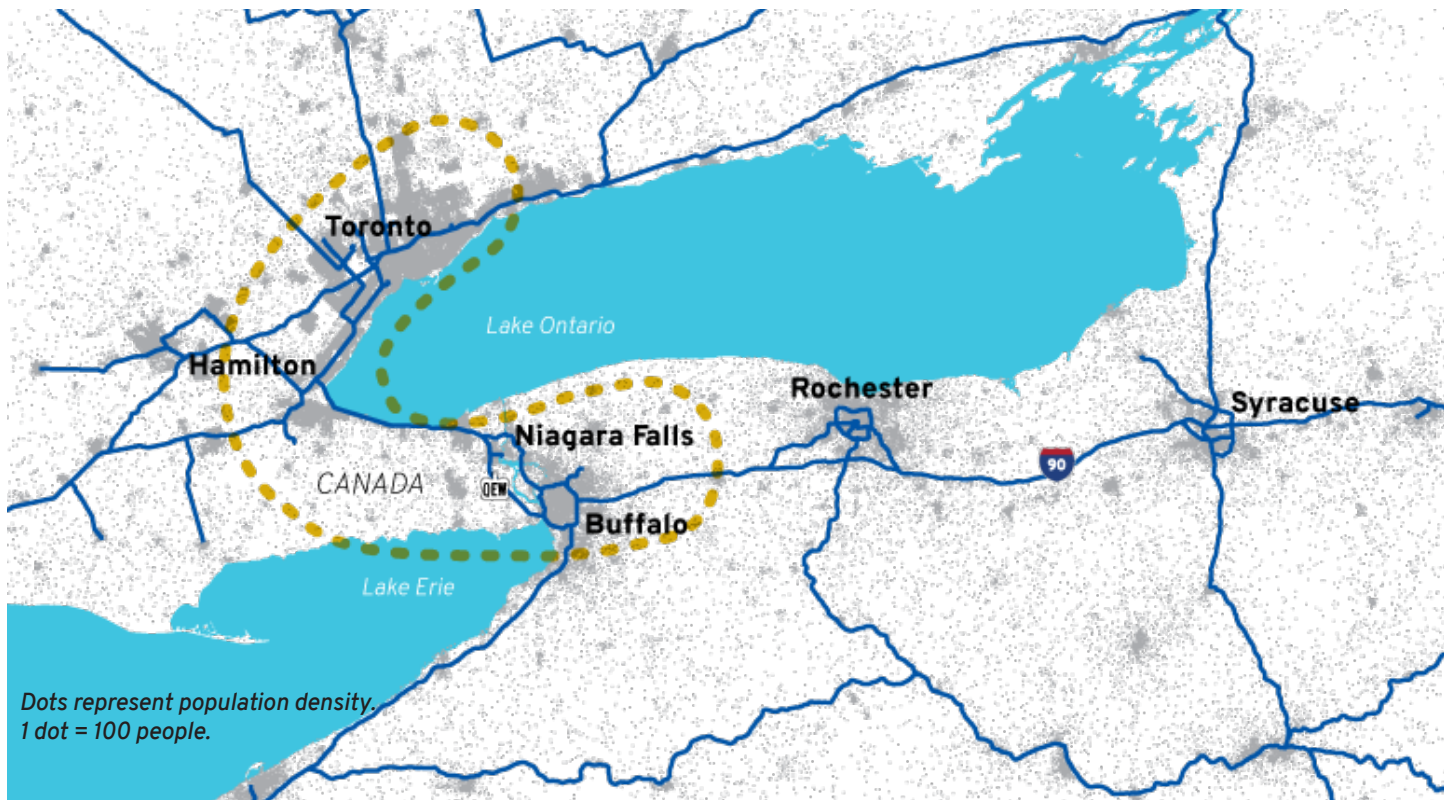Buffalo Niagara serves as a critical link in this megaregion. Fifteen percent of the trade between Canada and the U.S. moves across the Niagara River, making it the second largest port of entry on the U.S.-Canada border. Ensuring quick, effective and secure movement of freight and travelers through the region and along the border is imperative to building a robust, dynamic economy in Buffalo Niagara. This requires enhanced cross-border coordination, embracing innovative technologies and adaptive transportation management systems.

Nearly 2 million commercial trucks and 11.5 million vehicles cross between Buffalo Niagara and Canada every year.

The Greater Golden Horseshoe includes over 9 million people.

Dots represent population density.
*1 dot = 100 people.*

Source: U.S. Census Bureau, American Community Survey, 5-year estimates, 2015; Statistics Canada, 2011 Census of Population.

We can capitalize on cross-border opportunities by...

Adding value to goods *heading to and from Canada, as well as other countries, by encouraging foreign companies to ship components, instead of finished products, to the region for assembly with potentially locally-sourced components.*
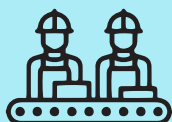
Supporting businesses in light manufacturing, assembly and logistics *as these companies tend to locate near transportation and distribution hubs.*

Promoting our "one day trip" access to major population centers *like Toronto and cities along the East Coast. We are well-positioned to serve as an inland port to the Port of New York and New Jersey. Our proximity to major U.S. and Canadian metro areas also enables companies here to quickly grasp and adjust to changing market conditions.*

Growing university support *for logistics, supply chain, data management and providing workforce training for target industries like advanced manufacturing.*

Leveraging our strong base in advanced manufacturing, logistics and other industries *and our skilled, but underemployed, workforce to tap into this trade and build a more productive business environment and a dynamic, prosperous workforce.*

Attracting tourists from Canada and around the globe *and promoting longer trips for those who visit major attractions, like Niagara Falls, to experience all the sights of Western New York and Southern Ontario.*

Realizing these opportunities will require coordination and innovation.

Today, we are **building on a long history of coordination** with partners across the border to improve how the bi-national transportation system operates and to promote regional economic prosperity.

This partnership of local governments and transportation agencies from both sides of the border is working to **optimize traffic flows** by identifying effective management strategies to **limit congestion** and related environmental impacts.

The cross-border collaborative is supporting policies and programs to optimize traffic flows, rather than adding costly infrastructure. These include **promoting transit use, electronic pre-clearance programs** and long-term solutions focused on **reducing border delay** with new technologies. For example, data-driven decision support tools could manage traffic on critical corridors by re-routing vehicles at anticipated and unexpected times of congestion.

Cross-border collaboration can also increase efficiencies and cut costs with innovative financing programs. One example is the **Niagara International Transportation Technology Coalition (NITTEC) Revolving Loan Fund**, an inventive financing device capitalized by a Federal Aid Grant and made available year-round to transportation agencies for projects throughout Western New York and Southern Ontario. This program lays out clear requirements to aid applicants and ensure that projects support a regional vision for transportation.

Moving forward, we will require **enhanced collaboration** through active participation by local citizens, and by coordination among state, county, and city governments in the U.S., and provincial and federal governments in Canada. **Broad-based collaboration across various jurisdictional levels** will be needed to establish innovative, effective financing programs, and to address highway capacity issues on both sides of the border while incorporating an inter-regional multi-modal transit network.

The economy is changing and so are travel demands.

New technologies enable a wider array of choices for locating the production, distribution, and consumption of goods and services. Ongoing shifts in regional, national, and global economies are also reconfiguring travel demands for workers and freight. The scale and pace of these changes will vary, but all point to a need to invest in new technologies and services to build a dynamic and diverse transportation system that is responsive to the needs of an increasingly global and high-tech economy.

Improvements in communication and information technology

Today, access to employment, education, and shopping is not always physical, and 24% of U.S. workers do some or all of their work at home.[2] Telecommuting, telemedicine and online education have become pervasive across many sectors with the potential to reduce travel expenses and limit traffic congestion.
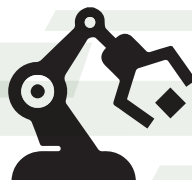
Rise in automation

About half of today's jobs will likely be done by computers in a decade or two.[3] Job automation could limit employment in some of today's most common jobs, like in retail. Autonomous, self-driving vehicles could also reduce jobs in other sectors, like logistics, while presenting new employment opportunities in technology, business and maintenance. These vehicles can also expand mobility for workers and businesses.

Evolution of sharing and gig economies

Online ride-sharing platforms enabled by digital technology are dramatically expanding transportation options. These companies reflect a broader shift towards freelance employment characteristic of the "gig economy." There are nearly 70 million of these "gig" workers estimated in the U.S.,[5] working non-traditional shifts and making more off-peak, non-rush hour trips, which might reduce road congestion during peak periods.

[1] U.S. Census Bureau, American Community Survey, 1-year estimates, 2015.

[2] U.S. Bureau of Labor Statistics. "24 Percent of Employed People Did Some or All of Their Work at Home in 2015," 2016. Accessed August, 2017 at https://www.bls.gov/opub/ted/2016/24-percent-of-employed-people-did-some-or-all-of-their-work-at-home-in-2015.htm.

[3] Carl Benedikt Frey and Michael A. Osborne. "The Future of Employment: How Susceptible are Jobs to Computerisation," 2017. Technological Forecasting and Social Change, 114, 254-280. https://doi.org/10.1016/j.techfore.2016.08.019.

[4] Alicia Adamczyk, "Amazon Prime Members Will Bring in $143 Billion," 2016. Accessed August, 2017 at http://time.com/money/4508101/amazon-prime-cowen-report/.

[5] McKinsey Global Institute. "Independent Work: Choice, Necessity, and the Gig Economy," 2016. Accessed August, 2017 at http://www.mckinsey.com/global-themes/employment-and-growth/independent-work-choice-necessity-and-the-gig-economy.

[6] Brookings Institution. "Metro Modes: Charting a Path for the U.S. Freight Transportation Network," 2015. Accessed August, 2017 at https://www.brookings.edu/wp-content/uploads/2015/06/srvy_cifreightmodes_june12.pdf.

Globalization, global trade, and cross-border freight flows

In today's global economy, physical access to markets is essential to regional competitiveness. While trucks move more than two-thirds of all U.S. goods, air transportation is key to emerging sectors that emphasize innovative, high-value commodities.[6] Investing in diverse transportation modes could support more efficient goods movement in tradable industries and emerging industry sectors.

Growth of e-commerce and changing consumer preferences

An estimated 50% of U.S. households have an account with Amazon Prime, which includes two-day shipping in the annual membership fee.[4] As more consumers are expected to purchase goods via online shopping and home deliveries, warehouses and distribution centers may grow in urban areas to provide faster deliveries at lower prices.

Mobility as a service (MaaS) may reduce personal vehicle ownership

Personal mobility is becoming less dependent on personal vehicle ownership. Many people are now using a variety of on-demand services that can provide convenient access without the high costs of owning a personal vehicle. This shift to mobility as a service (MaaS) is fueled by emerging services, like transportation network companies, bike-sharing programs, and in the near future, autonomous and connected vehicles. Mobility as a service can be further enabled by digital platforms that integrate multiple modes of transport into seamless trip chains and provide end-to-end trip planning, booking and payment services.

TRANSPORTATION CONNECTS OUR COMMUNITIES

For generations, our region spread out and added infrastructure, even as we lost population, resulting in a transportation system that is overbuilt and costly to maintain. But our region is rebounding, even in places that lost population for decades. Our transportation system can be an asset that helps all our communities build on this momentum. Our system is notably efficient for drivers, but we need to expand access using a variety of modes to turn recent signs of progress into lasting, shared prosperity.

Many communities that were once losing population are growing, including walkable places.

Buffalo Niagara is rebounding and communities across the region are being revitalized. Many places that lost population from 1990 to 2010 grew in recent years, including some of the region's most walkable communities where residents can reach many daily needs by foot.

Hamburg, NY

Lockport, NY

Places that lost population from 1990-2010 **but grew from 2010 to 2015**

Walkable Communities

Very Walkable

Relatively Walkable

Slightly Walkable

Lockport

Niagara Falls

North Tonawanda

Tonawanda

Williamsville

Buffalo

East Aurora

Hamburg

Springville
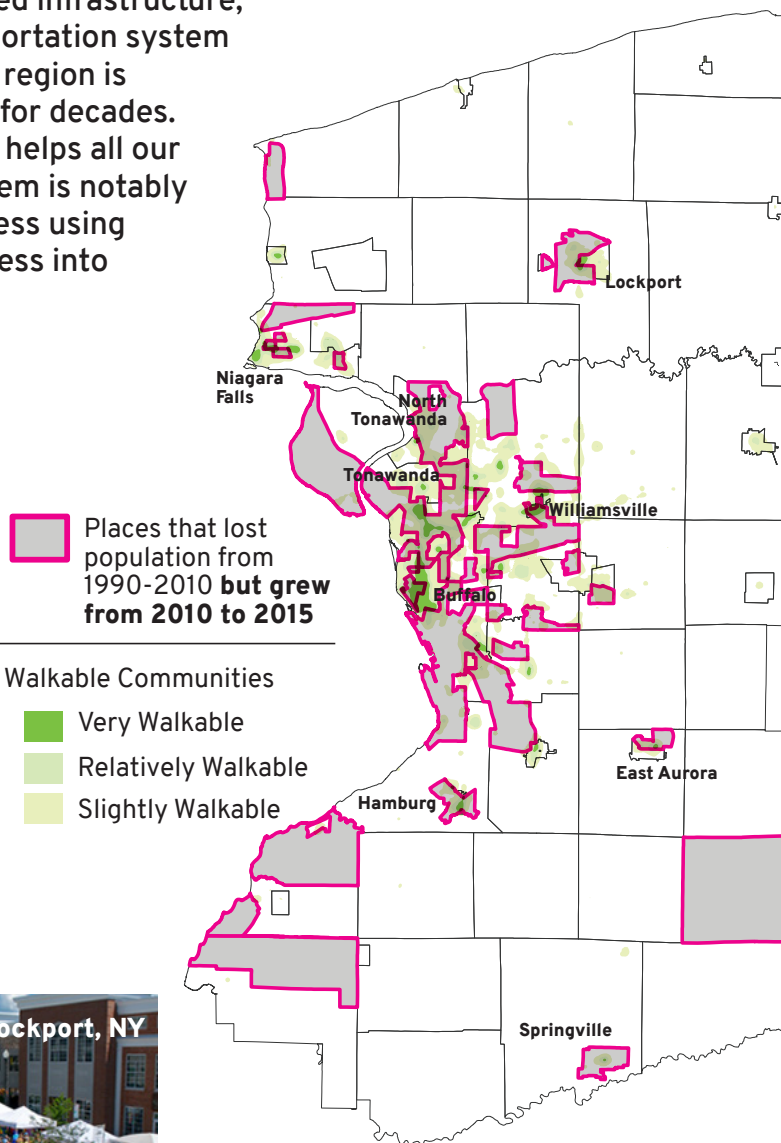
Source: U.S. Census, 1990, 2010; American Community Survey, 5-year estimates, 2015; UBRI analysis of walkability for "Local IMPACT: Strategies to Promote Mobility," 2016 (see Data Sources & Notes).

Our population is stabilizing and our young adult population is growing.

Since 2010, the region's population is stabilizing, and the young adult population is growing faster here than across the state and nation. More young adults are opting to live in walkable communities that provide access to a range of opportunities without having to own a car.

Our region has enough infrastructure to accommodate growth. We need to modernize and leverage our transportation system in ways that help attract young talent, revitalize communities and improve quality of life for residents. Focusing investments in existing communities while expanding transportation options will help. We also need collaboration between transportation providers to enable convenient multi-modal trips for travelers that open up opportunities while keeping congestion low.

Change in Young Adult Population (Age 20-34), 2010-2015

8.4% Buffalo Niagara

5.4% NYS

6.0% US
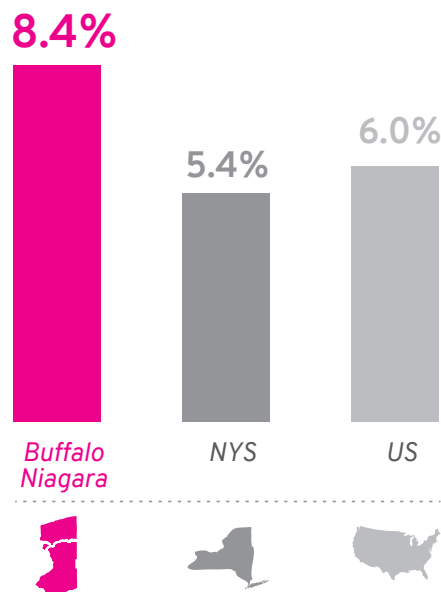
Source: U.S. Census, 2010; American Community Survey, 1-year estimates, 2015

Communities are changing and so are their transportation preferences.

More people opting to do without a car and live in walkable neighborhoods

66% of young adults say access to high-quality transportation is a top criteria in deciding where to live.[1] This may be related to cost savings, as individuals who commute via public transit save an average of over $9,000 a year.[2] To meet this demand, and make the region more attractive, we need walkable communities connected to diverse transportation options that can limit the need to own a personal vehicle. Shifting preferences underscore the need for connected and diverse transportation options that provide access to key destinations throughout the region.

Smaller households and fewer children

Broad social trends, like young people delaying marriage and having children later in life, are changing the structure and function of households and housing needs. As neighborhoods offer more housing choices, these shifts will also have important implications for transportation. A growing diversity of households calls for a wider range of integrated transportation options.

More seniors with mobility concerns

Our population is aging with one in five residents over 60, and a greater share of seniors than the national average.[3] This trend underscores the need for new, specialized transportation services and technologies like autonomous and connected vehicles to help maintain mobility and a high quality of life as we age. New forms of shared transportation, including ride-sharing and shuttle services, can play a crucial role in expanding mobility options for seniors. However, there remain gaps in use and awareness of shared mobility services across generations.

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[1] "Access to Public Transportation a Top Criterion for Millennials When Deciding Where to Live, New Survey Shows," 2014. Accessed October, 2016 at https://www.rockefellerfoundation.org/about-us/news-media/access-public-transportation-top.

[2] American Public Transportation Association. "March Transit Savings Report," 2016. Accessed November, 2016 at http://www.apta.com/mediacenter/pressreleases/2016/Pages/160324_Transit-Savings.aspx.

[3] U.S. Census Bureau, American Community Survey, 1-year estimates, 2016.

TRANSPORTATION CONNECTS
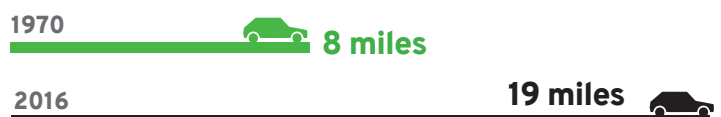# OUR
ENVIRONMENT

We're driving more.

Compared to 1970, we drive over twice as much every day on a per person basis. We also own more vehicles. From 1990 to 2015, our population declined by 5% while the number of vehicles in the region increased by that same margin (+5%).[1] Our surging dependence on automobiles increased the mileage we travel on local roads, household transportation costs and our collective impact on the environment, even with fewer people living in the region.

Vehicle Miles Traveled Daily Per Capita, 1970 VS 2016

1970 — **8 miles**

2016 — **19 miles**

Source: Greater Buffalo Niagara Regional Transportation Council, 2017; U.S. Census, 1970; American Community Survey, 1-year estimates, 2016.

[1] U.S. Census Bureau, 1990 Census; American Community Survey, 1-year estimates, 2015.

Driving increases energy use and greenhouse gas emissions.

More driving has a big impact on the environment. Transportation is the largest contributor to GHG emissions in the region, and the majority of transportation-related emissions come from on-road vehicles.

Buffalo Niagara GHG Emissions by Source, 2012

Industrial

| 8% | 12% Other | 18% Commercial | 26% Residential | 36% Transportation Energy |
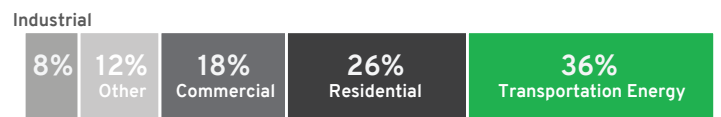
86% of these transportation emissions come from on-road vehicles.

Source: Ecology and Environment, Inc. Cleaner, Greener Communities Western New York Regional Tier II Greenhouse Gas Inventory, 2012.

Neighborhoods with greater traffic volumes have higher asthma rates.

Increased traffic has direct, detrimental impacts on the air we breathe and our health. Residents in our region that live in places where traffic volumes exceed the national average are 70% more likely to visit the ER due to asthma.

People in our region who live in neighborhoods with traffic **above the national average are**

70% more likely to visit the ER for asthma

Source: UBRI analysis of data from the U.S. EPA, EJ Screen Database, 2015; and NYS Department of Health, Asthma Emergency Department Visits ZIP Code Data, 2012-2014.

We added roads to connect new homes built on critical natural land.
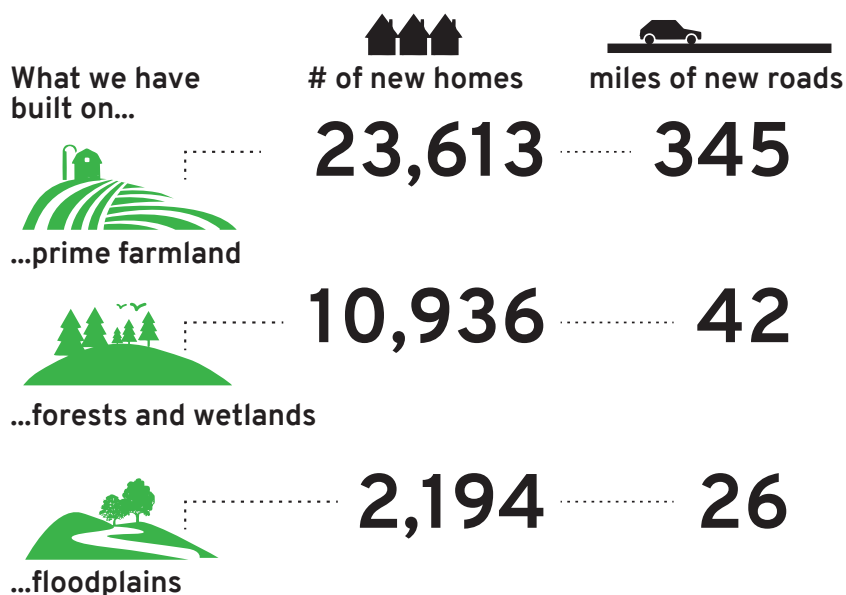
The growing environmental impact of our transportation system has a lot to do with land use. For the most part, roads are built to connect homes with jobs, services and other amenities. From 1990 to 2010, over 40,000 homes were built in the region. Most homes were constructed on key environmental areas, like prime farmland, forests, wetlands and floodplains. These provide critical environmental services, like flood control, wildlife habitat, and fertile soils for farming. Likewise, many of the roads built over that time are in these areas. These paved surfaces cause untreated stormwater to flow into local waterways. In total, our road network covers over 45 square miles of paved surfaces.[2]

Homes and Roads Built on Important Natural Areas, 1990 to 2010

What we have built on...	# of new homes	miles of new roads
...prime farmland	23,613	345
...forests and wetlands	10,936	42
...floodplains	2,194	26

Source: UBRI analysis of data from the U.S. Census Bureau, TIGER\Line Roads, 1990 and 2010; NYS Office of Real Property Services, 2010; USGS, National Land Cover Dataset, 2011; USDA-NRCS, SSURGO data; and FEMA, Flood Insurance Rate Maps, 2012.

[2] U.S. Census Bureau, 1990 Census; American Community Survey, 1-year estimates, 2015.

We are keeping up with broader trends that impact the future of transportation...

...by adding bike lanes and multi-use trails

Extending opportunities for residents and visitors to get around by bicycle has become a regional priority. Today, the total length of designated bike ways, bike routes and multi-use trails is nearly triple what it was in 2001. These pathways provide opportunities for all of us to enjoy our environment and lead healthy, active lifestyles.

Since 2001, Buffalo Niagara has added...

...110 miles of multi-use trails

...166 miles of bicycle lanes and routes

Source: Greater Buffalo Niagara Regional Transportation Council, 2017.

...and building alternative fueling stations.

In the future, transportation will not be entirely reliant on fossil fuels. Consumers and public transit agencies are increasingly switching to electric and other alternative fuels to cut fuel use and costs. To meet this trend, the number of electric charging and alternative fueling stations across the U.S. tripled since 2011, while in Buffalo Niagara, the number increased by over 5 times.

# of Electric and other Alternative Fueling Stations in Buffalo Niagara, 2011 and 2017

2011	2017
9	49
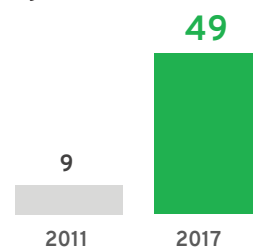
Source: U.S. Bureau of Transportation Statistics, National Transportation Atlas Database, 2011 and 2017.

We are taking better care of our environment by reactivating waterfronts and riverways.

Our waterfronts are our greatest natural assets. However, our industrial economy was centered on the waterfront, leaving a legacy of contaminated sites along the Niagara River and Great Lakes. Recently, we have taken great strides in cleaning up these sites and reconnecting people with the waterfront by adding bike routes and multi-use trails along shorelines to increase public access.

We are working to connect waterfronts with other transportation options and recreational activities. Ongoing improvements are being made to the Shoreline Trail along Lake Erie and the Niagara River. Plans are being made for the Buffalo Blueway—a network of access sites along the city's waterways to open up opportunities for paddlers. A portion of the Robert Moses Parkway in downtown Niagara Falls is being replaced with a multi-modal pathway for bicyclists and pedestrians to enjoy the Niagara River gorge. Other waterfront towns have taken big steps to remediate waterfronts and expand recreational trails, with more efforts underway.

Shoreline Trail

Buffalo Blueway

Future view of Robert Moses Parkway in Niagara Falls
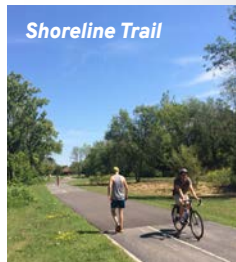
Reactivated sites and trails along major waterways

- Remediated sites
- Bike lanes and multi-use trails
- Buffalo Blueway Trail
- Shoreline Trail
- Waterways

Source: NYS DEC, Remediated Site Borders, 2016; Greater Buffalo Niagara Regional Transportation Council, 2017; USGS, 2016.

Future trends in transportation could have transformative impacts on our environment.

New technologies and emerging trends offer unprecedented opportunities to build a transportation system that works better for our environment and our health. Electric vehicles, ride-sharing services, autonomous cars, and advances in information technology, as well as improved bicycling and pedestrian infrastructure, offer new ways to reduce greenhouse gas emissions, make land use more efficient and improve air quality.

Electric vehicles offer increased fuel efficiency for personal vehicle owners. Public transit vehicle fleets are also adopting electric vehicles and other alternative fuels to cut fuel use and costs. While these innovations could greatly reduce the future environmental impact of our transportation system, the adoption of cleaner fuels depends on what infrastructure and incentives are in place.

Transportation network companies (TNCs), such as Uber and Lyft, offer a viable, cost-effective alternative to driving and could encourage some to drive less or even give up their personal vehicle. Integrating these companies into a robust and modern transportation network, including fixed-route public transportation, can enhance the environmental benefits of TNCs.

Active transportation modes, such as walking and bicycling, reduce greenhouse gas emissions when they substitute for motorized travel. Multi-use trails, complete streets, and walkable places give residents and visitors the option of walking, biking, and taking public transportation in addition to driving. Active transportation also encourages healthy lifestyles and can enhance public health outcomes.

CHAPTER 3

| Where we want to be in 2050 | Where we are today | A framework for moving forward | Big moves to get us there | Taking action and measuring progress |

OUR TRANSPORTATION SYSTEM

Our transportation system ties our communities together and connects our region with the nation and the world. This network of roads, bikeways, trails, rail lines, airports and more can move us towards a future aligned with our regional vision. This section gives an overview of the components of Buffalo Niagara's transportation system—the infrastructure we have, the condition it is in, and how well it is working for all of us—and how the evolving landscape of transportation demands innovative approaches for improving our system. This broad understanding of transportation infrastructure, programs and performance is critical in making effective plans for the future of our transportation system.

OUR TRANSPORTATION SYSTEM

ROADS AND HIGHWAYS

Our roads and highways accommodate tens of thousands of vehicles every day.

Our region is connected by over 7,800 miles of roads and highways that make up the backbone of our transportation system. Tens of thousands of vehicles carrying residents, workers and visitors travel across our roadways on a typical day. The region's roadways are comprised of both the National Highway System, which include interstates, expressways and major state routes, and of local roads, which are operated by counties, cities and towns.

TOTAL PASSENGER VEHICLES ON ROADWAYS PER DAY, ANNUAL AVERAGES, 2015

Total Vehicles on Roadways per Day

0
10,000
20,000
40,000
60,000

LAKE ONTARIO

CANADA

LAKE ERIE

Source: Greater Buffalo Niagara Regional Transportation Council & NYS Department of Transportation, 2015.
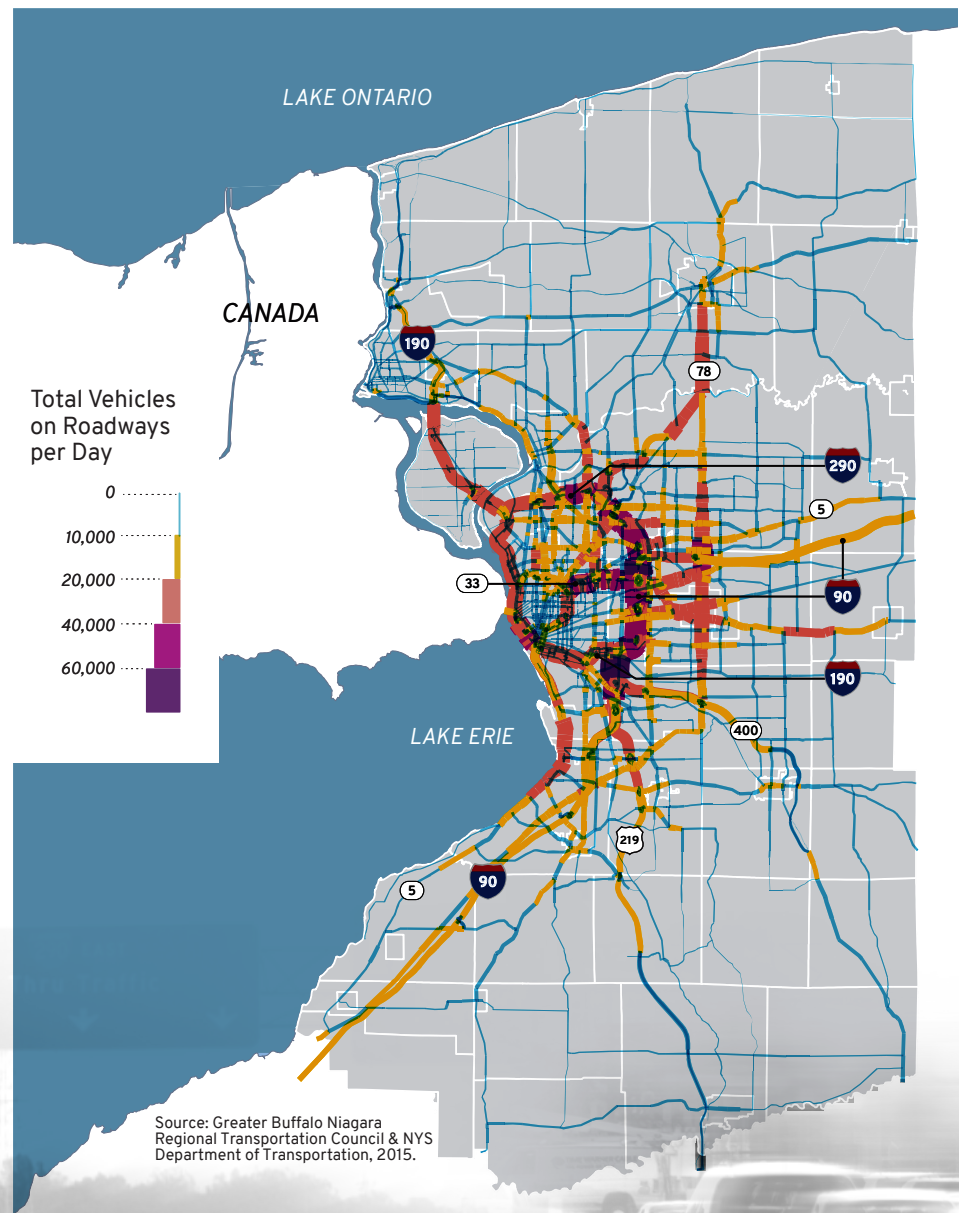
Collectively, we drive over 2.3 million more miles annually than we did 20 years ago, even with fewer people living in the region.

The total mileage traveled by all vehicles across the region fluctuated over the years. These ups and downs in vehicle use are due in part to broad changes in the population and the economy, like the number of workers and visitors driving around, as well as individual decisions, like how we choose to get around and how far we need to go. Overall, the amount of miles traveled on our roads increased over the past several decades, even though the population has not grown. This adds stress on our environment and roadways, which increases the costs of repairing and maintaining our roads and bridges.

Some of our major roads and highways experience more traffic than they can handle at times.

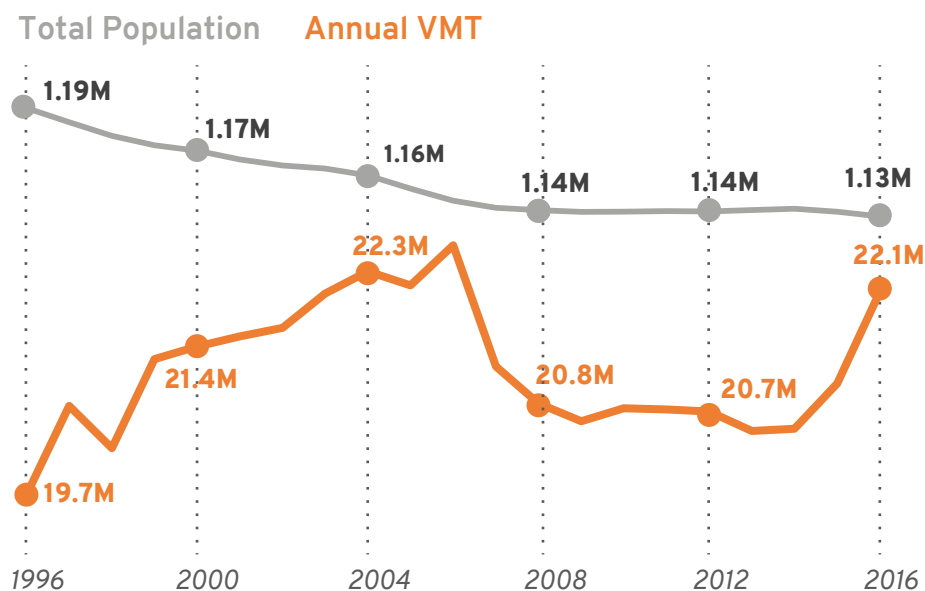When compared to other regions, ours has relatively low traffic volumes, which adds to our overall quality of life. However, many high-trafficked road segments can often become congested during peak daily travel hours. Some of these roadways end up carrying volumes that approach and at times exceed the capacity they were built to accommodate. These areas cost us time and money while burning extra fuel, and can often add to air quality concerns in surrounding neighborhoods.

POPULATION & VEHICLE MILES TRAVELED (VMT) IN BUFFALO NIAGARA, 1996-2016

Total Population   Annual VMT

1.19M 1.17M 1.16M 1.14M 1.14M 1.13M

22.3M   22.1M
21.4M
       20.8M 20.7M
19.7M

1996 2000 2004 2008 2012 2016

Sources: Greater Buffalo Niagara Regional Transportation Council, 2016; U.S. Census Bureau, Intercensal County Population Estimates, 1990-1999 and 2000-2010; Annual Population Estimates for Metropolitan Statistical Areas, 2010-2016.

MAJOR ROADWAY PERFORMANCE BY CAPACITY LEVEL OF SERVICE, 2016

Roadways that often carry traffic volumes that…

Approach or reach road's capacity at rush hour

Exceed road's capacity at rush hour

Source: Greater Buffalo Niagara Regional Transportation Council, 2016.
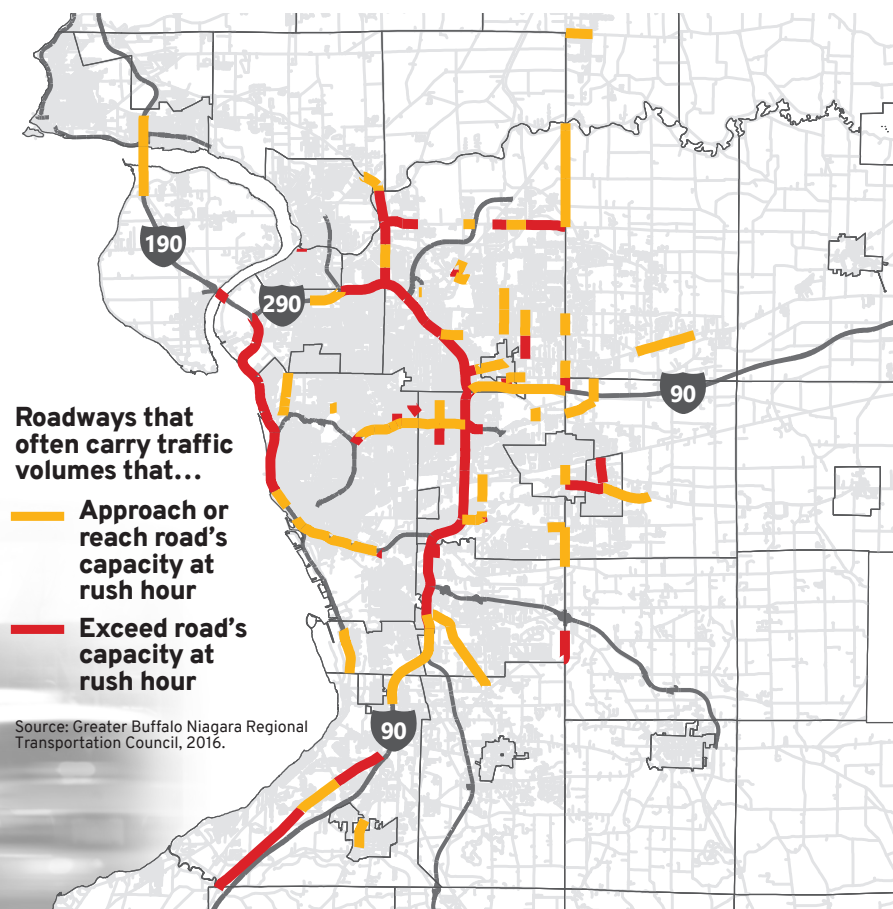
Our roads and highways are in good shape, but many need repair.

As roadways age, and the number of vehicles traveling on them grows, pavement conditions deteriorate. When public dollars are strapped, local governments must be selective in deciding when and where roads are resurfaced. Many roads will often need minor repairs or major improvements, but high traffic roads will be prioritized over others. Pavement condition ratings are based upon visual scoring procedures developed and used by the New York State Department of Transportation (NYSDOT).

SURFACE CONDITIONS OF BUFFALO NIAGARA ROADWAYS BY FUNDING SOURCE, 2015

System Total	National Highway System	Other Roads Eligible for Federal Aid	Local Roads
7%	8%	8%	2%
60%	81%	53%	38%
21%	8%	26%	34%
12%	3%	13%	27%
	9%		
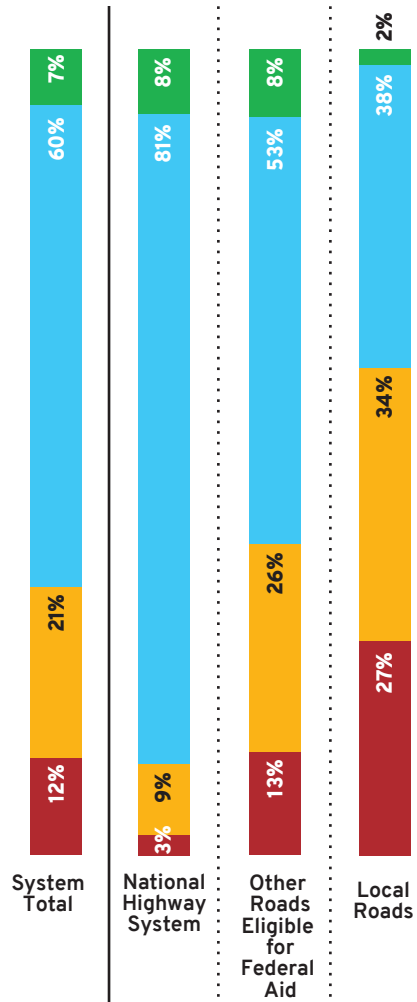
Source: GBNRTC & NYSDOT, 2015.

2015 SURFACE SCORES ON ROADWAYS ELIGIBLE FOR FEDERAL AID
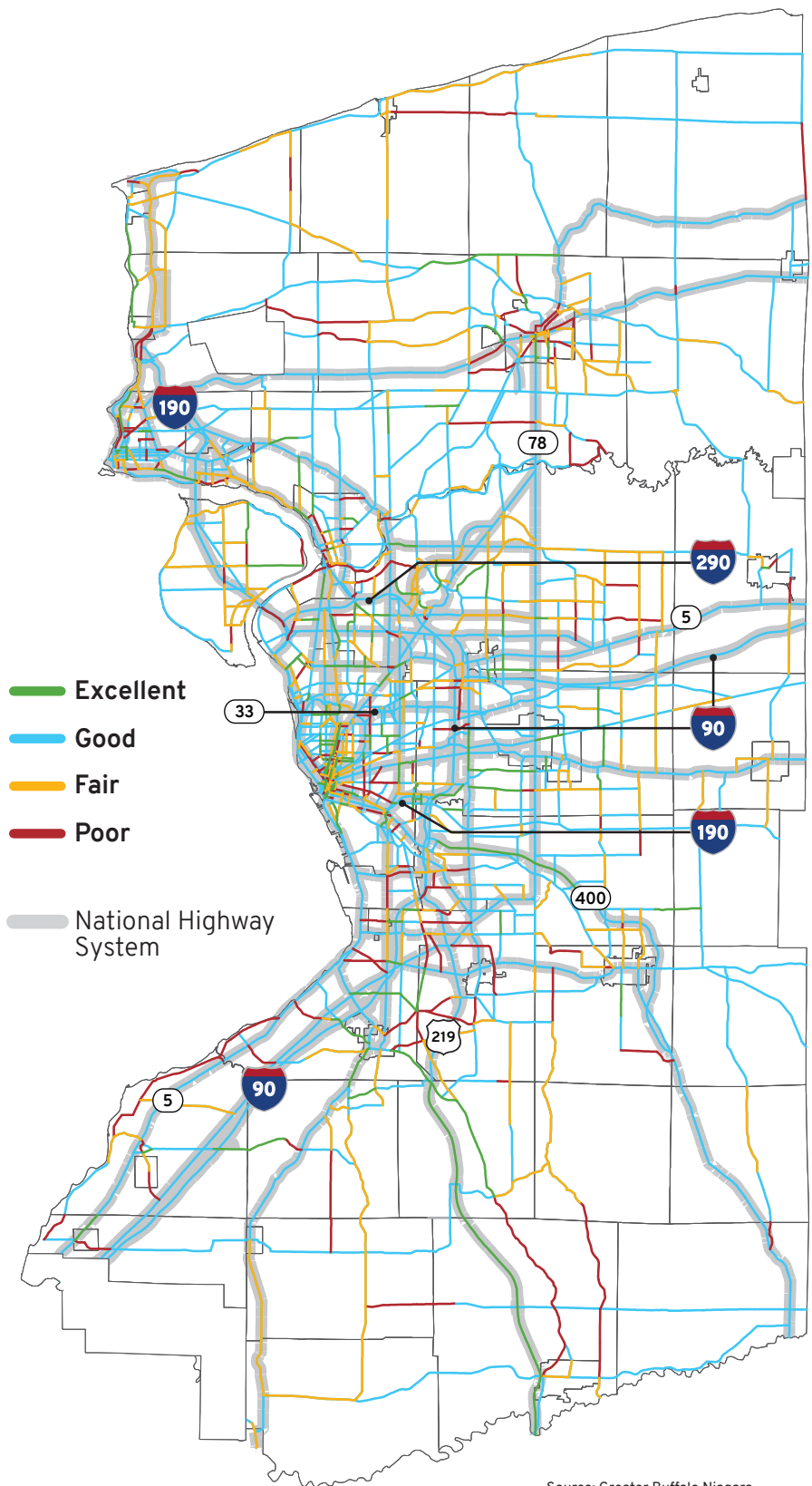
Legend:
- **Excellent**
- **Good**
- **Fair**
- **Poor**
- **National Highway System**

Source: Greater Buffalo Niagara Regional Transportation Council & NYS Department of Transportation, 2015.

Throughout recent years, our local roads have generally been in worse condition than those that receive federal funds.

The interstates, expressways, state and federal routes that make up the National Highway System (NHS) in our region accommodate the highest volumes of traffic and are the most critical corridors for our economy. While road surface conditions improved overall since 2001, roads that are reliant on local funds are consistently in worse condition than those eligible for federal funds. The most recent ratings score less than 40% of local road miles as in good or excellent condition.

% OF ROADWAYS WITH SURFACES IN GOOD OR EXCELLENT CONDITION BY FUNDING SOURCE, BUFFALO NIAGARA, 2015

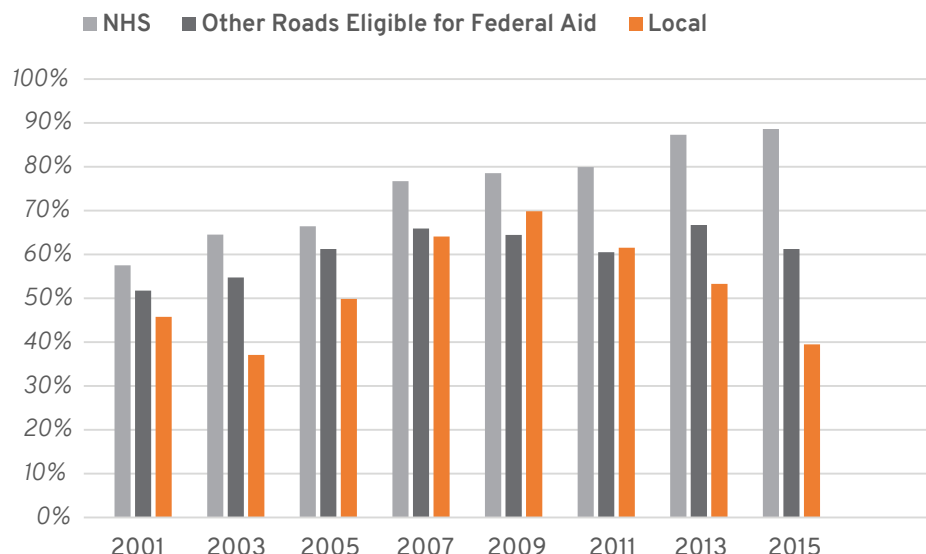Source: Greater Buffalo Niagara Regional Transportation Council & NYS Department of Transportation, 2015.

Most bridges in our region are in good, or passable, condition, but many need to be improved.

Over a third of locally-maintained bridges are rated functionally obsolete, based on inadequate design that may not meet current standards, compared to 14% of federally maintained bridges. NHS bridges are slightly more likely than local bridges to be structurally deficient due to the poor condition of supporting structures, or high likelihood of flooding that would bar traffic. In total, 111 of the region's bridges are structurally deficient and 287 are functionally obsolete. Alternative financing, like the competitive Bridge NY reimbursement program, will be relied on to fund all phases of future projects on local bridges and culverts.

BRIDGE CONDITIONS IN BUFFALO NIAGARA, 2015
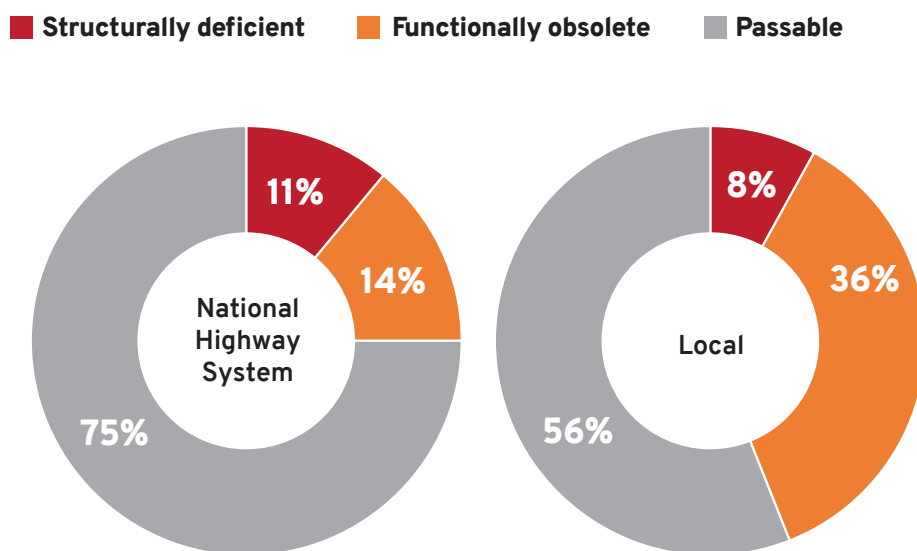
Source: Greater Buffalo Niagara Regional Transportation Council & NYS Department of Transportation, 2015.
Functionally obsolete bridges are structurally sound, but not built to current standards. These bridges may have inadequate vertical clearances, lane widths, or shoulder widths, or may occasionally be flooded. **Structurally deficient** bridges typically require repair and eventual replacement or rehabilitation to address deficiencies, but are safe and unlikely to collapse.

OUR TRANSPORTATION SYSTEM

PUBLIC TRANSPORTATION

The public transit system is extensive, but buses can be infrequent.

The Niagara Frontier Transportation Authority (NFTA) operates the public transit system linking Erie and Niagara counties. The system has over 60 bus routes covering cities and suburbs, and the Metro Rail runs six miles along Main Street in Buffalo. Most routes in the City of Buffalo offer frequent service during peak travel hours, but wait times are higher in outer suburbs where lower density and demand limits the financial feasibility of running buses frequently. NFTA also provides curb-to-curb paratransit services for passengers with disabilities. Other providers offer public transportation to and from rural areas and nearby counties, like the Seneca Transit System, Rural Niagara and Coach USA.

AVERAGE WAIT TIMES AT STOPS ALONG PUBLIC TRANSIT ROUTES DURING PEAK TRAVEL HOURS
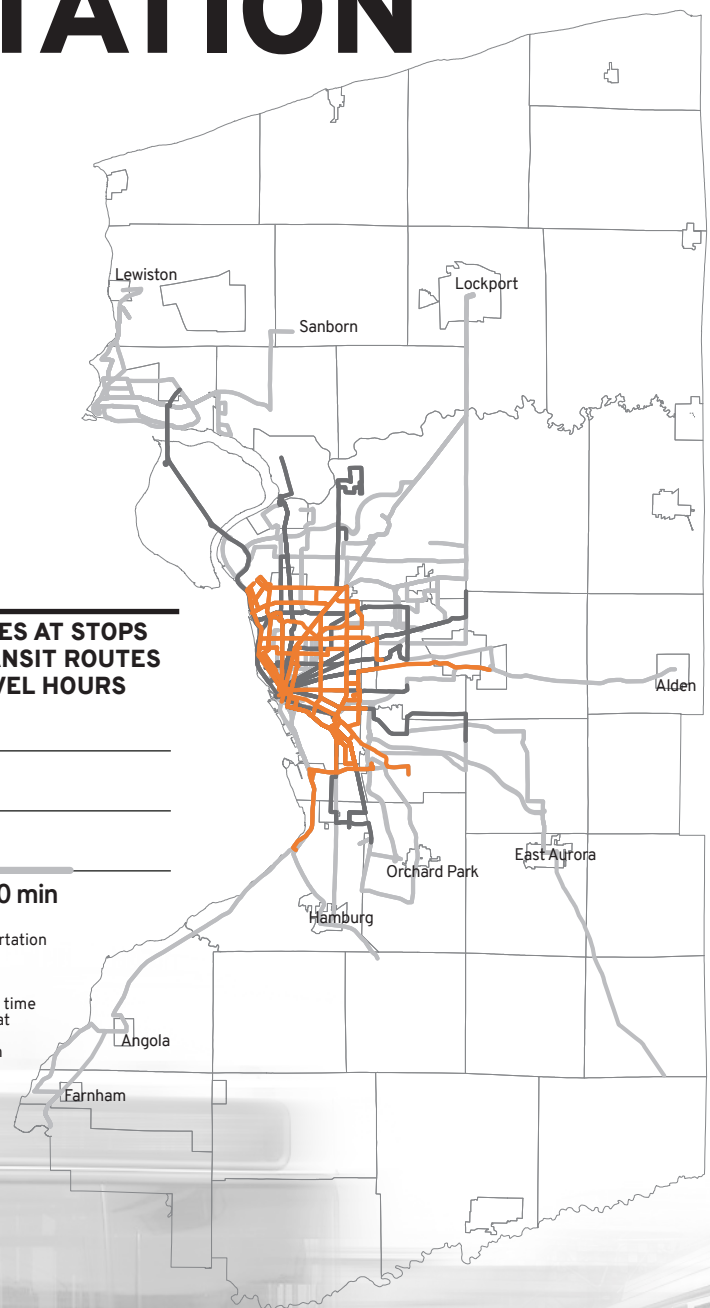
⎯⎯ < 15 min

⎯⎯ 15-30 min

⎯⎯ > 30 min

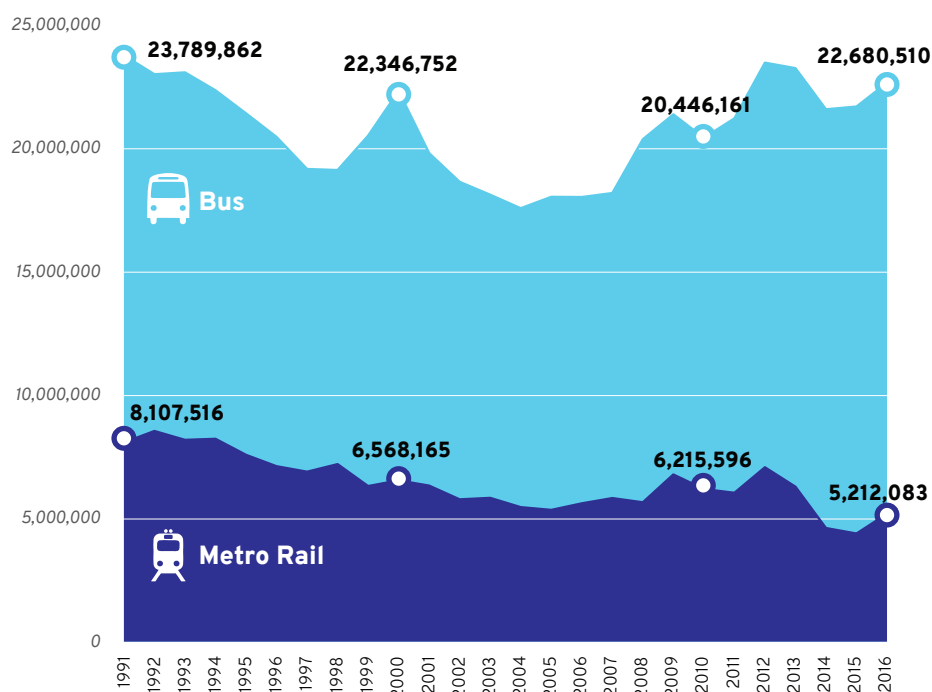Source: Niagara Frontier Transportation Authority, 2016; Cambridge Systematics, 2017.

Wait times represent the average time between buses or trains arriving at stops along each route during peak hours (6-9am and 3-6pm on weekdays).

Millions of trips are made each year using our public transit system.

Use of public transportation across our region generally trended downward for decades, but recently, transit use has increased. The metro rail and bus system still accommodate thousands of passengers every day. And although use of the metro line on Main Street remains below what it once was, more trips are being made by bus in recent years. In the years since 2010, the number of annual trips taken on our bus and metro system combined has generally been higher than at any point since 2000.

TOTAL ANNUAL PASSENGERS ON NFTA SYSTEM, 1991-2016

Source: Niagara Frontier Transportation Authority, 2016.

Other mobility options supplement our public transportation system.

Public transportation in Buffalo Niagara includes more than just the NFTA. Additional options will grow in the future as new technologies and emerging alternatives fill service gaps. These options, like vehicle-sharing and ride-sharing, can link into our public transportation network, which includes rural providers that offer critical transportation to outlying communities.

Vehicle-Sharing
Car-sharing and bike-sharing can offer alternatives to owning a personal vehicle by providing access to a fleet of shared vehicles at convenient locations. Reddy bikeshare offers shared bikes for rent at strategically located hubs throughout Buffalo. Zipcar provides cars for shared use near many of these hubs, including college campuses, and offers memberships for individuals, businesses and universities.

Transportation Network Companies
Transportation network companies, or ride-sharing services, use smartphone apps to quickly connect drivers with people who need a ride. In 2017, New York State lawmakers passed a bill expanding ride-sharing to Upstate New York and enabling residents and visitors of Buffalo Niagara to take advantage of on-demand ride-sharing services like Uber and Lyft. Future transportation network companies may include shuttle vans and carpools, and will eventually use autonomous vehicles.

Public Transportation Providers
Rural Niagara Transportation provides weekday bus service from rural parts of Niagara County to local cities and colleges. The Seneca Transit System offers fixed-route bus service between the Cattaraugus and Allegany territories, and connects to the NFTA bus system. These services are critical for many residents in outlying areas who do not have access to a personal motor vehicle.

Intercity Transportation Services
The region is also connected to intercity bus and rail services. The Amtrak stations in Depew and Buffalo, the new Niagara Falls Station and Customhouse Interpretive Center, the Buffalo-Niagara International Airport, the Niagara Falls International Airport, and UB's "Express Bus Home" stop at Greiner Hall all offer intermodal connections. Privately-operated facilities like Greyhound stops in Niagara Falls and Springville, and the Ocean Bus stop on Millersport Highway offer residents other travel options to get to other regions.

OUR TRANSPORTATION SYSTEM

BICYCLES AND PEDESTRIANS

Our network of bike and pedestrian infrastructure is continuing to grow.

Our region is adding ways for people to get around by bike. The miles of bike lanes, routes and multi-use trails more than doubled since 2009. Though more trails are underway, there are still missing links and unconnected communities. These gaps present opportunities to connect more people in more places with designated bikeways. Our region can also improve pedestrian access, especially for those with disabilities. About 10% of the region's sidewalks and 70% of curb ramps are inaccessible to people with disabilities.[1] This issue will be helped by NYSDOT's policy to add curb cuts and accessible sidewalks as roadway improvement projects are completed.

MILES OF BIKEWAYS IN BUFFALO NIAGARA, 2001-2016

Year	Bike Lanes	Designated Bike Ways & NYS Bicycle Routes
2001	93	62
2003	99	71
2005	102	71
2007	129	73
2009	129	75
2011	135	140
2013	138	160
2016	203	228
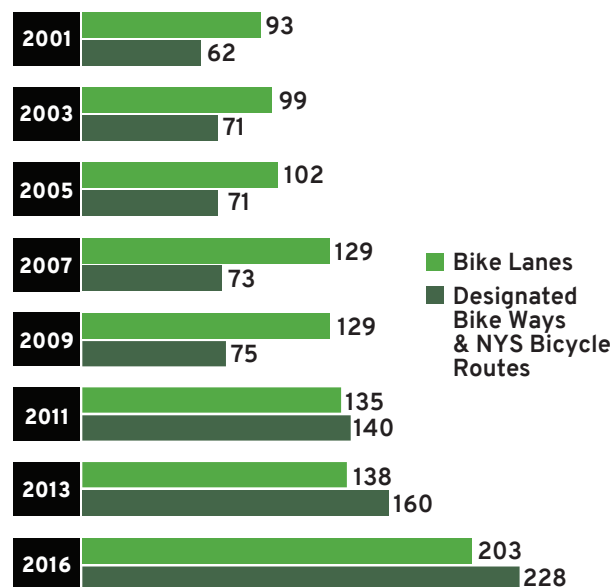
Source: Greater Buffalo Niagara Regional Transportation Council, 2017.

BIKEWAYS IN BUFFALO NIAGARA, 2015

Bike Lanes — Multi-Use Trails — NYS Bike Routes

LAKE ONTARIO

CANADA

Lockport

Niagara Falls

Amherst

Buffalo

LAKE ERIE

East Aurora
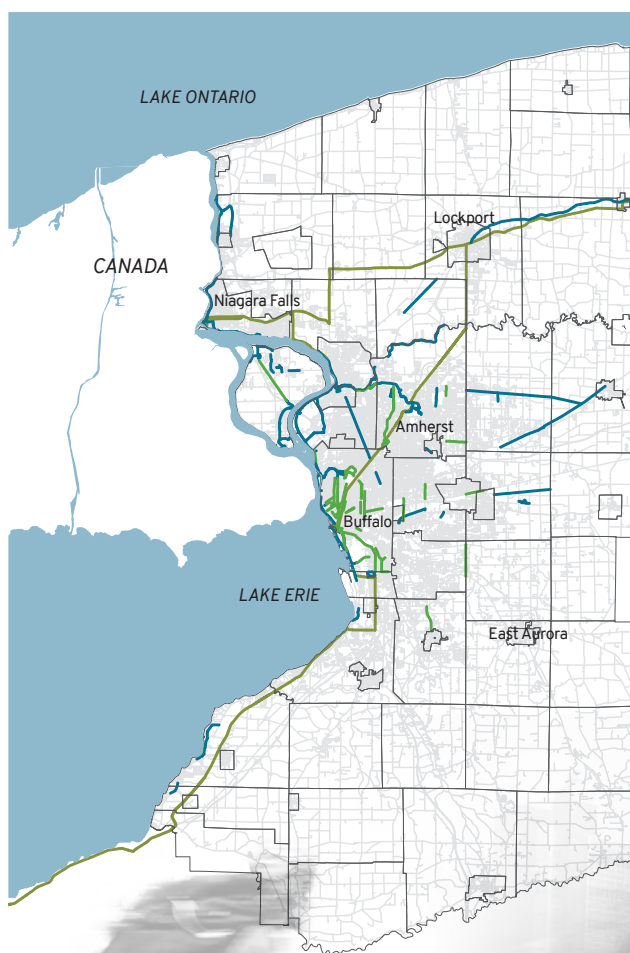
Source: Greater Buffalo Niagara Regional Transportation Council, 2017.

[1] NYS Department of Transportation, ADA Draft Transition Plan, ADA Inventory Summary, 2016.

A wide range of efforts are underway to support bicycles and pedestrians.

The recent regional progress in bicycle and pedestrian transportation amenities is due to the collective impact of a wide range of organizations, programs and policies.

GBNRTC Online Bicycle Map

This interactive map from the Greater Buffalo Niagara Regional Transportation Council (GBNRTC) allows users to navigate bicycle routes and infrastructure located throughout Erie and Niagara counties. The map features locations of bike lanes, racks and shops across the region, as well as multi-use trails, and other bike routes extending throughout the region and beyond. The map also provides key travel information for bicyclists planning to cross international borders and pair their bike ride with NFTA-Metro bus and rail service. To view the map, visit www.gbnrtc.org/maps
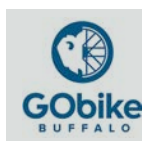
NFTA-Metro Bikes on Metro Bus and Rail Program

Passengers on NFTA-Metro bus and rail can bring their bikes along with them for no extra fees. Metro Buses are equipped with bike racks that can hold two standard bikes, and each Metro Rail car can hold two bikes in the areas designated for wheelchairs. Every Metro Rail Station also has bike racks, and several stations also offer bike lockers. This added convenience makes it easier for cyclists to bike to a stop and take a train or bus to complete their trip.

GObike Buffalo

GObike Buffalo is a bicycle advocacy organization that works with governments, private businesses, and community members across Western New York to improve regional bicycle infrastructure and increase awareness of the benefits of bicycling. Through advocacy efforts, infrastructure improvements, and community events, GObike supports bicyclists of all ages and interest levels.

Go Buffalo Niagara

Go Buffalo Niagara is a collaborative effort of the GBNRTC, Buffalo Niagara Medical Campus, GObike Buffalo, the NFTA, the Buffalo Niagara Partnership, and others, designed to provide employers, property owners, and commuters with information on transportation options across the region. Their website aims to encourage residents and visitors to change the way they get around the region to save money and reduce their carbon footprint by providing information on the accessibility and costs of various transportation options.

Bike-Sharing

Bike-sharing programs provide short-term bike rentals, enabling users to pick up a bike at a self-serve station and return it to other bike stations nearby. Reddy bikeshare was launched in the City of Buffalo in 2016, placing over 30 new bike stations and 200 bikes across the city at key civic, employment, and entertainment destinations. Residents and visitors can also rent a bike directly from someone nearby through the peer-to-peer bike-sharing app Spinlister that allows users to list or book a bike to rent by the hour, day, or week.

Safe Routes to School Programs

Since 2008, several communities throughout the region received funding through the federal Safe Routes to School program, including cities, towns, and small villages in both Erie and Niagara counties. Communities across the region used this funding for infrastructure projects that make it safer for students to walk and bike to school. More broadly, these programs promote active, healthy lifestyles in communities. Examples of projects include sidewalk improvements and reconstruction of intersections near schools, as well as pedestrian safety education in local school districts.

Complete Streets

Complete Streets are designed to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages, abilities, and modes of transportation. In recent years, several communities throughout Buffalo Niagara have taken a Complete Streets approach to development projects, and some places, like the City of Buffalo, Niagara Falls and the Village of Gowanda, adopted formal Complete Streets policies that mandate the inclusion of bicycle and pedestrian facilities in new construction, reconstruction, street maintenance, public works, and park projects.

Multi-Use Trails

Pathways and trails along historic rail lines, riverways, and waterfronts provide safe walking and biking opportunities for residents and visitors throughout the region. Many trails incorporate lighting, wayfinding signage, and brush clearing for improved safety and connectivity. In addition to enhancing walkability and protecting open spaces in established neighborhoods, some of these trails connect communities across the region such as the Tonawanda Rails to Trails Project that links the Town and City of Tonawanda with the City of Buffalo.

OUR TRANSPORTATION SYSTEM

FREIGHT AND COMMERCE

Our freight network is a critical asset.

Our mid-sized region handles an oversized volume of commerce. The railroads, shipping ports, transfer stations, international bridges and airports that make up our freight network allow us to exchange goods with the rest of the world. Most freight in our region is transported by truck, particularly along the interstate.

As the regional economy grows, and global trade accounts for an increasing share of our economy, we will grow even more dependent on our freight system in the future. Our system will have to evolve to accommodate growing and diversifying freight movement as new technologies continue to change the way goods are moved.

TOTAL FREIGHT VALUE IN BUFFALO NIAGARA BY MODE, 2015 AND 2045 (PROJECTED)

Truck | All Other | Rail

2015
2045

Truck: $73.1B / $154.6B
All Other: $20.5B / $44.8B
Rail: $10.2B / $23.8B
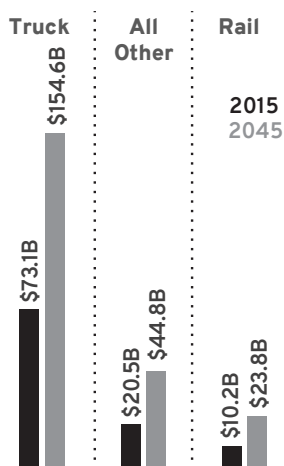
Source: Center for Transportation Analysis, Freight Analysis Framework v4.4, 2017.

TOTAL COMMERCIAL TRUCKS ON ROADWAYS PER DAY, ANNUAL AVERAGES, 2016

LAKE ONTARIO

CANADA

Total Trucks on Roadways per Day

0
1,000
2,000
4,000
6,000

LAKE ERIE

Source: GBNRTC, 2016.
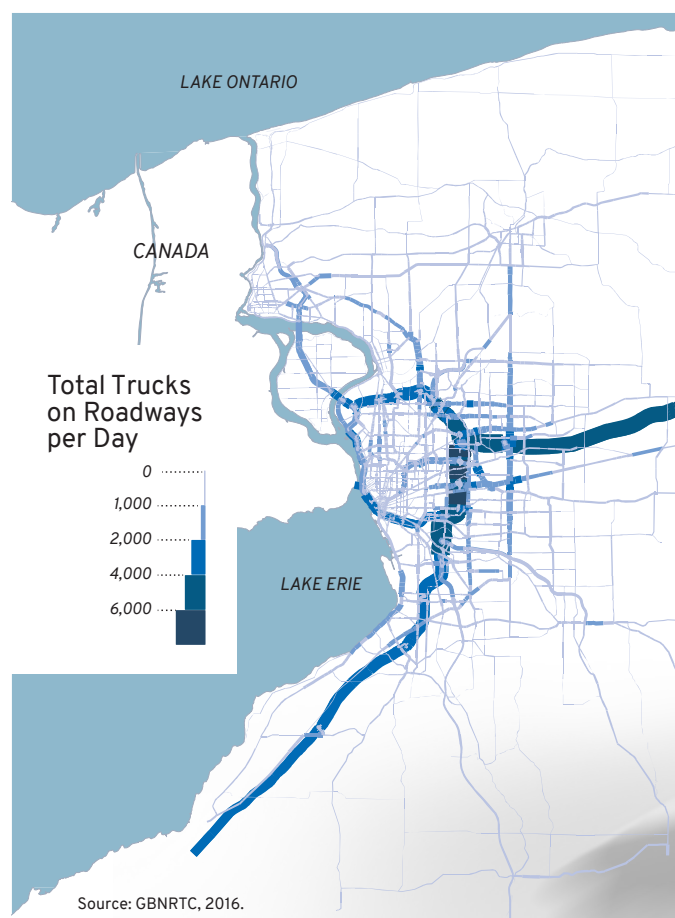
TOTAL VALUE OF FREIGHT IN BUFFALO NIAGARA, 2015 AND 2045 (PROJECTED)

WITHIN OUR REGION
$20.7B 2015
$35.3B 2045

OUT OF OUR REGION
$83.0B
$187.9B

INTO OUR REGION
$90.2B
$234.7B

Source: Center for Transportation Analysis, Freight Analysis Framework v4.4, 2017.

Portageville Bridge Project

Improvements to the Portageville Bridge, which spans the Letchworth Gorge in neighboring Wyoming County could have significant impacts on Buffalo Niagara's economy by enabling increased freight traffic to and from the region. The bridge falls along Norfolk Southern's Southern Tier Line, which connects Binghamton to Buffalo. This is a primary east-west rail route through NYS that links with other major Class 1 rail routes between Chicago and the East Coast. The project was completed in early 2018 and the bridge is now open.

BUFFALO NIAGARA FREIGHT SYSTEM, 2017

INTERNATIONAL BRIDGES

1 Lewiston-Queenston Bridge

2 International Railroad Bridge

3 Peace Bridge

INTERNATIONAL AIRPORTS

1 Niagara Falls International

2 Buffalo Niagara International

2 International airports with over 4.8 million passengers each year.

🔴 Shipping Ports

+ Active Rail Lines

🟦 Inter-modal Terminal Facilities

— Interstate & Expressways

Source: Greater Buffalo Niagara Regional Transportation Council; New York State Department of Transportation, 2017.

OUR TRANSPORTATION SYSTEM

HOW IT'S WORKING FOR US

Most workers drive alone to get to work.

The share of workers commuting by car rose consistently for decades. Today, 90% of workers commute by automobile, including 82% who drive alone to work.

Our earnings, commute times and how we get to work are inter-related.

Vehicle commutes in the region are quick and easy, but commuters who bike, walk or take transit to work spend more time commuting. This presents additional challenges for workers who are more likely to face economic and other barriers accessing jobs and opportunities.

Even though we have easy commutes, we still get stuck in traffic at times.

Low traffic volumes are a great regional asset that add to our quality of life, but many still spend extra time in traffic, usually during peak workday travel hours. We burn a lot of time and fuel sitting in traffic, which adds up to a lot of money spent and lost due to wasted time. Moving forward, enabling new mobility services and diverse transportation options can help keep congestion low.

DIFFERENCES IN COMMUTE TIMES BY MODE, BUFFALO NIAGARA, 2015

90% commute by automobile	**7%** commute without an automobile
Drive Alone or Carpool	*Transit, Bike, Walk or Other*
↓	↓

	Average commute time	
21 min.		**44 min.**
6%	**% Spending 45 minutes or more on commute**	**20%**
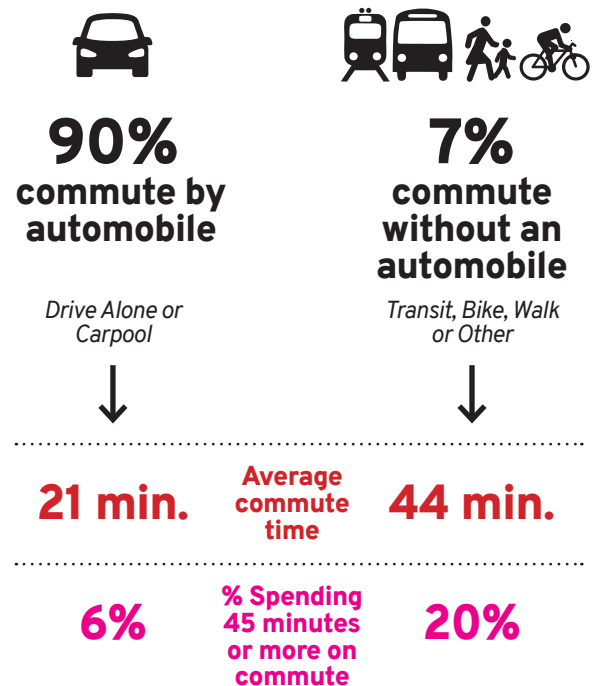
Source: U.S. Census Bureau, American Community Survey, 5-year estimates, 2015.
Those who work from home make up 2.5% of workers in the region.

Vehicle crashes result in thousands of injuries and fatalities every year.

As we look to make our transportation system more efficient, safety remains a primary concern. Numerous vehicle crashes occur every day across the region. Over the past few years, there have been 57 crashes each day, on average. Twenty-one of these result in injuries or fatalities, and about two involve pedestrians or bicyclists. We need innovative, effective solutions that make roads safe for drivers as well as pedestrians and bicyclists.

NUMBER OF VEHICLE CRASHES (AVERAGE, 2014-2016)

DAILY CRASHES ON AVERAGE

57 crashes every day...

...21 involved injuries or fatalities.

YEARLY CRASHES

20,959   **7,845**

NUMBER OF VEHICLE CRASHES INVOLVING BICYCLISTS AND PEDESTRIANS (AVERAGE, 2014-2016)

887 CRASHES PER YEAR

2.4 crashes involving injuries or fatalities every day.

It costs a lot to maintain our transportation system, even more than in the past.

A big share of public funds are spent on transportation, like plowing and paving roads, and running school buses. These costs increase as roads are built and infrastructure ages. Diverse, innovative financing will be needed to keep our system running well into the future.

LOCAL GOVERNMENT SPENDING ON TRANSPORTATION RELATED COSTS, 1995 AND 2015

Local government spending on transportation system maintenance and operation:

	1995	2015
TOTAL COST	**$336.7M**	**$417.5M**

AN INCREASE OF $87 PER PERSON SINCE 1995

COST PER PERSON **$281**   **$368**

1995   **2015**

TRANSPORTATION AND
INNOVATION

The future of mobility

The next generation of transportation will rely on technology to create an integrated and seamless transportation system that offers access to multiple transportation modes across various service providers. Anticipating and learning about new trends can help us harness emerging transportation technologies, data and services so we can make the most out of the evolution in transportation.

Transportation built on access, not ownership

Transportation Network Companies (TNCs)

Car shares

Microtransit and commuter circulators

Mobility as a Service (MaaS)

Public transit

Bike shares

Provides a platform that treats transportation as a customizable, on-demand service with "à la carte" mobility, real-time travel information and smart payment systems across modes.

The new face of transit

To ensure equitable access to services, public subsidies will continue to be provided as transit providers look to partner with TNCs and other service options. Wheelchair accessible vehicles will be part of the available fleet of options.

"Public transit" buses will focus on densely populated areas in the urban core and first-ring suburbs. Over time, buses could become autonomous.

Other services, like TNCs or microtransit, will integrate with the overall network and can provide services in less densely populated areas, and at times of the day when public transit is not running.

Data is the new infrastructure

"Person flow" traffic management technology

Technology will be used to make the movement of people and goods safer and more efficient through connected technologies and by upgrading infrastructure.

Connected Transportation Networks

- Integrated traffic management signs
- Traffic control and monitoring
- Data sharing
- Ramp metering
- Traffic incident management
- Electronic tolls and smart pavement systems
- Dedicated and managed lanes
- Pre-clearance for faster border crossings
- Variable speed limits
- Coordinated traffic signals
- Priority traffic signals
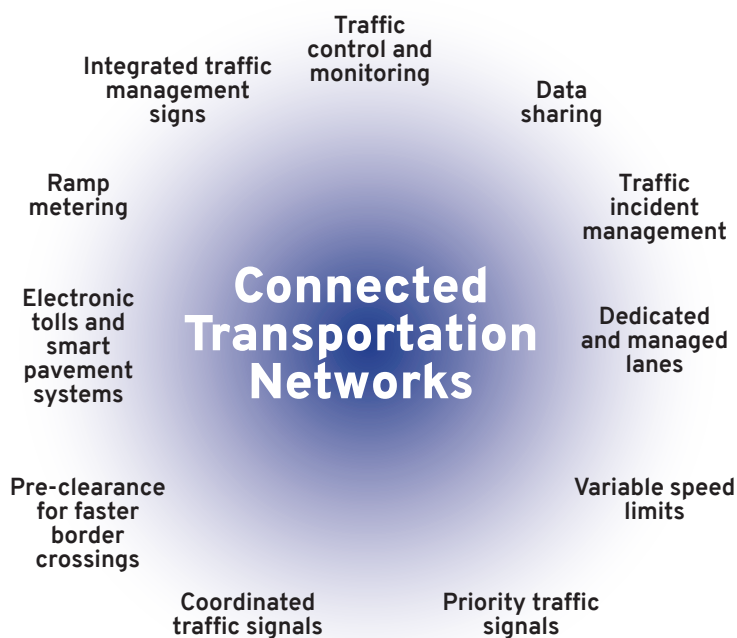
Mobility hubs

Mobility hubs conveniently connect all these services at one location.

Real-time travel information

- Kiosks, trip planners and message signs for real-time navigation
- Wi-fi access for on-demand trip planning on mobile devices

MaaS transportation options

- TNCs
- Bike shares
- Car shares
- Microtransit
- Public transit
- Smart parking

Mobility amenities

- Electric vehicle charging stations
- Bike repair stations
- Proximity to services, shops, restaurants and more

The future of vehicles

As the landscape of transportation services continues to evolve, carmakers are also changing the nature of the automobile by increasing the number of automated features, like parking assist, and moving toward electric, connected and autonomous vehicles, with many aiming to hit the market by 2020. These vehicle types are already evident, to some extent, but as these technologies continue to evolve and become more prevalent, the nature of our transportation system will have to embrace and plan for these changes to make the most of these new vehicle types.

Automobiles of the future that may be owned or shared

Electric Vehicles (EVs)

Vehicles that run on electricity rather than fossil fuels benefit drivers by reducing fuel costs, noise, air pollution and emissions. As these vehicles proliferate, EV charging stations, and even dedicated lanes with electrified road surfaces for vehicle charging will be needed.

Connected Vehicles (CVs)

Most vehicles manufactured today are connected to the internet in ways that help keep drivers safe and comfortable. In the future CVs with vehicle-to-vehicle (V2V) communications will improve the safety and flow of people and goods.

Autonomous Vehicles (AVs)

AVs range from human-driven vehicles with automated safety features like many vehicles on the market today, to fully autonomous vehicles that are completely driverless. AVs include personal cars as well as driverless buses or shuttles, deliverybots and commercial trucks, which may travel together in AV truck platoons. All of these will be connected and most will be electric. Automated vehicles further improve the efficiency and safety of travel by using V2V and vehicle-to-infrastructure (V2I) communications technology.

Anticipating the evolution of autonomous vehicles

NEAR TERM

Autonomous vehicle technologies continue improving, becoming less expensive.

Autonomous vehicles are tested on roadways alongside human-operated motor vehicles.

MID-TERM

Autonomous vehicles, delivery trucks, and possibly deliverybots and drones, are increasingly used to ship products to consumers requiring new regulations and uses of the street and curb space.

Public transit vehicles, cars and commercial trucks become increasingly autonomous, which may require managed and dedicated lanes on highways and other major roads as AVs mix with human-driven vehicles.

LONG TERM

As autonomous vehicles become commonplace, transportation infrastructure continues to adapt—including a reduced need for traffic signals. Land use around streets makes room for pedestrians, bicyclists, and other "active" types of transportation.

Benefits of AVs

Safety (no distracted drivers, no speeding, and vehicles automatically stop for pedestrians and cyclists)

Improved accessibility for non-drivers, seniors, people with disabilities

Reduction in need for parking space as vehicles return home or pick up the next passenger

Reduced needs for parking, along with reductions in the width of road lanes can mean opening up street and sidewalk space for recreation and commercial uses

Concerns with AVs

For more details on the risks and uncertainties of AVs, see the Risk Management section of Chapter 7.

Security (cyberattacks, personal information) and liability

Data management requirements

Regulation (to allow testing AVs before being fully integrating on local roads)

Relationship with public transit

Effects on jobs

Effects on development patterns

Adaptations for people with disabilities

CHAPTER 4

Where we want to be in 2050 | Where we are today | **A framework for moving forward** | Big moves to get us there | Taking action and measuring progress

A FRAMEWORK TO GUIDE DECISIONS MOVING FORWARD

To move us toward our regional vision, we need a framework to guide decisions about transportation policies, strategies, and investments. This policy framework lays out goals for our communities, economy, environment, and innovation. This framework represents a roadmap for reaching our regional vision.

What we want and how we'll get there with Moving Forward 2050

This section of MTP 2050 introduces a framework to guide future decisions about transportation policies, strategies, and investments that will move the region toward its vision. This policy framework lays out goals for our communities, economy, environment, and innovation that we can pursue by carrying out objectives for our transportation system. Along the way, we can track our progress towards these goals, and how well we are carrying out our objectives, by looking at key performance measures. This framework represents a roadmap for reaching our regional vision.

MOVING
FORWARD
2050

What we want in 2050

Our Economy

In 2050, our economy will be globally competitive with shared prosperity that spreads economic opportunities and benefits to all residents in the region.

Our Communities

In 2050, our communities will be brimming with opportunities, providing residents with various lifestyle choices and attracting new, diverse residents, businesses and investments from all over the world.

Our Environment

In 2050, our environment will be ecologically healthy and easily accessible so that all residents and visitors have abundant opportunities to enjoy our region's world class waterways and open spaces.

Innovation

By 2050, we will be making transformative changes to the way we plan, fund and implement the region's transportation investments through harnessing technological advances, making data-driven decisions and utilizing creative and diverse partnerships and funding sources.

What are our goals?

Raise the region's standard of living

Support efficient freight movement

Maximize infrastructure resiliency

Support focused growth in communities (urban, suburban and rural)

Ensure access to opportunities and services

Support healthy and safe communities through targeted transportation investment

Strengthen the fiscal health of local governments

Preserve and protect a healthy environment and accessible open spaces and waterways

Create a fully integrated and seamless transportation environment

TRANSPORTATION

To get there, we will need transportation that connects our region with a variety of convenient options to promote opportunity, health and safety for all. At the same time, the system will bolster a globally competitive economy with shared prosperity by encouraging efficient use of our resources and collaborating to make smart, forward-looking decisions that harness changes in the future.

Our goals, our objectives and how we'll measure progress

MOVING
FORWARD
2050

Our goals

Our Economy

Raise the region's standard of living

Support efficient freight movement

Strengthen the fiscal health of local governments

Our Communities

Support focused growth in urban, rural and suburban communities

Ensure access to opportunities and services

Support healthy and safe communities through targeted transportation investment

Our Environment

Preserve and protect a healthy environment and accessible open spaces and waterways

Maximize infrastructure resiliency

Innovation

Create a fully integrated and seamless transportation environment

Our objectives

Regional performance measures

Our objectives	Regional performance measures
Support REDC target sectors: Advanced Manufacturing, Agriculture, Bi-national Logistics, Energy, Health/Life Sciences, Higher Education, Professional Services, Tourism	INCREASE employment in a REDC target sector
Increase Gross Regional Product	INCREASE Gross Regional Product
Improve connectivity in the Greater Golden Horseshoe	DECREASE border delays for freight and passengers
Reduce freight delays	DECREASE in freight delays in the region
Minimize local governments' infrastructure costs and maximize benefits from infrastructure investments	INCREASE in return-on-investment (ROI) of local governments*
Maximize investments in community centers	INCREASE concentration of investment where we already have infrastructure*
	INCREASE in job growth around our main streets, downtowns and former industrial sites*
Increase multi-modal access to neighborhood services	INCREASE in share of commuting trips taken via alternative transportation modes
Improve equitable access to education and employment centers	DECREASE in commuting time (by different modes, and compare communities of concern vs. rest of population)
Increase active transportation options	INCREASE in dedicated bike paths, shared bike lanes and multi-use/ recreational trails*
Improve transportation system safety for pedestrians, cyclists, vehicle drivers	DECREASE in number of reported motor vehicle crashes with pedestrians, cyclists or motorists
Reduce negative impacts of local transportation on region's air quality and GHG emissions	DECREASE vehicle miles traveled (VMT) per capita*
Increase diversity and sustainability of energy supply system for transportation uses	INCREASE in number of EV charging stations in region
Maximize region's watershed quality	DECREASE the area of impervious surfaces
Improve public access to parks, greenways, and waterfronts	INCREASE in share of residents with access to public parks and recreation areas (by different modes, and compare communities of concern vs. rest of population)*
Reduce transportation infrastructure land use	DECREASE the number of lane miles with underutilized, excess road capacity in the region
Improve the ability of infrastructure to respond to weather and other extreme events	INCREASE the number of lane miles that utilize resilient paving materials
Fully build out a system of connected corridors throughout the region	INCREASE lane miles of connected corridors
Establish a Smart Ecosystem of data acquisition and management for transportation efficiency	INCREASE the acquisition and availability of data
Create a robust Mobility Marketplace that assures mobility on demand and integrates delivery technology	INCREASE options for on-demand mobility with integrated technology
Create and deploy new models of transportation finance and project delivery	INCREASE the use of new models of finance
	INCREASE the use of new models of implementation and project delivery

ONE REGION FORWARD

Performance measures from One Region Forward, A New Way to Plan for Buffalo Niagara

A FRAMEWORK TO
GUIDE DECISIONS

Different places, different needs

Our region is made up of many communities, each with its own distinct character and transportation needs. Planning for the future of our regional transportation system forces us to think about the different types of places that make up our region and what transportation can do to bolster their future. There are no clear lines between these places, but across our region there are clear differences in the way the land is used that make some transportation alternatives more viable than others in different areas. As transportation options continue to change in the future, they will need to be applied differently in different types of communities to improve quality of life across the region, while maintaining the unique character of every community.

LARGE URBAN
SMALLER CITIES
FIRST-RING SUBURBAN
SUBURBAN
RURAL
● **Village Centers**
▨ **Sovereign Territories**
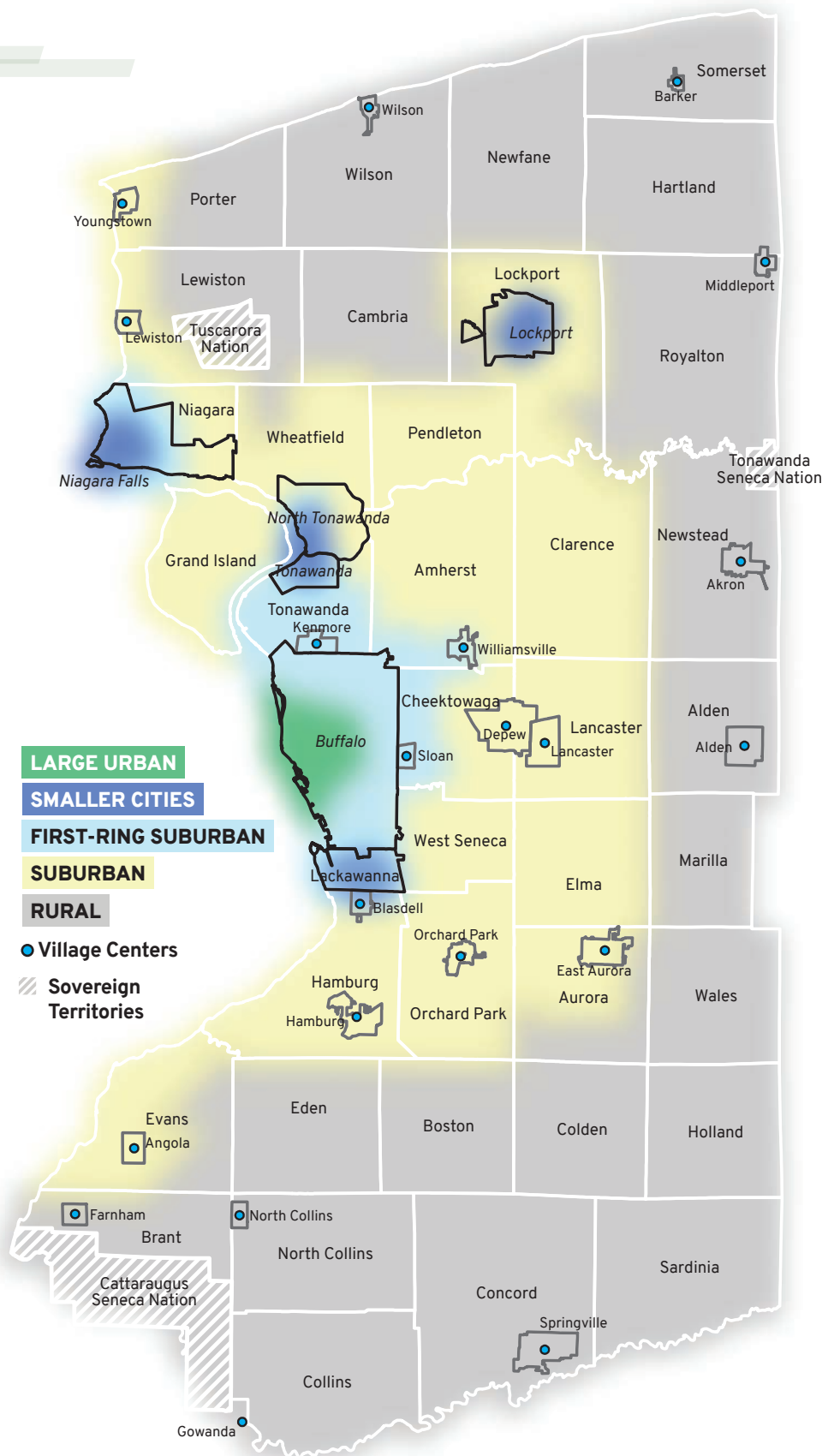
LARGE URBAN

These places have the largest concentrations of jobs and people in the region. Here, many individuals can easily get to work, home and fulfill most daily needs by walking or biking. These places support frequent public transit service thereby providing flexibility via access to multiple modes of transportation. Accommodating high traffic volumes is a primary concern here. Multi-modal access to jobs and other opportunities outside of large urban areas remains a challenge.

SMALLER CITIES

A few smaller cities, like Niagara Falls, Lockport and the Tonawandas, are key centers of the region. While many neighborhoods in smaller cities are somewhat walkable, individuals in these places often require cars to get to daily needs. Beyond main streets and other major corridors, public transit service is often not financially feasible in these cities. Access to services, shopping and other amenities within these smaller cities is limited. Transportation investments present a way to revitalize these places.

FIRST-RING SUBURBAN

Older suburbs were built to accommodate automobiles, but other transportation options do exist. Since these communities are relatively densely populated, with homes close to jobs and services, transit service can be feasible in most places. First-ring suburbs have commercial strips that are inconvenient for pedestrians, as well as village centers suitable for walking, biking and taking transit. The increasing suburbanization of poverty means these areas have a growing transit-dependent population.

SUBURBAN

These areas are more spread out than older suburbs. Walking and biking for daily travel is not feasible in most places. However, there are some strong village centers where people can take local trips without needing a car, but are difficult to connect to frequent transit service. Major commercial strips concentrate services, but walking and biking along these corridors is unsafe. Suburban residents lack multi-modal options to jobs, healthcare and other services located closer to the urban core.

RURAL

With large distances between homes, businesses and other destinations, a car is needed for most rural travel. Access to jobs, education and healthcare remains a challenge for rural residents—including seniors aging in place and people with disabilities. Farming activity adds to transportation demands in rural areas. Providing access to recreational trails and environmental assets can promote tourism and physical activity.

CHAPTER 5

Where we
want to be in
2050

Where we
are today

A framework
for moving
forward

Big moves to
get us there

Taking action
and measuring
progress

STRATEGIES TO MOVE US FORWARD

Our 2050 transportation system represents a new way of getting around. This new network aims to concentrate growth and investment, increase revenues to local governments and residents, promote a healthy environment, and improve quality of life by providing better access to jobs, education and services. To accomplish these goals, we need a new way of planning our transportation system. While we continue making the improvements and repairs needed to maintain our current system, we also need to make bigger, bolder moves to achieve our vision. Though the strategies presented here will continually need to be reassessed and refined as we move forward, they lay the groundwork for a new approach to transportation in Buffalo Niagara, one that harnesses technology and innovation to strengthen our economy, our communities and our environment.

STRATEGIES TO MOVE US FORWARD

NEW MOBILITY & TRANSIT

A fully connected region with more options and opportunities

New mobility is the next generation of transportation. It will offer shared, electric, and autonomous travel options, and relies on technology and data to create an integrated and seamless transportation system. New mobility will give residents across the region access to multiple transportation modes with various service providers.

New mobility and transit opportunities for the Buffalo Niagara region will mature across the thirty-year timespan of this plan. In this time, technology will significantly transform our current system of human-driven private automobiles, public transit, and the network of social service and volunteer-provided transportation options. Emerging needs in the region may be better served in a more sustainable manner by an integrated network of service options. These would provide more choices for travelers, as well as greater coverage and frequency for those who cannot or choose not to use a personally owned vehicle. Transportation in the region will be significantly affected by the adoption of electric vehicles, autonomous vehicles, other technologies and emerging transportation services. Some of these shifts will happen sooner than others and we will have to think ahead to make the most of these changes.

To start, traditional public transportation service providers will continue to focus on the most widely used corridors, while new technologies and services will be integrated to enhance the efficiency and accessibility of transit. This continued focus on service upgrades in specific corridors will induce development while improving access to jobs and homes by promoting alternative travel modes.
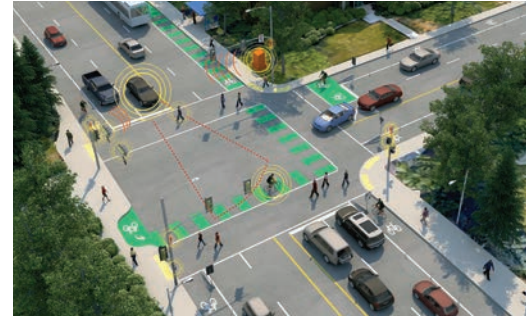
In the longer term, personal automobile ownership will likely decrease as more people use ride-sharing and other services. Land use and development patterns may also be affected due to a reduced demand for parking and greater concentration of services around transportation hubs and corridors.

We will need to ensure that new mobility is accessible to all residents, and that we utilize technology to enhance equity, safety and sustainability.

TODAY'S TRANSPORTATION SYSTEM

Our current transportation system has many components that are not integrated in a cohesive way. This makes us largely dependent on personal automobiles.

Human-driven private automobiles

Public buses and trains

Network of social service and volunteer-provided transportation options

Bike and pedestrian network

TOMORROW'S TRANSPORTATION SYSTEM

New mobility uses new technologies and emerging transportation services to create an integrated network that connects multiple modes of travel. This way we do not have to rely on any one mode of travel.

New Technologies ✚
Emerging Transportation Services

Electric Vehicles

Transportation Network Companies

Autonomous Vehicles

Data Management Services

NEW MOBILITY

Drone Delivery

Car Sharing

Community Mobility Hubs

Bike Sharing

STRATEGIES TO MOVE US FORWARD   **OUR REGIONAL HIGHWAY SYSTEM**
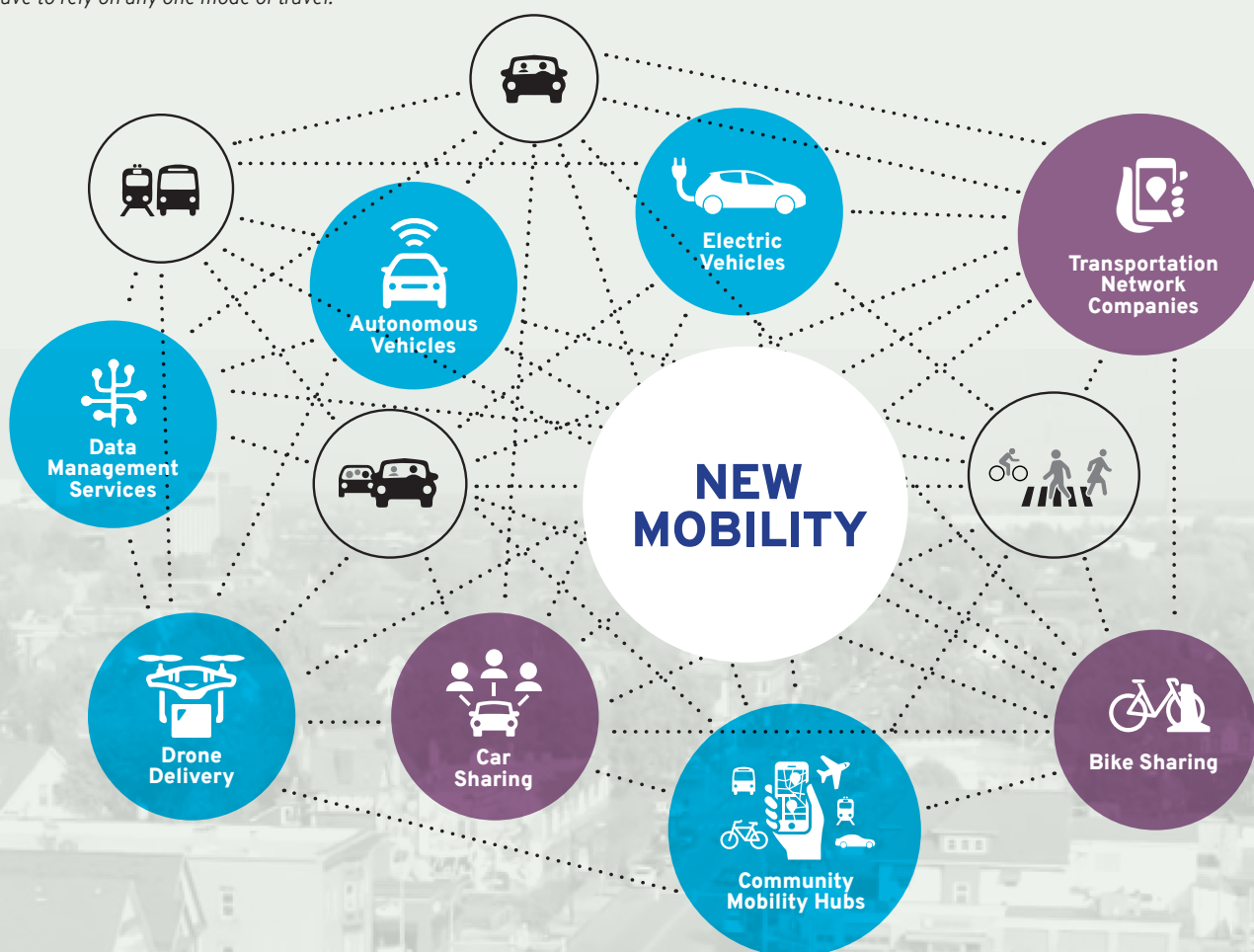
Enhancing our highway system with

Next Generation Freeways

Commuter Expressways

Connections to Other Regions

Our regional highway system is made up of **Next Generation Freeways**, **Commuter Expressways**, and **Connections to Other Regions**. Together, these work to distribute traffic around and into the metro area, accommodate interregional traffic—especially trucks— and experience congestion at rush hour times in certain locations.

Across this entire system, a number of technology advances will help improve the flow of people and goods, improve safety, reduce emissions, and support the region's economy.

Where to Implement this Strategy

The interstates that extend beyond the region, the freeways that circle the City of Buffalo and first-ring suburbs, and the expressways that connect outlying and rural areas make up our regional highway system.

Our Regional Highway System:

Next Generation Freeways

Commuter Expressways

Connections to Other Regions

WAYS TO GET THERE

Vehicle-to-vehicle (V2V) communications

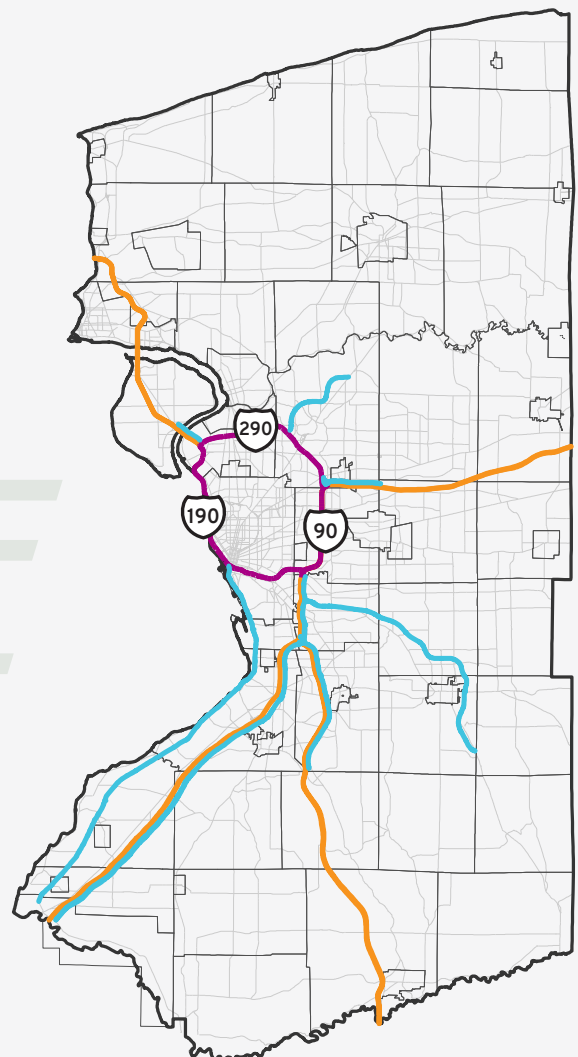V2V communications allow "connected" vehicles to alert each other about re-routing, real-time traffic monitoring, and hazard detection (for example, "icy road ahead" warnings), making travel more safe and efficient.
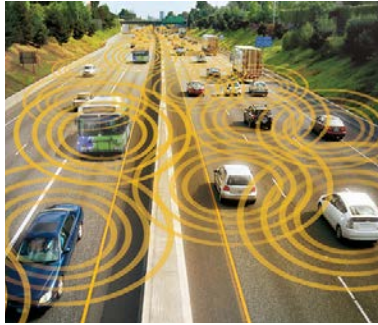
Vehicle-to-infrastructure (V2I) communications

V2I communications technology enables traffic management operators to detect incidents, measure speeds, advise travelers and divert traffic when necessary. It also helps provide data for transportation planning.
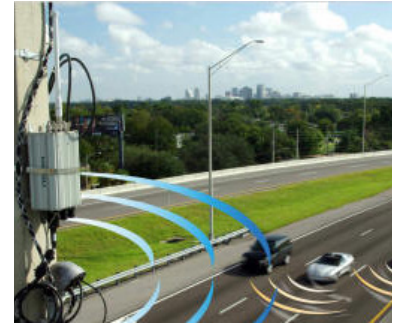
Electronic signage

Electronic signs inform motorists (especially those not in connected vehicles) of traffic conditions in real-time, including re-routing information.

Variable speeds

Signs display variable speed limits adjusted based on traffic and weather conditions to improve traffic flow and safety.

Alternative fueling

Charging stations for electric and/or other alternative fueled-vehicles, and potentially electrified road surfaces to charge electric vehicles as they drive in a dedicated lane.

Electronic tolling

Sensors at tolls read electronic tags in vehicles to charge for freeway usage—like an expanded EZpass plan.

Sustainable and innovative road materials

Sustainable construction materials help limit stormwater runoff, and reduce maintenance costs. Innovative road surfaces, paints and lane-marking solutions can help efficiently and cost-effectively manage traffic.

AV lane

Separate autonomous vehicle (AV) lanes support efficient and safe movement of AVs, especially during the early stages of integration. These lanes could accommodate AV truck "platoons" shipping freight into, from and through the region.
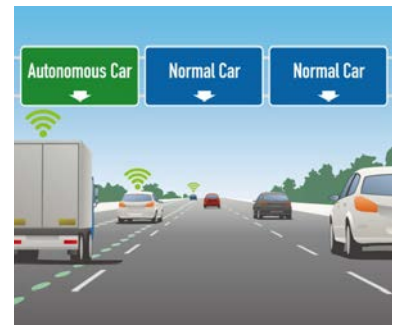
STRATEGIES TO MOVE US FORWARD

Modernizing major highways to build a Next Generation Freeway System
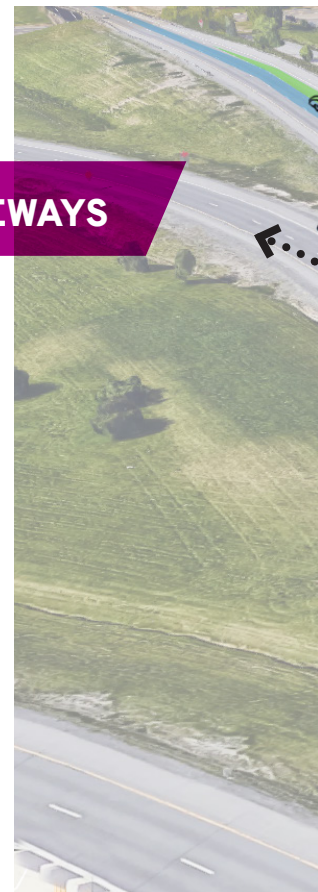
The "ring" of freeways around the City of Buffalo and first-ring suburbs are the most heavily used roadways in the region. These sections of highway are critical to regional economic growth and important for all communities across the region. They serve as a key regional travel link that enables quick drive times between Buffalo and nearby suburbs and from rural communities to major employment centers.

To manage congestion, improve safety and get the most out of our existing infrastructure, technology and innovative transportation management strategies will be integrated on this ring of freeways. These upgrades will transform these freeways into a Next Generation Freeway System with integrated traffic management systems to make travel on this critical ring of highways, and throughout our region, safe, timely and efficient well into the future.

Where to Implement this Strategy

The traditional "ring" of freeways circling the City of Buffalo and the first-ring suburbs make up the Next Generation Freeway System. This "ring" developed over time and today includes the free section of the I-90 from its Interchange with I-290 to its Interchange with I-190, then the I-190 North to the Grand Island Bridge and the I-290.
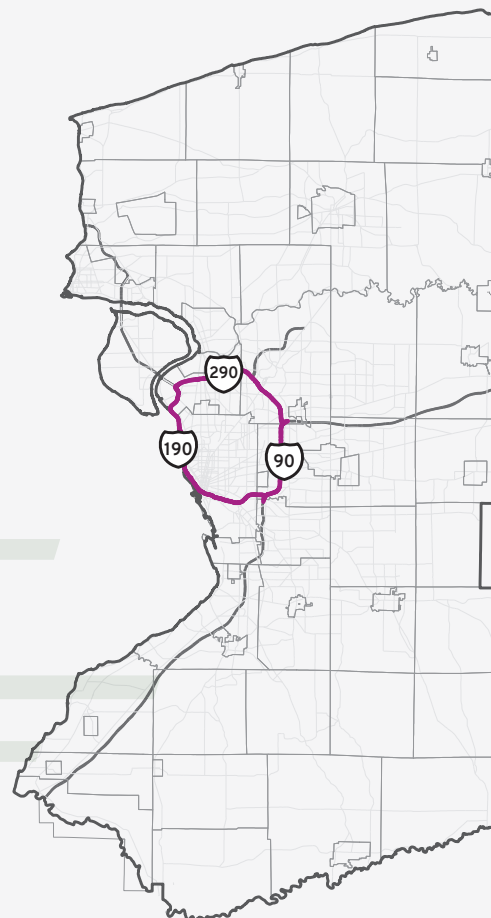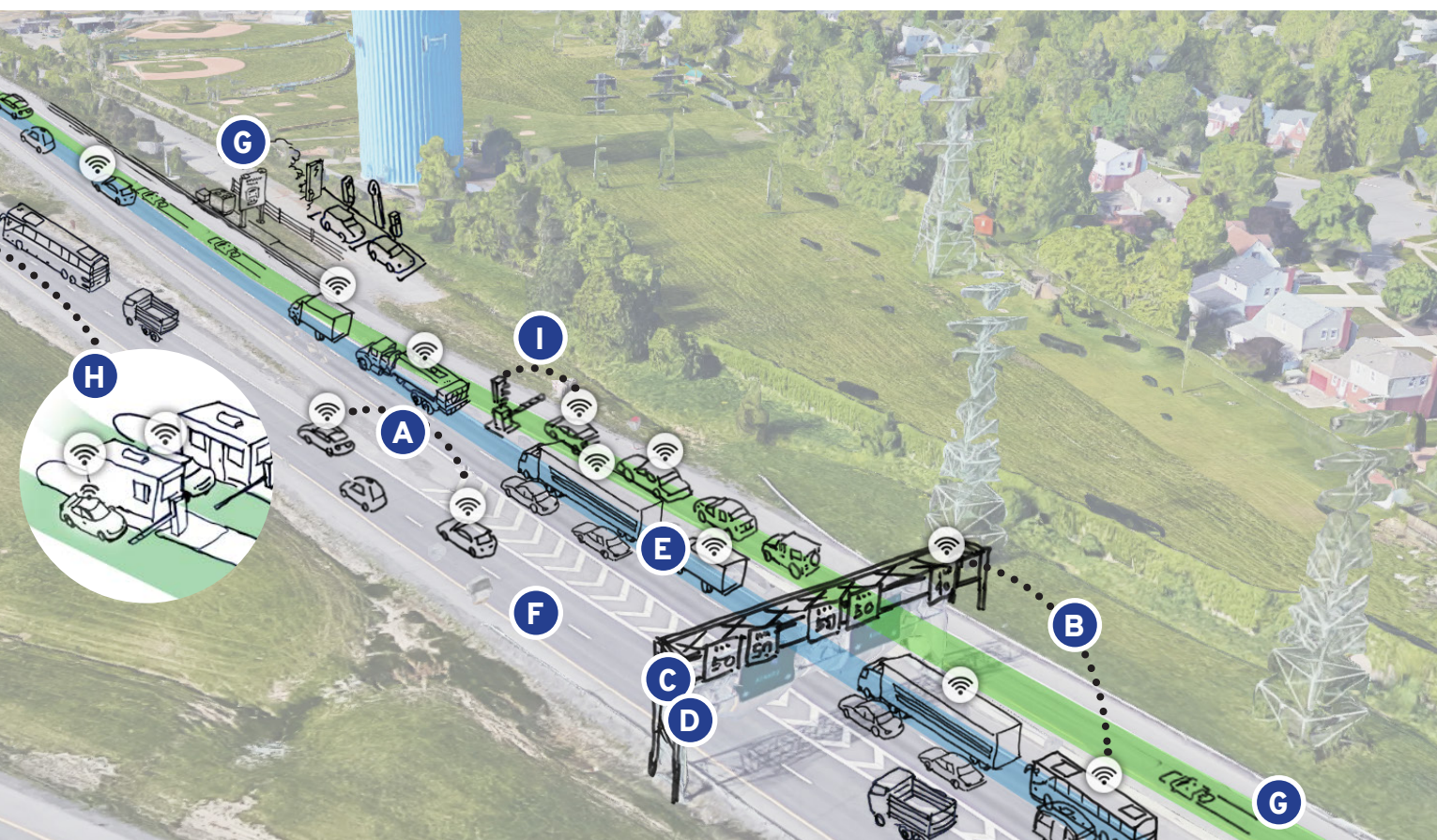
WAYS TO GET THERE

A Vehicle-to-vehicle (V2V) communications

B Vehicle-to-infrastructure (V2I) communications

C Electronic signage

D Variable speeds

E Autonomous vehicle (AV) lane

F Sustainable materials

G Alternative fueling (charging stations and lanes)

H Electronic tolling

I Ramp metering

Ramp meters control the frequency of cars entering the ring system of Next Generation Freeways from Commuter Expressways and major arterials. This helps balance the flow of traffic onto the freeway and into the entire system.
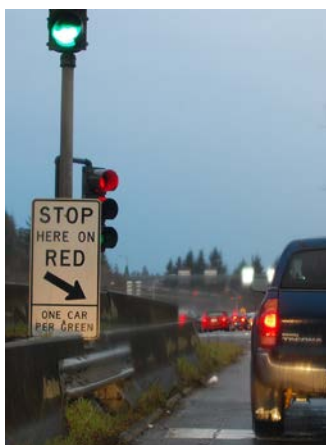
STRATEGIES TO MOVE US FORWARD

OUR REGIONAL HIGHWAY SYSTEM

COMMUTER EXPRESSWAYS

Improving commutes by integrating technology on local expressways
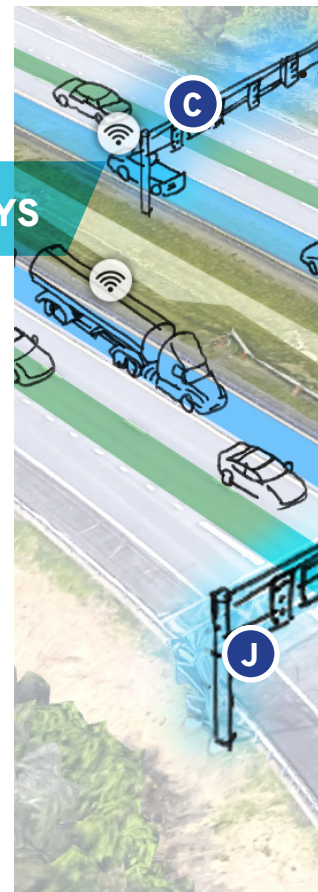
The commuter expressways work in concert with the Next Generation Freeway System and contribute to a significant portion of the daily traffic in the region. These secondary sections of freeways connect residents and workers in suburban and rural areas with major employment centers and other regional destinations in the urban core.

In the future, advanced highway technologies will be introduced to enhance these connections. When fully implemented, commuter expressways will improve residents' commutes throughout the region, especially during peak travel times.

Where to Implement this Strategy

The major sections of interstates and freeways that tie into the inner "ring" of the Next Generation Freeway system make up the commuter expressways in our region. These roadways—the I-990, Route 219, Route 400, and sections of the I-90 and I-190—carry thousands of commuters everyday and serve as critical links for suburban and rural communities.
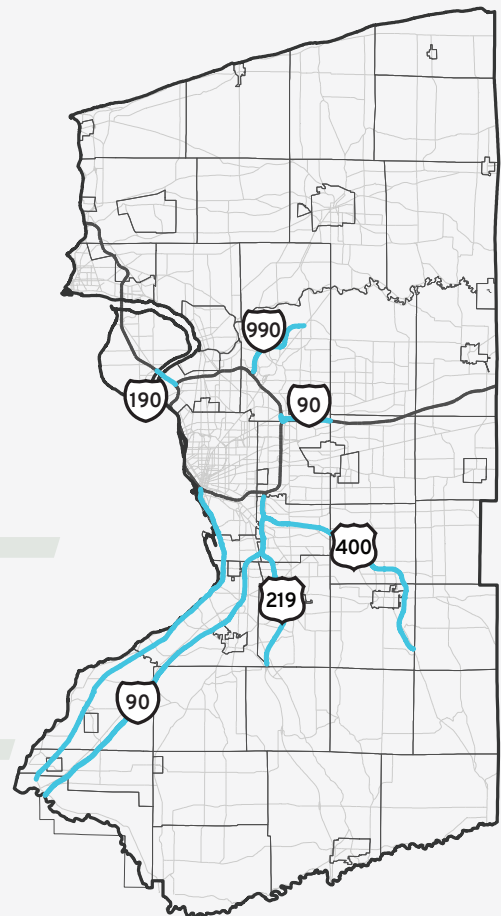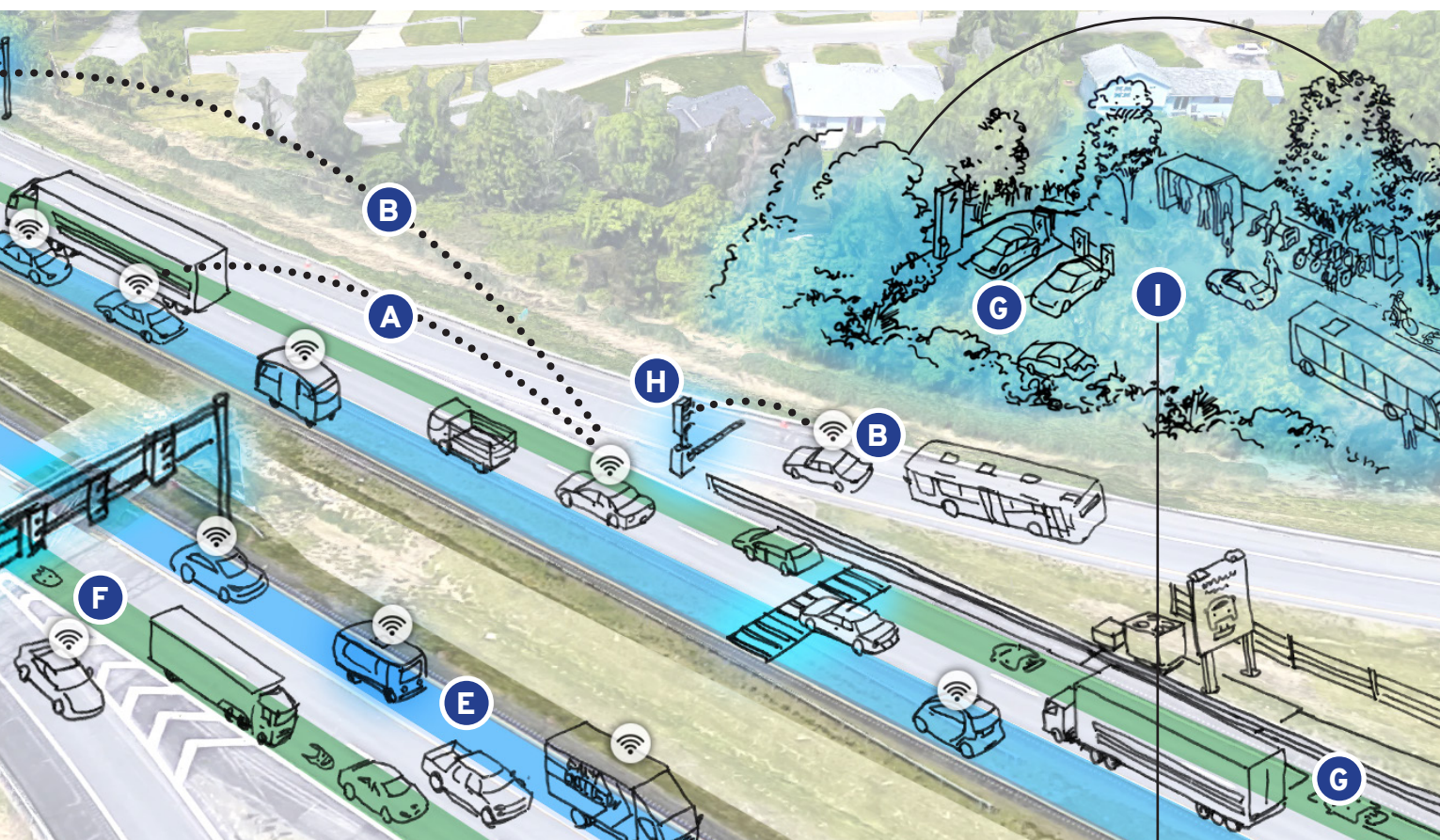
WAYS TO GET THERE

A   Vehicle-to-vehicle (V2V) communications

B   Vehicle-to-infrastructure (V2I) communications

C   Electronic signage

D   Variable speeds

E   Autonomous vehicle (AV) lane

F   Sustainable materials

G   Alternative fueling (charging stations and lanes)

H   Ramp metering

I   **Mobility Hub**

Mobility hubs located near commuter expressways offer connections to and from transit buses and transportation network companies (TNCs), as well as carshare, bikeshare, EV charging, and real-time travel information.

Transportation network companies

Bike shares

EV charging stations

Information kiosk

Wi-Fi

Car shares

J   **Electronic Tolling**

Installing electronic payment systems at tolls limits delays and improves commutes.

STRATEGIES TO MOVE US FORWARD

OUR REGIONAL HIGHWAY SYSTEM

CONNECTIONS TO OTHER REGIONS

Harnessing technology to improve our connections to other regions

As a major metropolitan area, the Buffalo Niagara region has many roadway connections to communities and destinations outside our region. The interstates, highways and major international bridges that connect people and freight to places beyond are critical to our regional economy. These roadways are also important for intercity bus service providers which provide affordable and efficient transportation options for residents and visitors traveling from our region to places beyond

These key regional connectors support longer trips and more trucks than other highways. Although currently well developed and functional, these external connections must be adequately maintained and modernized. Technology aspects need to be upgraded to ensure efficient travel and keep the region competitive, particularly as an international border crossing for people and goods.

Where to Implement this Strategy

There are many ways to get to and from our region, but most of the traffic flows over these critical highways. The I-90 connects us with economies across Upstate New York and throughout the rest of the country going west. Route 219 is the fastest link between Pittsburgh and Buffalo, and also connects us with the Southern Tier of New York State. The I-190, with the terminus at the Queenston-Lewiston Bridge, the Peace Bridge and Rainbow Bridge are key links between our region, the U.S., and into Canada.
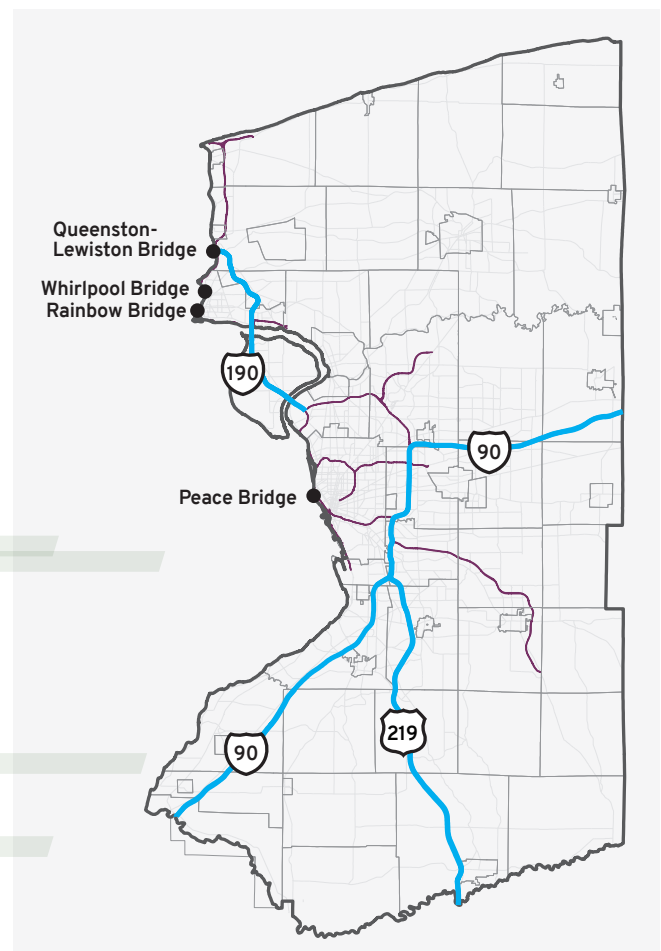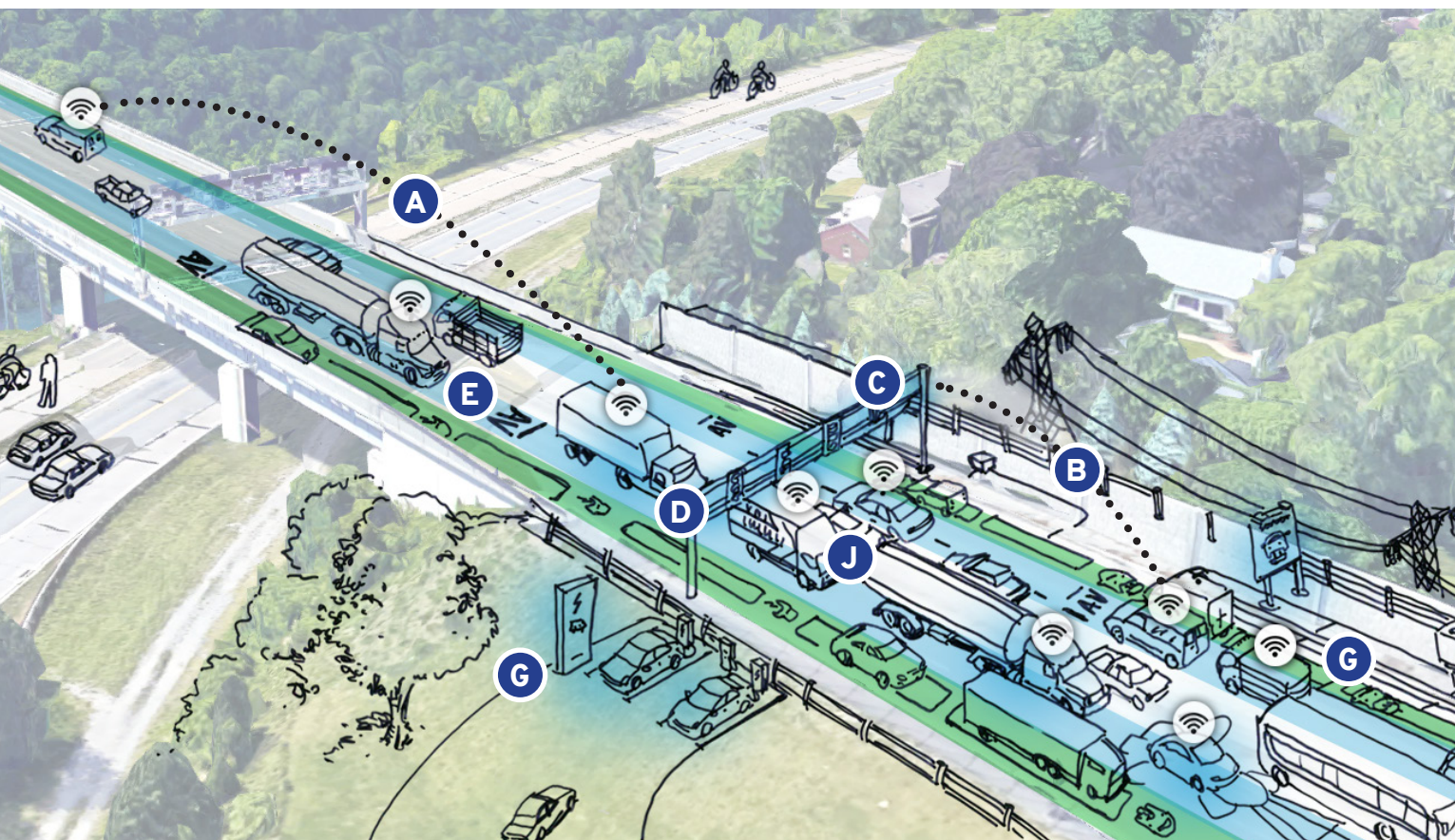
WAYS TO GET THERE

A Vehicle-to-vehicle (V2V) communications

B Vehicle-to-infrastructure (V2I) communications

C Electronic signage

D Variable speeds

E Autonomous vehicle (AV) lane

F Sustainable materials

G Alternative fueling (charging stations and lanes)

H Electronic tolling

I **Seamless bridge crossings**

Allow most passenger and freight vehicles to be pre-cleared to cross, minimizing border delays and congestion. Low-risk cross-border travelers and freight shippers enroll in pre-clearance programs in order to expedite the customs process and limit border delays—like an expanded NEXUS plan.

J **AV lane with Truck Platoons**

AV lanes could accommodate closely-spaced together AV truck "platoons" that ship freight into, from and through the region. These may initially run during off-peak hours and would travel in a dedicated lane alongside passenger vehicles.

STRATEGIES TO MOVE US FORWARD ▌ **SMARTLY ENHANCED MULTI-MODAL ARTERIALS**
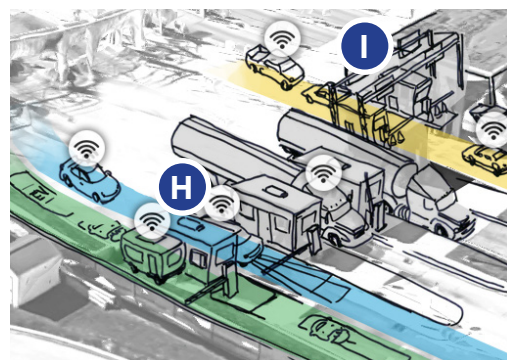
Transforming key corridors into Smartly Enhanced Multi-modal Arterials

Many major corridors in large urban areas of our region were originally built to carry more traffic than they currently do. Today, many people still use these streets to drive, walk, bike or take transit, but they often lack the basic elements that make alternative travel modes safe and efficient.

Moving forward, new technologies, upgraded street features and emerging transportation services will be incorporated along these corridors to create Smartly Enhance Multi-modal Arterials (SEMAs) that offer a range of convenient transportation options. Select radial roads, along with east-west and north-south corridors, will be maintained and modernized as SEMAS. These corridors will work with the Next Generation Freeways to accommodate rush hour traffic using coordinated and priority signals.

SEMAs are designed and actively managed to efficiently utilize the full capacity of key corridors for the safe movement of people and goods. SEMAs represent the convergence of modern street design standards, connected vehicle technologies, and multi-modal mobility services. Making these improvements and repurposing underused roadway space for pedestrians, bicycles and transit, where feasible, will optimize travel along these corridors.

SEMAs will make transportation throughout the region more safe and efficient while reactivating corridors with infrastructure improvements that promote reinvestment with spin-off benefits for nearby communities and the regional economy.

Mobility Hub

Mobility hubs strategically located along SEMAs connect travelers to a range of transportation options for safe and efficient multi-modal trips.

Transit stops
For ride-sharing, circulators or buses.

Bike shares
To easily link bicycles into multi-modal trips for first- and last-mile connections.

EV charging stations
Grouped together at parking spaces near mobility hubs to support longer trips for electric vehicles.

Information kiosk
With real-time information on traffic and transit conditions, the availability of shared bikes, cars, and electric charging stations, as well as price and travel time by different modes.

Wi-Fi
So people and vehicles can quickly use the Internet to access service maps, trip planners and connect with other transportation services.

Car shares
Shared vehicles can be used to complete trips, limiting the need to own personal vehicles.
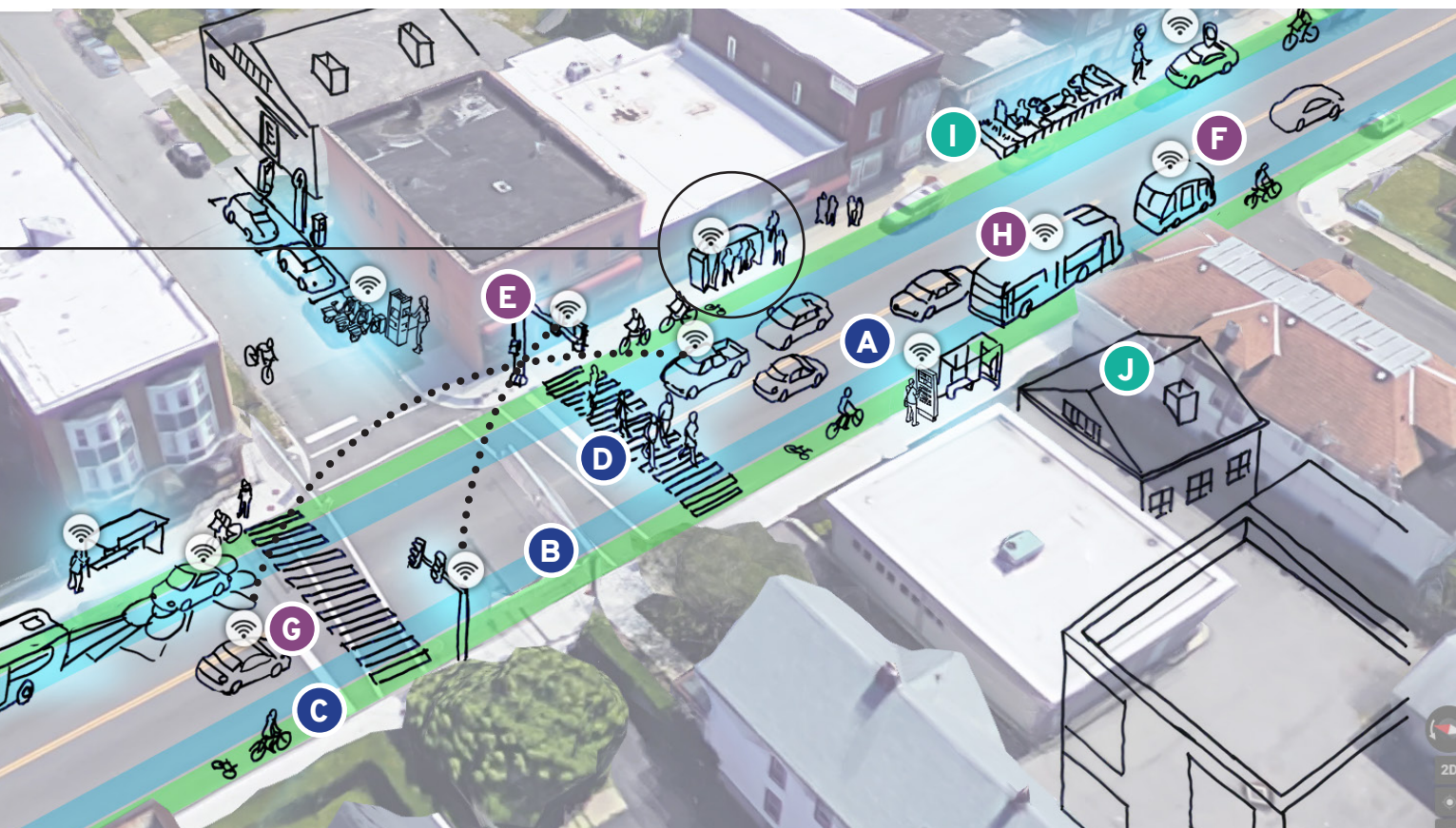
WAYS TO GET THERE

Sharing the street

Using the street right-of-way for more than just automobile traffic allows for safe and convenient travel via other modes—like walking, bicycling and transit.

A   **Travel lanes for vehicles**

B   **Dedicated bus/transit lanes**

C   **Bike lanes**

D   **Safe pedestrian environment, with wide sidewalks, frequent crosswalks and pedestrian activated signals**

Improving the flow of people and goods

E   **Coordinated and priority traffic signals**

Traffic signals coordinated across jurisdictions using real-time traffic information will limit stop-and-go traffic, and give priority to buses and other mass transit vehicles.

F   **Microtransit**

Microtransit, or a shared vehicles to transport multiple commuters in one vehicle, limiting the number of cars on the road. Rerouting school buses to other roadways would also improve traffic flow on SEMAs.

G   **Connected vehicles**

Technology will enable vehicles to share information on roadway hazards, traffic signal timing, and alternative routes, and could direct vehicles to available parking spaces, variably priced based on demand.

H   **Autonomous vehicles**

AVs, including public buses and other commuter vehicles, improve efficiency and safety with technology to avoid congestion and prevent crashes.

Reactivating the street

I   **Flexible curb space**

Curbs are used differently at different times of the day. For instance, AVs could drop off and pick up passengers during AM and PM peak travel hours; AV and drone deliveries could be made overnight; and events can be held throughout the year (See page 76).

J   **New development along the street**

Existing buildings can be reused and new buildings can be constructed along the street to add commercial space and housing and revitalize these corridors. Benches, street art and other amenities can also be incorporated to bring life back to these corridors. Green infrastructure, like sustainable pavement materials, trees and plants, and drainage improvements, can help reduce runoff into the region's waterways.

STRATEGIES TO MOVE US FORWARD

SECONDARY CORRIDORS

Revitalizing car-dependent corridors with new mobility upgrades

Secondary corridors serve to connect important centers. They were originally designed for slow moving traffic and to cover shorter distances, but have expanded over time to become vital commercial corridors that link between major roadways to local streets.

The challenges of aging housing, underused commercial sites, and deteriorating infrastructure which face parts of our cities in Buffalo Niagara have also become a growing issue for first-ring suburbs in the region. Secondary corridors in these communities that once served to connect local areas and link to larger, main arterial roads have widened over time, becoming automobile centric and presenting safety concerns for pedestrians. Over the horizon of the plan, rethinking the infrastructure along these secondary corridors will make these communities more walkable, livable and attractive for reinvestment.

Flexible curb space

Curbs can serve different purposes at different times. For instance, AVs could drop off and pick up passengers during AM and PM peak travel hours; AV and drone deliveries could be made overnight; and events could potentially be hosted on specific days of the year.

Delivering goods

During overnight and early morning hours, deliveries could be made to stores, restaurants, or directly to consumers, by trucks, AVs, delivery robots, or drones

Moving passengers

During morning and evening weekday commute times, curbs could be dedicated to picking up and dropping off commuters riding public transit, AVs or shared vehicles.

Pedestrian activity

On certain days or times, curb space could be used as parks, to host farmers markets, or for pop-up street vendors for events.
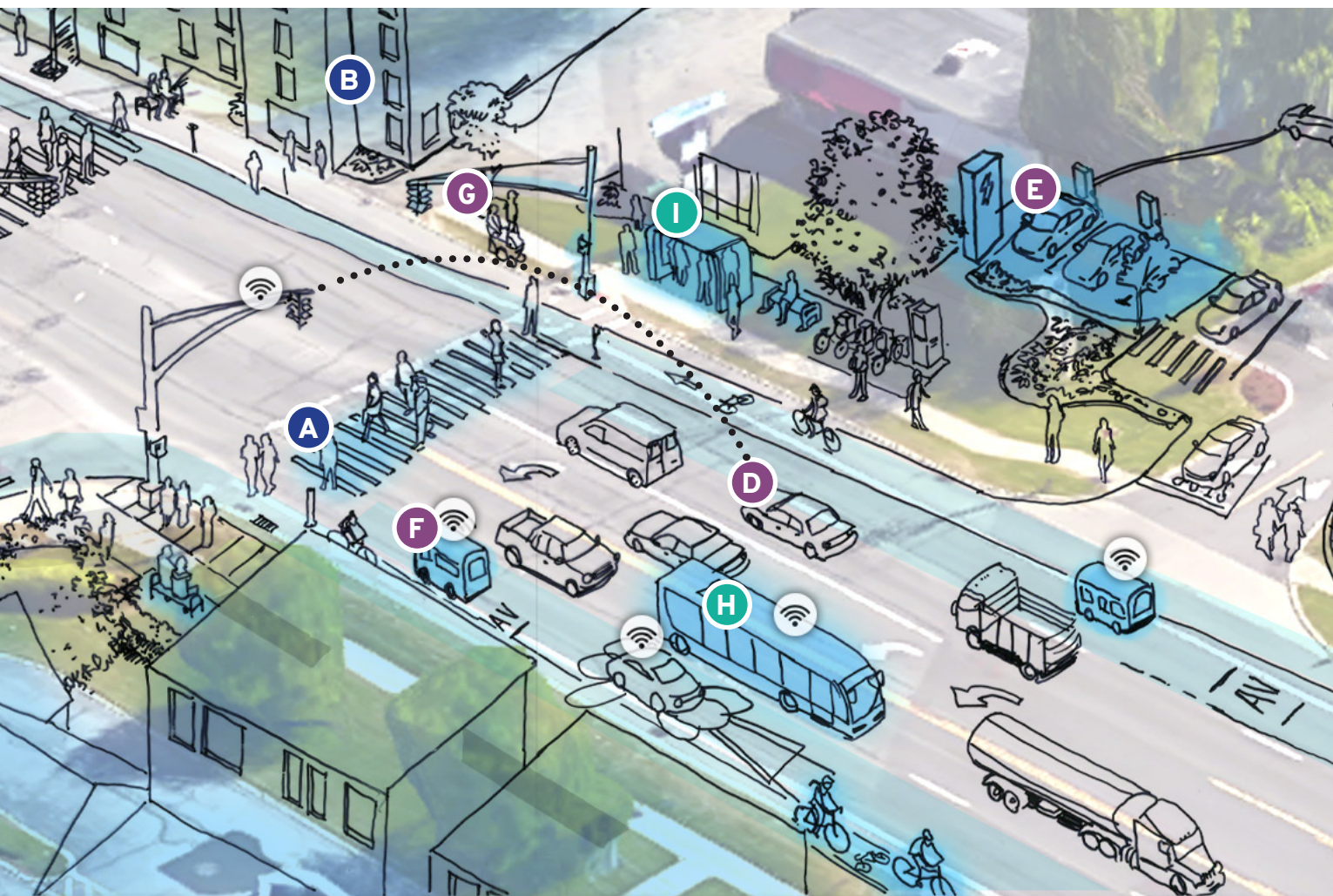
WAYS TO GET THERE

Improving Walkability

A **Pedestrian focused safety improvements**

Crosswalks, bike lanes, and pedestrian-activated traffic signals make streets safe for walking and bicycling.

B **Concentrated development**

Focused investment and concentrated development at targeted nodes to make the street vibrant.

C **Flexible curb space**

Flexible use of the street and curb space to accommodate different uses throughout the day, like TNC or AV drop-off, deliveries, markets or festivals.

Integrating Technology

D **Vehicle-to-infrastructure (V2I) communications**

Coordinated signals help make vehicle traffic smooth and efficient.

E **Vehicle charging stations**

Charging stations for electric vehicles.

F **AV shuttles and dedicated lanes**

AV shuttles and autonomous TNC vehicles supplement traditional fixed route transit service in dedicated lanes.

G **Coordinated traffic signals**

Traffic signals coordinated across jurisdictions with real-time traffic information to make vehicle traffic smooth and efficient.

Enhancing Mobility

H **Optimized bus routes**

Optimizing fixed route bus service with support from TNC operators and autonomous vehicles

I **Mobility hubs**

Mobility hubs provide access to transit, TNCs, bike routes and bike and car sharing.

Improving our smaller cities

Lackawanna, Lockport, Niagara Falls and the Tonawandas

Our region's smaller cities of Lackawanna, Lockport, Niagara Falls, and the Cities of Tonawanda and North Tonawanda have strong neighborhoods and downtown centers, are home to a variety of important industries, have rich histories, and their proximity to the region's waterways makes them a draw for tourists and local residents. Like many older cities, they face aging infrastructure, are overbuilt for today's needs, and suffer from economic decline. Moving Forward 2050 aims to support the revitalization of these small cities through a number of transportation investments:

• Continue to implement complete streets in downtowns and neighborhoods, with walkable neighborhoods and downtown centers, bike lanes and other cycling amenities, green infrastructure, pedestrian and cyclist connections to waterways, and smart parking management (See page 81).

• Support Transportation Network Companies (TNCs)—and eventually autonomous circulators—to improve connectivity from neighborhoods to services and shopping areas, as well as connections among the smaller cities (See page 81).
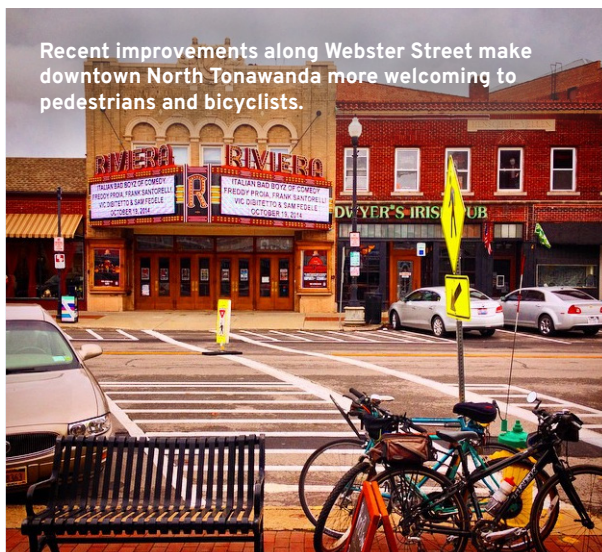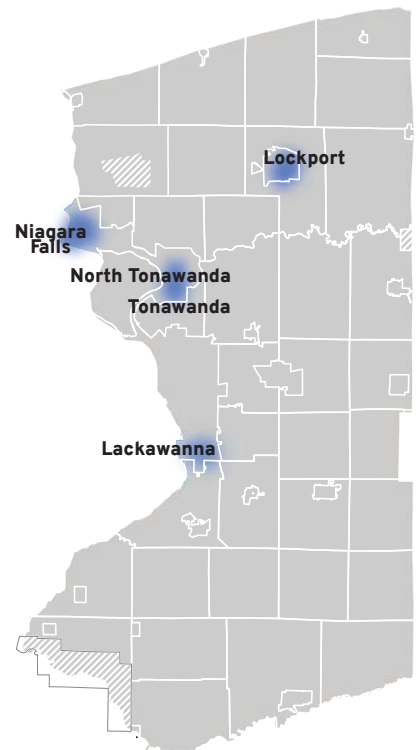
Recent improvements along Webster Street make downtown North Tonawanda more welcoming to pedestrians and bicyclists.

"Pop-up" project along Parker Blvd in Tonawanda to demonstrate the addition of bicycle infrastructure on local streets.

Crosswalks near schools made safer after being painted by elementary school students in the City of Niagara Falls.

Upgrading our rural roadways

Transportation plays a crucial role in the sustainable development of the region's rural communities, including sovereign territories. Many rural areas are faced with mobility challenges due to a lack of transportation options. Access to healthcare and social services, employment and educational opportunities, as well as basic daily needs, is critical to enhancing the economic development, health, and quality of life in rural communities.

Providing access to recreational trails and environmental assets can enhance the quality of life for rural residents while also promoting tourism in rural communities. From ecotourism and wine trails, to agritourism and seasonal events, tourism can be a viable economic component in rural community development.

In addition to access, safety is another significant concern in rural areas. Most rural roadways are not constructed to safely accommodate the weight and width of larger farming equipment that is increasingly used on rural roadways to carry out commercial agricultural operations.

Over the next thirty years, the integration of new technology, improved access to emerging mobility services and funding for rural roadway maintenance and upgrades will improve road safety, the condition of bridges and culverts, and allow for enhanced access to multiple transportation options and services in rural communities. These and other upgrades to rural roadways will promote key sectors of the rural economy.

Supporting rural communities by upgrading rural roadways

Rural roadways will be enhanced to accommodate the unique needs of rural communities, like commercial farming, tourism and environmental preservation.

*Incorporate **new construction materials and design of culverts** to minimize infrastructure deterioration and negative impacts on the local habitat and wildlife.*

*Transportation investments that **enhance connections to tourist assets in rural areas**, like the Niagara Wine Trail, can be a key component to economic development in the region's rural communities.*

*Transportation investments that **enhance connections to tourist assets in rural areas**, like the Niagara Wine Trail, can be a key component to economic development in the region's rural communities.*

STRATEGIES TO MOVE US FORWARD ❘ **VILLAGE CENTERS**

Maximizing access and mobility in village centers

While our region's village centers range in size, they all share a desire to be the focal point for local residents, businesses and other services, and to remain safe, walkable and easily accessible. Moving Forward 2050 will help support the region's villages through a variety of transportation initiatives:

- Where appropriate, retrofit and redesign State and county roads that run through villages to become safer, more walkable, and comfortable for biking
- Sidewalk plans and improved pedestrian street crossings
- Bike lanes and amenities where appropriate
- Parking management with smart parking, signage, and striping
- Local circulators (eventually including autonomous vehicles) with regular service or for special events
- Smaller mobility hubs in key locations that link together multiple transportation options

An autonomous circulator being piloted in other communities across the nation.

Main Street in the Village of Springville.
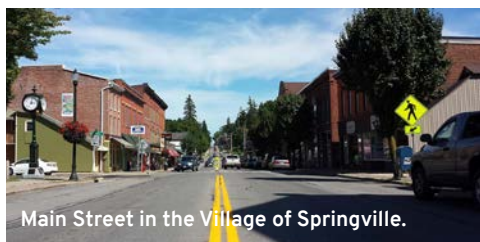
Main Street in the Village of East Aurora.
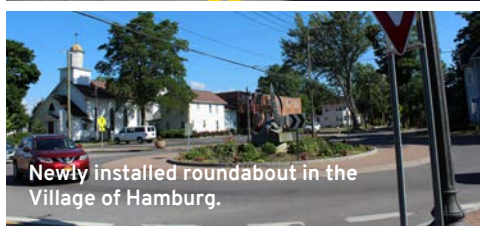
Newly installed roundabout in the Village of Hamburg.
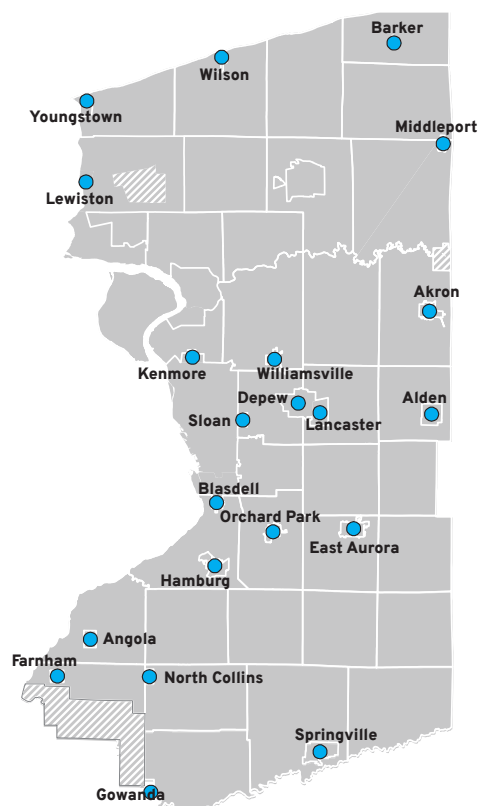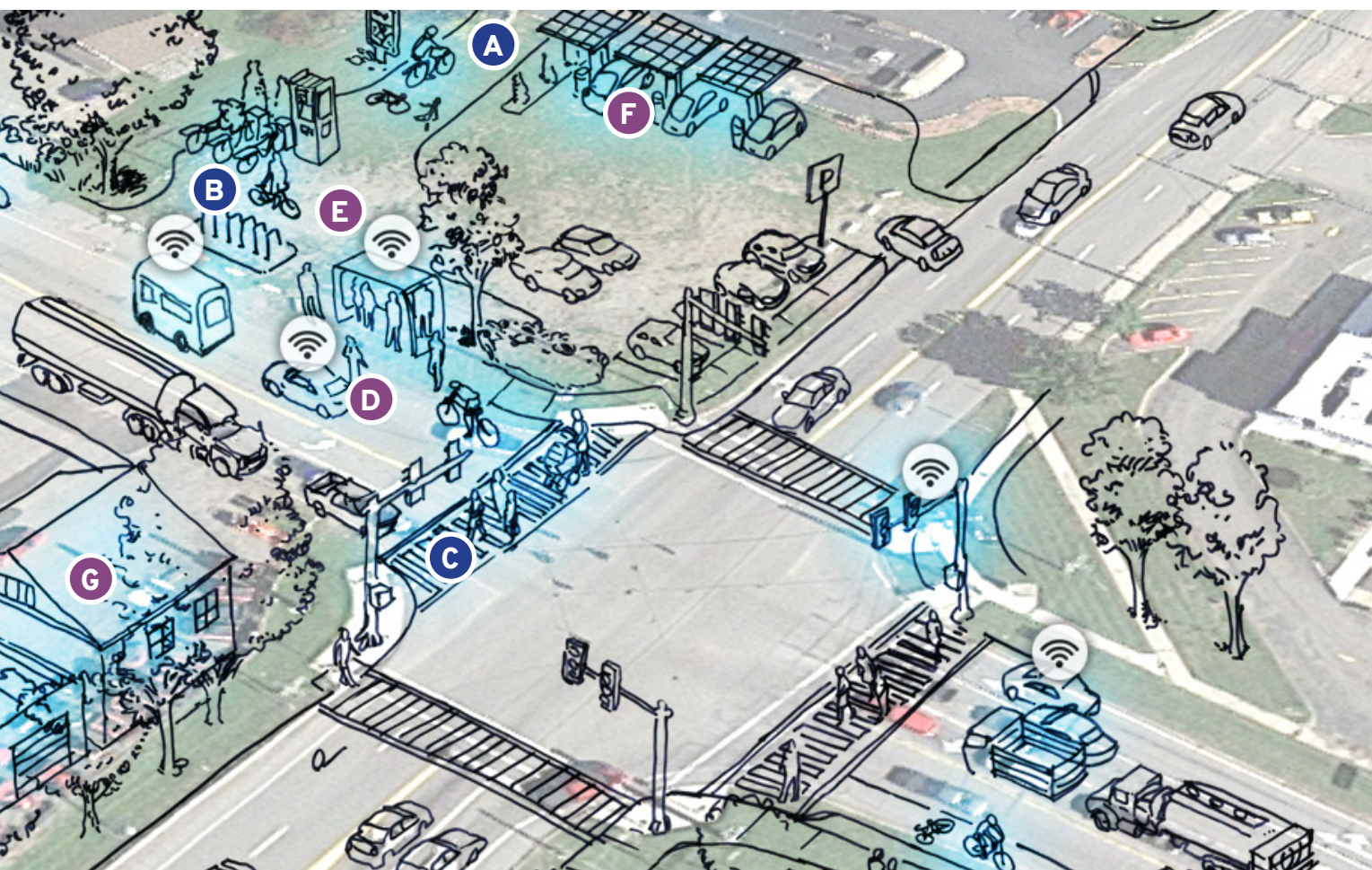
WAYS TO GET THERE

Increasing mobility with active transportation

Ⓐ Multi-use trails

Multi-use, recreational trails connected to smaller cities, rural towns and village centers to enhance access to recreational opportunities and enable bicycling for daily trips.

Ⓑ Bike amenities

Bike amenities, like bike racks and bike share stations, and accommodations for electric, or pedal-assist bikes, to make bicycling more convenient in rural communities.

Ⓒ Pedestrian amenities

Pedestrian amenities, like benches, crosswalks, sidewalks and pedestrian activated signals, to make streets safer and more welcoming for pedestrians in smaller cities, rural towns and village centers.

Improving access

Ⓓ Expanded Transportation Network Company service

TNCs can partner with local volunteer organizations and municipalities to fill service gaps in rural communities.

Ⓔ Mobility hubs

Mobility hubs where multiple transportation options link together at key points in smaller cities, villages and rural communities.

Ⓕ Electric vehicle charging stations

Electric vehicle charging stations in rural communities so electric vehicle drivers can travel farther without fossil fuels.

Ⓖ New development

New businesses and housing along Main Streets in smaller cities, rural towns and village centers, supported by infrastructure investments and streetscape improvements.

STRATEGIES TO MOVE US FORWARD   **REGIONAL CYCLE NETWORK**

Promoting bicycling with a modern cycle network

Our region's current network of bicycle infrastructure is suitable for confident and fearless cyclists, but typical riders tend to feel bicycling for daily travel is unsafe and inconvenient. Although we are adding more bike trails and lanes every year, most remain disconnected from one another and from other transportation options and services.

Moving forward to our vision will require a modernized regional cycle network marked by a Next Generation Shoreline Trail to provide seamless connections to bicycling opportunities within the region and across the border. This network will also build out bike pathways for commuters to get to jobs and educational opportunities in the City of Buffalo and first-ring suburbs along with additions and upgrades to bicycle and pedestrian networks in smaller cities, towns and village centers.

Completing the commuter and recreational cycling networks

Making bicycling a viable transportation option for the region starts with carrying out the plans we have in place while exploring other ways to connect more communities and destinations with the regional bicycle network.

Linking together trail systems

Shoreline Trail   Empire State Trail   Buffalo Blueway

Implementing existing plans

Buffalo Bike Master Plan   The Olmsted City
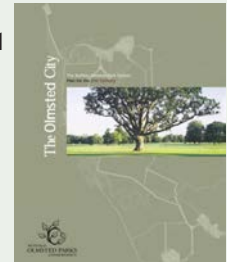
Exploring other ways to complete the bicycle network
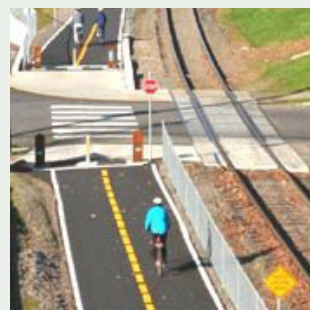
Underused infrastructure can be re-purposed for bicycles. Former railways can be converted to multi-use trails and bike lanes can be added on underutilized roadways with excess capacity.

Bicycle lanes and other amenities at international bridges can create safe border-crossing connections and bi-national bicycling opportunities.

Linking bikes with other options

Bicyclists, connected to the Internet through mobile devices or connected bicycles themselves, can plan multi-modal trips that link with other modes at mobility hubs.

Electronic route maps, timetables and trip planners

MOBILITY HUB

Bike storage facilities

Bike sharing services

Using the services at mobility hubs and other technologies, bicyclists can connect with these other options to complete their trips.

Ride sharing

Car sharing

AV commuter circulators

Buses and light rail
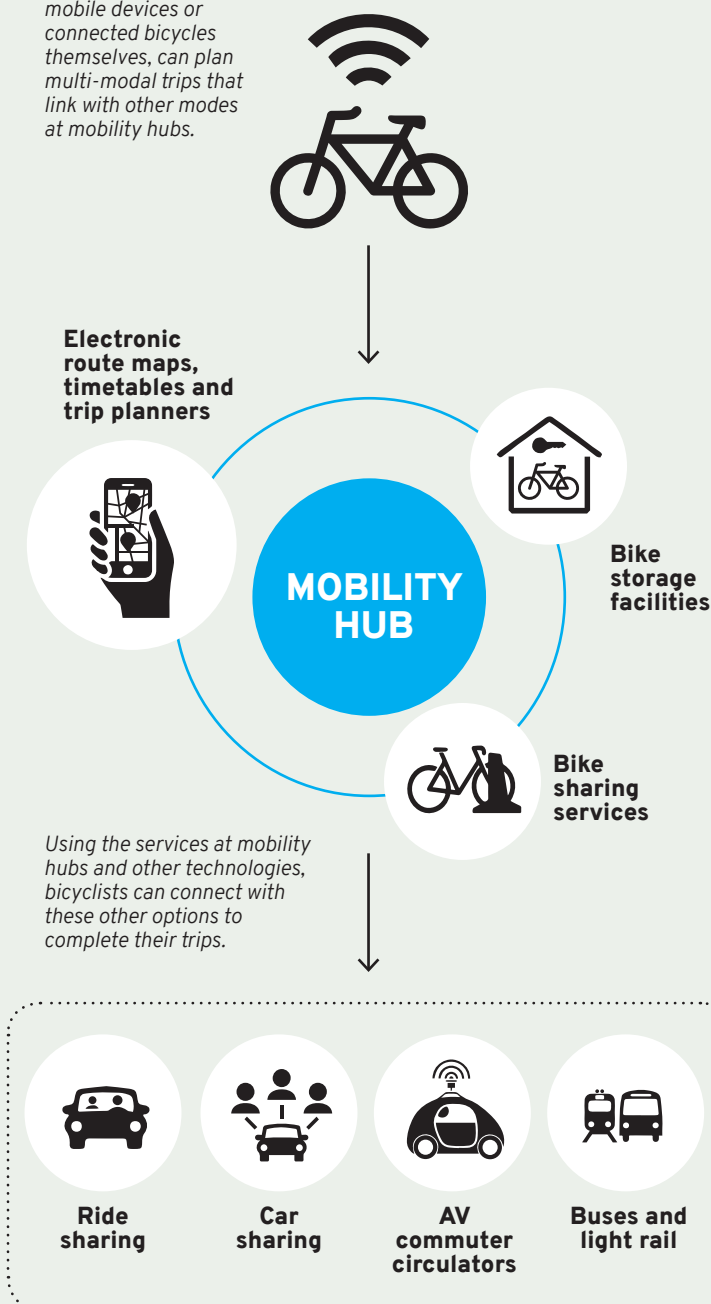
Adding bike amenities and upgrading bike infrastructure

Developing a modern regional cycle network will require updated infrastructure, more bike amenities and new technologies that make it easier for bicyclists to get around and connect with other options.

Bike storage facilities with secure, sheltered bike racks and other amenities, like changing rooms, lockers and showers.
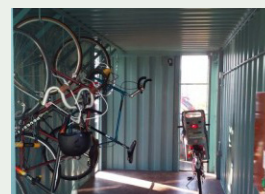
Landscaping and green infrastructure can be used to separate bike lanes from vehicle traffic while beautifying streetscapes.

Electric bike charging stations for pedal assist and electric powered bikes to enable longer trips for bicyclists.

Bike amenities and bike sharing near transit stops with dedicated space for bikes on trains and buses so bicyclists can easily access public transit.

Electronic route maps, timetables and trip planners to give bicyclists flexibility in planning trips at mobility hubs or through their mobile devices.

Rest areas with lighting, seating, bike repair equipment, mobile charging stations, or other amenities throughout the network and along the Next Generation Shoreline Trail to make bicycling more convenient.

STRATEGIES TO MOVE US FORWARD | **FUTURE FREIGHT NETWORK**

Strengthening our economy with a smart, efficient and diverse freight network

New technologies, emerging transportation services and shifting consumer preferences are changing how goods get to market. Our regional freight network will have to anticipate and adapt to these shifts in order for the region to remain competitive in an increasingly global marketplace. In doing so, our regional freight system will become more diverse, integrating more facilities, like package pick-up lockers on local streets, and delivery modes, like drones and autonomous vehicle fleets, into the network.

While looking to the future, we also need to pursue short-term actions that improve the movement of goods through the roadways, ports and railroads that make up our regional freight network and inter-modal facilities (where truck, rail and ships meet). Recently developed freight plans for the region, state and nation lay the groundwork for these actions, including strategies for physical system upgrades, financing mechanisms and collaborative governance arrangements. Moving forward, we will need to continually reassess and adapt our plans for the regional freight system as we learn more about how these changes can benefit our regional economy.

Where to Implement this Strategy

The future regional freight system will transform how the railroads, shipping ports, transfer stations, inter-modal facilities, international bridges and airports that make up our freight network operate. To accommodate new services and local delivery methods, our freight network is also likely to expand to include more local streets.

WAYS TO GET THERE

Bi-national Autonomous Green Freight Corridor

A significant volume of U.S.-Canada trade crosses the border in the Buffalo Niagara region. Advances in technology will help support a designated freight corridor. Autonomous freight vehicles, next generation border technology, electric vehicles and other alternative fuels, and green infrastructure will all work to improve efficient bi-national trade.

Green Freight Corridor

Alternative fuel stations and EV lanes

AV lanes

CANADA

USA

Integrated Corridor Traffic Management

Faster border crossings with e-tolls and pre-clearance
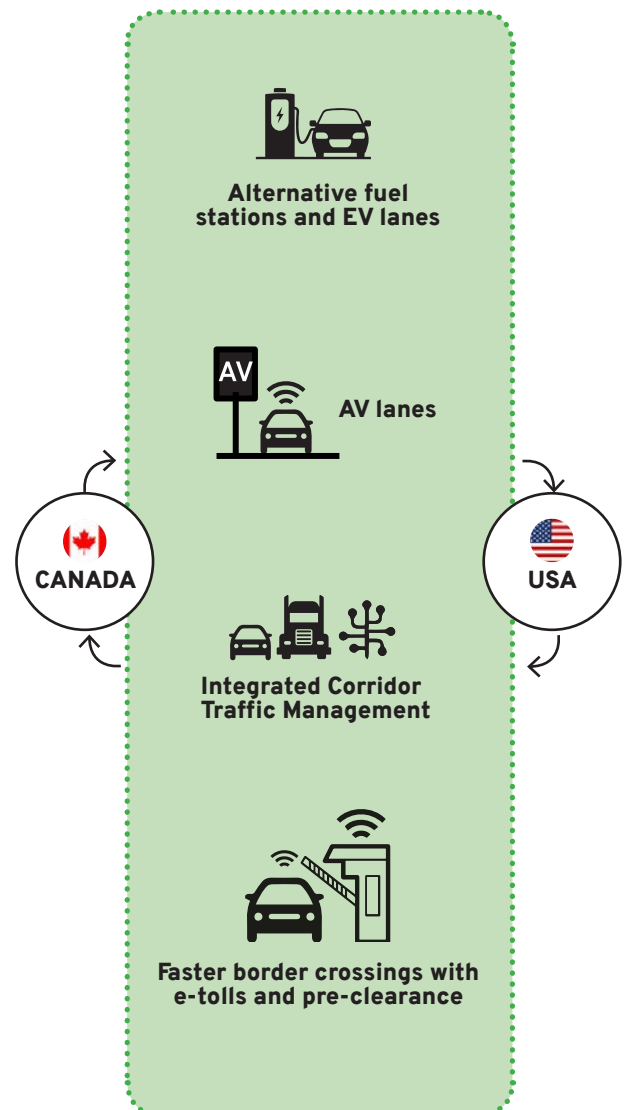
Local "last mile" deliveries

Our freight network will need to diversify to accommodate new services and expand so that deliveries can be made safely and efficiently on local streets using drones, delivery bots and package pick-up lockers.

Supply Chain Optimization

A supply chain is a system of organizations, people, activities, information, and resources involved in moving a product or service from first supplier to customer. Supply Chain Optimization makes this system more efficient by producing the right quantities and distributing at the right time to minimize cost while continuing to meet service requirements. The reduction of freight infrastructure bottlenecks and implementation of new technologies is a critical element.

FIRST SUPPLIERS (Local, National and Global)

Other Suppliers
Carriers
Customs
Producers
Distributors
3rd Party Logistics
Traders
Retailers

CONSUMERS (Local, National and Global)
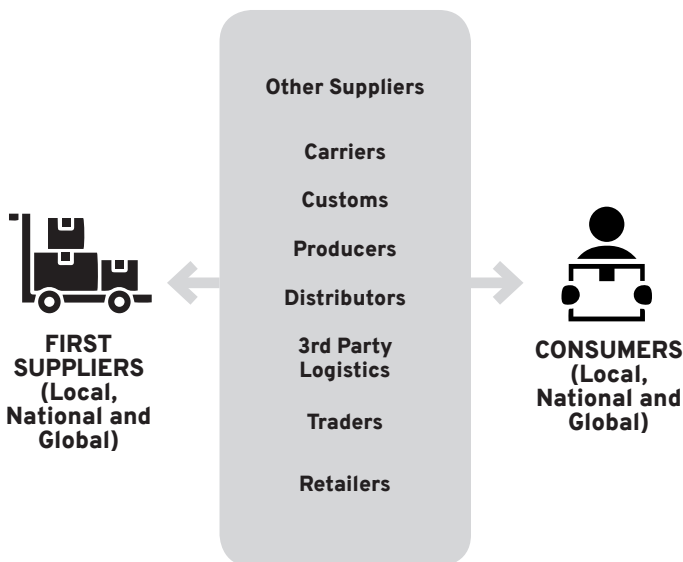
AV truck platoons on highways

Upgrades that facilitate AV truck platoons, like dedicated lanes and vehicle-to-infrastructure communications, can make our freight system more efficient.

Freight Hubs

Freight hubs bring together multiple transportation modes and logistical services to connect local businesses and consumers with markets across the nation and the globe.

Local businesses and other suppliers could ship products or components to freight hubs via rail, truck, air, or other modes.

SUPPLIERS (Local, National and Global)

FREIGHT HUB

Rail | Drone and CV Deliveries | Trucks | Logistics

Data Management Services | Brokering Services | Hospitality and Other Amenities

Using services located at freight hubs, suppliers can ship products to domestic and international markets more efficiently.

CONSUMERS (Local, National and Global)

STRATEGIES TO MOVE US FORWARD **INFRASTRUCTURE FOR RECONSIDERATION**

Adapting underutilized infrastructure

Taking a critical look at some of the region's roadways—how much they cost to maintain and how much traffic they typically carry today compared to the volume of traffic they were originally built for—reveals opportunities to reduce existing infrastructure to accommodate future land use and travel patterns. Reconfiguring some portions of the system will reduce the costs of maintaining and repairing our infrastructure while still enhancing mobility and the overall efficiency of our transportation system.

Infrastructure for reconsideration include major roads and freeway segments that may exhibit some of the following characteristics:

• Built based on previous forecasts of significant growth and travel demand in an area where those forecasts have not been reached.

• Traffic levels below what would justify the size and nature of the existing road.

• Areas where travel patterns have shifted resulting in less reliance on the road.

• Out of context with their surrounding land uses.

Robert Moses Parkway FUTURE VIEW -2020

Robert Moses Parkway CURRENT VIEW
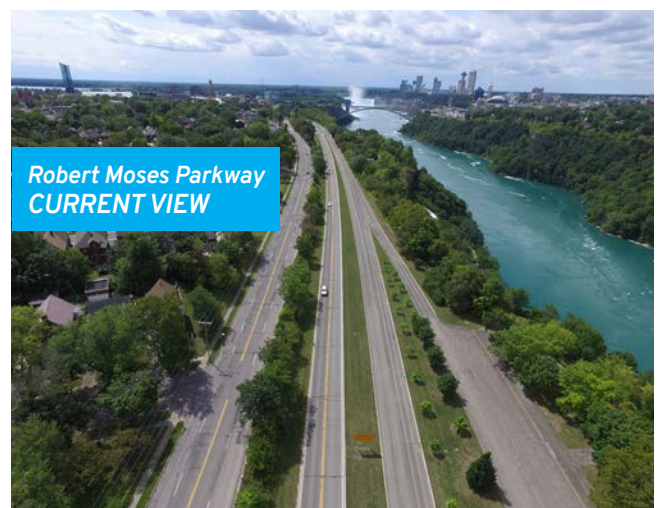
The recent transformation of the Robert Moses Parkway along the Niagara River Gorge into the Niagara Scenic Parkway illustrates how existing roadways can be reused for other purposes, like green space and trails, that provide recreational opportunities and incentives for private development while reducing unneeded pavement and limiting infrastructure maintenance costs.

STRATEGIES TO MOVE US FORWARD | **EXTERNAL OPPORTUNITIES**

Capitalizing on our strategic location with external opportunities

Apart from strengthening the region's internal transportation system, a key to Buffalo Niagara's future lies in leveraging its position as an American hub within the Greater Golden Horseshoe and Great Lakes Megaregion, as well as our proximity to the Northeast Megaregion.

In the global playing field where value is created by time savings, efficient mobility gives a competitive advantage. The capacity for our economy to expand and prosper depends on the rapid, predictable and safe movement of people and goods into, within and out of the region. Capitalizing on our strategic location with enhanced regional linkages can improve the flow of workers, business and recreational travelers, information, and goods between Buffalo Niagara and other hubs.

Building on these economic linkages requires the establishment of an integrated, multi-modal transportation network that maximizes the movement of goods and people through the region and beyond. It will also depend on greater collaboration, flexibility, and innovation. Taking advantage of future external opportunities will bolster our economy by enabling safe, predictable and efficient trips across the region for people and goods.

The Emerging Megaregions

Economic linkages for Buffalo Niagara to build off of:

Trade within the Greater Golden Horseshoe

Our region is the second largest port of entry along the U.S. northern border, accounting for 15% of all trade between the U.S. and Canada. Canadian shoppers are one of the prime customer bases for malls and retail outlets in our region.

Global trade

U.S. and Canadian firms increasingly partner to produce quality goods and services for global markets. For instance, auto parts cross the border 11 times when building a car. Our region is also within "One day's trip" of East Coast ports.

Tourism

The bi-national region offers a wide range of attractions for domestic and international tourists, including history, arts and culture, a cross-border wine region, and of course, Niagara Falls. The region can position itself in the middle of tourist trips to Niagara Falls and New York City.

Education

Buffalo Niagara is home to 60 colleges and universities with aggregate enrollment around 300,000 students. Local universities are growing support for related sectors of logistics, supply chain and data management systems.

Sports

Our region ranks as the number 11 television market for sports in North America. Thirty percent of NFL game day attendance is from Ontario and the Rochester metro area.

Unmatched "soft" infrastructure for trade

A strong base of logistics and advanced manufacturing companies, a highly skilled workforce, a network of workforce trainers and a budding entrepreneurial environment offer strategic advantages for the region.

STRATEGIES IN ACTION   **ROUTE 5 AND MAIN STREET**
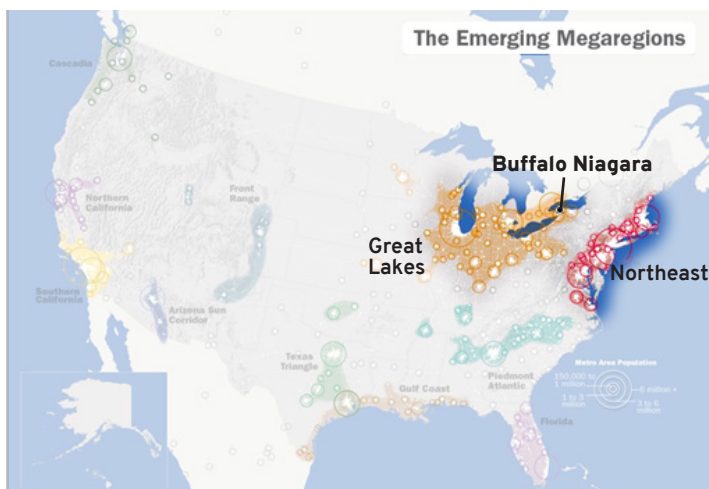
Rethinking Route 5 and Main Street

"Route 5" or "Main Street" runs across our region and through a variety of places, each with unique assets and challenges. Moving Forward 2050 is an opportunity to rethink how this roadway connects and supports our economy, communities, and environment.
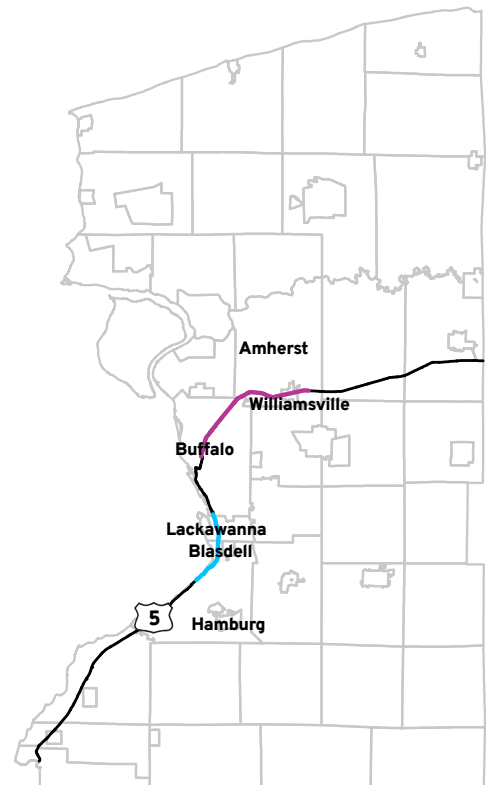
Route 5: Hamburg to Lackawanna
(Hamburg Beach to Ridge Road)

This section of Route 5 passes through many different places, including neighborhoods and small communities, freight and other industries, and beaches and parks. It faces a number of challenges:

Ensuring pedestrian, cyclist and driver safety

Maintaining efficient flow of people and goods

Offering residents easy access to neighborhoods and services

Ensuring access to parks and beaches by walking or cycling

Some sections are overbuilt and expensive to maintain, and may not be suitable for the surrounding areas

Portions of the road experience flooding regularly

TAKING ACTION

Moving Forward 2050 will look at ways to:

Redesign Route 5 to safely accommodate pedestrians, cyclists, drivers, and freight

Implement some SEMA elements where appropriate, like coordinated signals, mobility hubs, EV charging stations, and flexible curb space

Support economic and community development through transportation investments

Promote environmental health by utilizing sustainable materials and minimizing runoff into local waterways

Integrate freight hubs at existing industrial locations like the Bethlehem Steel site

Improve pedestrian and cyclist access to Lake Erie, especially for local residents

Enhance the resiliency of infrastructure to climate and extreme weather events

BUFFALO

Bethlehem Steel Site

Shoreline Trail

LACKAWANNA

Woodlawn Beach State Park

BLASDELL

Hamburg Beach and Town Park

HAMBURG

5

Bethlehem Steel Site

Rail lines
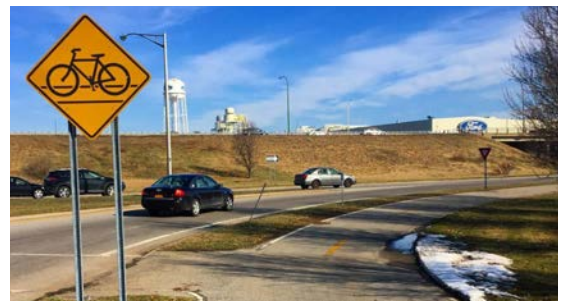
Shoreline Trail

Hamburg Beach and Town Park

STRATEGIES IN ACTION ⚙ / **ROUTE 5 AND MAIN STREET**

Main Street Knowledge Corridor:
Buffalo Niagara Medical Campus (BNMC) to Erie Community College North

This section of Main St. passes through the densely populated City of Buffalo as well as **suburban communities** with some concentrations of commercial development. It also connects major **educational institutions**, including Erie Community College, the University at Buffalo, Medaille College, Canisius College, and Daemen College. In addition, Transit Oriented Development (TOD) plans near **light rail stations** along Main St. are expected to spur economic growth and community development.

The City of Buffalo and the BNMC, which is home to the University at Buffalo's medical and health sciences, are developing a Smart Corridor to incorporate smart transportation infrastructure and technology, and energy efficiency into the campus. The Knowledge Corridor builds off of these efforts to connect multiple educational institutions, neighborhoods and jurisdictions to create a complete corridor.

In the Knowledge Corridor, research lives alongside transportation planning, where local governments, universities, colleges, communities and businesses all benefit from cutting edge research applications. The Knowledge Corridor can elevate the Buffalo Niagara region to become a leader in transportation that uses technology to improve our economy, community and environment.

⚙ TAKING ACTION

Leverage university and college connections to act as a "living lab" for transportation innovations like:

Vehicle to Infrastructure technology

Connected Vehicles

Autonomous Vehicles (particularly in snow)

Data collection and management

Equity and technology

Mobility hubs

Electric Vehicle charging

Smart lighting

Smart sensors to detect pedestrian, cyclists, vehicles and real-time road conditions

Testing sustainable materials

Coordinated and priority signals for transit, pedestrians and cyclists

Integrate Smart Enhanced Multi-modal Arterial elements to:

Support economic and community development—especially in sections of disinvestment or declining commercial activity

Offer multi-modal options in addition to the light rail

Improve pedestrian, cyclist and driver safety along the corridor
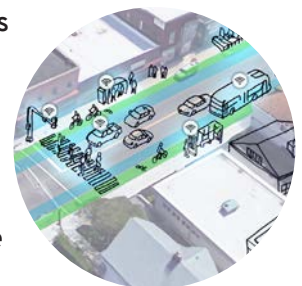
Demonstrate new partnerships across different governments, educational institutions, and other organizations

TONAWANDA

TONAWANDA

AMHERST

CLARENCE

EGGERTSVILLE

Daemen College

Erie Community College

KENMORE

UB South Campus

WILLIAMSVILLE

SNYDER

LaSalle Station

LANCASTER

Medaille College

Canisius College

Utica Station

Summer-Best Station

DEPEW

BUFFALO

CHEEKTOWAGA

Buffalo Niagara Medical Campus

LANCASTER

SLOAN

Erie Community College

LANCASTER

Autonomous vehicle circulator to be piloted at BNMC.

Buffalo Niagara Medical Campus

CHAPTER 6

Where we want to be in 2050

Where we are today

A framework for moving forward

Big moves to get us there

Taking action and measuring progress

THE IMPACTS OF MOVING FORWARD

The strategies of Moving Forward 2050 will take big strides in making our regional transportation system more innovative, reliable and efficient. While unforeseen and outside factors will play a large role in determining the ultimate impacts of our strategies, based on our current understanding, the Moving Forward approach will produce a number of meaningful and far-reaching benefits for our communities, economy and environment.

Where we'll be in 2050

ONE REGION FORWARD → MOVING FORWARD 2050

The impacts of Moving Forward are dependent on how our region grows from now until 2050. A range of empirical data projections were examined to forecast the total number of homes and jobs that will exist in the region by 2050. The total increases in people and jobs were allocated to different areas across the region using the land use patterns of the shared vision for the region's future as expressed by citizens through One Region Forward.

This vision concentrates population and employment growth near existing communities where we already have built infrastructure. Ultimately, this land use vision is not a certainty, we cannot predict precisely how the region will grow, but achieving the vision of One Region Forward will largely depend on the transportation investments of Moving Forward 2050.

Projected Change in Population and Employment, 2015-2050

Our economy will continue to grow and provide more opportunities by focusing jobs near existing communities.

Projected Growth in Jobs, 2015-2050

per square mile

HIGH 8,000

LOW 10
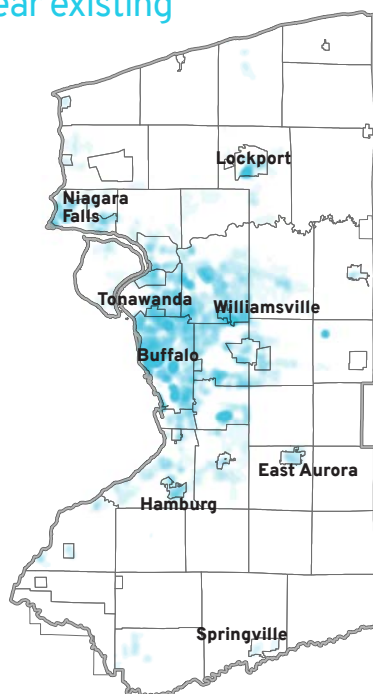
Our communities will grow stronger as we continue to invest in the places we live and work in today.

Projected Growth in Population, 2015-2050

per square mile

HIGH 2,400

LOW 10
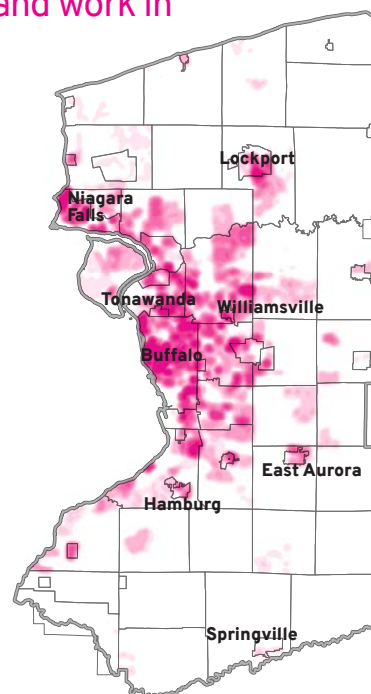
Source: Cambridge Systematics, 2050 Projections by Block Group (2016).

	2015	2050 Vision	Change	% Change
EMPLOYMENT	657,702	**768,693**	110,991	**+16.9%**
POPULATION	1,131,664	**1,152,111**	20,447	**+1.8%**

Source: Cambridge Systematics, 2050 Projections by Block Group (2016).

Should we stand still or move forward?

The transportation investments we make today will shape how we live, work and play in 2050. If we stand still and stay on our current path, sprawl—while slower than in previous decades—will continue, and our choices for getting around will remain limited. In addition, further stress will be placed on infrastructure maintenance budgets, taking away needed resources for the region to achieve the full potential of innovative technologies for AV, new mobility, transit and freight.

The Moving Forward approach embraces a pattern of development that will make more efficient use of our existing infrastructure. Going beyond maintenance, it will create a modern multi-modal transportation system that attracts visitors, connects residents to a wider variety of job opportunities and improves the on-time delivery of goods for businesses.

WHAT EACH APPROACH MEANS FOR...	THE STANDING STILL APPROACH	THE MOVING FORWARD APPROACH
ROADS & HIGHWAYS	Maintain existing roadways in a piecemeal fashion. Build new roads to accommodate new development and extend infrastructure.	Systematically maintain, but also enhance regional roadways by integrating new technologies and using more sustainable and impervious surface materials.
MOBILITY & TRANSIT	Rely on one public transit provider by extending service routes to follow sprawling land use patterns. Owning a car is a necessity in most communities.	Mobility as a service supplements the public transit provider, filling in service gaps and connecting with other modes so that owning a car is not necessary for most of the region's communities.
BICYCLE & PEDESTRIAN NETWORK	Build bike lanes and add pedestrian features where they fit, in a disconnected fashion. The bike and pedestrian network is not well-linked with other transportation modes.	Complete a regional network of pedestrian and bicycle infrastructure, fully connected with technologies and efficient links with other transportation modes and services.
FREIGHT	Prolong a conventional freight network, reliant on fossil fuels with commercial trucks experiencing border delays.	Develop a diverse, robust freight network with freight hubs, electric and other alternative fuels, autonomous trucks, local, last mile deliveries and faster border crossings to propel the economy.
TECHNOLOGY	Use older technologies where appropriate to maintain our traditional network without looking ahead to enhance transportation.	Harness improvements in technology to enhance our transportation network in order to improve our communities, economy and environment.
FINANCING & DECISION MAKING	Making piecemeal decisions without much collaboration between jurisdictions. Depending on federal and state dollars for transportation improvements.	Leverage technology, data, and public engagement to make smarter decisions and investments. Use diverse funds and financing mechanisms to pay for projects.

How our strategies meet our objectives

Utilizing a performance-based planning approach, transportation strategies were designed to achieve our goals and objectives. The tables above show the potential for each strategy to meet the objectives based on a preliminary assessment and best practices research. Going forward, individual projects will be designed, evaluated and prioritized based on their ability to meet Moving Forward 2050's goals. An ideal suite of projects will act to collectively reach these goals.

STRATEGIES

ECONOMY

Our Goals	Our Objectives	New Mobility & Transit	Regional Highway System	Smartly Enhanced Multi-modal Arterials	Secondary Corridors	Smaller Cities	Village Centers	Rural Roadways	Regional Cycle Network	Future Freight Network	Infrastructure for Reconsideration	External Opportunities
Raise the region's standard of living	Support REDC target sectors	●	●	●	●	●	●	●	●	●		●
	Increase Gross Regional Product	●	●					●	●	●		●
	Improve connectivity in the Greater Golden Horseshoe		●					●	●	●		●
Support efficient freight movement	Reduce freight delays		●	●	●					●		
Strengthen the fiscal health of local governments	Minimize local governments' infrastructure costs and maximize benefits from infrastructure investments			●	●	●	●	●	●	●	●	

COMMUNITIES

Our Goals	Our Objectives	New Mobility & Transit	Regional Highway System	Smartly Enhanced Multi-modal Arterials	Secondary Corridors	Smaller Cities	Village Centers	Rural Roadways	Regional Cycle Network	Future Freight Network	Infrastructure for Reconsideration	External Opportunities
Support focused growth in urban, rural and suburban communities	Maximize investments in community centers	●		●	●	●	●	●	●			●
Ensure access to opportunities and services	Increase multi-modal access to neighborhood services	●	●	●	●	●	●	●	●			●
	Improve equitable access to employment centers	●	●	●	●	●	●	●	●			●
Support healthy and safe communities	Increase active transportation options	●	●	●	●	●	●	●	●		●	
	Improve transportation system safety for pedestrians, cyclists and vehicle drivers	●	●	●	●	●	●	●	●			

ENVIRONMENT

OUR GOALS	OUR OBJECTIVES	New Mobility & Transit	Regional Highway System	Smartly Enhanced Multi-modal Arterials	Secondary Corridors	Smaller Cities	Village Centers	Rural Roadways	Regional Cycle Network	Future Freight Network	Infrastructure for Reconsideration	External Opportunities
Preserve and protect a healthy environment and accessible open spaces and waterways	Reduce negative impacts of local transportation on the region's air quality and GHG emissions	●	●	●	●	●	●	●	●	●		●
	Increase diversity and sustainability of energy supply system for transportation uses	●	●	●	●	●	●	●	●	●		●
	Maximize region's watershed quality	●	●	●	●			●	●		●	●
	Improve public access to parks, greenways, and waterfronts	●		●	●	●	●	●	●			●
	Reduce transportation infrastructure land use	●		●				●	●		●	●
Maximize infrastructure resiliency	Improve the ability of infrastructure to respond to weather and other extreme events		●	●	●			●	●		●	

INNOVATION

OUR GOALS	OUR OBJECTIVES	New Mobility & Transit	Regional Highway System	Smartly Enhanced Multi-modal Arterials	Secondary Corridors	Smaller Cities	Village Centers	Rural Roadways	Regional Cycle Network	Future Freight Network	Infrastructure for Reconsideration	External Opportunities
Create a fully integrated and seamless transportation environment	Fully build out a system of connected corridors throughout the region	●	●	●	●	●	●	●	●	●		●
	Establish a Smart Ecosystem of data acquisition and management for transportation efficiency	●	●	●	●			●	●	●	●	●
	Create a robust Mobility Marketplace that assures mobility on demand and integrates delivery technology	●	●	●			●	●	●	●		●
	Create and deploy new models of transportation finance and project delivery	●	●	●	●		●	●	●	●	●	●

For more details on how our strategies meet our objectives, see the appendix.

What Moving Forward 2050 means for Our Transportation System

Better ways to get around

In addition to investments in the regional network, Moving Forward 2050 includes upgrades to streets, sidewalks, and paths that will improve safety and connectivity for people walking and biking. Along with an improved transit network and new options for vehicle sharing and ride sharing, people will have more choices for getting to their daily destinations. If we implement the investments in Moving Forward 2050, households may choose to own fewer cars—or no cars at all.

Transformed, more efficient transit service

Improving transit by running buses and trains more frequently, reducing the time they are stuck in traffic or at stoplights, and giving riders better information about arrival times will help people who depend on transit to get around and attract new riders who might otherwise drive themselves. If we are successful at concentrating future growth around our highest capacity transit routes and we upgrade transit technology to reduce operating costs and fares, our entire transportation system will become more efficient.

Less time traveling to work, school, appointments, stores and recreation

Moving Forward 2050 will help the region maintain relatively low levels of congestion, helping people spend less time and money on transportation each day. Investments in the regional freeway network, other roads that connect communities, and an extension of the light rail to Amherst are projected to reduce the hours people spend traveling each day.[1] That's time people can spend with their families and friends or generating more economic value for the region.

More options to move goods around

We'll continue to need freight rail lines, seaports, and waterways—and ways to access them—to move bulk commodities like construction materials. Investments in freight terminals and intermodal connections between modes will reduce transit times for freight and make rail and water transportation competitive. In the future, to support first-mile and last-mile delivery and pickup of smaller, higher value packages, we'll need innovative options like community-scale freight mobility hubs to complement people-oriented mobility hubs.

More efficient flow of goods

Moving Forward 2050 doesn't just impact people. Overall truck travel times in the region are expected to decrease as we make investments in border crossings, Interstate Highways, and major regional freight corridors, helping existing businesses become more productive and making the region more attractive to new industry.[2]

Streets that facilitate first and last-mile connections

Adapting our major arterial roadways and commercial streets to enable safer and more efficient delivery of goods at appropriate times of day will help lower the price of consumer goods and help more packages arrive more quickly—while maintaining safe spaces for people walking, biking, using transit, and driving.

Green Freight Corridor Improves Bi-National Trade

As Buffalo Niagara expands its position as a Logistics Gateway, opportunities exist to stimulate economic growth and provide contemporary solutions for an array of benefits to the region. Identifying primary freight corridors and Ontario linkages will help focus efforts to manage autonomous truck platoons to reduce congestion, maximize efficiency and enhance border clearance. Upgrading the corridor to shift trucks to alternative fuel sources and supporting the infrastructure with green elements will strengthen environmental improvements.

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[1] Cambridge Systematics, Buffalo Niagara 2050 Regional Transportation Model, 2018.

[2] *Ibid.*

What Moving Forward 2050 means for Our Economy

Enhanced access to jobs and educational opportunities

As we focus growth where we have existing infrastructure and make improvements to the transportation services operating on that infrastructure, people will be able to access universities, community colleges, and jobs more quickly and at lower cost. The investment package in Moving Forward 2050 will improve the freeways and major arterials that connect our region's economic engines, and more frequent, high-capacity transit services will help move people efficiently.

Households and businesses spend less on transportation costs

Just the region-wide improvements in Moving Forward 2050 are projected to save people and businesses in the region more than $100,000 per day in costs related to travel and congestion.[3] Households could save even more as vehicle and ride sharing options expand and we invest in sidewalks and bike infrastructure, reducing vehicle ownership, operating, and maintenance costs.

Improved safety and public health

A combination of technology enhancements, better design, education, and enforcement will reduce the long-term social and economic costs associated with fatalities and serious injuries on our roadways. With the dramatic reduction in crashes associated with the spread of automated and connected vehicles, vehicle liability and collision insurance costs could plummet.

Growth in target industries

A robust and diverse transportation system can attract growing businesses and younger workers, especially in the region's target industries like professional services, and health and life sciences. Having more reliable ways to get around will also bolster tourism in the region. Promoting electric and other alternative fuels can expand the region's energy sector. Concentrating transportation investments near existing infrastructure can steer development away from farmland and support agriculture. The future freight system, with more diverse and efficient ways of getting goods to consumers, can expand all industries, particularly logistics. The future transportation system will also make it easier for residents to access training opportunities and jobs in target industries and other emerging sectors.

Dollars invested in transportation go further

Moving forward with our transportation system can lead to more economic activity than merely repairing and maintaining current infrastructure—$1 spent on infrastructure can spur up to $3 in economic activity.[4]

- The transportation improvements in Moving Forward 2050 can concentrate development near transit, which is more fiscally productive than development along automobile oriented corridors. For instance, the dense development along the Metro-rail corridor in Buffalo has a net taxable value of over $1M per acre, while a similar sized retail corridor along Transit Road in Amherst is valued at about one-third that price, or $347,556 per acre.[5]

- Creating complete streets can be a catalyst for private investment. One recent local example is Niagara Street in Buffalo where a $28.7 million streetscape project that began in 2016 followed nearly $50 million in private investments from 2013 through 2016.[6] The completion of this and similar initiatives, like SEMAs, can stimulate further private investment to build our economy and revitalize communities.

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[3] *Ibid.*

[4] National Association of Manufacturers, "Catching Up: Greater Focus Needed to Achieve a More Competitive Infrastructure," 2014.

[5] Minicozzi, Joseph & McCarty, Joshua, "The Dollars & Sense of Development Patterns: The Buffalo Niagara Regional Report," 2014.

[6] City of Buffalo, "Niagara Street Gateway Resurfacing Project," 2016. Retrieved January, 2018 at https://www.ci.buffalo.ny.us/Mayor/Home/Leadership/Archived_Press_Releases/2016_Archives/NiagaraStreetGateway; City of Buffalo Office of Strategic Planning, Internal Investment Tracking, 2017. Includes all investments approved by city's planning board from 2013 to 2016. Projects may be in the planning stages, under construction, or completed.

What Moving Forward 2050 means for Our Communities

Communities are more walkable

Moving forward takes huge steps to promote walking in all communities. Adding pedestrian amenities and integrating technology with safety features on SEMAs, village Main Streets and other roadways will make walking safer and more convenient on automobile-oriented streets. Focusing transportation investments, like Mobility Hubs, near existing infrastructure can better connect pedestrians to other transportation options and bring more jobs and services within walking distance for residents. Moving forward approach also shows that the population of walkable communities would grow three times more than in car-dependent places.

Communities are more bike-friendly

Moving forward will accelerate the region's recent progress in promoting bicycling by expanding bikeways to more communities and connecting bike lanes together and to other transportation modes. Transportation improvements, such as the Next Generation Shoreline Trail, additional bicycle amenities, and safety enhancements from new technologies, will make bicycling a much more reliable mode of transportation while land use patterns shift to place more services and jobs within reach by bicycle.

Amenities and services are more accessible

The investments in Moving Forward 2050 and accompanying changes in development patterns are designed to give people better access to opportunities: jobs, education, social services, and other daily needs. Our communities will be stronger if our residents feel connected to each other and to institutions that are the foundation of our society.

Communities are revitalized

Concentrating transportation investments where we already have infrastructure can spark revitalization in communities. Better data and governance mechanisms that engage more diverse stakeholders in decisions on how to improve the region's transportation system can also strengthen communities while ensuring that our strategies are effective for the entire population.

Communities are healthier with more active and safer transportation options

In addition to economic benefits of safety improvements, as we invest in active transportation options and reduce transport-sector emissions, households and employers in the region could see improvements in public health, including lower obesity rates and improvements in chronic conditions like asthma and diabetes.

What Moving Forward 2050 means for Our Environment

Air quality is improved and GHGs are reduced

Providing more ways to get around will limit how much we need to drive and improve air quality. The estimated reduction in annual vehicle miles traveled due to the Moving Forward approach equates to a decrease in greenhouse gas emissions of over 76 metric tons of CO_2 equivalents per year.[7] Promoting the use of electric vehicles and alternative fuels will further limit the impact transportation has on our environment. By burning less fossil fuels, air quality will improve, specifically near highways and bottlenecks, while greenhouse gas emissions from transportation will fall drastically.

Water quality is improved

Using road surface materials that are permeable, or let rainwater seep into the ground, will reduce the amount of water entering our combined sewer system during rainfall events. This prevents sewer overflows from happening when rainwater or snow melt exceeds the capacity of sewer treatment facilities. It also can reduce on-road contaminants, like oil and gas, from reaching waterways. Incorporating green infrastructure on street rights-of-way can also have a substantial impact on water quality. For instance, retrofitting just 60% of streets in the City of Buffalo to control stormwater could prevent over 38 megagallons of run-off entering the sewer system in a 1" rainfall event.[8]

Access to natural assets is enhanced

Moving forward not only improves the environment, but improves our access to our natural assets, like parks, shorelines and waterways. Concentrating transportation investments near existing communities will encourage new development in these places, adding more jobs and homes within walking distance of existing parks and open spaces while limiting sprawl to preserve natural areas in rural communities. Many transportation investments of Moving Forward will significantly enhance access to natural assets. Developing a Regional Cycle Network will connect more neighborhoods, particularly in smaller cities and village centers, to bike lanes that extend to neighborhood parks and shorelines. Providing mobility as a service, will provide residents and visitors with more ways to access the region's world class natural assets.

Infrastructure is more resilient to climate

A range of new threats means that standard designs for public infrastructure may no longer be adequate to withstand the effects of climate change. To boost system resiliency, local officials should work together to anticipate changing environmental and operational conditions and to update design standards accordingly, including pavement requirements and maintenance protocols. Climate change-induced design factors, which have both short-term and long-term implications, include temperature change, precipitation and water levels, wind loads, storm surges and wave heights. These factors may require the retrofit of existing facilities as well as the redesign of new, replacement, or renovated capital items.

Our region will work to meet the goals of the Paris Climate Agreement

Moving Forward 2050 works hand in hand with Erie County's Commitment to meeting the GHG reduction goals set by the Paris Climate Agreement. Recognizing that transportation accounts for the largest share of GHGs emitted in the region, Erie County's plan, "Erie County Commits to Paris," includes a variety of targeted transportation strategies that set out to reduce emissions from vehicles, like incentivizing the use of public transportation. The plan also calls for enhanced coordination between Erie County Department of Environment & Planning, GBNRTC, NFTA, and other partners within the county and beyond, which will help the region meet Erie County's commitment to the Paris Climate Agreement while also accomplishing the goals of Moving Forward 2050.

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[7] UBRI analysis of data from Ecology and Environment (E&E), "Cleaner, Greener Communities Western New York Regional Tier II Greenhouse Gas Inventory," 2012; and Cambridge Systematics, Buffalo Niagara 2050 Regional Transportation Model, 2018. Estimates of greenhouse gas emissions per vehicle-mile traveled based on the composition of the vehicle fleet of Buffalo Niagara (2012) from E&E were applied to the estimated reduction in VMT of the Moving Forward approach versus a Standing Still scenario (from Cambridge Systematics, 2018).

[8] Buffalo Niagara Riverkeeper, "Green Infrastructure Solutions to Buffalo's Sewer Overflow Challenge: Draft Feasibility Study," 2011.

What Moving Forward 2050 means for Equity in Our Communities

Better access to jobs, education, training, and services for communities of concern

The integration of multiple travel modes through MaaS and at mobility hubs near communities of concern can improve the ability to get to work, school, medical appointments and other services. Partnerships between TNCs and transit providers will help fill gaps in communities of concern, and subsidies will keep fares affordable. More frequent traditional transit will improve travel times for those in the urban core and first-ring suburbs. The regional cycling network can help link communities of concern with jobs, school and services. AVs are expected to improve access for those who do not own or cannot operate a vehicle.

Supporting investment in communities of concern

SEMAs and Secondary Corridors will use many of the underutilized roadways in communities of concern that have seen disinvestment. Similarly, the Knowledge Corridor and transit-oriented development (TOD) can help spur reinvestment. Complete streets projects in the Smaller Cities and village centers can help revitalize these communities.

Better health outcomes for communities of concern

Mobility hubs, SEMAs and Secondary Arterials, and complete streets support active transportation options like biking, walking and transit, which have both physical and mental health benefits for communities of concern. Getting around by bike will be easier through a connected regional cycle network that includes communities of concern. SEMAs, Secondary Arterials, complete streets, AVs, and rural roadway safety projects will all make communities of concern safer places to live.

Defining Communities of Concern

Our region has concentrations of residents living near or below poverty levels, a growing refugee population with limited English skills, and a legacy of disinvestment in communities of color. To help guide equity in transportation planning, we define our communities of concern as:

Areas with significant concentrations of residents with low incomes, people of color, foreign born residents, individuals with disabilities, senior citizens and children, and limited English proficiency (LEP) speakers.

Moving Forward 2050 Equity and Environmental Justice Analysis

In compliance with Title VI of the Civil Rights Act of 1964, GBNRTC overlayed mappable Moving Forward projects against communities of concern. This helps identify any disproportionate distributions among projects in terms of location and spending. The analysis showed no such impacts (see the Appendix for more detail).

Next Steps for Equity and Environmental Justice in Transportation Planning

Evaluate and prioritize projects with equity in mind
Projects will be assessed and prioritized with performance measures that compare access to opportunities between communities of concern with the rest of the population.

Monitor impacts on communities of concern
Including: access and travel time to jobs, education, services, and parks and waterways; air quality; traffic density; and safety.

Monitor regional trends in communities of concern
Including: commuting and travel behavior; residential locations; population size, age, and employment; housing and transportation costs.

Continue working with regional partners and stakeholders
Including community organizations involved in One Region Forward, and the Racial Equity Roundtable.

Continue to refine equity analysis
Incorporate new indicators, data and methods as they become available.

How we'll measure our progress moving forward

To better understand the impacts of our approach in the future, we will track these measurable indicators to evaluate how well we are meeting our objectives and achieving our goals. Project evaluation measures are included in Data Sources & Notes.

...ON OUR ECONOMY

INCREASE employment in a Regional Economic Development Council target sector

INCREASE Gross Regional Product

DECREASE in freight delays in the region

DECREASE border delays for freight and passengers

INCREASE in return-on-investment (ROI) of local governments

...IN OUR COMMUNITIES

INCREASE concentration of investment where we already have infrastructure*

INCREASE in job growth around our main streets, downtowns and former industrial sites*

INCREASE in share of commuting trips taken via alternative transportation modes*

DECREASE in commuting time
(by different modes, and compare communities of concern vs. rest of population)

DECREASE in number of reported motor vehicle crashes with pedestrians, cyclists or motorists

INCREASE in dedicated bike paths, shared bike lanes and multi-use/recreational trails*

...ON OUR ENVIRONMENT

DECREASE vehicle miles traveled (VMT) per capita*

DECREASE the area of impervious surfaces

INCREASE in share of residents with access to public parks and recreation areas
*(by different modes, and compare communities of concern vs. rest of population)**

DECREASE the number of lane miles with underutilized, excess road capacity in the region

INCREASE the number of lane miles that utilize resilient paving materials

...ON THE WAYS WE INNOVATE

INCREASE lane miles of connected corridors

INCREASE the acquisition and availability of data

INCREASE options for on-demand mobility with integrated technology

INCREASE the use of new models of finance

INCREASE the use of new models of implementation and project delivery

*Performance measures from One Region Forward, A New Way to Plan for Buffalo Niagara

CHAPTER 7

Where we want to be in 2050

Where we are today

A framework for moving forward

Big moves to get us there

Taking action and measuring progress

DOING THINGS DIFFERENTLY: FUNDING, FINANCE AND PROJECT DELIVERY

A new way of planning for transportation in Buffalo Niagara requires new sources of funding, agile and flexible project design and delivery, and new partnerships and collaborations.

This section provides a financial plan that estimates how much funding will be needed over the life of the plan, how much will be available for the recommended transportation investments and the costs of maintaining the existing system. It also includes both constrained and illustrative project lists as well as new ways to fund, develop and implement these projects. It also describes the new forms of governance needed in a time of limited funds, complex challenges, and fast-paced technological advances. The section closes with an overview of risks and uncertainties—especially those related to technology—and ways we can get ahead to create a transportation system that realizes what we desire for our communities, our economy, and our environment.

A financial plan for Moving Forward 2050

Many of our local streets, roads, bridges and highways were built decades ago and now require investments to rehabilitate, reconstruct and maintain them. Moving Forward 2050 will ensure that the region's infrastructure and services continue to function properly, safely and support the movement of people and goods—while at the same time prioritizing infrastructure that is both critical to the region, and supports Moving Forward's goals. Overall approaches to asset management and maintenance include: implementing systematic, aggressive road maintenance region-wide, with safety and technology upgrades; adopting advanced materials and construction techniques; and carrying out the Transit Asset Management Plan.

A Financial Plan assuring fiscal constraint is a key component of the Moving Forward 2050. Transportation plans encompass a number of projects that are to be implemented by a variety of organizations, both public and private. All levels of government—federal, state, and local—have a role to play in maintaining and improving the transportation system. The fiscal constraint aspect of any regional transportation plan requires a financial plan be prepared so that the resulting plan can be used as a tool for the community to realistically establish priorities within the financial resources likely to be available. The plan must be fiscally constrained to the amount projected to be available to the region. The following Financial Plan table illustrates forecast revenues through 2050 (basis for forecasts are detailed in the Appendix). The table also shows projected expenditures over that period, including system preservation needs, also detailed in Appendix, and expenditures per strategy. The table illustrates the balance between revenues and expenditures in Moving Forward 2050.

MTP 2050 Plan Forecast Expenditures

System Preservation	**$6,764.57**
Preservation of Highway, Bridge and Transit Systems	$6,764.57
Constrained Strategies Beyond Preservation	**$3,484.82**
Regional Highway System Upgrades	$391.47
Smartly Enhanced Safety and Mobility Corridors	$675.34
Secondary Corridors	$138.68
Smaller Cities	$281.14
Rural Roadways	$376.42
Regional Cycle Network	$122.00
Infrastructure for Reconsideration	$100.00
New Mobility & Transit	$1,399.77
Program Total	**$10,249.39**

MTP 2050 Financial Plan
(in Millions of Matched Year-of-Expenditure Dollars)

Reasonably-Expected Revenues	Near-Term (FFYs 2018-2030)	Mid-Term (FFYs 2031-2040)	Long-Term (FFYs 2041-2050)	Full MTP 2050 (FFYs 2018-2050)
Federal	**$2,164.71**	**$1,687.77**	**$1,947.77**	**$5,800.25**
Regionally-Allocated Highway and Bridge				
National Highway System	$470.49	$479.38	$525.46	$1,475.33
Highway Flexible	$215.31	$219.38	$240.47	$675.16
Safety	$47.85	$48.75	$53.44	$150.04
Non-Motorized/Air Quality	$63.80	$65.00	$71.25	$200.05
State-Selected Highway and Bridge	$160.03	$163.05	$178.73	$501.81
State-Selected HSIP	$28.91	$29.45	$32.29	$90.65
Directly-Apportioned Transit	$465.87	$574.14	$708.44	$1,748.45
Discretionary				
Multi-modal	$112.45	$108.62	$137.69	$358.76
Transit *	$600.00	$0.00	$0.00	$600.00
State	**$1,499.50**	**$829.58**	**$932.15**	**$3,261.23**
Dedicated Highway and Bridge to NYSDOT	$102.03	$87.75	$90.96	$280.74
Formula Highway and Bridge to Localities	$270.16	$192.45	$250.58	$713.19
Formula Transit	$110.95	$70.38	$87.12	$268.45
Thruway Contribution	$716.36	$479.00	$503.49	$1,698.85
Transit Discretionary - Capital Match *	$300.00	$0.00	$0.00	$300.00
Local	**$219.05**	**$178.43**	**$187.56**	**$585.04**
Highway	$160.77	$130.96	$137.66	$429.39
Transit	$58.28	$47.47	$49.90	$155.65
Non-Transportation (Federal, State & Local)	**$407.61**	**$92.78**	**$102.49**	**$602.88**
Full MTP 2050	**$4,290.86**	**$2,788.57**	**$3,169.97**	**$10,249.39**

Note: Allocated Revenues are for MPO area only, Erie and Niagara Counties.

* Assumptions for $1.2B Amherst-Buffalo LRT Extension include $600M Federal New Starts; $300M State match; $300M local match various sources.

NYSDOT and local members annually budget funds for operation and maintenance purposes. In addition, both federal and state funds are allocated to NYSDOT's operations and maintenance forces for betterments to the system. NYSDOT budgets for preventive, corrective and demand maintenance on highways and bridges. Specific activities include pavement and bridge maintenance, drainage improvements, guide rail repair, pavement markings, sign and signal maintenance, snow and ice control and numerous other maintenance activities.

Some projects to support our big moves

Input from One Region Forward, subject matter experts and regional stakeholders helped create over 100 potential projects. These projects were then analyzed to determine their ability to meet Moving Forward 2050's objectives. A quantitative analysis used the regional travel demand model, and a qualitative assessment was based on observed improvements in other regions when similar projects were implemented. The Moving Forward 2050 project selection process embodies performance-based planning by taking a strategic, data-informed approach to identify transformative investments in the region's transportation system. The table below includes representative projects that help meet Moving Forward 2050's objectives, as well as the total estimated cost for each strategy.

It is important to note that the projects below are dependent on the proper operation and maintenance of the existing transportation network. To that end, Moving Forward 2050 allocates nearly two-thirds of reasonably-expected revenues to preservation of the existing system. This includes $4.44 billion for highways and bridges and $2.17 billion for transit. These funding levels will result in Buffalo Niagara meeting and exceeding the national requirements for operations and maintenance of key transportation assets included in current federal surface transportation legislation based on the outputs of models and analysis developed specifically for reporting infrastructure conditions to FHWA and FTA.

Constrained Project List by Strategy

PROJECT NAME	DESCRIPTION	TOTAL ESTIMATED COSTS (2018-2050)*
New Mobility & Transit		**$1,399.77**
NFTA Metro Rail LRT Extension - Amherst Buffalo	Advance the Niagara Falls Blvd to I-990 Locally Preferred Alternative	$1,200.00
NFTA Bus Service Optimization	Implement the Erie and Niagara County Service Plan	$22.00
High Quality Public Transportation to BNIA	Procure vehicles, stop structures/amenities, and technology to enhance service from Buffalo CBD to BNIA	$63.00
Buffalo CBD, Niagara Falls and Villages Smart Parking	Deploy technology to optimize existing spaces by providing real-time information to users seeking parking.	$22.08
Mobility Hubs and Bus Fleet Upgrades	Install varying physical and technology improvements for various modes to better serve travelers at strategic locations	$50.35
DL&W Metro Rail Station	Construct new Metro Rail Station and access second floor	$42.34
Regional Highway System		**$391.47**
Next Generation Freeway Technology and Safety Upgrades	Systematic Freeway upgrades to deploy corridor management solutions, operational and safety upgrades	$169.63
Freeway Interchange Reconfigurations and Upgrades	Reconfigure selected freeway interchange and arterial interface locations for traffic management and safety	$80.25
I-290/Main Street Interchange Improvements	Consolidate interchange ramps at Blue Water Tower to improve safety and efficiency (Phase I)	$25.00
Commuter Shed Ramp Metering	Establish ramp metering at eight locations to manage flows onto ring freeways	$4.59
Route 5 Skyway Study	Assess alternatives for longer term Skyway/Route 5 planning	$6.00
Smart Region Coordination Support	Provide operational support for regional Transportation Management Center (TMC) and Transportation Management Assoc (TMA)	$106.00

In Millions of matched Year-Of-Expenditure (YOE) dollars.

PROJECT NAME	DESCRIPTION	TOTAL ESTIMATED COSTS (2018-2050)*
Smartly Enhanced Multi-modal Arterials		**$675.34**
Initial SEMA Corridor	Construct upgraded street features, safety improvements and technology integration, and create mobility hubs on SEMA Corridors including Main Street BNMC	$136.69
2nd Generation SEMA Corridors	Construct two SEMA Corridors with updated designs, safety improvements and technology integration by 2031	$165.00
3rd Generation SEMA Corridors	Construct two SEMA Corridors with updated designs, safety improvements and technology integration by 2039	$373.65
Secondary Corridors		**$138.68**
Phase 1 Secondary Corridors Complete Streets	Construct five Complete Streets with improved walkability, integrated technology, and enhanced mobility by 2025	$35.39
Phase 2 Secondary Corridors Complete Streets	Construct five Complete Streets with improved walkability, integrated technology, and enhanced mobility by 2035	$45.30
Phase 3 Secondary Corridors Complete Streets	Construct five Complete Streets with improved walkability, integrated technology, and enhanced mobility by 2045	$57.99
Smaller Cities		**$304.14**
Neighborhood Walk Access Improvements	Upgrade five miles of sidewalks, crossings, and wayfinding between neighborhoods and main streets annually	$165.85
Neighborhood Complete Streets	Construct one Complete Streets treatment annually on arterials or collectors	$138.29
Rural Roadways		**$376.42**
Safety Upgrades	Install countermeasures at high crash locations along with guiderail, signage, and pavement marking upgrades	$90.66
Bridge/Culvert Improvements	Upgrade existing structures to reduce hydraulic vulnerability and improve system resilience	$194.09
Village Main Street Improvements	Construct 10--12 Complete Streets treatments in Village Center arterials or collectors	$66.50
Agricultural Access Improvements	Expand and upgrade access roads serving commercial farming and agribusiness establishments	$25.17
Regional Cycle Network		**$122.00**
Shoreline Trail Gaps & Water Way Access	Complete currently unfinished segments and integrate access to waterway into improvements	$23.78
Next Generation Shoreline Trail Technology Upgrades	Deploy technology along trail network for wayfinding, data collection, smart lighting, and other purposes	$18.00
Olmsted Plan Implementation	Implement pathway rehab, access to water amenities/neighborhoods, traffic calming and related projects	$27.81
Bicycle Master Plan Implement-Buffalo/Smaller Cities/Villages	Construct recommended bike lane, cycletrack, traffic calming, connector, commuter cycling network improvements	$52.41
Infrastructure for Reconsideration		**$100.00**
Adapting Underutilized Infrastructure	Reduce and repurpose facilities that are projected to have excess capacity that currently requires maintenance	$100.00
	CONSTRAINT SUMMARY	**$3,484.82**
	Total Funds Available	**$10,249.39**
	Total Highway, Bridge, Transit Preservation	**$6,764.57**
	Total Constrained Projects	**$3,484.82**

See the appendix for details on financial forecasts."

Illustrative List

These projects have not been programmed for improvements. Illustrative projects may be considered for future programming contingent upon additional resources becoming available.

STRATEGIES	PROJECT NAME	DESCRIPTION	TOTAL ESTIMATED COSTS (2018-2050)*
Regional Highway System			**$176.85**
	I-290/Main Street Reconfiguration	Reconfigure interchange at Blue Water Tower by consolidating ramps to improve safety and efficiency (Phase II)	$100.00
	Next Generation Freeway Electrification Demonstration	Demonstrate production of in-motion wireless power transfer to charge electric vehicles (EVs) on a high-volume corridor	$73.21
	Commuter Shed EV Charging Demonstration	Install 10 EV charging stations per year for 5 years to demonstrate viability of private operation at Mobility Hubs	$3.64
Future Freight Network			**$363.64**
	Permanent Pre-Clearance Implementation	Work with U.S. and Canadian customs agencies to implement pre-clearance and expedite travel over the Peace Bridge	$31.52
	Transshipment Facility	Construct an intermodal freight facility, potentially in conjunction with the Port Authority of New York & New Jersey	$32.00
	I-90 Interchange at Youngs Road	Construct a new interchange to provide improved access and better distribute truck trips	$70.40
	Shortline Rail Improvements	Upgrade tracks, siding, and other facilities as well as purchase ultra-low emissions locomotives	$131.49
	CP Draw Bridge Twinning	Create a second span adjacent to the current CP Draw Bridge to relieve existing congestion	$65.54
	Automated Vehicle (AV) Truck Platoon Facilities	Identify locations for up to 10 facilities with staging areas and alternative fuel charging	$103.09
Regional Cycle Network			**$133.49**
	Next Generation Shoreline Trail Rebuild	Reconstruct the Shoreline Trail with newer materials and technology upgrades upon end of its useful life	$133.49
External Opportunities			**$149.83**
	Border Crossing Improvements	Provide pre-clearance, AV-compatible facilities on international bridges	$149.83

In Millions of matched Year-Of-Expenditure (YOE) dollars.

External Opportunities

Additional investments to consider that would be pursued with the help of partners in the region and beyond.

PROJECT NAME	DESCRIPTION	TOTAL ESTIMATED COSTS (2018-2050)*
Bi-national Autonomous Green Freight Corridor	Designated bi-national freight corridor with AV/alternative fuel, pre-clearance and available technologies	TBD
Electronic Tolling	Establish electronic tolling at remaining regional locations	Part of Statewide implementation
Autonomous Transit Vehicles	Deploy autonomous transit vehicles in the fleet of LRT and buses	TBD
Mobility as a Service	Establish MaaS coordination among service providers including TNCs	TBD
Bi-national Cycling Network	Integration NY and Ontario cycling networks through bridge infrastructure	TBD
Buffalo - Niagara Falls Passenger Rail Connection	Commuter rail service (private operator) between Buffalo and Niagara Falls	TBD
Empire Corridor High Speed Rail to New York City	High-speed rail service between Buffalo and New York City	TBD

New way of paying for our transportation system

How we'll pay

Reasonably-expected revenues for implementing the recommendations of Moving Forward are based on traditional sources and levels of federal, state, and local expenditures for roads, bridges, public transportation vehicles and rail infrastructure, bicycle paths and lanes, and sidewalks. These sources are expected to generate $10.2 billion through 2050. But it will take more to realize our vision.

Progress has been made in implementing transportation projects by combining funds from existing federal and state, county and local sources. Recent local examples include the Robert Moses Parkway removal and Niagara Street projects. However, creative packaging of funds from existing transportation and non-transportation programs will not be sufficient to create the transportation system we want. City, county and regional entities across the country have had recent success in utilizing new funding and financing resources.

Examples of innovative funding and financing include:

User fees for:

- Vehicle miles traveled
- Parking (including variable rates based on demand; implemented in San Francisco)
- Curb space (based on location and vehicle type)
- EV charging
- TNCs (Chicago charges a fee that funds public transportation)
- Tolls (including higher prices during peak hours)

Value capture:

- Tax increment financing (to encourage private development in specific areas and along designated corridors)
- Data from traffic signal timing, vehicle counts, bike counts, bus tracking sold to third-party travel navigation companies (Los Angeles and Seattle are exploring this)
- Ballot measures to allow for tax increase to be spent on transportation infrastructure (done in Austin, Los Angeles and Seattle, among other places)
- Increased gas tax (or possible EV charging tax in the future)

How we'll make it all happen

Across the country, transportation agencies are utilizing new project delivery models that, in a growing number of instances, include greater participation by private companies. Known as public-private partnerships or P3s, these arrangements build off of the traditional model of a private company (the consulting engineer) paying for project design, and then receiving bids to select another company to build it (the contractor). The public owner is ultimately responsible for ongoing operation and maintenance activities.

Alternative project delivery methods include the use of teams of private sector engineers, contractors, and others to design, build, operate, and maintain designated facilities. The benefit of P3s is that the private sector is willing to assume the risk that it can provide the same safety and convenience at less of a cost than if the public owner conducted the work.

As alternative delivery methods have evolved, P3s have expanded to include a wide breadth of projects. In a growing number of instances, P3 projects are paid for using the same federal, state, and local funds that would be used if the public sector project owner to undertake the work. P3s have recently been used to implement projects like EV charging stations in Washington State and replacing aging bridges in Pennsylvania. Given the benefits that can be accrued on appropriate projects, it is anticipated that P3s and alternative delivery methods will be available to public entities in the near future.

Less formal versions of P3 have been seen locally, including the Niagara Street project in Buffalo and transit-oriented development (TOD) at light rail stations. These have gained interest from businesses and real estate developers who see the value in investing in high quality transportation and mobility infrastructure to attract customers and residents. Investments might range from simple landscaping to mobility hubs and housing. Cities like Boston, Chicago, Cleveland, Columbus, Seattle, and Spokane have developed successful cross-sector partnerships to help fund, implement and manage transportation projects that benefit local communities.

New forms of governance

We're entering a time of increasingly limited state and federal funding, of technological complexity and where transportation projects involve multiple jurisdictions and agencies. This means we need to reconsider how we design, fund and deliver these projects. And because transportation cuts across economic, community and environmental goals, we need to move away from projects based in individual agencies or departments to more broad-based collaboration across jurisdictions and sectors. We also need to be flexible and efficient in project funding and delivery—including looking at ways to capture financial value to reinvest into our communities.

Part of Moving Forward 2050's implementation work will identify and clearly define new forms of governance to address four core areas.

Coordinated Planning and Delivery

To succeed as a region, transportation projects and programs need to be coordinated across jurisdictions and sectors—including businesses, real estate development, universities and colleges, and community organizations. Moving Forward 2050 acts as a catalyst to build from One Region Forward and address the connections among transportation, land use, agriculture, energy, water and housing in rural, suburban and urban communities.

As part of implementation, Moving Forward 2050 will explore ways to formalize coordinated planning and project delivery as a region. Initial steps include using performance-based planning as a framework to collectively meet the region's goals.

Moving Forward 2050's strategies like SEMAs and Secondary Arterials will cross multiple jurisdictions and will require coordinated planning and delivery. The Niagara Street reconstruction project in Buffalo exemplifies how various partners can collaborate to implement projects across jurisdictions while leveraging multiple funding sources.

New Mobility

New Mobility presents never before seen technology and mobility options. A mobility manager or other entities will need to oversee MaaS data, and manage the platform and payment system. Other responsibilities could include establishing standards for data sharing and privacy. This new form of governance could help develop a regional microtransit policy framework, creating protocols for partnerships between TNCs and transit providers or municipalities.

Other regions and cities across the country are beginning to create these new governance structures in order to ensure that new mobility benefits all residents. This new way of planning and management is crucial to the success of Moving Forward 2050's New Mobility and Transit strategy.

Smart Region

Going forward, we'll need new governance structures to coordinate "smart" technology deployment, data collection, management and analysis, and regulatory considerations. This entity could coordinate I2V, traffic management, smart lighting, internet access, energy grids, and EV charging.

Leveraging off of work by NITTEC and the Buffalo Niagara Medical Campus, and engaging the emerging technology sector and local university research, this could be a collaborative of local governments, colleges and universities, the private sector, energy providers, and the mobility operator. Moving Forward 2050 strategies like the Next Generation Highway and SEMAs depend on well-coordinated smart technology.

Innovative Funding and Financing

In order to fully achieve Moving Forward 2050's regional vision, we must look beyond the limited state and federal funding sources. Public-private partnerships (P3s) to invest in infrastructure and maintenance and value capture—including from sharing data about traffic signal timing, vehicle counts, bike counts, bus tracking, as well as users fees—present new funding opportunities. With this comes a need for new governance to manage these new funding sources. Innovative sources of funding and financing can help support Moving Forward 2050 initiatives like SEMAs, mobility hubs, and investments in Smaller Cities and Village Centers.

We need new forms of governance to create our future transportation network

New Forms of Governance

MOVING FORWARD 2050

Transportation Network for 2050
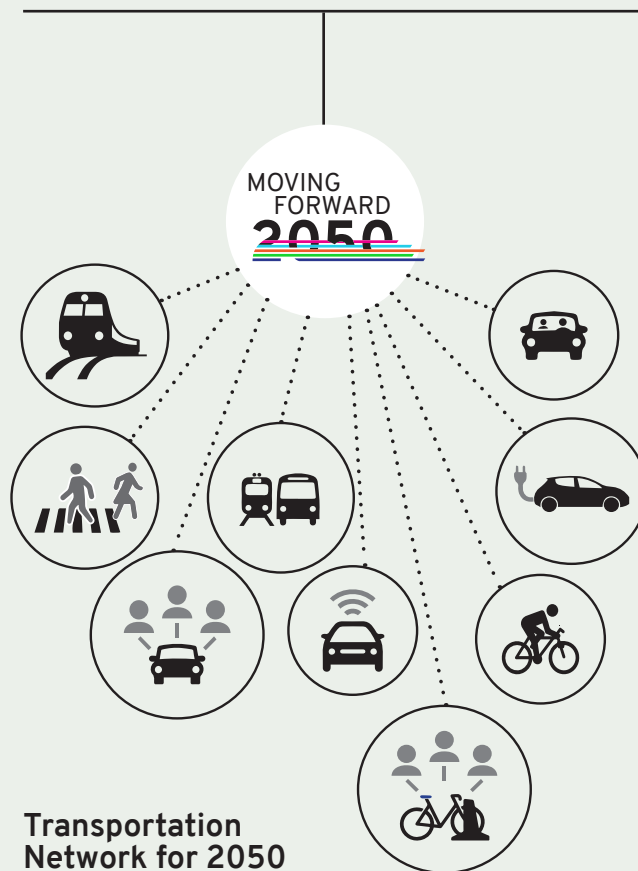
Risk management

The transportation planning process faces risks and uncertainty in terms of both the effects of external forces and the results of Moving Forward 2050's projects. Transportation planning is entering an era of what risk analysts call *deep uncertainty*, where we don't yet know the consequences of actions, and of *wicked problems* that are difficult to solve due to their complex interconnections. The fast pace of technological advances means we don't know what technology is coming, when, and its effects. We also don't know how people will react to and change their behavior in the face of new technology, and we cannot assume that previous patterns can predict the future. And as Moving Forward 2050's goals show us, transportation is interconnected with our economy, communities and environment.

This means that we have an opportunity to shape the future by addressing risks and uncertainties early and often. A risk management framework supports informed decision-making by not only confronting and planning for risks, but trying to prevent these risks from occurring.

GBNRTC has developed an initial risk management framework to address and manage the risks related to Moving Forward 2050's success. This framework will later serve as the foundation for a risk management mechanism for GBNRTC and project partners.

Potential risks are organized around six categories: Technological, Demographic, Financial, Economic, Legal and Political, and Other External Factors (See the appendix for more detail). Based on best practices and current knowledge, each risk is assigned a value for its likelihood to occur, and its impact if it were to occur. To help prioritize risk management efforts, a final risk score is calculated by multiplying likelihood and impact. Preliminary risk management actions are identified for each potential risk, along with indicators to help monitor how close we are to an event's occurrence.

Part of Moving Forward 2050's implementation will involve creating a risk management mechanism to monitor and take action in regards to potential risks, which will be regularly updated to incorporate new risks.

Deep uncertainties
We do not even understand the potential consequences of an action or event, or its exact causes and how they are related.

Wicked problems
Social or cultural problems that are difficult to solve due to lack of information, lack of consensus, high economic costs, and the complex interconnections among these problems and other problems. Common examples include poverty, terrorism, social injustice and climate change.

Modeling Future Risks

Given particular uncertainty about the risks and impacts of AV, GBNRTC will continue developing a regional travel model that incorporates AV. One of the first in the country, this model considers elements like AV penetration, vehicle availability (which could be 100 percent with AVs and TNCs), people's willingness to spend more time and go farther distances in an AV (because they can work or sleep), costs (operating and parking), and the effects of AVs on person miles traveled, person hours traveled, and highway and road capacity and congestion.
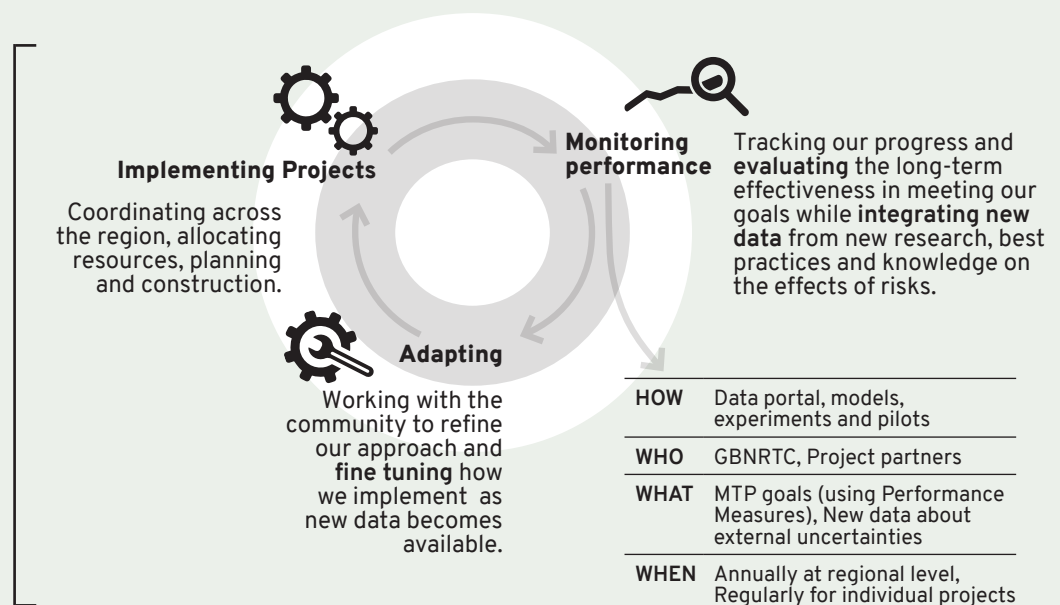
Adaptive planning

Alongside external risks are the uncertainties about how well Moving Forward 2050's projects will achieve the plan's goals. An adaptive planning framework promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from projects and other efforts become better understood. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive planning allows for pilots and experiments to learn effects, gather data, and adapt. To be successful, this requires a willingness to be agile, to experiment, fail and learn. Adaptive planning is used by the US Department of the Interior, US Fish and Wildlife Service, and the Environmental Protection Agency.

As with risk management, an adaptive planning monitoring mechanism will be created as part of Moving Forward 2050's implementation, which will determine how data is collected, managed and assessed.

Taking Action and Measuring Progress

As we carry out the work of the plan, we will track our progress and adapt our approach to move us closer to our goals. This continuous process will update our regional transportation plan in the next five years.

MOVING
FORWARD
2050

The Plan

MOVING
FORWARD
2050

Implementing Projects

Coordinating across the region, allocating resources, planning and construction.

Adapting

Working with the community to refine our approach and **fine tuning** how we implement as new data becomes available.

Monitoring performance

Tracking our progress and **evaluating** the long-term effectiveness in meeting our goals while **integrating new data** from new research, best practices and knowledge on the effects of risks.

HOW	Data portal, models, experiments and pilots
WHO	GBNRTC, Project partners
WHAT	MTP goals (using Performance Measures), New data about external uncertainties
WHEN	Annually at regional level, Regularly for individual projects

New mobility and future uncertainties to consider

New mobility presents an unknown and never before seen world that requires us to pay attention to uncertainties and risks now in order to create the future we want.

POTENTIAL CONSEQUENCES	THINGS TO THINK ABOUT	WAYS WE COULD ADAPT OUR APPROACH
Traffic and congestion could increase	*Transportation network companies and autonomous vehicles could increase congestion and vehicle miles traveled by encouraging more trips, at a lower cost, and making extra trips to pick up passengers.*	Revisit land use policies to encourage focused growth so that services, shops, restaurants and other attractions are in concentrated centers that minimize the requirement for long vehicle trips. Support transportation management associations (TMAs) to encourage shared and active transportation options within large employers, and among small businesses, schools and neighbors. Reconsider how our streets, sidewalks and curbs are utilized. Space can be prioritized for people and deliveries, and can be flexible for different uses throughout the day. Roadways could be priced to discourage empty AVs.
Inequitable access to opportunities may continue	*The new mobility services will not naturally solve equity issues without proper planning. For instance, mobility-as-a-service (MaaS) platforms may be difficult to access for non-English speakers. These services might be unaffordable or out of reach for communities of concern, and may not accommodate the needs of people with children, older adults, or people with disabilities. Residents may lack internet access to use MaaS, or may be reluctant to use new mobility options. Moreover, residents who do not have a credit card or bank account may not be able to access new mobility services.*	Develop MaaS platforms in multiple languages— including the growing language diversity of the Buffalo Niagara region. This also presents new business opportunities. Look at innovative ways to make new mobility affordable for all residents, which may require revisiting current subsidy practices. Planners, policymakers and community organizations can start working now to ensure communities of concern and people with disabilities can access new mobility options. A telephone-based MaaS system can help those without internet access. Educational training sessions can be provided to help people access MaaS and other new mobility options. Pay-as-you go cards to access new mobility options can be sold at retail outlets. This enables unbanked residents to utilize the system, and could also present new business opportunities to create, distribute and manage these cards.
AV liability is unclear	*Without drivers, it remains unclear who will be held accountable if an AV causes injury or death to its occupants, passengers in other vehicles, or to pedestrians or cyclists.*	Policymakers can act soon to develop regulations. Some states have already begun doing so, and are placing the legal burden on AV manufacturers. In a way, this creates opportunity for a new legal specialization.

POTENTIAL CONSEQUENCES	THINGS TO THINK ABOUT	WAYS WE COULD ADAPT OUR APPROACH
Public transit could lose resources	*TNCs and AVs will compete with public transit agencies, potentially reducing ridership and revenue.*	Additional service providers can present an opportunity for public transit agencies to strengthen and improve their core services in densely populated areas. The resulting improvements in service frequency and reliability can help attract more riders. AV transit fleets could mean a reduction in operating costs for transit agencies. Transit providers could partner with TNCs and other mobility operators to provide coordinated mobility access.
Unemployment and lost revenues	*The adoption of AVs could put bus, truck and other drivers out of work. An increase in electric vehicles will mean a reduction in gas tax revenues. Local revenues from parking could also be lowered with more AVs and fewer single-occupant vehicles. If public transit agencies lose revenue, agency employees could also lose their jobs.*	AVs and other new mobility technology present new employment opportunities in technology (like programming, installation and maintenance—and in training people to do these), data management, and MaaS platform development. The Buffalo Niagara region can work to attract technology companies to the area, joining the burgeoning tech industry here. AVs and other technology continue to be refined and improved. The Buffalo Niagara region can position itself as a testing ground, particularly for cold weather and snow testing of AVs. TNCs present new business and employment opportunities Policymakers can create new revenue streams, which may include curb usage fees, empty vehicle fees, pricing VMT, and EV charging fees
We do not have the data to understand and manage new mobility, and we need to protect personal data	*Our system's signals are not coordinated and are managed by multiple jurisdictions and we have limited access to real-time traffic data. There is minimal sharing and coordination of data across agencies and jurisdictions. New mobility systems could be subject to cyber attacks, so we need to protect the privacy of personal data.*	New mobility presents a framework to help guide data collection, management and coordination. This could mean opportunities for partnerships among private and public sector organizations. Policymakers can begin developing ways to protect data by requiring a third party to anonymize and aggregate individuals' data. This third party presents potential business and employment opportunities. Uncertainties surrounding new mobility technology create a space for planners and others to test, learn and adapt to better understand how technology and people interact.

APPENDIX

Moving Forward 2050 Meets Federal Requirements for Metropolitan Transportation Plans

REGULATION	RELEVANT CONTENT IN MOVING FORWARD 2050
The metropolitan transportation planning process shall include the development of a transportation plan addressing no less than a 20-year planning horizon as of the effective date. [23 CFR § 450.324 (a)]	Moving Forward 2050 has a horizon year of 2050, 32 years from the date of adoption (2018).
In formulating the transportation plan, the MPO shall consider factors described in § 450.306 as the factors relate to a minimum 20-year forecast period. [23 CFR § 450.324 (a)]	23 CFR § 450.306(b) lists ten "planning factors" that relate to the overall Federal goals for the nation's transportation system. See "Moving Forward 2050 Alignment with Federal Planning Factors" for details about how the plan addresses these factors.
The transportation plan shall include both long-range and short-range strategies/actions that provide for the development of an integrated multi-modal transportation system (including accessible pedestrian walkways and bicycle transportation facilities) to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand. [23 CFR § 450.324 (b)]	Chapter 7 presents a fiscally constrained set of projects comprised of long- and short-range strategies/actions across all surface transportation modes that support the goals and objectives of Moving Forward 2050, as well as the ten "planning factors" that relate to the overall Federal goals for the nation's transportation system. In addition, illustrative projects encompassing multiple modes are included in the event that additional funding beyond reasonably-expected revenues is identified. With respect to accessible pedestrian walkways and bicycle transportation facilities, the Smartly Enhanced Multi-modal Arterials, Secondary Corridors, Smaller Cities, and Regional Cycle Network strategies include complete streets and dedicated bicycle amenities that directly address this requirement.
The MPO shall review and update the transportation plan at least every 5 years. [23 CFR § 450.324 (c)]	GBNRTC is no longer an air quality maintenance area, so it must meet the plan update requirements for attainment areas. The last Metropolitan Transportation Plan was adopted by GBNRTC on May 12, 2014, less than 5 years ago.
The MPO, the State(s), and the public transportation operator(s) shall validate data used in preparing other existing modal plans for providing input to the transportation plan. In updating the transportation plan, the MPO shall base the update on the latest available estimates and assumptions for population, land use, travel, employment, congestion, and economic activity. The MPO shall approve transportation plan contents and supporting analyses produced by a transportation plan update. [23 CFR § 450.324 (e)]	GBNRTC has been working closely with New York State DOT and transit agencies in the region to develop common assumptions regarding the future of the region. The desired future of the region is documented in One Region Forward, and Moving Forward 2050 provides more detail on the transportation component of that vision, based on common data and assumptions. Detailed maps of regional projections on population and employment are shown on page 94. Methods used are detailed in the E-Appendix on Demographic Forecasts.
The metropolitan transportation plan shall, at a minimum, include: [23 CFR § 450.324 (f)] *(1) The current and projected transportation demand of persons and goods in the metropolitan planning area over the period of the transportation plan;*	See Chapter 3 and the E-Appendices on Demographic Forecasts and the GBNRTC Regional Travel Model for detailed methods and assumptions.
(2) Existing and proposed transportation facilities (including major roadways, public transportation facilities, intercity bus facilities, multi-modal and inter-modal facilities, non-motorized transportation facilities (e.g., pedestrian walkways and bicycle facilities), and inter-modal connectors) that should function as an integrated metropolitan transportation system, giving emphasis to those facilities that serve important national and regional transportation functions over the period of the transportation plan.	See Chapter 3. Two specific new requirements of the FAST Act are met by this plan: • Intercity bus facilities are described on page 47. • Pedestrian walkways and bicycle facilities are described on pages 48 and 49.

REGULATION	RELEVANT CONTENT IN MOVING FORWARD 2050
(3) A description of the performance measures and performance targets used in assessing the performance of the transportation system in accordance with § 450.306(d).	GBNRTC is actively working with New York State DOT and transit agencies in the region to assess performance metrics and establish performance targets in accordance with National Performance Management Measure rulemakings. Any amendments to Moving Forward 2050 adopted after May 27, 2018 and the next plan update will include a description of these performance measures and performance targets.
(4) A system performance report and subsequent updates evaluating the condition and performance of the transportation system with respect to the performance targets described in § 450.306(d), including– *(i) Progress achieved by the metropolitan planning organization in meeting the performance targets in comparison with system performance recorded in previous reports, including baseline data; and* *(ii) For metropolitan planning organizations that voluntarily elect to develop multiple scenarios, an analysis of how the preferred scenario has improved the conditions and performance of the transportation system and how changes in local policies and investments have impacted the costs necessary to achieve the identified performance targets.*	GBNRTC is actively working with New York State DOT and transit agencies in the region to assess performance metrics and establish performance targets in accordance with National Performance Management Measure rulemaking. The next plan update adopted after May 27, 2018, will include a System Performance Report.
(5) Operational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods;	Operational and management strategies are described as part of the "Strategies to Move Us Forward" in Chapter 5. For example, both the Next Generation Freeways and Smartly Enhanced Multi-modal Arterials strategies rely heavily on transportation system management and operations to achieve maximum operational efficiency.
(6) Consideration of the results of the congestion management process in TMAs that meet the requirements of this subpart, including the identification of SOV projects that result from a congestion management process in TMAs that are nonattainment for ozone or carbon monoxide.	Moving Forward 2050 incorporates the GBNRTC congestion management process (CMP) consistent with 23 CFR § 450.322. The strategies and associated projects (new and existing, including those eligible for Federal funding) integrate the management and operation of all surface transportation modes and were developed cooperatively as part of the development of Moving Forward 2050. Chapter 6 discusses how the strategies of Moving Forward 2050 will result in improvements to agreed upon multi-modal system performance measures at a level deemed acceptable by State and local officials as evidenced by their inclusion in One Region Forward and the REDC strategic plan and progress reports. The methods for monitoring and evaluating performance in Moving Forward 2050 will be adjusted to incorporate relevant rulemakings, and will be included in system performance reports after May 27, 2018 (as necessary).

REGULATION	RELEVANT CONTENT IN MOVING FORWARD 2050
(7) Assessment of capital investment and other strategies to preserve the existing and projected future metropolitan transportation infrastructure, provide for multi-modal capacity increases based on regional priorities and needs, and reduce the vulnerability of the existing transportation infrastructure to natural disasters. The metropolitan transportation plan may consider projects and strategies that address areas or corridors where current or projected congestion threatens the efficient functioning of key elements of the metropolitan area's transportation system.	One goal of Moving Forward 2050 is "Maximize infrastructure resiliency," and a related objective is "Improve the ability of infrastructure to respond to weather and other extreme events." The strategies described in Chapter 5, "Strategies to Move Us Forward," contain elements that address all of these requirements, such as the use of permeable pavements, sustainable road surface materials and vehicle-to-infrastructure communications. Page 101 discusses how the strategies of Moving Forward 2050 will enhance the resiliency of the region's infrastructure.
(8) Transportation and transit enhancement activities, including consideration of the role that intercity buses may play in reducing congestion, pollution, and energy consumption in a cost-effective manner and strategies and investments that preserve and enhance intercity bus systems, including systems that are privately owned and operated, and including transportation alternatives, as defined in 23 U.S.C. 101(a), and associated transit improvements, as described in 49 U.S.C. 5302(a), as appropriate;	Current regional connections to intercity bus service providers are described on page 47 of the plan. These services benefit the region by providing interregional connectivity and affordable transportation options; and also by reducing pollution and energy consumption (especially as electric bus fleets are promoted). Their role in future transportation strategies that address goals of lowering congestion, emissions and costs are detailed in the "Connections to other regions" strategy (page 72).
(9) Design concept and design scope descriptions of all existing and proposed transportation facilities in sufficient detail, regardless of funding source, in nonattainment and maintenance areas for conformity determinations under the EPA's transportation conformity regulations (40 CFR part 93, subpart A). In all areas (regardless of air quality designation), all proposed improvements shall be described in sufficient detail to develop cost estimates;	Concepts were advanced to the Federal definition of "Design Scopes" inclusive of length/project limits, number of lanes/rail tracks/vehicles, safety features (e.g., amount of guiderail, pavement, striping, etc.), and access (e.g., number and location of ramp meters, high occupancy vehicle lanes, etc.). The results of this intensive and iterative exercise are presented as the total estimated costs of constrained and illustrative projects as presented in Chapter 7 in year of expenditure dollars.
(10) A discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the metropolitan transportation plan. The discussion may focus on policies, programs, or strategies, rather than at the project level. The MPO shall develop the discussion in consultation with applicable Federal, State, and Tribal land management, wildlife, and regulatory agencies. The MPO may establish reasonable timeframes for performing this consultation;	Moving Forward 2050 specifically calls for mitigation of the impacts of freight traffic on communities; reducing transport-sector greenhouse gas emissions through strategies to reduce vehicle miles traveled; investments in Green Infrastructure, like sustainable pavement materials, trees and plants, and drainage improvements, to help reduce runoff into the region's waterways; and adapting certain transportation facilities for other purposes, like green space and trails, that provide recreational opportunities and incentives for private development while reducing unneeded pavement. The Public Engagement E-Appendix discusses the consultation process and the Environmental Justice/ Equity Analysis E-Appendix detail the environmental impacts of investments.

REGULATION	RELEVANT CONTENT IN MOVING FORWARD 2050
(11) A financial plan that demonstrates how the adopted transportation plan can be implemented.	Reasonably-expected transportation revenues over the period covered by Moving Forward 2050 are detailed in the "Data Notes on Finance" component of Chapter 7. These are grounded in historical amounts of revenues from Federal, State, and local sources, and were cooperatively developed and agreed to by member agencies.
(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, 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.	Additional funding and financing opportunities ("new funding sources") to supplement the reasonably-expected transportation revenues were identified and included in the "New way of paying for our transportation system" component of Chapter 7. Potential yields of new revenues were calculated for some of these user fee and value capture mechanisms. These opportunities are not part of the reasonably-expected transportation revenues. They will be further developed as part of the implementation of Moving Forward 2050.
(iii) The financial plan shall include recommendations on any additional financing strategies to fund projects and programs included in the metropolitan transportation plan. In the case of new of funding sources, strategies for ensuring their availability shall be identified. The financial plan may include an assessment of the appropriateness of innovative finance techniques (for example, tolling, pricing, bonding, public private partnerships, or other strategies) as revenue sources for projects in the plan.	Revenue and cost estimates are expressed in "year of expenditure dollars." As previously discussed, increases in revenues were projected based on historical changes. Costs were escalated at a 2.5 percent compounded annual growth rate (CAGR). This inflation factor was selected based on a review of CAGRs used by other MPOs in New York State and the northeast, the NYSDOT-suggested inflation factor for the most recent transportation improvement program, and actual changes in prices as reflected in multiple indices. Cost ranges/cost bands were not applied to the outer years (2028 and beyond) of Moving Forward 2050.
(iv) In developing the financial plan, the MPO shall take into account all projects and strategies proposed for funding under title 23 U.S.C., title 49 U.S.C. Chapter 53 or with other Federal funds; State assistance; local sources; and private participation. Revenue and cost estimates that support the metropolitan transportation plan must use an inflation rate(s) to reflect "year of expenditure dollars," based on reasonable financial principles and information, developed cooperatively by the MPO, State(s), and public transportation operator(s).	
(v) For the outer years of the metropolitan transportation plan (i.e., beyond the first 10 years), the financial plan may reflect aggregate cost ranges/ cost bands, as long as the future funding source(s) is reasonably expected to be available to support the projected cost ranges/cost bands.	Illustrative projects encompassing multiple modes are presented in Chapter 7 in the event that additional funding beyond reasonably-expected revenues is identified.
(vi) For nonattainment and maintenance areas, the financial plan shall address the specific financial strategies required to ensure the implementation of TCMs in the applicable SIP.	
(vii) For illustrative purposes, the financial plan may include additional projects that would be included in the adopted transportation plan if additional resources beyond those identified in the financial plan were to become available.	
(viii) In cases that the FHWA and the FTA find a metropolitan transportation plan to be fiscally constrained and a revenue source is subsequently removed or substantially reduced (i.e., by legislative or administrative actions), the FHWA and the FTA will not withdraw the original determination of fiscal constraint; however, in such cases, the FHWA and the FTA will not act on an updated or amended metropolitan transportation plan that does not reflect the changed revenue situation.	

REGULATION	RELEVANT CONTENT IN MOVING FORWARD 2050
(12) Pedestrian walkway and bicycle transportation facilities in accordance with 23 U.S.C. 217(g).	See Chapter 3, pages 48 and 49. In addition, in Chapter 5, the Smartly Enhanced Multi-modal Arterials, Route 5 and Main Street, Secondary Corridors, Smaller Cities and Villages, Rural Corridors, and Regional Cycle Network strategies all contain distinct pedestrian and bike elements. Specific projects for these strategies are presented in Chapter 7.
The metropolitan transportation plan should integrate the priorities, goals, countermeasures, strategies, or projects for the metropolitan planning area contained in the HSIP, including the SHSP required under 23 U.S.C. 148, the Public Transportation Agency Safety Plan required under 49 U.S.C. 5329(d), or an Interim Agency Safety Plan in accordance with 49 CFR part 659, as in effect until completion of the Public Transportation Agency Safety Plan, and may incorporate or reference applicable emergency relief and disaster preparedness plans and strategies and policies that support homeland security, as appropriate, to safeguard the personal security of all motorized and nonmotorized users. [23 CFR § 450.324 (h)]	The safety strategies integrated into Moving Forward 2050 are consistent with the priorities, goals, countermeasures, strategies, and projects listed in New York State's Highway Safety Improvement Plan annual report and the state's Strategic Highway Safety Plan. Specific examples include recommendations for sidewalk improvements and reconstruction of intersections near schools; pedestrian safety education in local school districts; use of vehicle-to-vehicle and vehicle-to-infrastructure communications; reconfiguration of on- and off-ramps and other operational improvements on expressways; prioritization of asset management; and rural roadway safety projects to reduce head-on collisions and wildlife-related crashes.

Compliance with the following requirements regarding public outreach and agency consultation are noted in the separate Public Engagement E-Appendix:

(g) The MPO shall consult, as appropriate, with State and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation concerning the development of the transportation plan. The consultation shall involve, as appropriate:

(1) Comparison of transportation plans with State conservation plans or maps, if available; or

(2) Comparison of transportation plans to inventories of natural or historic resources, if available.

(j) The MPO shall provide individuals, affected public agencies, representatives of public transportation employees, public ports, freight shippers, providers of freight transportation services, private providers of transportation (including intercity bus operators, employer-based commuting programs, such as carpool program, vanpool program, transit benefit program, parking cashout program, shuttle program, or telework program), representatives of users of public transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, and other interested parties with a reasonable opportunity to comment on the transportation plan using the participation plan developed under§ 450.316(a).

(k) The MPO shall publish or otherwise make readily available the metropolitan transportation plan for public review, including (to the maximum extent practicable) in electronically accessible formats and means, such as the World Wide Web

Source: Code of Federal Regulations, Chapter 23, § 450.324, "Development and content of the metropolitan transportation plan.

Moving Forward 2050 Alignment with Federal Planning Factors

Federal regulations1 require all Metropolitan Transportation Plans to address ten "planning factors" that relate to the overall Federal goals for the nation's transportation system. The table below summarizes the ways in which Moving Forward 2050 address the Federal planning factors.

PLANNING FACTOR	RELEVANT MOVING FORWARD 2050 CONTENT
(1) Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;	One component of the four-part vision in Moving Forward 2050 is: "In 2050, our economy will be globally competitive with shared prosperity that spreads economic opportunities and benefits to all residents in the region." Related goals are: • Raise the region's standard of living; • Support efficient freight movement; and • Maximize infrastructure resiliency. Moving Forward 2050 summarizes current and future economic conditions, identifies objectives and strategies to move the vision forward, and uses project evaluation criteria to demonstrate the connection between the projects in Moving Forward 2050 and the goals and objectives related to "Our Economy." Chapter 6 summarizes how specific strategies and projects support Moving Forward 2050's goals and objectives."
(2) Increase the safety of the transportation system for motorized and non-motorized users;	In Chapter 3, "Our Transportation System," the Plan summarizes current safety statistics and trends, considering both automobile crashes and collisions involving cyclists and pedestrians. In Chapter 4, under the "Our Communities" component of the Moving Forward 2050 vision, one goal is "Support healthy and safe communities through targeted transportation investment." A related objective is "Improve transportation system safety for pedestrians, cyclists, and vehicle drivers." Each of the "Strategies to Move Us Forward" in Chapter 5 of the Plan addresses impacts on safety, and Chapter 6 of Plan summarizes how strategies and project support desired safety outcomes."
(3) Increase the security of the transportation system for motorized and non-motorized users;	Moving Forward 2050 addresses security in the context of overall risk management and hazard assessment; adaptive planning; risks associated with automated and connected vehicles; and the benefits of border crossing improvements. The goal "Improve the ability of infrastructure to respond to weather and other extreme events" is linked to enhanced emergency planning and ensuring safety in case of human-made disasters.
(4) Increase accessibility and mobility of people and freight;	Moving Forward 2050 is built on One Region Forward, a Federally-recognized Regional Plan for Sustainable Development. The vision for the region's future transportation system includes "transportation that connects our region with a variety of convenient options to promote opportunity, health and safety for all." The themes of accessibility, mobility, and connectivity for people and freight permeate Moving Forward 2050. Relevant goals include: • Support efficient freight movement • Support focused growth in communities (urban, suburban and rural) • Ensure access to opportunities and services Strategies introduced in Chapter 5 and benefits discussed in Chapter 6 are linked to themes of accessibility and mobility"

PLANNING FACTOR	RELEVANT MOVING FORWARD 2050 CONTENT
(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;	The Community component of the vision in Moving Forward 2050 states: "In 2050, our communities will be brimming with opportunities, providing residents with various lifestyle choices and attracting residents, businesses, and investments from all over the world."

The Environment component of the vision in Moving Forward 2050 states: "In 2050, our environment will be ecologically healthy and easily accessible so that all residents and visitors have abundant opportunities to enjoy our region's world class waterways and open spaces."

Objectives include:

- Support target industry sectors identified by the Regional Economy Development Council (Advanced Manufacturing, Agriculture, Bi-national Logistics, Energy, Health/Life Sciences, Higher Education, Professional Services, Tourism)
- Improve freight fuel efficiency
- Maximize investments in community centers
- Increase multi-modal access to neighborhood services
- Improve equitable access to employment centers
- Improve equitable access to educational institutions
- Minimize local governments' infrastructure costs and maximize benefits from infrastructure investments
- Reduce negative impacts of local transportation on region's air quality
- Increase diversity and sustainability of energy supply system for transportation uses
- Maximize region's watershed quality
- Improve public access to parks, greenways, and waterfronts
- Reduce transportation infrastructure land use

The transportation strategies prioritized in Moving Forward 2050 have been selected using criteria that are tied to these goals and objectives. Chapter 6 shows how specific strategies and projects support the goals and objectives."

PLANNING FACTOR	RELEVANT MOVING FORWARD 2050 CONTENT

(6) Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;	"The vision for the region's future transportation system includes "transportation that connects our region with a variety of convenient options to promote opportunity, health and safety for all."
	
	The themes of accessibility, mobility, and connectivity for people and freight permeate Moving Forward 2050. Relevant goals include:
	  Support efficient freight movement
	  Support focused growth in communities (urban, suburban and rural)
	  Ensure access to opportunities and services
	
	Strategies in Moving Forward 2050 have been selected to support the following objectives related to the economy:
	  Improve connectivity in the Greater Golden Horseshoe (an international metropolitan area stretching from Rochester to Toronto)
	  Improve capacity and modal options for passenger ground transportation to adjacent megaregions
	  Support capacity and access for Inland Port Distribution
	
	Finally, the region's vision for Innovation in transportation includes the following goal: "Create a fully integrated and seamless transportation environment." Objectives related to innovation include:
	  Fully build out a system of connected corridors throughout the region
	  Establish a Smart Ecosystem of data acquisition and management for transportation efficiency
	  Create a robust Mobility Marketplace that assures mobility on demand and integrates delivery technology
	  Create and deploy new models of transportation finance and project delivery
	
	Chapter 6 shows how strategies and projects support these goals and objectives."

(7) Promote efficient system management and operation;	The strategies discussed in Chapter 5 all emphasize use transportation system management and operations elements to maximize efficiency. The Next Generation Freeway System, for example, includes use of 'technology and innovative transportation management strategies." Likewise, "Smartly Enhanced Multi-modal Arterials," or SEMAs, are envisioned to incorporate signal coordination and transit signal priority, vehicle-to-infrastructure technologies, and innovative uses of infrastructure to match demand for moving people and freight throughout the day..
(8) Emphasize the preservation of the existing transportation system;	Chapter 3 of Moving Forward 2050 includes an assessment of the current condition of the regional transportation system, including roadway pavement, bridges, and transit assets. The financial plan assumes that New York State Department of Transportation and local governments continue to invest in infrastructure maintenance, repair, rehabilitation, and replacement as needed to ensure the region meets its targets for preservation and state of good repair. Specific strategies in Moving Forward 2050 assume the use of advanced pavement materials and promotes investments focused on areas of the region with existing infrastructure.
(9) Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation; and	Moving Forward 2050 recommends the use of permeable pavement where possible. One goal is to "improve the ability of infrastructure to respond to weather and other extreme events."
(10) Enhance travel and tourism.	Tourism is one of the industry sectors targeted by the Regional Economic Development Council. Moving Forward 2050 investments, such as those focused on connectivity in the Greater Golden Horseshoe, improved border crossings, and improving public access to parks, greenways, and waterfronts, are targeted toward tourism.

Risk management

This section provides an initial risk management framework to address and manage the risks related to Moving Forward 2050's success. This framework will later serve as the foundation for a risk management mechanism for GBNRTC and project partners.

Potential risks are organized around six categories. Based on best practices and current knowledge, each risk is assigned a value (low-medium-high) for its likelihood to occur, and its impact if it were to occur. These values are then given numerical scores (low=1, medium=2, high=3). To help prioritize risk management efforts, a final risk score is calculated by multiplying likelihood and impact. Preliminary risk management actions are identified for each potential risk, along with indicators to help monitor how close we are to an event's occurrence.

Part of Moving Forward 2050's implementation will involve creating a risk management mechanism to monitor and take action in regards to potential risks. This mechanism will be regularly updated to incorporate new risks.

Potential Risk	Likelihood	Impact	Risk Score	Risk Management Actions	What to Monitor
TECHNOLOGICAL					
Low level of AV market penetration (due to lack of consumer trust, technology not yet available)	M	H	6	"Support AV testing in the region to improve technology and consumer trust Continue to support other transportation modes (transit, car and bike share, EV, CV) "	% AV in regional vehicle fleet
Unequal access to transportation network companies (TNCs) across the region (particularly in rural areas)	M	H	6	Support local organizations and municipalities (especially in rural areas) in partnering with TNCs	Availability of TNCs in rural, suburban and urban areas
Limited publicly available data	L	H	3	"Support regulations to require access to TNC and other privately held data (via third party) Support/develop regional data management entity "	Implementation of data sharing regulations across the region
Limited high-speed internet access in rural areas	M	H	3	Continue to support local government efforts to bring high-speed internet access to rural areas	% households with high-speed internet access in rural, suburban and urban areas
DEMOGRAPHIC					
Regional population does not match projections	M	H	6	"Make strategic transportation investments that will retain and attract residents Review MTP strategies, revise as needed "	Regional population
Regional employment does not match projections	M	H	6	"Make strategic transportation investments that will retain and attract businesses Review MTP strategies, revise as needed "	Regional employment
Sprawl continues	H	H	9	"Support local smart growth efforts Invest in existing infrastructure to support focused growth "	Development patterns (land use change, new infrastructure)
Workplace location and/or behavior significantly changes (more teleworking, gig economy)	M	M	4	Review MTP strategies, revise as needed	% change in teleworking, freelance employment
Future traffic does not match projections	M	M	4	Review MTP strategies, revise as needed	Regional traffic counts

Potential Risk	Likelihood	Impact	Risk Score	Risk Management Actions	What to Monitor
FINANCIAL					
Insufficient funding for projects	H	H	9	Develop new funding partnerships across jurisdictions, agencies and sectors Support new value capture options	"Funding opportunities Best practices from other cities and regions "
ECONOMIC					
Energy availability and costs significantly fluctuate	M	M	4	Support multi-modal options and diverse fuel sources (EV, CNG)	"Energy supply Energy prices "
Cross-border trade and travel significantly fluctuates	L	H	3	Make strategic transportation investments that strengthen domestic commerce and tourism Review MTP strategies, revise as needed	"Canadian economic conditions Cross-border freight Cross-border visitors"
ECONOMIC					
US or Canadian policy precludes the development of "borderless" crossings	M	M	4	Make strategic transportation investments that strengthen domestic commerce and tourism Review MTP strategies, revise as needed	US and Canadian policies
Regulations limit AV use in NY State	L	H	3	Advocate for AV use in NY State Continue to support other transportation modes (transit, car and bike share, EV, CV) Review MTP strategies, revise as needed	NY State AV regulations
Limited planning and implementation capacity in local governments	H	H	9	Support/provide training and technical assistance (potentially via a regional entity)	"Number of planning staff in local governments Number of local governments asking for assistance Number of local governments applying for funding"
Changes to municipal land use, zoning and parking requirements are slow to occur	H	H	9	Support/provide training and technical assistance (potentially via a regional entity)	Land use, zoning and parking requirements across region
Lack of agency/jurisdictional consensus and cooperation on projects	H	H	9	Support/provide training and technical assistance (potentially via a regional entity) Support multi-jurisdictional pilot projects to show proof of concept	Number of projects with multiple partners
Lack of public support for projects	M	H	6	Engage the public and other stakeholders early and often Utilize multiple methods of engagement Use GBNRTC's Public Participation Plan as guidance	"News reports Social media comments Comments at public meetings Number of meetings with stakeholders"
OTHER EXTERNAL FACTORS					
Catastrophic event (e.g., terrorism, earthquake, storm) destroys infrastructure	M	H	6	Work with experts and local partners to develop security and resiliency plans	"Post-event actions in other locations Best practices research Results of local simulations/drills (computer and real-life)"

Potential Risk	Likelihood	Impact	Risk Score	Risk Management Actions	What to Monitor
Climate change: adverse effects of weather, more frequent major weather events	H	M	6	Work with experts and local partners to develop resiliency plans	"Weather forecasts Post-event actions in other locations Best practices research Results of local simulations/drills (computer and real-life)"
Design issues delay projects	H	H	9	Carefully define project scope	Project schedule
Vehicle ownership model does not change to more shared use	M	H	6	Continue efforts to promote shared use (e.g., transportation management associations, GO Buffalo Niagara) Support TNC, bike and car share partnerships with transit agencies"	"% change in households owning a vehicle % change in use of shared mobility options "
Financial constraints of traditional public transit operations continue	M	H	6	Support NFTA's strategic planning process Support partnerships between TNCs and NFTA and other public transportation providers Invest in infrastructure to facilitate fast and frequent transit service "	"NFTA strategic planning process NFTA financial reports"
Air quality regulations become more strict	M	M	4	Support alternative fuel charging stations Promote multi-modal and active transportation options Support focused growth to reduce trips Promote shared use mobility options	Air quality regulations

Data Sources and Notes

CHAPTER 2

OUR ECONOMY

New Private Sector Jobs Since 2009

UBRI analysis of U.S. Census Bureau, Longitudinal Employer-Household Dynamics Program, "LEHD Origin-Destination Employment Statistics (LODES): Workplace Area Characteristics," 2009 and 2014. Map illustrates spatial patterns of private sector employment change from 2009 to 2014. LODES data provides the annual average number of private sector jobs within each census block. ArcGIS software is used to calculate the change in employment per census block and produce the map shown.

% Change in Private Sector Jobs in Buffalo Niagara, 1990 – 2015

U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 1990-2015. Chart shows the overall percentage change in annual average private sector employment over five-year intervals for the Buffalo-Niagara Falls Metropolitan Statistical Area.

Average annual cost to own a car

Average annual costs of vehicle ownership from American Automobile Association's "Your Driving Costs," 2015. Accessed September, 2016 at http://exchange.aaa.com/wp-content/uploads/2015/04/Your-Driving-Costs-2015.pdf $8,698 represents the estimated annual average cost of owning and operating a sedan and includes the costs of fuel, maintenance, tires, insurance, fees, depreciation and financing. This number is expressed as a percentage of the federal poverty guideline for a family of four in 2015 (from U.S. Department of Health & Human Services at https://aspe.hhs.gov/2015-poverty-guidelines) and the regional median household income (American Community Survey, 5-year estimates, 2011-2015).

New Roads Built, 1990-2010

University at Buffalo Regional Institute, Independent analysis using U.S. Census Bureau TIGER\Line Roads Data, 1990 and 2010. Cost estimate from NYS Office of the State Comptroller, 2011, Local Government Snapshot: Local Government Spending on Highways. Accessed January, 2013 at www.osc.state.ny.us/localgov/pubs/research/snapshot/highwayspending.pdf

Spatial roads data for the years 1990 and 2010 was retrieved from the U.S. Census Bureau for the region. All road segments from the 2010 file that fell outside of 100 feet of roads in 1990 were selected. These road segments were compared with the 1990 roads layer, on a segment by segment basis, ensuring that all previously existing roads were excluded from the estimate of new roads. The feature class codes assigned to each road segment by the U.S. Census Bureau were used to determine the number of lanes in each segment of new road. Then, the aggregate lane miles of road constructed since 1990 within the two-county region was calculated using ArcGIS software. These totals were multiplied by county figures of the average annual road maintenance cost per lane-mile from the The New York State Comptroller's Office, "Local Government Snapshot: Local Government Spending on Highways" report (2011). These

maintenance costs are based on expenditure data reported by local governments to the Comptroller's Office for the 2009 fiscal year and include physical maintenance of the road surfaces, as well as costs related to snow plowing, street sweeping, street lighting, etc...

Annual transit trips decline, 1991 to 2015

Niagara Frontier Transportation Authority, Fixed Route Ridership, 1991-2016. Total annual number of system riders (both bus and metro rail) fell from 31,897,378 in 1991 to 26,122,148 in 2015. Numbers do not include paratransit services.

Western New York REDC Target Industry Businesses Map

InfoGroup, ReferenceUSA Business Database, 2017. Target industry firms are selected by the NAICS code they are primarily associated with (Advanced Manufacturing = 31-33; Agriculture = 11; Professional Services = 52, 53, 54, 55, 56; Energy = 21, 22; Life & Health Sciences = 621, 622, 623; Tourism = 71, 72; Transportation & Logistics = 48) and mapped based on employment levels given by ReferenceUSA.

The Greater Golden Horseshoe Population Density Map

U.S. Census Bureau, American Community Survey, 5-year estimates, 2015; Statistics Canada, 2011 Census of Population. ArcGIS software is used to plot the estimated total population by block group in the U.S. (ACS, 2015) and the total population by dissemination area in Canada (Statistics Canada, 2011).

OUR COMMUNITIES

Change in Young Adult Population (Age 20-34), 2010-2015

U.S. Census Bureau, 2010 Census; American Community Survey, 1-year estimates, 2015. Chart shows percentage change in population age 20 to 34 from 1990 to 2015 for the Buffalo-Niagara Falls MSA, New York State and the U.S.

Places that lost population from 1990-2010 but grew from 2010 to 2015

U.S. Census, 1990, 2010; American Community Survey, 5-year estimates, 2015. Map highlights census tracts where the total population in 2010 was less than the population in 1990 but greater than the population in 2010.

Walkable communities are from a UBRI analysis of walkability for "Local IMPACT: Strategies to Promote Mobility," 2016. Walkability scoring is similar to that employed by Duncan, Aldstadt, Whalen, Melly, and Gortmaker in "Validation of Walk Score® for estimating neighborhood walkability: an analysis of four U.S. metropolitan areas." International journal of environmental research and public health 8, no. 11 (2011). Scores are based on location of amenities that research has found to be drivers of walking and applies a weighting scheme based on proximity and amenity type where amenities that are closer and better drivers of walking score higher. For detailed methods, see "Local IMPACT: Strategies to Promote Mobility," 2016 at http://regional-institute.buffalo.edu/wp-content/uploads/sites/3/2017/02/LocalImpactActionPlan_FINAL2017_Spreads.pdf

More seniors with mobility concerns

U.S. Census Bureau, American Community Survey, 1-year estimates, 2016. 2016 population estimates for the Buffalo-Niagara Falls MSA show 279,293 residents over the age of 60, or 24.7% of the total regional population. By comparison, 21.3% of the national population is over 60 years old.

OUR ENVIRONMENT

We're driving more

U.S. Census Bureau, 1990 Census; American Community Survey, 1-year estimates, 2015. Estimates of the number of household vehicles in the region show an increase from 680,478 in 1990 to 714, 266 in 2015, compared to a decline in population (from 1,189,288 in 1990 to 1,135,230 in 2015).

Vehicle Miles Traveled Daily per Capita, 1970 vs 2016

Greater Buffalo Niagara Regional Transportation Council, 2017; U.S. Census, 1970; American Community Survey, 1-year estimates, 2016. Data on daily vehicle miles traveled in the Buffalo-Niagara Falls MSA from the Greater Buffalo Niagara Regional Transportation Council is divided by the total regional population from the 1970 Census and the ACS, 1-year estimates, 2016 for the corresponding years.

Buffalo Niagara GHG Emissions by Source, 2012

Ecology and Environment, Inc. Cleaner, Greener Communities Western New York Regional Tier II Greenhouse Gas Inventory, 2012. Transportation emissions include those from on-road and off-road vehicles, as well as air, marine and rail transportation. "Other" includes GHG emissions from agriculture, waste management, energy generation and distribution, and Ozone depleting substances.

Neighborhoods with greater traffic volumes have higher asthma rates

UBRI analysis of data from the U.S. Environmental Protection Agency, Environmental Justice Screen (EJScreen) Database, 2015; and NYS Department of Health, Asthma Emergency Department Visits ZIP Code Data, 2012-2014. Census tracts that contain block groups with higher than national average traffic volumes and proximity (EPA, 2015) are selected. ZIP code data on the number of visits to emergency rooms due to asthma (NYS DOH, 2012-2014) and population (ACS, 2014) are transferred to census tracts using the HUD-USPS ZIP Code Crosswalk File (Quarter 3, 2013) to calculate annual asthma visits per 10,000 population in neighborhoods with above average traffic proximity and volumes. Calculation is repeated for areas with below average traffic volumes and proximity.

Homes and Roads Built on Important Natural Areas, 1990 to 2010

UBRI analysis of data from the U.S. Census Bureau, TIGER\Line Roads, 1990 and 2010; NYS Office of Real Property Services, 2010; U.S. Geological Survey, National Land Cover Dataset, 2011; U.S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS), Soil Survey Geographic (SSURGO)

Database; and Federal Emergency Management Agency (FEMA), Flood Insurance Rate Maps, 2012. Residential structures built after 1990 were selected by attribute information in the Real Property Data. ArcGIS software was used to count the number of these parcels that intersected: (1) areas classified as "Prime farmland" or "Prime farmland if drained" by USDA-NRCS, SSURGO data, (2) 100-year floodplains delineated by FEMA (1996), and (3) areas classified as being forests or wetlands in 1992 by the USGS National Land Cover Dataset. Roads built from 1990 to 2010 were found through an analysis of data from the U.S. Census Bureau (see notes for "New Roads Built, 1990-2010" in "Our Economy" section). ArcGIS software was used to calculate the total miles of road within the environmental areas listed.

Miles of bike lanes/routes and multi-use trails built since 2001

Greater Buffalo Niagara Regional Transportation Council, 2017. GBNRTC records bi-annual data on aggregate length of multi-use trails and designated bike ways in Buffalo Niagara region. Bike lanes and routes include designated lanes and marked shared lanes, or "sharrows" and NYS Bicycle Routes.

Alternative Fueling Stations in Buffalo Niagara, 2011 and 2017

U.S. Bureau of Transportation Statistics, National Transportation Atlas Database, 2011 and 2017. Alternative fueling stations include biodiesel, compressed natural gas, ethanol, hydrogen, liquefied natural gas, liquefied petroleum gas and electric charging stations.

Reactivated sites and trails along major waterways

New York State Department of Environmental Conservation, Remediated Site Borders, 2016. Data includes mapped site borders for environmental remediation sites managed by DEC - the State Superfund, Environmental Restoration, Brownfield Cleanup and Voluntary Cleanup Programs. Greater Buffalo Niagara Regional Transportation Council, Bike lanes, routes and multi-use trails, 2017; U.S. Geological Survey, National Hydrography Dataset, 2016.

CHAPTER 3

OUR TRANSPORTATION SYSTEM

Total Passenger Vehicles on Roadways per Day, Annual Averages, 2015

Greater Buffalo Niagara Regional Transportation Council; New York State Department of Transportation, Average Annualized Daily Traffic Volumes, 2015.

Population vs. Vehicle Miles Traveled in Buffalo Niagara, 1996-2016

Greater Buffalo Niagara Regional Transportation Council, Annual Vehicle Miles Traveled in Buffalo Niagara, 1990-2016; U.S. Census Bureau, Intercensal County Population Estimates, 1990-1999 and 2000-2010; Annual Population Estimates for Metropolitan Statistical Areas, 2010-2016. Census population figures used for 2000 and 2010 represent the population count as of April 1 of a given year. The intercensal population estimates represent the population as of July 1 for each year.

Major Roadway Performance by Capacity Level of Service, 2016

Greater Buffalo Niagara Regional Transportation Council, Roadway Capacity Level of Service and Deficiencies, 2017. Capacity level of service and deficiencies are calculated by GBNRTC using peak traffic volume data from NYS DoT. Roads with traffic volumes that approach or reach road's capacity are calculated as level of service D; roads where volumes exceed road's capacity are a level of service E or F, as defined by the U.S. Transportation Research Board's Highway Capacity Manual.

2015 Surface Scores on Roadways Eligible for Federal Aid

Greater Buffalo Niagara Regional Transportation Council; New York State Department of Transportation, Pavement Data and Roadway Surface Scores, 2017. Pavement conditions are scored on a 1 to 10 scale by conducting driving surveys and visual inspections of area roadways (where roads scored 1-5="Poor"; 6 ="Fair"; 7-8="Good"; 9-10="Excellent"). Local roads primarily includes county-operated roads that are not eligible for federal aid. The majority of roads operatedby municipalities are not scored by the GBNRTC. For 2011, surface scores of local roads were estimated using the 2009 and 2013 figures, as the reporting of road surface scores in 2011 was inconsistent with other years.

% of Roadways with Surfaces in Good or Excellent Condition by Funding Source, Buffalo Niagara, 2015

Ibid.

Average Wait Times at Stops along Public Transit Routes

Cambridge Systematics Analysis of Service Route data from Niagara Frontier Transportation Authority, 2017. Wait times represent the average time between buses or trains arriving at stops along each route during peak hours (6-9am and 3-6pm on weekdays).

Total Annual Passengers on NFTA System, 1991-2016

Niagara Frontier Transportation Authority, Annual Ridership Data, 1991-2016.

Miles of Bikeways in Buffalo Niagara, 2001-2016

Greater Buffalo Niagara Regional Transportation Council, 2017. GBNRTC records bi-annual data on aggregate length of multi-use trails and designated bike ways in Buffalo Niagara region. Bike lanes and routes include designated lanes and marked shared lanes, or "sharrows," and NYS Bicycle Routes.

Bikeways in Buffalo Niagara

Greater Buffalo Niagara Regional Transportation Council, Bike lanes, routes and multi-use trails, 2017.

Sidewalks and curb ramps inaccessible to people with disabilities

New York State Department of Transportation, Americans with Disabilities Act Draft Transition Plan, ADA Inventory Summary, "Table 1: NYSDOT Curb Ramp Accessibility by Region, by County, as of 2014," 2016. Regional figures are calculated using data for Erie and Niagara counties.

Total Freight Value in Buffalo Niagara by Mode, 2015 and 2045 (Projected)

Center for Transportation Analysis, Freight Analysis Framework v4.4, 2017. Includes foreign and domestic freight imported into the Buffalo Niagara region, exported from the region and shipped within the region from local suppliers to local customers. "All Other" includes freight moved by air, water, pipeline, mail, multiple modes and unknown modes.

Total Value of Freight In Buffalo Niagara, 2015 And 2045 (Projected)

Center for Transportation Analysis, Freight Analysis Framework v4.4, 2017. Includes all foreign and domestic freight shipped by any mode.

Total Commercial Trucks on Roadways per Day, Annual Averages, 2015

Greater Buffalo Niagara Regional Transportation Council; New York State Department of Transportation, Average Annualized Daily Traffic Volumes, 2015.

Buffalo Niagara Freight System, 2017

Greater Buffalo Niagara Regional Transportation Council, Intermodal Terminal Facilities; International Bridges, 2017; New York State Department of Transportation, Active Rail Lines, 2017.

Differences in Commute Times by Commute Mode, Buffalo Niagara, 2015

U.S. Census Bureau, American Community Survey, 5-year estimates, 2011-2015. Numbers do not add to 100% due to rounding and workers who work at home, which make up 2.5% of workers in the region. Average commute times calculated by dividing aggregate commute times by the total number of workers 16 years and over commuting by these modes, for both automobile and non-automobile modes. "Other" modes include taxicab and motorcycle.

Number of Automobile Collisions (Average, 2014-2016)

New York State Department of Motor Vehicles, Accident Information System, 2009-2016. Retrieved September 2017 from the University at Albany's Institute for Traffic Safety Management and Research (ITSMR) at https://www.itsmr.org/ Annual data used to calculate a 3-year average of automobile collisions per day and per year.

Number of Collisions Involving Bicyclists and Pedestrians (Average, 2014-2016)

Ibid.

Local Government Spending on Transportation Related Costs, 1995 And 2015

UBRI analysis of data from the NYS Office of the State Comptroller, Local Government Finance Data, 1995 and 2015. Transportation related costs include direct expenditures (excluding intergovernmental exchanges) from county, municipal governments and school districts in Erie and Niagara counties on transportation infrastructure (highways, airports, rail service, waterways, ancillary and miscellaneous transportation costs, such as street lighting, sidewalks, off-street parking, and street cleaning), public transportation (bus service, transportation facilities) and education transportation (school buses). 2015 data is preliminary as the NYS Office of the State Comptroller updates local government finance data on a quarterly basis for five years after initial release. Figures for 1995 are adjusted for inflation to 2015 dollars using the U.S. Bureau of Labor Statistics, Consumer Price Index. Per capita costs are calculated using figures from the U.S. Census Bureau, Intercensal County Population Estimates, 1995 and the American Community Survey, 1-year estimates, 2015.

CHAPTER 6

HOW OUR STRATEGIES MEET OUR OBJECTIVES

New Mobility & Transit

By improving worker access to job centers with multiple modes and new transportation services, enhancing freight movement, and promoting investments in targeted areas while limiting the costs of system maintenance, new mobility will benefit our economy.

New mobility can revitalize communities by reconnecting residents to opportunities with multiple modes of transportation. Technological advances will improve safety and increase mobility for the elderly and people with disabilities. Strategic reinvestments will improve walkability, transit access, and bike infrastructure to keep communities active and healthy.

By improving access to multiple modes of transportation, and shifting to electric vehicles, new mobility will reduce private vehicle ownership, which would limit greenhouse gas emissions. It would also increase access to parks and may free up land for green space as autonomous vehicles are expected to require fewer parking spaces.

Innovation is at the heart of new mobility. Technology is used to integrate transportation modes, improve available options, and create a more reliable transportation network. New mobility also relies new partnerships to help finance and manage these initiatives.

Our Regional Highway System

Incorporating technology upgrades on the region's highway system will make travel more efficient and cost-effective, expanding access to jobs and making people and businesses more productive. Enhancing our connections to other regions, particularly by making the flow of freight across the border more efficient, will increase trade, help grow local businesses and bring new employment and workforce development opportunities to the region.

Leveraging vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications on expressways will improve transportation safety and efficiency, and enhance access to employment, education and other opportunities for all residents, particularly in rural and suburban communities. Promoting autonomous vehicles by adding dedicated lanes and V2I communications will improve transportation safety and efficiency while improving the flow of traffic and enhancing access to opportunities.

Technology upgrades to improve the flow of traffic on the regional highway system will decrease congestion and the environmental impacts of transportation. Adding dedicated lanes and charging stations will promote the use of autonomous and electric vehicles to further reduce fossil fuel use and improve air quality. Applying innovative, sustainable materials for road surfaces will minimize stormwater runoff.

Technology advances are expected to facilitate better flow of vehicle traffic through dynamic routing, lane management, and border clearance. The region's highway system relies on technological innovation to make transportation highways more efficient, safe and cost-effective. Communications technology will

allow vehicles to communicate to one another and relay traffic information back to integrated transportation management systems. Innovative traffic management strategies like variable speed limits and ramp-metering will also improve travel on the highway system. Trucks will likely become the first autonomous fleet, allowing more efficient flow of freight into and out of the region. Creating a strong bi-national border requires innovative partnerships and governance arrangements to facilitate the efficient movement of people and goods.

Smart Enhanced Multi-modal Arterials

Focusing investments in key areas along major corridors will maximize revenues for local governments while limiting new infrastructure costs.

Linking reliable transportation options along major corridors will enable multi-modal trip planning and expand access to opportunities while promoting revitalization of key areas.

Adding electric vehicle charging stations, limiting congestion and promoting alternatives to personal vehicle ownership can limit transportation's impact on the environment and air quality.

SEMAs will integrate existing and emerging technologies to create a seamless system for safely navigating between various transportation modes. SEMAs will also transform existing right-of-ways to create a sense of place and spur investment in key corridors to strengthen the region.

Secondary Corridors

Focusing investments in key locations along corridors will maximize revenues for local governments while limiting new infrastructure costs.

Concentrating development along key locations of corridors will revitalize and strengthen communities. Adding bike lanes and pedestrian amenities can make communities more active and healthy.

By reducing or repurposing excess road capacity, adding electric vehicle charging stations and amenities for bicycles and pedestrians, secondary multi-modal corridors improve our environment.

Innovative retrofits of secondary arterials can create flexible use of the right-of-way. In off peak times, parts of the right of way may be used to create a sense of place through the programming of festivals, farmer's markets or other community events.

Rural Roadways

Upgrading rural roadways to better accommodate commercial farming vehicles will support agriculture and other target sectors. Streetscape improvements at key rural centers can spur reinvestment with potential spin-off benefits for local businesses.

Connecting rural communities with multiple transportation options, through bike trails, bike sharing, TNCs, car sharing and more, will enhance mobility and improve access to services, employment and other opportunities while increasing safety on roadways.

Promoting alternative transportation options in rural communities can reduce the need for personal vehicle ownership, which would limit the environmental impacts of our

transportation system. Applying innovative, sustainable materials on road surfaces in rural areas will also reduce stormwater runoff.

This strategy encourages innovation in the ways rural communities design, finance and apply new technologies and services to accommodate heavier vehicles and develop safe and appealing networks for bicycling and walking, where possible. Creating a multi-modal environment in rural communities also gets us closer to a more integrated and seamless transportation environment.

Regional Cycle Network

Expanding and upgrading the regional cycle network will increase multi-modal access to employment centers and support tourism by providing abundant recreational opportunities that connect with tourist destinations on both sides of the border.

A modernized, safe and convenient regional cycle network bolsters communities throughout the region by enhancing multi-modal access to employment, services and recreational opportunities. Linking bikes with other modes and services at mobility hubs could also spur reinvestment in key centers of urban, suburban and rural communities.

Supporting bicycling with improvements to the regional cycle network, like electric bike charging stations, and connections with other modes can reduce the use of motorized vehicles and limit greenhouse gas emissions. This would also increase access to parks and recreational opportunities thereby promoting active, healthy lifestyles.

The regional cycle network relies on innovation in technology and in intergovernmental collaboration. This strategy will depend on innovative infrastructure improvements, partnerships and financing to develop safe and appealing networks for bicycling throughout urban, suburban and rural communities. Universal bicycle access also gets us closer to our goal of having a more integrated and seamless transportation environment.

Future Freight Network

A modernized and diversified freight network will improve the flow of goods and bolster our economy, particularly by improving exports and increasing the amount of cargo and containers processed in the region. Making transportation more cost effective will allow people and businesses to be more productive, which will support all industries in the region, including REDC target sectors, and increase Gross Regional Product. Improving the local business climate could also create spin-off economic benefits for our communities. Reducing border delays and promoting alternative fuels would improve fuel efficiency and reduce the environmental impact of our freight network.

Technology advances are expected to facilitate better flow of vehicle traffic through dynamic routing, lane management, and border clearance. Trucks will likely become the first AV fleet, facilitating efficient flow of freight in and out of the region. Creating robust and secure bi-national bridges requires innovative partnerships and governance arrangements to facilitate safe and efficient movement of people and goods across the border.

HOW WE'LL MEASURE OUR PROGRESS

Project Evaluation Performance Measures

As part of Moving Forward 2050's implementation using performance-based planning, projects will be evaluated and selected based on their estimated ability to meet the plan's goals and objectives. The list below includes some potential performance measures for this evaluation process.

One Region Forward indicators are marked with an asterisk.

OUR ECONOMY

INCREASE employment in a Regional Economic Development Council target sector

INCREASE Gross Regional Product

INCREASE in return-on-investment (ROI) of local governments*

DECREASE freight delays

INCREASE freight fuel efficiency

OUR COMMUNITIES

DECREASE in commuting time for alternative transportation modes*

DECREASE in travel time to educational institutions

DECREASE in travel time to employment centers (by different modes, comparing communities of concern to rest of population)

INCREASE in dedicated bike paths, shared bike lanes and multi-use/ recreational trails

OUR ENVIRONMENT

DECREASE vehicle miles traveled (VMT) per capita*

INCREASE the number of electric vehicle charging stations

DECREASE the area of impervious surfaces

INCREASE in share of residents with access to public parks and recreation areas (by different modes, and compare communities of concern vs. rest of population)*

DECREASE the number of lane miles with underutilized, excess road capacity in the region

INCREASE the number of lane miles that utilize resilient paving materials

INCREASE the ability of infrastructure to respond to weather and other extreme events

INNOVATION

INCREASE lane miles of connected corridors

INCREASE the acquisition and availability of data

INCREASE options for on-demand mobility with integrated technology

INCREASE the use of new models of finance

INCREASE the use of new models of implementation and project delivery

CHAPTER 7

HOW WE'LL MAKE IT ALL HAPPEN

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CHAPTER 7
DATA NOTES ON FINANCE

DATE	*Revised* March 23, 2018
TO	GBNRTC *MTP 2050* Project Team
FROM	Richard Perrin, AICP
REGARDING	Financial Plan Revenue Projections

This memo provides the proposed projections of reasonably-expected transportation revenues in Buffalo Niagara through 2050 along with descriptions of how they were developed consistent with the relevant portions of Chapter 23 Part 450.324 (11) of the *Code of Federal Regulations.* The key elements of the financial plan projections for the *MTP 2050* include:

- The projections represent a realistic estimate of reasonably-expected revenues to be programmed to surface transportation (e.g., highway, bridge, transit, bicycle, pedestrian, and air quality improvement) projects and programs by the Greater Buffalo Niagara Regional Transportation Council (GBNRTC) from Federal Fiscal Year (FFY) 2018 through FFY 2050. The projections are neither conservative nor liberal, representing to the maximum extent practical (given available data) probable future funding levels.

- The projections were calculated using base year amounts provided by GBNRTC with two exceptions where amounts were not provided: federal highway funds that are programmed to projects selected by New York State ("Federal State-Selected Highway and Bridge") and state highway funds from the Dedicated Highway and Bridge Trust Fund that are programmed to projects selected by New York State ("State Dedicated Highway and Bridge to NYSDOT"). All projections are presented in year of expenditure (YOE) dollars.

- The recognition that there is a strong national interest in a safe, efficient, and reliable surface transportation system is reconciled with the reluctance of the current Administration and Congress to increase surface transportation revenues by projecting nearly flat levels of federal highway and transit funding through the next authorization beginning in Federal Fiscal Year (FFY) 2022 (i.e., the successor to the Fixing America's Surface Transportation Act) and then applying actual changes in apportionments over the last 20 years through the remainder of the plan to FFY 2050.

- State and local funds are expected to grow at a slower rate than federal funds with moderate infusions of extra funds every 10 to 15 years consistent with the Rebuild and Renew New York Transportation Bond Act of 2005 and the recent BRIDGE NY and PAVE NY programs, increases in state transit capital appropriations, and the Public Transportation Modernization and Enhancement Program that were included in the State Fiscal Year 2016-2017 budget.

- Local revenues from new value capture or user fees are not included as federal regulations state that "[t]he financial plan may include an assessment of the appropriateness of innovative finance techniques (for example, tolling, pricing, bonding, public private partnerships, or other strategies) as revenue sources for projects in the plan" as these "projects" have not yet been identified. The exception is the light rail extension, which could serve as the basis for raising revenues via value capture.

- The total amount of reasonably-expected revenues from all existing sources (federal, state, and local) is projected to be $10.249 billion between FFY 2018 and FFY 2050.

MTP 2050 Financial Plan

(Millions of Matched YOE Dollars)

Reasonably-Expected Revenues	Near-Term (FFYs 2018-2030)	Mid-Term (FFYs 2031-2040)	Long-Term (FFYs 2041-2050)	Full MTP 2050 (FFYs 2018-2030)
Federal				
Regionally-Allocated Highway and Bridge				
National Highway System	*$470.49*	*$479.38*	*$525.46*	*$1,475.33*
Highway Flexible	*$215.31*	*$219.38*	*$240.47*	*$675.16*
Safety	*$47.85*	*$48.75*	*$53.44*	*$150.04*
Non-Motorized/Air Quality	*$63.80*	*$65.00*	*$71.25*	*$200.05*
State-Selected Highway and Bridge	$160.03	$163.05	$178.73	$501.81
State-Selected HSIP	$28.91	$29.45	$32.29	$90.65
Directly-Apportioned Transit	$465.87	$574.14	$708.44	$1,748.45
Discretionary				
Multimodal	*$112.45*	*$108.62*	*$137.69*	*$358.76*
Transit *	*$600.00*	*$0.00*	*$0.00*	*$600.00*
Federal Total	**$2,164.71**	**$1,687.77**	**$1,947.77**	**$5,800.25**
State				
Dedicated Highway and Bridge to NYSDOT	$102.03	$87.75	$90.96	$280.74
Formula Highway and Bridge to Localities	$270.16	$192.45	$250.58	$713.19
Formula Transit	$110.95	$70.38	$87.12	$268.45
Thruway Contribution	$716.36	$479.00	$503.49	$1,698.85
Transit Discretionary - Capital Match *	$300.00	$0.00	$0.00	$300.00
State Total	**$1,499.50**	**$829.58**	**$932.15**	**$3,261.23**
Local				
Highway	$160.77	$130.96	$137.66	$429.39
Transit	$58.28	$47.47	$49.90	$155.65
Local Total	**$219.05**	**$178.43**	**$187.56**	**$585.04**
Non-Transportation (Federal, State, & Local) *	$407.61	$92.78	$102.49	$602.88
Full MTP 2050	**$4,290.86**	**$2,788.57**	**$3,169.97**	**$10,249.39**

Note: Allocated Revenues are for MPO area only, Erie and Niagara Counties

*Assumptions for $1.2B Amherst-Buffalo LRT Extension include $600M Federal New Starts; $300M State match; $300M local match various sources
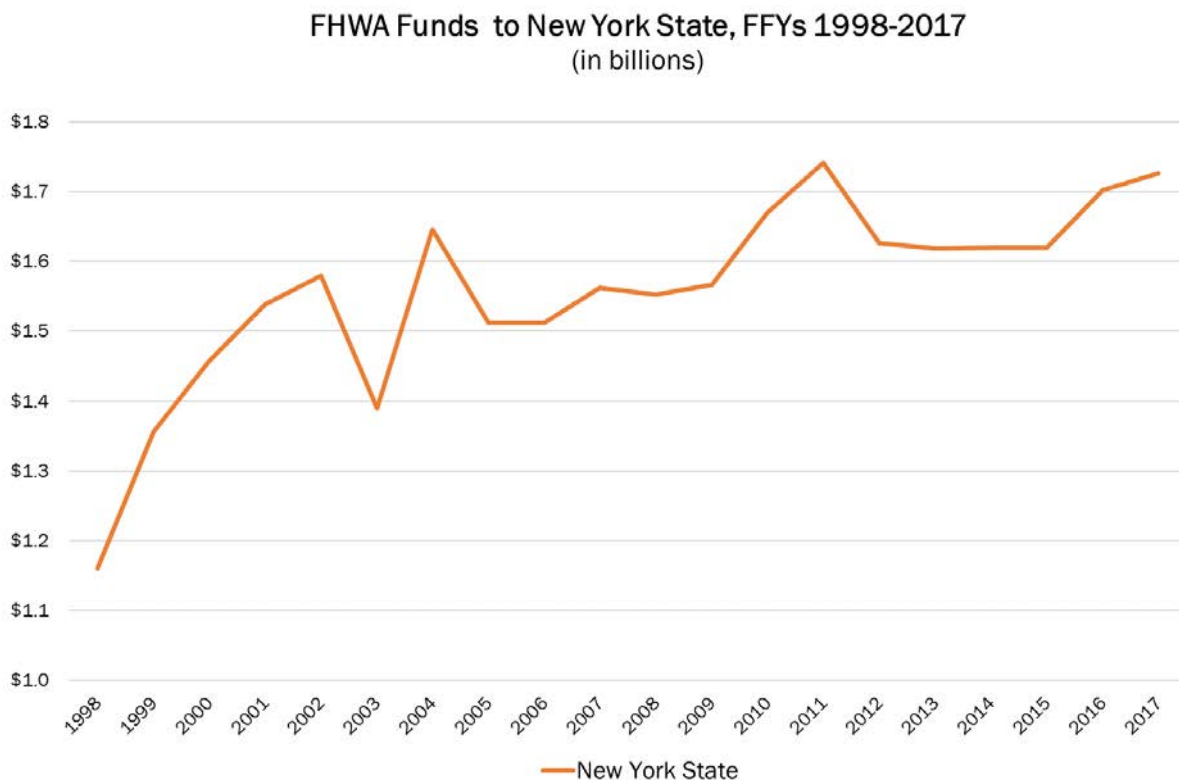
Federal

Federal transportation revenues include four categories: 1) Regionally-Allocated Highway and Bridge, 2) State-Selected Highway and Bridge, 3) Directly-Apportioned Transit, and 4) Discretionary. Apportionments of Federal Highway Administration and Federal Transit Administration funds from FFYs 1998 through 2017 were compiled and analyzed. This incorporates all of the apportionments made under the authority of the Transportation Equity Act for the 21st Century, Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), and the Moving Ahead for Progress in the 21st Century Act (MAP-21) inclusive of extensions, as well as the first two years of the current surface transportation legislation: the Fixing America's Surface Transportation Act (FAST Act). The 20-year timeframe ensures that long-term trends are incorporated into the projections.

Through 2050, reasonably-expected federal revenues (including match) are projected to be $6.40 billion.

Regionally-Allocated Highway and Bridge

These represent the FHWA revenues that are apportioned to New York State and then distributed by the New York State Department of Transportation (NYSDOT) to its 11 regional offices for programming (including in consultation and coordination with and by MPOs), as well as funds apportioned to the Census Bureau-defined Buffalo Urbanized Area. Figure 1 presents total FHWA apportionments to New York State for FFY 1998 through 2017.

Figure 1

FHWA Funds to New York State, FFYs 1998-2017
(in billions)

To incorporate both long-term trends and the current reluctance to increase federal apportionments into the projection of reasonably-expected revenues to Buffalo Niagara through 2050, the following assumptions were made for Regionally-Allocated Highway and Bridge funds (including projections of non-federal matching funds):

- The Planning Targets provided by NYSDOT for the current TIP will be the reasonably-expected revenues from FFY 2018 through FFY 2021. These total $223.44 million or $55.86 million per year based on:

  o 60 percent of the National Highway Performance Program (NHPP) target at an 85 percent federal/15 percent non-federal matched amount: $27.43 million per year;

  o 60 percent of the Surface Transportation Block Grant Program New York State component (STBG, referred to as "STP FLEX" by NYSDOT) target at an 80 percent federal/20 percent non-federal matched amount: $9.49 million per year;

  o 100 percent of the STBG Buffalo Urbanized Area component (referred to as "STP LG URBAN" by NYSDOT) target at an 80 percent federal/20 percent non-federal matched amount: $13.49 million per year;

  o 60 percent of the STBG Off-System Bridges component (referred to as "STP-OFF" by NYSDOT) target at an 80 percent federal/20 percent non-federal matched amount: $1.90 million per year;

  o 60 percent of the Highway Safety Improvement Program (HSIP) target at a 90 percent federal/10 percent non-federal matched amount: $2.70 million per year; and

  o 60 percent of Congestion Mitigation and Air Quality Improvement Program target at an 80 percent federal/20 percent non-federal matched amount: $816,000 per year.

- The successor to the FAST Act will be a six-year authorization and changes in apportionments will be similar to those in MAP-21 and the FAST Act. The average of the rates of change in apportionments to New York State between FFYs 2012 and 2017 was 1.2 percent. This percent growth is added to the flat FFY 2018 through FFY 2021 Planning Target amount for the FFY 2022 through FFY 2027 projection.

- Authorizations covering the remaining 23 years of the plan – FFY 2028 through FFY 2050 – will see a return to the longer-term, historical average of the rates of change in apportionments to New York State (such as those from FFY 1998 through FFY 2027), which was 2.4 percent. The rationale behind this assumption is that:

  o There is a strong national interest in a safe, efficient, and reliable surface transportation system for purposes of economic competitiveness, quality of life, and homeland security, and the federal government will eventually return to playing a larger role in funding the portions of the system that serve said national interest.

  o Increased fuel efficiency of gasoline- and diesel-powered engines are expected to continue to rise while the price of lithium ion batteries will fall, making electric vehicles (EVs) more attractive to a larger segment of people and businesses (Bloomberg New Energy Finance expects "an inflection point in adoption between 2025 and 2030, as EVs become economical on an unsubsidized total cost of ownership basis across mass-market vehicle classes").

  o This is anticipated to necessitate the need to either move towards a user-based charge of some kind (vehicle miles traveled), fully fund surface transportation from the General Fund, or some combination thereof before 2030. Any of these scenarios combined with a renewed national commitment and advances in vehicle technology makes the proposed annual growth rate a reasonable scenario.

In terms of the structure of reasonably-expected regionally-allocated federal highway funds, the continued emphasis in surface transportation authorizations on preservation of and improvements to the National Highway System (NHS) and projects and programs to increase safety is assumed to be maintained at the current proportions. This is to say that it is not anticipated that highway funding for projects not on the NHS or those dedicated to non-motorized forms of transportation will be eliminated as they both further national goals and demonstrate to local officials and the citizenry that Congresspersons are delivering results.

Figure 2 presents the structure of the federal highway apportionments at the national level from FFY 1998 to FFY 2017 to illustrate the increase in funds directed toward the NHS and safety over the 20 years analyzed (after removing set-asides for State Planning and Research, Revenue Aligned Budget Authority, Transportation Enhancements, and Transportation Alternatives as well as programs that cannot be used for construction activities).

Figure 2

FHWA Funds by Eligible Use in Billions, FFY 1998-2017

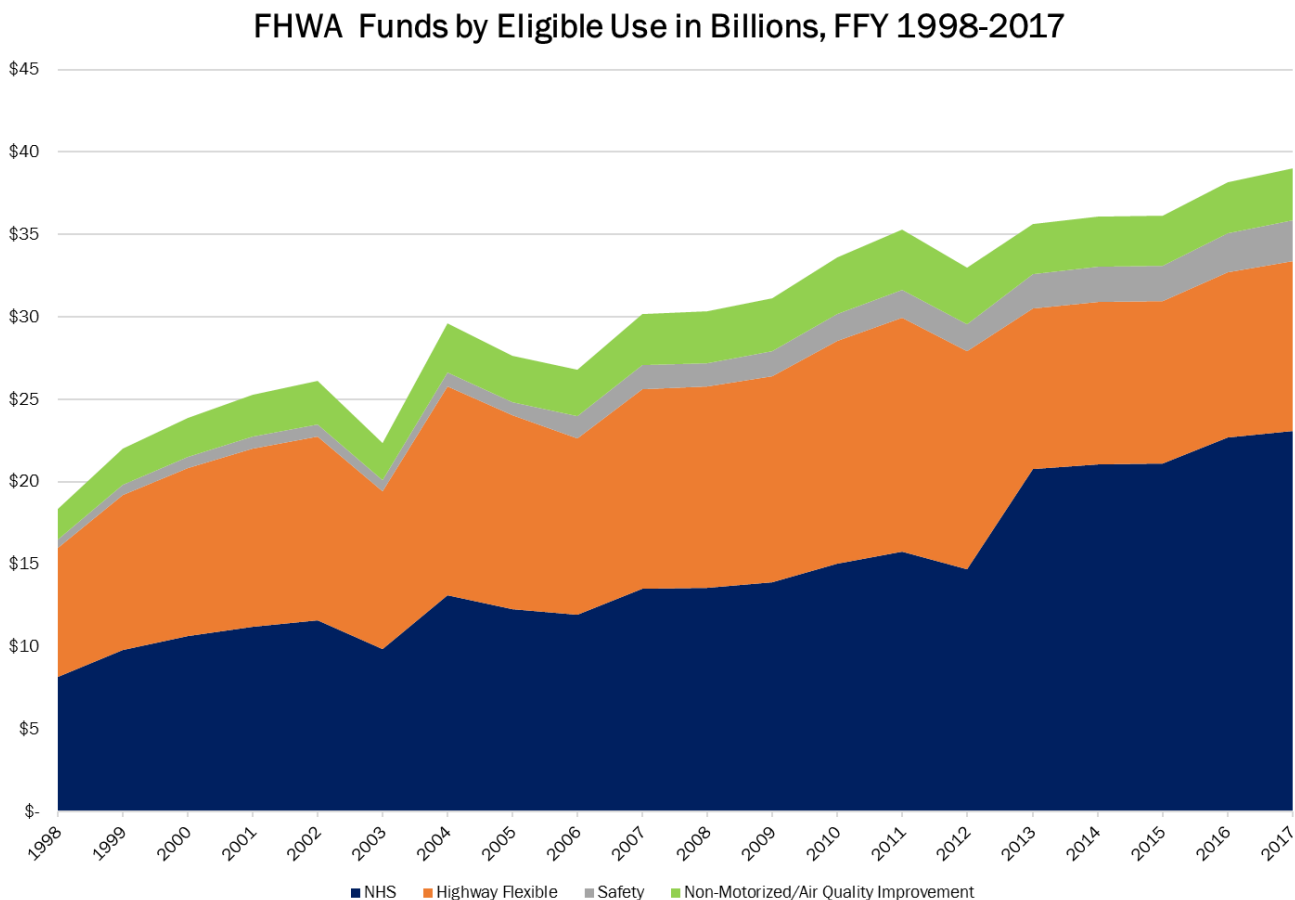Legend: NHS | Highway Flexible | Safety | Non-Motorized/Air Quality Improvement

Figure 3 presents the projections of reasonably-expected federal Regionally-Allocated Highway funding from FFY 2018 through FFY 2050 broken into near-term (FFYs 2018-2030), mid-term (FFYs (2031-2040), and long-term (2041-2050) by eligible uses of the funds.

Figure 3

Reasonably-Expected Federal Regionally-Allocated Highway Funds by Eligible Use, FFYs 2018-2050
(Millions of Matched YOE Dollars)

	NHS	Highway Flexible	Safety	Non-Motor./Air Qual.
Near-Term (FFYs 2018-2030)	$470.49	$215.31	$47.85	$63.80
Mid-Term (FFYs 2031-2040)	$479.38	$219.38	$48.75	$65.00
Long-Term (FFYs 2041-2050)	$525.46	$240.47	$53.44	$71.25
Totals by Program	$1,475.33	$675.16	$150.04	$200.05
Total		$2,500.58		

State-Selected Highway and Bridge

These represent the FHWA revenues that are apportioned to New York State and then programmed to projects selected by NYSDOT Main Office. The base year amount represents:

- Sixty percent of the FFY 2017 through FFY 2021 Planning Target "Main Office Funded" component as provided for the development of the current GBNRTC TIP at an 80 percent federal/20 percent non-federal match amount ($2.63 million)

  Plus

- The matched (80 percent federal/20 percent non-federal) amount of Transportation Alternatives Program (TAP) and Congestion Mitigation and Air Quality Improvement program (CMAQ) funds awarded to projects in Erie and Niagara Counties by the Governor on April 19, 2017 divided in half as there was two years' worth of funding from these programs awarded ($11.71 million)

  Minus

- Half of the matched amount to the Niagara Frontier Transportation Authority (NFTA) for the purchase of Compressed Natural Gas buses ($3.13 million)

A simplified equation of the base year amount in matched funds is:

Annual Average GBNRTC TIP Planning Target for FFYs 2017-2021 ($2.63 million)
+ Annual Average Annual TAP and CMAQ Award ($11.71 million)
– ½ NFTA CMAQ Award ($3.13 million)
State-Selected Highway and Bridge Base Year Amount ($11.21 million)

As these are apportioned federal highway funds, the same growth rates by year as were applied to Federal Regionally-Allocated Highway and Bridge Funds were also applied to the base year amount of $46.75 million. Please note that a breakdown by eligible uses was not conducted to incorporate a practical amount of uncertainty in both the programmatic structure of future federal highway authorizations and NYSDOT's decisions on which programs it will use to select and program projects at the statewide level.

The resulting calculations of reasonably-expected federal State-Selected Highway and Bridge funding from FFY 2018 through FFY 2050 broken into near-term, mid-term, and long-term is presented in Figure 4.

Figure 4

Reasonably-Expected Federal State-Selected Highway Funds, FFYs 2018-2050
(Millions of Matched YOE Dollars)

Near-Term (FFYs 2018-2030)	$160.03
Mid-Term (FFYs 2031-2040)	$163.05
Long-Term (FFYs 2041-2050)	$178.73
Total	**$501.80**

State-Selected Safety

MAP-21 more than doubled the amount of HSIP funds apportioned to New York State compared to SAFETEA-LU levels. Regional allocations of HSIP funds to the respective 11 NYSDOT regions remained essentially flat with the remainder of these funds programmed to projects selected by NYSDOT Main Office through competitive solicitations. The annual amounts represent 60 percent of the Regionally-Allocated Highway Safety funding across the life of the projections to represent consistent growth of the overall HSIP program. Figure 5 presents the projections of reasonably-expected federal State-Selected Safety funding from FFY 2018 through FFY 2050 broken into near-term, mid-term, and long-term.

Figure 5

Reasonably-Expected Federal State-Selected Safety Funds, FFYs 2018-2050
(Millions of Matched YOE Dollars)

Near-Term (FFYs 2018-2030)	$28.91
Mid-Term (FFYs 2031-2040)	$29.45
Long-Term (FFYs 2041-2050)	$32.29
Total	**$90.65**

Directly-Apportioned Transit

These represent the FTA revenues that are apportioned to NFTA. As with the highway and bridge components included in the Federal projections, apportionments to NFTA between FFY 1998 and FFY 2017 were analyzed. SAFETEA-LU saw the advent of direct apportionment of specialized human service- and employment-related programs to large urban area operators. These programs were and continue to be relatively small compared to the large mass transportation programs (namely, FTA Section 5307), never accounting for more than 4.6 percent of the apportioned funds to NFTA over the 20 FFYs analyzed. It is anticipated that this general programmatic structure will continue and the vast majority of funds apportioned directly to NFTA over the course of the *MTP 2050* will be for mass transportation activities. Figure 6 presents total FTA apportionments to NFTA for FFY 1998 through 2017.

Figure 6

FTA Funds to the Niagara Frontier Transportation Authority, FFYs 1998-2017
(in millions)
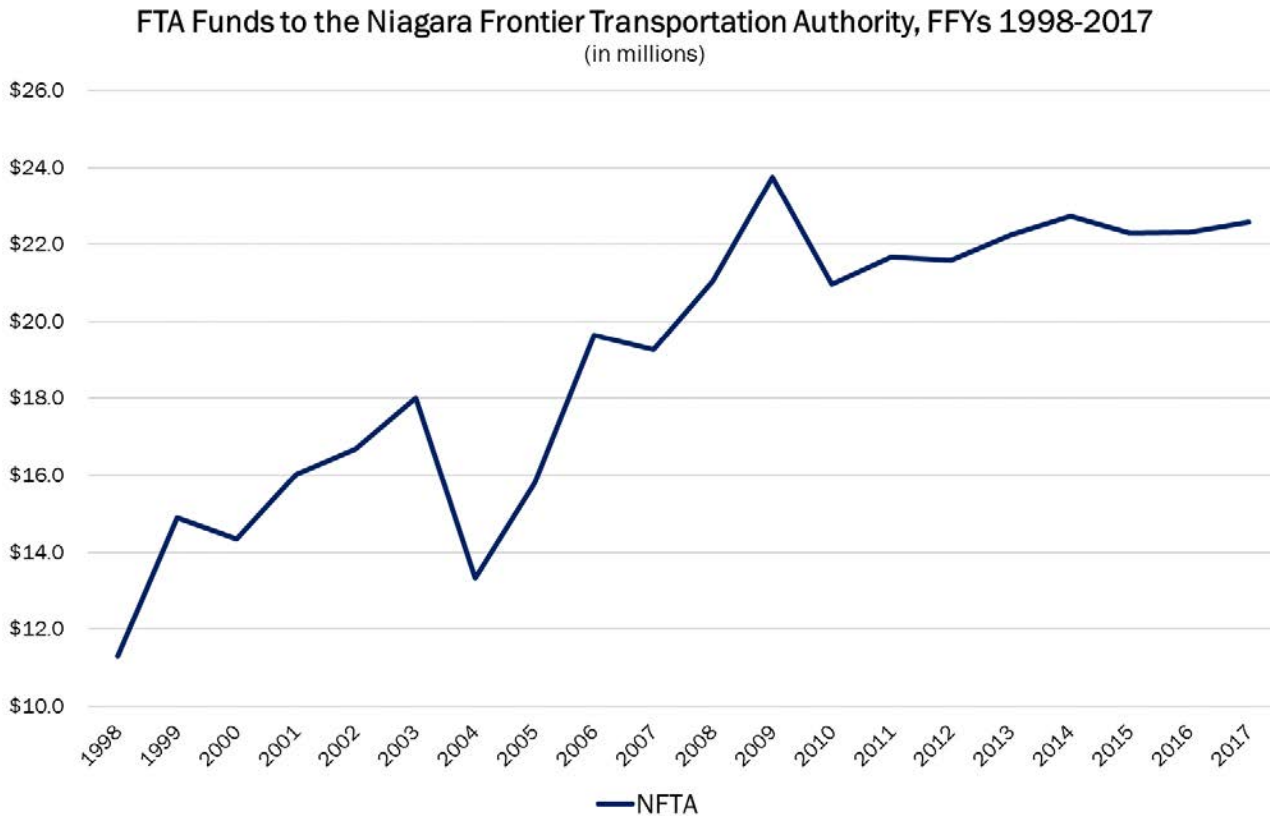
The same assumptions regarding future surface transportation reauthorizations for highways and bridges are applied to transit based on the rationale described above. Specifically, this entails:

- The Planning Targets provided by NYSDOT for the current TIP will be the reasonably-expected revenues from FFY 2018 through FFY 2021 with an additional $3.13 million annually to include the CMAQ funding awarded to NFTA that was not accounted for in the State-Selected Highway and Bridge component. These represent the 80 percent federal/20 percent non-federal matched amount.

- The successor to the FAST Act will be a six-year authorization and changes in apportionments will be similar to those in MAP-21 and the FAST Act. The average of the rates of change in apportionments to NFTA between FFYs 2012 and 2017 was 0.9 percent. These rates of change are added to the flat FFY 2018 through FFY 2021 Planning Target matched amount for FFY 2022 through FFY 2027.

- Authorizations covering the remaining 23 years of the plan – FFY 2028 through FFY 2050 – will see a return to the longer-term, historical average of the rates of change in apportionments to NFTA (such as those from FFY 1998 through FFY 2027), which was 4.5 percent.

Figure 7 presents the projections of reasonably-expected federal Directly-Apportioned Transit funding from FFY 2018 through FFY 2050 broken into near-term, mid-term, and long-term.

Figure 7

Reasonably-Expected Federal Directly-Apportioned Transit, FFYs 2018-2050
(Millions of Matched YOE Dollars)

Near-Term (FFYs 2018-2030)	$465.87
Mid-Term (FFYs 2031-2040)	$574.14
Long-Term (FFYs 2041-2050)	$708.44
Total	**$1,748.46**

Discretionary

These represent the funds for specific projects that are selected by modal administrations such as FHWA or FTA, the USDOT Office of the Secretary (OST), or Congress. It is not anticipated that the number or amount of discretionary awards will approach their peak during the last 20 years, which occurred during the SAFETEA-LU period. It is assumed that there will be funds awarded based on solicitations that include a review by FHWA, FTA, or OST.

With respect to discretionary funds that can be used for either highway, transit, rail and other modes, it is deemed reasonable that that the amounts and frequency of awards in the future will be similar in nature to the Transportation Investment Generating Economic Recovery (TIGER) and Nationally Significant Freight and Highway Projects (now referred to by the acronym INFRA, formerly FASTLANE) programs. There have been seven rounds of TIGER awards made (2010 through 2016). Buffalo Niagara was successful in being awarded two TIGER grants totaling $37.5 million for projects with a full cost of $58 million (at time of award). It is reasonable to assume that the region will achieve similar success ($5.36 million per year in FFY 2018 dollars) at similar cost share (65 percent federal/35 non-federal) in future rounds and that increases in discretionary programs will mirror those of the overall FHWA apportionments (1.2 percent increases from FFY 2021 through FFY 2027 and 2.4 percent increases from FFY 2028 through 2050).

Regarding transit, the emphasis is currently on the implementation of the locally-preferred alternative for the Metro Rail light rail transit (LRT) line extension into the Towns of Amherst and Tonawanda. Per the timeline, an FTA Full Funding Grant Agreement (or the equivalent of it) is expected to be secured and construction will begin in FFY 2024. The total capital cost is estimated at $1.2 billion in YOE dollars with a cost share of 50 percent federal/50 percent non-federal. Based on the current FTA Capital Investment Grants program requirements and the likelihood that any successor programs (at least those over the next decade) will be similar, the award of discretionary funds and their match from state and local revenue streams for the Metro Rail LRT line extension into the Towns of Amherst and Tonawanda can be considered reasonably-expected. At this time, the draft project list of the *MTP 2050* does not identify any other "new starts." Absent a specific project or initiative, no other discretionary transit funds are assumed to be reasonably-expected.

Figure 8 presents the projections of reasonably-expected federal Discretionary funding from FFY 2018 through FFY 2050 broken into near-term, mid-term, and long-term.

Figure 8

Reasonably-Expected Federal Discretionary Funds, FFYs 2018-2050
(Millions of Matched YOE Dollars)

	Multimodal	Transit
Near-Term (FFYs 2018-2030)	$112.45	$600.00
Mid-Term (FFYs 2031-2040)	$108.62	$0.00
Long-Term (FFYs 2041-2050)	$137.69	$0.00
Totals by Program	**$358.75**	**$600.00**
Total	**$958.75**	

State

Transportation revenues provided by entities of New York State include four categories: 1) Dedicated Highway and Bridge to NYSDOT, 2) Formula Highway and Bridge to Localities, 3) Formula Transit, and 4) Thruway Contribution.

Through 2050, reasonably-expected state revenues are projected to be $3.26 billion.

Dedicated Highway and Bridge to NYSDOT

These represent funds from the New York State Dedicated Highway and Bridge Trust Fund (SDF). The amount projected here represents available funds for capital improvements above and beyond SDF allocations for labor, match to FHWA funds, and debt service. The base amount was calculated by determining the annual average of the projects included in the NYSDOT Region 5 "State Process" component of the *State Fiscal Year 2015-16/2019-20 Transportation Capital Program (MOU),* with 60 percent of the total costs of projects listed as "Multiple" counties attributed to Buffalo Niagara. Recognizing the limitations to growth on this funding source, a growth rate of 0.5 percent per year from FFY 2018 through FFY 2050 was applied.

These amounts are exclusive of the $25 million allocated for the Exchange Street Station in the MOU. To account for intermittent increases in this category, $25 million infusions are included in 2026, 2038, and 2050 (every 12 years since the initial allocation to the Exchange Street Station in 2015). Figure 9 presents the projections of reasonably-expected state Dedicated Highway and Bridge Trust Fund funding from FFY 2018 through FFY 2050 broken into near-term, mid-term, and long-term.

Figure 9

Reasonably-Expected State Dedicated Highway & Bridge to NYSDOT, FFYs 2018-2050 (Millions of Matched YOE Dollars)

Near-Term (FFYs 2018-2030)	$102.03
Mid-Term (FFYs 2031-2040)	$87.75
Long-Term (FFYs 2041-2050)	$90.96
Total	**$280.74**

Formula Highway and Bridge to Localities

These represent state funds to counties, cities, towns, and villages for improvements to highway and bridge assets. The apportionment of Consolidated Local Street and Highway Improvement Program (CHIPS) funds State Fiscal Year (SFY) 2017-18 to the counties of Erie and Niagara and cities of Buffalo and Niagara Falls were calculated as they own, maintain, and operate the majority of federal-aid eligible facilities under the jurisdiction of local governments in Buffalo Niagara. As with state Dedicated Highway and Bridge to NYSDOT revenues, the limitations to growth on this funding source was recognized and annual growth rate of 0.5 percent was applied for FFY 2018 through FFY 2050.

In addition, the SFY 2017-18 PAVE NY apportionments and one–half of the 2016 BRIDGE NY awards (as it was two years of awards) matched in Erie and Niagara Counties were added as infusions in FFY 2026 through FFY 2030 and FFY 2040 through FFY 2044 based on the assumption that there will be similar infusions of state funds to localities over the horizon of the *MTP 2050*. The projections of reasonably-expected state Formula Highway and Bridge to Localities funding from FFY 2018 through FFY 2050 broken into near-term, mid-term, and long-term is presented in Figure 10.

Figure 10

Reasonably-Expected State Formula Highway & Bridge to Localities, FFYs 2018-2050
(Millions of Matched YOE Dollars)

Near-Term (FFYs 2018-2030)	$270.16
Mid-Term (FFYs 2031-2040)	$192.45
Long-Term (FFYs 2041-2050)	$250.58
Total	**$713.19**

Formula Transit

These represent state funds to the NFTA for capital improvements. Beyond operating assistance (STOA), state funds are also provided to Upstate New York transit authorities, As with PAVE NY and BRIDGE NY funds, the amounts have seen increases above recent levels per the MOU. For NFTA, the pre-"Accelerated Transit Capital Program" amount provided to the NFTA was $3.85 million; the current amount is $5.18 million. In addition, the MOU created the Public Transportation Modernization and Enhancement Program, which provides three years of funding for capital improvements that include those related to state of good repair, enhancement, or expansion. NFTA is slated to receive $13.85 million per year over this three-year period.

As with the previously discussed state funding programs, limitations to growth require that a conservative annual growth rate be applied so as not to assume an unrealistic future amount of funding. For state Formula Transit revenues in the *MTP 2050,* a 0.5 percent annual growth rate was used to escalate the current $5.18 million per year state formula capital apportionment to NFTA for FFY 2018 through FFY 2050. In addition, $13.85 million per year was added in three year increments in FFY 2026 through FFY 2028 and FFY 2040 through 2042 based on the assumption that there will be similar infusions of state funds to NFTA over the horizon of the *MTP 2050.*

The projections of reasonably-expected state Formula Transit funding from FFY 2018 through FFY 2050 broken into near-term, mid-term, and long-term is presented in Figure 11.

Figure 11

Reasonably-Expected State Formula Transit, FFYs 2018-2050
(Millions of Matched YOE Dollars)

Near-Term (FFYs 2018-2030)	$ 110.95
Mid-Term (FFYs 2031-2040)	$ 70.38
Long-Term (FFYs 2041-2050)	$ 87.12
Total	**$268.45**

Thruway Contribution

These represent New York State Thruway Authority (NYSTA) funds for reconstruction, rehabilitation, maintenance, and operation of the Authority's assets. The projection of reasonably-expected revenues for inclusion in the *MTP 2050* were provided by NYSTA to GBNRTC and comprise $70 million per year for FFY 2018 through FFY 2022 and $45 million per year for FFY 2023 through FFY 2050. The $45 million per year for FFY 2023 through FFY 2050 was escalated at a conservative growth rate of 0.5 percent annually (the $70 million per year for FFY 2018 through FFY 2022 was not escalated). Figure 12 presents the projections of reasonably-expected state Thruway Contribution funding from FFY 2018 through FFY 2050 broken into near-term, mid-term, and long-term.

Figure 12

Reasonably-Expected State Thruway Contribution Funds, FFYs 2018-2050
(Millions of Matched YOE Dollars)

Near-Term (FFYs 2018-2030)	$716.36
Mid-Term (FFYs 2031-2040)	$479.00
Long-Term (FFYs 2041-2050)	$503.49
Total	$1,698.85

Transit Discretionary – Capital Match

These represent funds that will be applied to the Metro Rail LRT line extension into the Towns of Amherst and Tonawanda. They total $300 million, which is half of the non-federal cost share and 25 percent of the total project cost. As discussed in the Federal Discretionary category portion, no other transit "new starts" projects have been identified so the full amount presented is dedicated to the Metro Rail LRT line extension into the Towns of Amherst and Tonawanda. These funds will be available in the near-term.

Figure 13

Reasonably-Expected Transit Discretionary – Capital Match, FFYs 2018-2050
(Millions of Matched YOE Dollars)

Near-Term (FFYs 2018-2030)	$	300.00
Mid-Term (FFYs 2031-2040)	$	-
Long-Term (FFYs 2041-2050)	$	-
Total		$300.00

Local

Local revenues include those transportation funds generated and expended by the counties of Erie and Niagara and the cities of Buffalo and Niagara Falls exclusive of matching funds for the federal and state programs discussed above.

Through 2050, reasonably-expected local revenues are projected to be $585.03 million.

GBNRTC provided base amounts of local revenues to be expended by the counties of Erie and Niagara and cities of Buffalo and Niagara Falls. These local governments own, maintain, and operate the majority of federal-aid eligible facilities under the jurisdiction of local governments in Buffalo Niagara. Data from the New York State Comptroller's Local Government Division (including trend reports) were analyzed for the four localities, but did not include the detail needed to determine trends in the expenditure of local funds for highway and bridge improvements.

Given the lack of meaningful publicly-available data upon which to conduct a trend analysis of expenditures and the fiscal environment that counties and cities in New York State operate under, the growth in current funding to project reasonably-expected revenues from the counties of Erie and Niagara and the cities of Buffalo and Niagara was conservatively estimated at 0.50 percent per year from FFY 2018 through FFY 2050.

With respect to transit, GBNRTC provided the base amount for 88c funding that is anticipated to be used by NFTA for capital improvements. This local transit funding source is also used for operations and as match to federal and state assistance. It should be recognized that there are variations in 88c expenditures on capital improvements (outside of as match to federal Directly-Apportioned Transit funds) from year-to-year.

Accordingly, the suitability of the base amount was discussed with NFTA prior to projecting reasonably-expected revenues of it through 2050. As with the local highway revenues, a conservative approach was utilized by estimating growth at 0.5 percent per year from FFY 2018 through FFY 2050.

Figure 14 presents the reasonably-expected local highway and transit funding from FFY 2018 through FFY 2050 broken into near-term, mid-term, and long-term.

Figure 14

Reasonably-Expected Local Funds, FFYs 2018-2050
(Millions of Matched YOE Dollars)

	Highway	Transit
Near-Term (FFYs 2018-2030)	$160.77	$58.28
Mid-Term (FFYs 2031-2040)	$130.96	$47.47
Long-Term (FFYs 2041-2050)	$137.66	$49.90
Totals by Program	$429.38	$155.65
Total	$585.03	

Non-Transportation (Federal, State, and Local)

Revenues provided by entities at all levels of government that do not include a dedicated transportation function within their respective organization comprise the remainder of the reasonably-expected revenues from implementation of the *MTP 2050*. These are revenues that are included in funding packages for transportation projects exclusive of the federal and state programs discussed above and matching funds for them.

Through 2050, reasonably-expected non-transportation revenues are projected to be $602.88 million.

Buffalo Niagara has gotten ahead of the curve in advancing transportation projects by packaging funding from multiple sources, including non-transportation ones (as opposed to relying a single transportation-related fund source). This is a very worthwhile approach to supplementing existing transportation funds not only because funds are limited at all levels but also because it recognizes that transformative transportation projects involve non-transportation elements that can and should be programmed with other revenues. GBNRTC provided the breakdown of funding programmed to improvements on Niagara Street and the removal of the Robert Moses Parkway. These include revenues from the:

- Buffalo Sewer Authority,
- Dormitory Authority of the State of New York,
- Empire State Development,
- New York Power Authority,
- New York State Department of Environmental Conservation,
- New York State Energy Research and Development Authority,
- New York State Office of Parks, Recreation and Historic Preservation, and
- U.S. Environmental Protection Agency.

Image Credits

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