Shared Mobility Network for New York State

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Final Report

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Over the course of the project, shared mobility programs have expanded to all corners of the State, thanks in part to the technical assistance provided by the contractor and project subcontractors at the Shared Use Mobility Center and Mobility Development Partners. These programs have been developed through a combination of public and private investment totaling over $7 million over the course of the project period. The private investments include industry investments in the growth of these programs, as well as sponsorships by entities such as Independent Health and the Capital District Physicians Health Plan. Public investments include both direct funding to program startup, as well as indirect investments by cities and regional planning organizations including commitment of the public right-of-way and in-kind time around the planning and launch of these programs. The nexus of stakeholders and partners created by this project is poised to move forward as a growing community, thanks to the seed investment provided through this project. The result of this has been 17,000 fewer metric tons (MT) of Carbon Dioxide (CO_2) emissions during the project timeframe and an additional 14,000 MT projected for the next two years.

In addition, the contractor has hosted three convenings with 240 attendees in total that have brought together stakeholders and industry leaders to formulate solutions and exchange ideas for their own communities. These convenings, and the contractor's work more broadly, focused on opportunities to move certain models forward throughout the State, including the following:

- Proliferation of bike sharing across Upstate New York through public-private partnership models
- Expansion of Zipcar's presence in Upstate New York and evolution of community-based models
- Expansion of transit authorities' role in and partnerships with shared mobility networks including vanpooling, carsharing, and bike sharing networks
- Expansion of Volunteer Transportation Organizations (VTO)
- Exploration of new technologies and strategies to expand shared mobility, including electrification of the industry
- Deployment of software tools to support community-based VTO and carsharing solutions

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Abstract

Over the course of the project, shared mobility programs have expanded to all corners of the State, thanks in part to the technical assistance provided by the contractor and project subcontractors at the Shared Use Mobility Center and Mobility Development Partners. These programs have been developed through a combination of public and private investment totaling more than $7 million over the course of the project period. The private investments include industry investments in the growth of these programs, as well as sponsorships by entities such as Independent Health and the Capital District Physicians Health Plan. Public investments include both direct funding to program startup, as well as indirect investments by cities and regional planning organizations including commitment of the public right-of-way and in-kind time around the planning and launch of these programs. The nexus of stakeholders and partners created by this project is poised to move forward as a growing community, thanks to the seed investment provided through this project. The result of this has been 17,000 fewer metric tons (MT) of Carbon Dioxide (CO_2) emissions during the project timeframe and an additional 14,000 MT projected for the next two years.

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- Deployment of software tools to support community-based VTO and carsharing solutions

Keywords

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List of Acronyms

BCS	Buffalo CarShare
CDTA	Capital District Transportation Authority
CDTC	Capital District Transportation Committee
CMAQ	Congestion-Mitigation Air Quality (Grant)
CO_2	carbon dioxide
GHG	greenhouse gases
MOU	memorandum of understanding
MT	metric tons
NEMT	non-emergent medical transportation
NYSERDA	New York State Energy Research and Development Authority
RTS	Regional Transit Service
SNAP	Simple Neighborhood Accessibility Platform
SoBi	Social Bicycles
SOV	single-occupancy vehicle
SUMC	Shared-Use Mobility Center
SWOT	Strength Weakness Opportunity Threat
TDM	Transportation Demand Management
VMT	vehicle miles traveled
VTC	Volunteer Transportation Center
VTO	volunteer transportation organization

Executive Summary

Clean shared mobility networks in Upstate New York have seen a radical transformation over the last three years. Bike sharing programs have expanded from serving one city to eight; volunteer transportation is expanding statewide based on national best practices emerging from the North County; and an all-electric, community-based carsharing program will launch in Rochester in 2019. This project effort, which ran from October 2015 to June 2018, had four main components:

- **Three convenings of stakeholders in several New York State regions** who are interested in launching shared mobility systems, which introduced them to industry experts and innovators. The convenings varied in scale and format—nuts and bolts information sessions, workshops and a larger summit—all of which presented stakeholders with industry best practices, implementation strategies, an introduction to new technology, and a network of practitioners.
- **Feasibility studies and startup assistance for these emerging networks.** Depending on the stage of development of the local project, Shared Mobility (the contractor) provided preliminary scoping, developed pro formas and business plans, and assisted with demonstrations or launch.
- **Coordination between mobility companies and regional stakeholders** to integrate shared mobility services and, where appropriate, explore back-offices coordination of these services.
- **Research to evaluate the impacts** (social, environmental, and economic) and business performance of shared mobility programs across Upstate New York.

The project ultimately led to over $7 million in capital and operating investments in these systems across the State in numerous cities including Albany, Buffalo, Niagara Falls, Rochester, Troy, Schenectady, Saratoga Springs, and Watertown. Prior to the commencement of this contract, shared mobility options were prevalent in many cities nationally but very limited across Upstate New York. Therefore, staff in upstate cities, transit agencies, and metropolitan planning organizations were not especially familiar with these services. The contractor developed convenings in Ithaca, Buffalo, and Rochester to address this deficit, with each focusing on a different piece of the mobility solutions puzzle. Some of the topics addressed were improving shared mobility service in rural areas, reducing vehicle miles traveled (VMT) and CO_2 emissions, and new models/technology in shared mobility.

The consortiums of stakeholders brought together at these convenings led to several ongoing strategic partnerships, which include the following:

- Expansion of shared mobility services in the Capital region to include demonstration and launch of bike sharing in four cities: Albany, Troy, Schenectady, and Saratoga Springs.
- Development of an integrated shared mobility program for the City of Rochester that included carsharing, bike sharing, and vanpooling.

- Addition of app-based technology to volunteer transportation organizations, which are now in the process of expanding throughout rural New York State.

Throughout the project, the contractor tracked and analyzed the environmental impacts of this project, as well as the operations of existing carshare programs (Zipcar, Ithaca Carshare, and Capital Carshare), especially as the industry began to shift to electric vehicles. According to this analysis, the total environmental impact of these systems has a projected impact of over 30,000 fewer metric tons (MT) of carbon released in the State between 2015–2019.

Work with both local stakeholders and national shared mobility operators over the course of the three years of this project has, above all else, demonstrated the need for community-controlled mobility programs that are adapted to the needs of rural and low-income populations. Moving forward, upstate transit agencies and cities have been receptive to the idea of forming local *Mobility Development Corporations* (akin to the Community Development Corporations that are common to the world of affordable housing) to manage the growth of these programs, serving as an intermediary between public investment, community guidance, and private sector partners. As these programs continue to grow in number, scale, and complexity over the coming years, the contractor expects to grow to meet this challenge, working with communities to design and execute the programs—focusing on the development of Mobility Development Corporations to serve as vessels for the journey ahead.

BUFFALO

Over $3 million in public and private investment was secured for a 250+ bikeshare network. Shared mobility networks Zipcar and Reddy bikeshare integrated into Buffalo's downtown Transportation Management Association pilot with over 3,000 corporate and business memberships to date. The City of Buffalo Green Code adopted bikesharing and carsharing as Transportation Demand Management credits needed to secure Major Site Plan approval from the City.

CAPITAL REGION

Capital District Transportation Authority (CDTA) continues its partnership with
Capital Carshare, a non-profit carshare operator growing to 10 cars including
hybrid vehicles. CDTA additionally invested $2 million in the State's first multi-city
bike-share network and integrates membership options for transit riders.

NIAGARA FALLS

With $641,000 of public and private investment, bike sharing will be launching in 2019. This system will connect with Buffalo's Reddy bikeshare and become a regional operation, similar to the Capital Region. Stakeholders are currently planning electric-assist bikesharing demonstrations to commence in 2019.

NORTH COUNTRY

With over $2 million in grants and charitable donations over the last decade, the Volunteer Transportation Center of Watertown expanded service to three additional counties in rural northern NY as one of the most affordable transportation options for residents trying to overcome the long distances to medical appointments or medical treatment. With the addition of its software solution, the network can operate at an even higher volume, match trips more efficiently, and rideshare where possible.

ROCHESTER

Over $1 million has been invested for the deployment of a 250+ bikeshare network and the planning and development of an all-electric carsharing network for the City of Rochester. Additionally Rochester Genesee Regional Transit Authority formalized its partnership with Enterprise Rideshare for a reverse commute vanpooling system, steadily adding vans and ridership for City residents commuting to job locations in suburban and rural outskirts.

1 Introduction

1.1 Shared Mobility Overview

Shared mobility is a term that refers to any type of shared transportation service "that enables users to gain short-term access to transportation modes on an as-needed basis" This includes the use of vehicles that are both operated as fleets or owned privately and shared using a dedicated platform. The focus of shared mobility has changed as our nation's transportation system has evolved. Previously, more traditional shared transportation modes like public transit and taxis were the only types of shared modes users could engage in. However, in recent years, several new options have appeared in the marketplace. Carsharing, bikeshare, and ridehailing, and have risen to prominence as major transportation options for those who live in places where such services are available.

Traditional carsharing and bikesharing are a type of mobility program in which users typically pay membership fees for access to shared vehicles, automobiles and bicycles respectively, and that can be reserved for private use. The fleet vehicles are owned, maintained, and insured by a 3rd party entity that operates the system. These operators range from private companies to public entities, such as transit agencies or municipal governments, as well as non-profit organizations. While the specific operations models vary from system to system, in all cases, users reserve the vehicle they seek to use and use it in a rental capacity for a given period of time. Additionally, both modes are on-demand options and do not require pre-planning by users.

In recent years, however, non-traditional models have emerged in this market. Instead of utilizing fleet vehicles for the shared service, non-traditional shared mobility leverages personally owned vehicles and make them available to shared users. This has been particularly pronounced in carsharing where 'peer-to-peer' services such as Turo or GetAround offer automobiles to users that are owned and maintained by existing vehicles owners. While no equivalent, privately facilitated alternative has emerged in bikesharing, dockless bikesharing has come about in the market. Unlike traditional bikesharing systems, dockless systems do not require custom racks and other infrastructure to lock the bicycles to.

Ridehailing is one of the newest concepts introduced to the shared mobility realm. Also known as ridesharing or ridesourcing, ridehailing is a coordinated, on-demand service provided by transportation network companies through the use of subcontracted drivers using their personal vehicles. Rides are ordered, and fares are collected via mobile applications, thus making the concept tied to the use of

smartphones for both users and drivers alike. Ridehailing is the newest shared mode examined in this study with the entire industry growing out from a concept within the past five years. The ridehailing landscape is dominated by two companies, Uber and Lyft, both of which offer comparable services in almost all markets nationwide.

Shared Mobility Inc., the contractor, originally designated a group of stakeholders focused around carsharing, specifically non-profit carsharing organizations in Ithaca, Albany, Burlington, VT, and Boulder, CO. As the project evolved, stakeholder engagement expanded significantly to include partners in bike sharing and volunteer transportation networks throughout the State, from Niagara Falls to Rochester to the North Country and Long Beach. The following three sections summarize the process of engagement with both communities and innovators in the shared mobility sector. The last section describes how the project partners tracked environmental impacts of these systems.

1.2   Shared Mobility Convenings

The contractor convened three events in parts of New York State that were considering launching or expanding shared mobility systems. The focus of the convenings were to adapt national industry trends to the needs and priorities of the host community. Convenings were held in Ithaca (June 2016, 90 guests), Buffalo (May 2017, 50 guests), and Rochester (May 2018, 100 guests). These convenings were made possible with assistance from the Shared Use Mobility Center (SUMC), Tompkins County, the Urban Land Institute, the Volunteer Transportation Center, the City of Rochester, and many other partners.

1.3   Business Assistance for New York State Communities

The contractor provided business assistance to public sector agencies, nonprofit organizations, and anchor institutions throughout NYS that were interested in hosting and growing shared vehicle networks. This model was derived from the contractor's work in the Albany region with Capital CarShare, which translated experience from the operation of Buffalo CarShare to assist Capital CarShare in their startup and initial operations. The contractor advanced several projects through this business assistance model, including bike sharing in the Capital region, a range of shared mobility services in Rochester, and volunteer transportation in Buffalo.

Throughout this contract period, the contractor sought to obtain co-funding from local partners for these efforts in cash or in-kind support. The contractor was successful in securing contracts with the Capital District Transportation Authority (CDTA) for demonstration and later siting research for the Capital region's bike share program (now CDPHP Cycle!). While the project's resources in the Rochester region were not initially matched, the City of Rochester has sought additional funds to grow shared mobility programs with the intention for the contractor to continue their role in providing guidance beyond the project period.

1.4   Shared Mobility Services Coordination and Facilitation

As part of this contract, the contractor was originally tasked with engaging partner organizations across the State toward development of a back-office services platform for carsharing. The contractor convened an Integration Working Group of these subcontractors to discuss coordination of back-office support, software development, procurement of vehicles and insurance, and fundraising. The contractor engaged the Wellness Institute of Greater Buffalo to initially convene five carshare operators around this discussion. Conversations were productive regarding software and insurance coordination, but partners did not elect to produce a unified back-office platform, and the contractor expanded this coordinating group to consider operational best practices among a broader range of shared mobility programs.

1.5   Integrated Evaluation and Benchmarking

The contractor worked with SUMC to track environmental, economic, and social impacts across shared mobility platforms in Upstate New York. The contractor's calculations have been based on Susan Shaheen's 2008 North American carsharing survey methodology, which was used to calculate greenhouse gas emissions, VMT, and reductions in private auto ownership. While the original scope of the project called for more in-depth, end-user surveys among carsharing organizations, the rapid changes in the industry and growth of bike sharing and volunteer transportation led the contractor to focus additional effort on Goal 3 in their business assistance model—financial development. As both bike share and volunteer transportation programs mature, and as the carshare industry evolves, such a survey may once again be warranted across several modes.

2   Background

The objectives and goals of this project have evolved alongside the changing landscape of shared mobility in New York State over the last several years. The contractor has shifted the scope of work during the contract period from a primary focus on carsharing to a more balanced portfolio across multiple shared mobility modes. Within each mode, the contractor has provided strategic, locally tailored assistance with the launch and operation of programs in each region.

The project's original aim was particularly focused on the study and replication of carsharing models based on the contractor's operation of the nonprofit Buffalo CarShare (BCS) from 2009 through the start of this project in 2015, and more recently the contractor's provision of business planning and launch management of Capital Carshare in Albany, NY in 2013 and 2014. Due to unexpected insurance challenges in June 2015, BCS sold and transitioned operations to Zipcar over the second half of 2015. During this period, the contractor worked with Zipcar to identify areas of collaboration and expansion potential, which allowed the contractor to deploy additional resources toward the development across all shared mobility modes in Upstate New York communities. Additional project partners were identified early in the second year of the project—Volunteer Transportation Center (VTC) and Mobility Development Partners (MDP) became partners/subcontractors to assist in implementing BEV carsharing and volunteer transportation rideshare networks that are assisted by dynamic routing software.

3 Phase 1. Developing Opportunities: Oct 2015–Dec 2016

The first half of the project included major progress in developing carsharing and bike sharing initiatives and early research toward the expansion of VTOs. The first of three convenings was held during this period and the contractor worked with SUMC to develop an initial set of research and white papers to support the implementation work of the contractor and upstate partners. These partners (five upstate cities and transit agencies) then applied to and were awarded a total $3.5 million in Federal Congestion Mitigation and Air Quality (CMAQ) funds for bike sharing, carsharing, and vanpool operations.

3.1 Carsharing

The transition of Buffalo area carsharing operations from BCS to Zipcar became one of the first major undertakings led by the contractor during late 2015 and 2016. The contractor worked with Zipcar on this progression beginning with a memorandum of understanding (MOU) executed in January 2016 between Zipcar and the contractor and followed by a visit from Zipcar staff to Buffalo and Rochester. During this time, the contractor made a series of introductions to public sector officials and community partners in both cities. At the time of the transition, BCS had maintained a 19-vehicle fleet with approximately 900 active members. By year end 2016, Zipcar was operating with three hubs and six vehicles in the City of Buffalo (in addition to its vehicles located on the University at Buffalo's North and South campuses), falling short of the impact achieved by BCS in prior years. With expansion languishing in the early months of 2016, the contractor produced a community engagement report for Zipcar, which suggested a range of outreach and marketing techniques that could assist the operator in achieving the membership and fleet levels of BCS. Unfortunately, Zipcar was unable to address these techniques without further public subsidy, which was not available.

Due in part to this slower-than-expected growth in Buffalo, in fall 2015 and winter 2016, Zipcar communicated its decision in spring 2016 to delay expansion of services in Rochester and other urban upstate cities to focus on the Buffalo market. During this period, the contractor developed a memo recommending a series of marketing and outreach techniques that Zipcar could apply to recruit new members in Upstate New York. Working with Zipcar, the contractor conducted further visits with public officials in both Buffalo and Rochester to seek financial support for marketing. These appeals were not successful.

- Without direct marketing support from the cities of Buffalo, Rochester, Syracuse, or Albany (the four cities in which Zipcar has continued to maintain college campus-tailored programs), Zipcar was not motivated to invest company resources in the form of marketing, staffing, and a local office presence unilaterally in these markets. Staff transition at Zipcar further complicated efforts to focus attention on Upstate New York.
- While Zipcar's acquisition of the BCS membership base allowed for carsharing services to continue in the Buffalo market, Zipcar continued to show only modest growth throughout 2016. Ultimately, both parties moved away from their joint pursuit of expanding the Zipcar model in the upstate area. Around this time (late fall 2016), Zipcar had secured approximately 300 members in the City of Buffalo, or about one-third of the scale of the BCS program.

Details on the evolution of Zipcar's growth in the 2015–2018 timeframe are shown below in Table 1.

Beginning in spring 2016, the contractor also began working on community-based carsharing projects beyond the scope of their partnership with Zipcar, focusing particularly in the Ithaca, Rochester, and Albany markets. This work included the following:

- **A subcontract with the Wellness Institute.** The institute worked with BCS to convene four community-based carsharing operators to work toward operational efficiencies, particularly around software, hardware, and insurance. Although these entities (Ithaca Carshare, Capital Carshare, and two out-of-state organizations: Carshare Vermont and eGo Carsharing in Denver) did not move to merge or share staffing for operations, three of the four (Ithaca, Albany, and Vermont) moved forward with a common hardware/software interface.
- **Support of the staff transition and growth of Capital Carshare**. A new executive director was brought on in early 2016, and the contractor provided technical guidance to the board and new executive director. During this time the contractor conducted a Strength Weakness Opportunity Threats (Analysis (SWOT)of the program based on the first two years of operations, the contractor also worked with the CDTA to develop guidelines for the agency's continued investment in the Albany-based nonprofit.
- **Working with the City of Rochester on analysis of opportunities for shared mobility systems including carsharing**. This led to a successful grant application for $1.2 million in CMAQ funds to support the launch of a carsharing, bike sharing, and vanpool programs. The carsharing portion of the grant, totaling $350,000, envisioned an eventual 15+ vehicle network in and around downtown Rochester.

3.2   Bike Sharing

Much of the project's first year was spent on the development of bike sharing systems across New York State. The flagship program launched in this period was Buffalo's Reddy Bikeshare, which launched with 240 bikes throughout the City of Buffalo and at the University at Buffalo in the spring of 2016. Reddy is the evolution of the contractor's initial foray into bike share operations with Buffalo BikeShare, which

began in 2012 as a partnership with New York State Energy Research and Development Authority (NYSERDA), New York State Department of Transportation (NYSDOT), Social Bicycles (SoBi; now JUMP Bicycles), and the University at Buffalo. The partnership was made possible by the same NYSERDA/NYSDOT collaborative that has funded this project (Buffalo Bikeshare Demonstration Project—NYSERDA Contract #25729). Through this demonstration project, the contractor was able to pilot one of the first dockless bike sharing operations *in the world.*

As this 75-bike demonstration program wrapped up in 2015, the contractor team moved toward negotiation of system sponsorship with Independent Health and demonstration of the SoBi product as a contractor to the Capital District Transportation Committee (CDTC) in summer 2015. The demonstration involved one-week deployments of bicycles in each of the four cities that CDTC was considering for a bike share program: Albany, Schenectady, Troy, and Saratoga Springs. A total of 192 individuals participated in the program riding over 400 miles. The contractor compiled the trip data collected to assist in the scoping and site planning efforts that would follow during Phase 2 of the statewide engagement. The demonstration was featured in the *New York Times*.

This transition from the NYSERDA/NYSDOT-funded pilot program to a viable social enterprise in the months leading up to the start of this project, positioned the contractor to later utilize resources in 2016 to work with CDTA, the City of Rochester, and the City of Niagara Falls to submit CMAQ applications for the launch of dockless bike share networks referred to at the time as *flexible* bike sharing. These applications were supported with technical input from the contractor during June and July 2016, and all three proposals were successful in securing competitive funds. Total public and private funds secured for bike sharing in these three regions by year-end 2016 exceeded $3 million, with the Capital District Physicians Health Plan (CDPHP) committing to a major sponsorship of the Capital region program following the successful first season of Reddy Bikeshare.

As of the end of the first phase of this project, in December 2016, commitments to bike share deployments in Upstate New York had increased from the 75-bicycle demonstration to over 800 bikes planned between Buffalo, the Capital region, Niagara Falls, and Rochester.

Based on funding secured in 2016, the scale of anticipated bike share programs was as follows:

Table 1. Regional Bike Share Systems Scaling

City or Region	Bikes Launched or Funded	Launch Date	Initial Investment	Expansion and Additional Investment Sources
Buffalo	240	Summer 2016 Re-launch w/240 bikes	NYSERDA (Pilot)	Expansion in 2019 (to 300 bikes) with private sponsorship
Capital Region	160	Summer 2017	Public/Private Sponsorship	Expansion in 2018 (to 350 bikes) with sponsorship from CDPHP
Niagara Falls	120-200	Expected Spring 2019	CMAQ/Private Sponsorship	200 bikes expected at full build-out
Rochester	250	Spring 2017	CMAQ/Operator	Expansion to 340 bikes in 2018 self-sponsored by Pace
Ithaca	350	Spring 2018	Operator	450 Bikes by summer 2018; Bikes self-funded by operator (Lime) in response to RFI

The launch of Buffalo's Reddy Bikeshare in July 2016 featured 200 new bikes in addition to the continuation of the 40-bike program at the University at Buffalo, which has run continuously since 2012. The program's first season ran from July through October of 2016 and logged 12,000 trips with 1,700 riders using the system. This performance is similar to the first full-year results of similar networks in midsized cities.

In the spring of 2016, with the support of SUMC, the contractor invested resources profiling dockless or *flexible* bike sharing programs like Buffalo's, which were expanding quickly in small and midsized cities. By 2016, almost every major city in the U.S. had planned or launched a dock-based program, led by trends established starting in 2009 by the Twin Cities and Washington, D.C. In Upstate New York, CDTC and the Genesee Transportation Council (GTC), in coordination with the City of Rochester, published feasibility studies completed by Alta Planning in 2013 and Toole Design Group in 2015, respectively.

Both studies (the latter of which was funded by the NYSERDA/NYSDOT partnership in Rochester Area Bike Sharing Program Study, NYSERDA Contract #30909) concluded that dockless bike sharing was an unproven technology, and—despite the lower capital costs of these systems—neither study recommended use of a dockless solution. Instead, both studies encouraged the cities to invest in larger dock-based systems gradually and in line with further and relatively more expensive investments in street infrastructure to accommodate bicycles.

The contractor's report, Bikeshare Systems in Small and Midsized Cities, was completed in summer 2016 to assist CDTA, Niagara Falls, and the City of Rochester in profiling the range of vendors emerging in bike sharing and to assist upstate cities in understanding the rapid growth of dockless bike sharing. Since the GTC's publishing of the Rochester report in March 2015, cities like Portland, Pittsburgh, and Hamilton, Ontario followed Buffalo in embracing dockless bike share programs and experienced success. This report describes the relative advantages of dockless programs in terms of unit economics and operational considerations. The report assisted upstate cities in making the case for fundraising and rapid deployment of dockless systems from 2016–2018.

Following the release of this report, the contractor developed a policy memo and sample RFPs for the City of Rochester. The city integrated this information into an RFP in summer 2016 and selected Boston-based Zagster as the system operator prior to securing CMAQ funds. The commitment of CMAQ funds, as well as other local commitments, helped Zagster to increase its initial launch target for the program to 340 bicycles. As it became clear that CDTA would also be awarded CMAQ funds for bike sharing, the CDTA issued its RFP later in the year, selecting Social Bicycles as the vendor and operator in early 2017.

3.3   Vanpooling

The contractor also supported the advancement of vanpooling as a shared mobility option in the Rochester region as part of the City of Rochester's CMAQ application. Following a hiatus of vanpooling in Upstate New York after an unsuccessful pilot in the Capital region several years ago, Rochester moved to test this shared mode during the 2016 CMAQ cycle, and was awarded $354,000 to launch this program, with the pilot project hoping to directly divert VMT from single-occupancy vehicle (SOV) commute trips. The contractor introduced the vanpooling concept to Rochester stakeholders at its first convening in Ithaca during the summer of 2016.

3.4   Volunteer Transportation

During spring 2016, the contractor worked with SUMC to develop an analysis of Volunteer Transportation Programs across New York. The associated report, titled Volunteer Transportation Organizations in New York State, profiled eight organizations across the State varying in size from 16 to 200 drivers delivering 250–120,000 rides annually. Key takeaways from this report include:

- The largest of the Volunteer Transportation Organizations studied, the Volunteer Transportation Center of Watertown (VTC) now provides over 150,000 rides annually with a volunteer base of 250 active drivers. VTC emerged not only as an outlier in terms of performance but also in terms of interest and readiness to introduce new technology for increasing the efficiency of trip routing through telematics, introduction of trip chaining features, and automation of certain dispatching components.
- VTC and others have found their organizations well placed to serve a recent change in New York State Medicaid rules, which encourages Medicaid brokers (the intermediary responsible for arranging transportation for patients without access to a vehicle) to seek the lowest cost provider for these trips. In reimbursing volunteers for their mileage, these organizations provide a long-distance and more hands-on version of Transportation Network Companies (TNCs) like Uber and Lyft.
- Technology solutions that better integrate with existing platforms will drive more uptake by users seeking transportation options.

The contractor proceeded to work with VTC to create a purpose-built software solution called the Simple Neighborhood Accessibility Platform (SNAP). VTC moved forward with this initiative without grant support, investing approximately $375,000 through 2018 to develop this VTO software, beginning with the June 2016 Mobility Summit. This software allows VTC to track and verify trips via a very-low cost telematics solution that is customized for long-distance volunteer trips within regions with inconsistent cell connectivity. This software has enabled New York State's Office of Medicaid to continue to reduce cost around non-emergency medical transportation in Upstate New York. At the same time VTC began expansion efforts into St. Lawrence, Genesee, Erie, and Niagara counties.

3.5   Mobility Solutions Summit (First Convening)

In collaboration with the Tompkins County Department of Social Services, the contractor and SUMC worked to organize a Mobility Solutions Summit on June 23 and 24, 2016 at the Cinemapolis in downtown Ithaca, NY. The summit was divided into two tracks: trends in shared mobility and "better practices" for transportation service delivery, with a focus on smaller cities and rural communities. Dwight Mengel from Tompkins County served as the lead organizer of the event, and the contractor worked with SUMC to provide guidance on the format, agenda, and speakers. Three themes emerged as follows:

- The transition of BCS to Zipcar had been preceded by a vigorous State policy discussion among New York carshare providers, and the 2016 legislative session featured bills related to carsharing, ride-hailing, and electric bicycles (all sponsored but not passed), so briefings on State policy around shared mobility programs was a major topic of conversation at the event.

- Many participants were not familiar with dockless bike sharing technology or even with services like Uber and Lyft (which had not been legalized outside of New York City at the time), and so much of the summit was also focused on providing a basic understanding of recent developments in shared mobility.
- Few participants had heard of VTC or the mechanics of VTOs, and the summit provided a forum for rural communities across NYS to become more familiar with "better" practices in volunteer transportation.

3.6 Policy Context

Thanks in part to interest in ride-hailing companies Uber and Lyft (formally referred to as Transportation Network Companies)—which were not legal in New York State outside of New York City until June 2017—there was a great deal of interest in several policy areas leading up to the Mobility Solutions Summit:

- Pathways toward legalizing Transportation Network Companies in Upstate New York.
- Pathways toward legalizing electric *pedal-assist* bicycles still not legal outside of New York City at the time of this report.
- Barriers in NYS insurance law to prevent nonprofit organizations from pooling risk through mechanism called a Risk Retention Group.
- Barriers in NYS insurance law that prevent peer-to-peer carsharing providers from operating.

Legislation was not enacted in any of these four areas, but all four areas have been revisited in both the 2017 and 2018 legislative sessions.

3.7 Memorandums of Understanding and Fundraising

Although the CMAQ funding mechanism has been around for almost three decades, 2016 represented the first year in which (1) three NYS communities applied for this funding competitively across the State for specifically shared mobility networks, and (2) NYSDOT guidelines made explicit mention of shared mobility modes as eligible activities for funding. The notice of funding availability presented an ideal opportunity for the contractor to advance many of the concepts discussed at the Ithaca Summit. To formalize the contractor's support of various cities' efforts, the contractor advanced Memorandums of Understanding (MOU) with four partners including the following:

- With the City of Niagara Falls, to jointly explore bike sharing best practices and development of business planning and fundraising.
- With the CDTA, to support the evaluation of Capital Carshare.
- With the City of Rochester to support research and fundraising for carsharing, bike sharing, and vanpooling.

A great deal of progress was made with the use of CMAQ funding for shared mobility in 2016. The contractor helped prepare the Capital District, Rochester, and Niagara Falls to seek these funds, and the three regions requested and secured over $3.5 million in federal funds for shared mobility networks. The contractor spent considerable time working with these stakeholders, researching other best practices, and formulating operational strategies for the shared mobility projects proposed during the contract's first year of execution. Future phases were spent supporting these communities in attracting private sector and community-based resources to match these federal funds.

4 Phase 2. Creating and Expanding Viable Systems: 2017–2018

As each of the CMAQ applications moved forward and were awarded, the contractor shifted into a role to support deployment of these networks. Much of the contractor's technical assistance during this period was devoted to working with VTC on expansion of volunteer transportation in Upstate New York and with the City of Rochester to advance the business plan for carsharing and integrate electric vehicles into this network planning. The contractor also delivered two convenings during this period, and 2017 saw the growth of the Reddy Bikeshare system in Buffalo and launch of the Pace and CDPHP Cycle! programs in Rochester and the Capital region, respectively.

4.1 Carshare

Figure 1. Carsharing In Upstate New York

Carsharing in Upstate New York
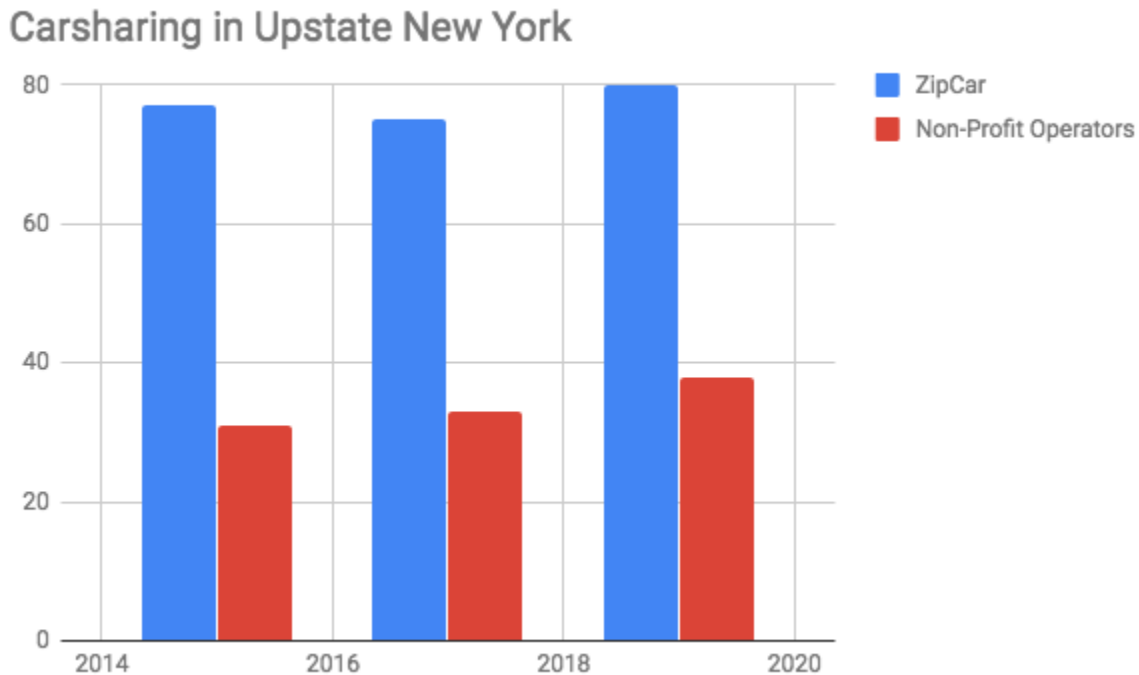
While carsharing programs nationally saw some significant changes, such as the shift toward and competition with transportation network companies, there were no significant changes in carsharing in upstate New York during the second half of this project. The biggest development was the City of Rochester's progress toward an all-electric model in 2019. During this period, among existing operators:

- Zipcar continued to provide service in and around upstate college markets and maintained several of the original BCS parking spaces within the City of Buffalo but did not see significant growth in these markets in 2017 or 2018. Nationally, Zipcar saw contraction in several similar midsized markets, closing local offices (but not exiting entirely) in Minneapolis, Detroit, and Milwaukee, among others.
- CDTA continued to provide operating funds to Capital Carshare, which faced the same insurance challenges as BCS as it grew to an eight-vehicle fleet in 2017. The organization has shifted to a *last resort* underwriter, which charges over three times the organization's previous premiums. Thanks to continued CDTA support, Capital Carshare can maintain insurance at very high premiums.
- In Tompkins County, Ithaca Carshare sustained its fleet of 24 cars and over 1,400 members, continuing to yield significant environmental, social, and economic impacts from the original NYSERDA/NYSDOT investment of $150,000 in the program in 2008. Capital Carshare and Ithaca Carshare continued to express concerns over the insurance environment surrounding their program. Lack of affordable insurance coverage—due to restrictions such as New York State's prohibition on risk retention groups—remains the most significant barrier to the expansion of carsharing programs at the scale that was originally sought as part of this demonstration program.

The City of Rochester, having focused earlier efforts on the bike share and vanpool components of the CMAQ award, began the process of business development for carshare in late 2017 and re-engaged with the contractor. The partners worked to tackle two main (related) outstanding issues:

- Community-controlled networks, like the programs in Ithaca, Albany, and formerly Buffalo, could launch a larger network of vehicles and get closer to operational self-sufficiency than major national operators, but face the central insurance hurdle addressed previously.
- Private sector operators in the space are beginning to become comfortable with public procurement for carsharing in small and midsized cities. The contractor and the City of Rochester worked to shape partnership scenarios that would be sufficient to attract bids. The contractor engaged with SUMC in fall 2017 to interview several similarly scaled programs that featured a public investment and procurement process around carsharing. The interviews also gave the contractor the opportunity to engage with operators directly to discuss interest in the Rochester opportunity.

Around this same time the City of Rochester worked with the contractor to develop a proposal that would leverage the CMAQ investment while leveraging additional funding through NYSERDA to deploy a larger and all-electric network. The contractor worked with the city to develop a proposal for an additional $500,000 in support for this network that would allow the project to shift to an all-electric fleet with additional infrastructure investments on the part of the city. With PON 3578 Plug-in Electric Vehicle ("PEV")-Enabling Technology Development and Demonstration, support tentatively awarded at the time of this report, public support, including the city's matching funds, for this EV Carshare program will total over $1 million. Private investment of at least $500,000 is expected to be attracted to these public resources. A 15–20 electric vehicle fleet is expected to launch in 2019.

4.2   Bike Share

Thanks to groundwork laid in 2016, both 2017 and 2018 were banner years for bike share growth in Upstate New York. The region went from one network (Reddy Bikeshare) to three in 2017 with the launch of Pace in Rochester and CDPHP Cycle! in the Capital region. The results were a six-fold increase in ridership and nearly a ten-fold increase in participation. A fourth network in Ithaca, NY with the dockless startup, Lime (formerly LimeBike), launched in 2018.

Table 2. Bike Share System Usage and System Profile

Program	Bikes (2017)	Rides (2017)	Users (2017)	Bikes (2018)
Reddy Bikeshare (Buffalo)	240	26,500	5,600	240
Pace Bike Share (Rochester)	250	22,000	8,000	340
CDPHP Cycle! (Capital Region) *	160	12,000	2,500	350
Lime (Ithaca)	-	-	-	350
Totals	635	60,500	16,100	1,280

Each of these four networks features a different approach to public and private partnership and funding:

Table 3. Structure and Financing of Bike Share Systems

Program	Capital Funding	Procurement	Ownership
Reddy Bikeshare (Buffalo)	Seed funding from NYSERDA, now fully funded by sponsors and site partners (e.g., UB).	Nonprofit startup owner-operator Initially w/out municipal contract, now exclusive permittee.	Nonprofit
Pace Bike Share (Rochester)	Partially grant funded, partially private + sponsors.	City issued RFP for owner-operator. Two-year contract provides for an *extended pilot* approach.	Private vendor
CDPHP Cycle! (Capital Region) *	Fully grant funded, sponsorship also secured.	Transit agency-issued RFP to both procure bikes and operate network.	Transit agency
Lime (Ithaca)	Fully privately financed, no sponsorship.	Nonprofit issued RFI inviting private operators to partner.	Private permittee

Since the Rochester program features privately owned equipment and bicycles, the city relied on a *turn-key* approach to program management through a two-year contract that allows the city to utilize CMAQ resources without getting locked into a long-term contract in such a rapidly changing industry. Pace Bike Share (formerly Zagster) committed substantial self-funding to sponsor the program and secured additional funds in local sponsorships over the early months of 2017 for a two-year operating contract beyond the original seed funding from CMAQ resources that were subcontracted to Pace.

JUMP Bikes (Social Bicycles at the time) engaged with the contractor to evaluate the station locations in the four cities chosen for initial deployment: Albany, Schenectady, Troy, and Saratoga Springs. The contractor worked with local officials on specific concerns regarding rack placement and to communicate the optional conditions for success in each community. The program then launched in late July 2017 and saw very strong results in less than four months of the full season. The contract amount for this work of $44,500 was applied as a match to the NYSERDA project work.

4.3 Niagara Falls

In 2017 the contractor partnered with the City of Niagara Falls to provide a bike sharing analysis of the area. With this analysis, the contractor met with community groups, office of the Mayor, Parks Departments, and the Niagara River Greenway commission to help guide the process. This led to not only a CMAQ awarded project for bike sharing, but also provided the needed research to assist with a deployment of a bikesharing system.

In 2017, the City of Niagara Falls developed an RFP for a bike-sharing vendor. To date, Niagara Falls has not publicly announced the vendor of the bike-sharing system. Expected launching of bike sharing in Niagara Falls is spring of 2019.

4.4   Ithaca

Bike Walk Tompkins, a nonprofit incubated by Ithaca Carshare, began exploring bike sharing in the fall of 2017. The contractor's team had an opportunity to provide guidance to Bike Walk Tompkins staff beginning with the North American Bikeshare Association conference in Montreal. The contractor continued to provide strategic assistance in 2018 toward the development of a Request for Information to Bike Walk Tompkins and Ithaca CarShare to bring a bike sharing vendor into the city. Because of the evolution of bike sharing, more vendors with different technologies were vetted. This included three new dockless bike share companies— Lime, Spin, and Pace—as well as electric bikes provided by JUMP Bikes. Eventually, the decision was made to partner exclusively with Lime due to the ability to bring a cost-free system to the area. The scale of Lime commitment (350 bikes) over a one-year term was a major factor in this decision. The first-year report from Bike Walk Tompkins and Lime was not yet available at the time of writing.

4.5   Volunteer Transportation Organizations

As VTC moved forward with software development, the contractor's team assisted VTC in assessing comparable features of similar software systems used by VTOs, while introducing VTC to other VTOs in the Capital region, Western New York, and the Southern Tier. During this same period, the contractor brought VTC on as a contractor to conduct preliminary business planning toward replication of its business model in Upstate New York, beginning with an Erie County and Niagara County service launch planned for fall 2018. This involved a few initial steps toward the end of the project period:

- Coordination between VTC, the NYS Department of Health (Medicaid Division), and Medical Answering Services (NYS's non-emergency medical transportation broker) to assess priority areas within rural regions of Western New York where non-emergency medical transport (NEMT) service is particularly costly.
- Feasibility study for several zip codes of Erie County (with an emphasis on the Southtowns region): 14057, 14031, 14025, 14032, 14111, 14080.
- Initial program development in coordination with the contractor and the Erie County Departments of Health and Senior Services.

- VTC also provided operational/business training to the contractor on volunteer transportation systems. The contractor staff spent two training days in Watertown, NY going over business modeling, operations and customer service, accounting, and marketing of this service. The experience provides the contractor the ability to assist in replication of this valuable transportation service.

4.6   May 2017 Urban Land Institute Workshop

Working with the Urban Land Institute of Western New York, the contractor facilitated a second convening on June 21, 2017 on Transportation Demand Management (TDM). The contractor focused on educating city, State, and private sector partners on strategies and systems that reduce VMT and CO_2 emissions while relieving congestion and conforming to new urban development codes, such as the City of Buffalo's zero minimum parking requirements for new or adaptive development projects. Over 50 attendees from various sectors heard presentations and discussions on these issues from developers, city officials, and the Greater Buffalo Niagara Regional Transportation Council (GBNRTC). The contractor as the facilitator selected presenters (and their case studies) that represented the shared mobility industry's best practice model.

4.7   June 2018 Mobility Innovation Summit

This third and final convening was particularly focused on smaller cities and rural transportation solutions, gathering stakeholders, decision-makers, and innovators across the shared mobility spectrum from New York State, Ohio, Pennsylvania. More than 100 leaders from over 50 communities participated in the two-day event which featured four plenary sessions, three breakout panel discussions, and presentations from leading academic and industry experts. Represented sectors included public agencies, transit agencies, city planning specialists, community and health-based organizations, academics, senior services providers, private foundations, academics, and mobility advocates.

Notable sessions included the following:

- Bike Sharing in Smaller Communities
- New Business Concepts in Carsharing
- Mobility Programs in Rural Communities
- New York State's Shared Mobility Future
- Creating Competitive Advantage with Innovative and Equitable Mobility

The Innovation Mobility Summit featured a keynote presentation, Tara Lynn Gray, CEO of the Fresno Metro Black Chamber of Commerce as well as an introductory presentation by Dr. Susan Shaheen of the University of California, Berkeley Transportation Sustainability Research Center along with a networking reception to open the convening. Ms. Gray spoke on the power of mobility in disinvested communities, specifically using it as a tool to uplift economic prospects. Dr. Shaheen spoke on the future of the shared mobility landscape, its increasing integration with new technology, and the anticipated shift in operating models. Both presenters provided unique insights and underscored the overall goals of the summit by emphasizing the ongoing successes in the field as well as the need to anticipate imminent changes in shared mobility. Morning sessions focused on the role of transit in shared mobility while early afternoon sessions highlighted innovative funding models and the role of public-private partnerships. The following are a few highlights:
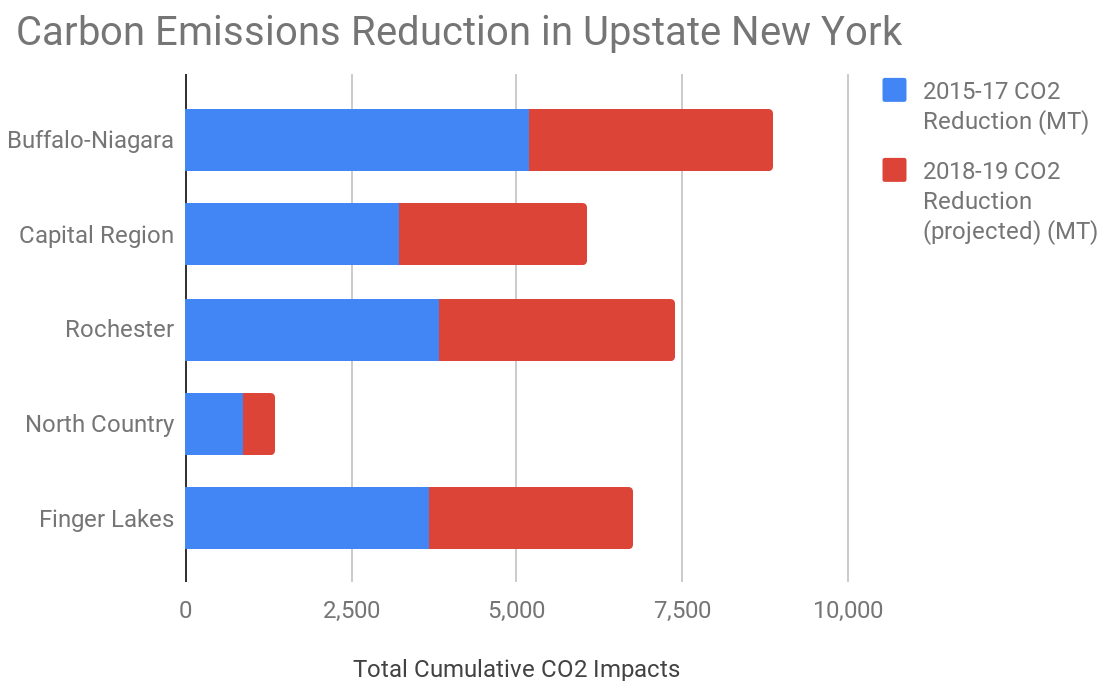
- Maggie Brooks of Rochester's Regional Transit Service (RTS) discussed the agency's "Reimagine RTS" planning process which may require new and more responsive systems to be added to the mix of RTS services.
- Lauren Bailey of the Capital District Transportation Authority's discussed the agency's forays into shared mobility through operating carsharing and bike-sharing systems as a transit agency.

The workshop included a biking tour utilizing Reddy Bikeshare bikes on June 19th that introduced people to Western New York. With guidance from the contractor, riders explored Buffalo by bike—the many new, old and historic areas of the region. This included Historic Allentown neighborhoods, Canalside, Riverbend (downtown), and Elmwood Village. On June 20th and 21st the contractor engaged a lineup of speakers and panelists producing nearly 12 hours of open dialogue, learning, and networking with a total of 30 presenters over the course of the day as well as the networking reception held the previous night. Ninety-five percent of recipients in a post-summit survey said that they would attend another convening in the future and the same margin agreed they could apply the summit's content to their own work.

5   Overall Impacts

The contractor's work was primarily concentrated in 11 counties of Upstate New York: Erie, Niagara, Monroe, Tompkins, Albany, Rensselaer, Schenectady, Saratoga, Lewis, St. Lawrence, and Jefferson, representing 27.4% of the population of New York State not including NYC. Impacts were tracked across these 11 study counties based on the best available research on the effects of carshare, bike share, and vanpools programs. This led to the conclusion that participants in this program likely helped shed more than 3,800 household vehicles between 2015 and 2017 (Tables 1 and 2) and are projected to shed another 3,000 between 2018 and 2019. Together, this adds up to a cumulative impact of over 30,000 fewer metric tons (MT) of carbon dioxide, methane, and nitrous oxide—the energy equivalent of heating and electricity for 3,500 homes over one year or the carbon sequestration equivalent value of planting more than 800,000 trees.[1]

Figure 2. CO_2 Impacts

Carbon Emissions Reduction in Upstate New York

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[1]   https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

In comparison, these impacts were much more significant (by a factor of 20) than the original goals for the project, which were the following:

- Take an estimated 150–240 vehicles off the road, resulting in 550,000–880,000 less annual VMT and 31,750–50,000 gallons of gas avoided.
- Generate savings for these new members of $450,000–$720,000 annually, due to their expected decrease in driving.

A few reasons for the project far exceeding its initial projections are as follows:

- The scope of the project (and impact tracking) expanded to include bike sharing and vanpooling.
- The impact tracking also references Zipcar's impacts, which are widespread across the State and include regions and counties (especially related to Zipcar's campus-based programs) that were indirectly related to the project and not a programmatic focus.

As such, we caution the reader against considering the sum of these impacts as an outcome of the project alone. It should also be noted that these impacts may also be reflected in other NYSERDA project reporting on bike sharing and carsharing pilots that may align with this historical period.

The impacts can be further broken down by mode as follows:

- **Carsharing**. Despite the backdrop of a period of national consolidation and contraction of carshare fleets, carsharing will likely remain the largest and most consistent facet of this environmental impact.
- **Bike sharing**. As the mode was nonexistent in the study regions in 2015, bike sharing is the fastest growing source of transportation emission reductions in the study but represents the smallest overall impact.
- **Vanpooling**. Despite remaining the mode for very few trips, vanpooling has the capacity to make a significant regional impact if modest growth continues statewide. Projected impacts for 2018 and 2019 are strong based on the more than one dozen shared mobility systems in operation in the project area and their continued growth during this two-year period.

Urban areas are not the only places where shared mobility impacts can be seen. The expansion of volunteer transportation services, like those provided by the Volunteer Transportation Center, have increased access to necessary medical care for residents who are mobility-impaired and live in communities with low to no transit access. Without this vital service, elderly and disabled populations would be restricted from fundamental primary care. This mirrors the ability of shared mobility programs to positively affect health outcomes of implementer communities where participants substitute the sedentary use of their automobiles for walking, biking, and associated public transit service.

Financial Impacts of Shared Mobility Programs

The multiplier effect of shared mobility programs is well documented. Shared mobility networks create a community of users that interact with the community of businesses and services surrounding and between carsharing stations. The following reports detail various levels of economic impact:

- See Page 53 of *Shared-Use Mobility Toolkit For Cities* Final Report June 2016
- See Page 9 *Buffalo CarShare Two Years in Review* Report C-08-24 November 2011

Health, Wellness, and Quality of Life Impacts

As Buffalo Carshare grew to more than 900 members, survey results captured member feedback indicating their carsharing experience helped advance some level of active transportation in their life – walking
or biking more as part of a daily routine. The following report discussed some of these active transportation outcomes:

- See Page 7 *Buffalo CarShare Two Years in Review* Report C-08-24 November 2011

Figure 3. Shared Mobility Program Growth in Upstate New York 2015-2019

Carsharing Programs in Upstate New York
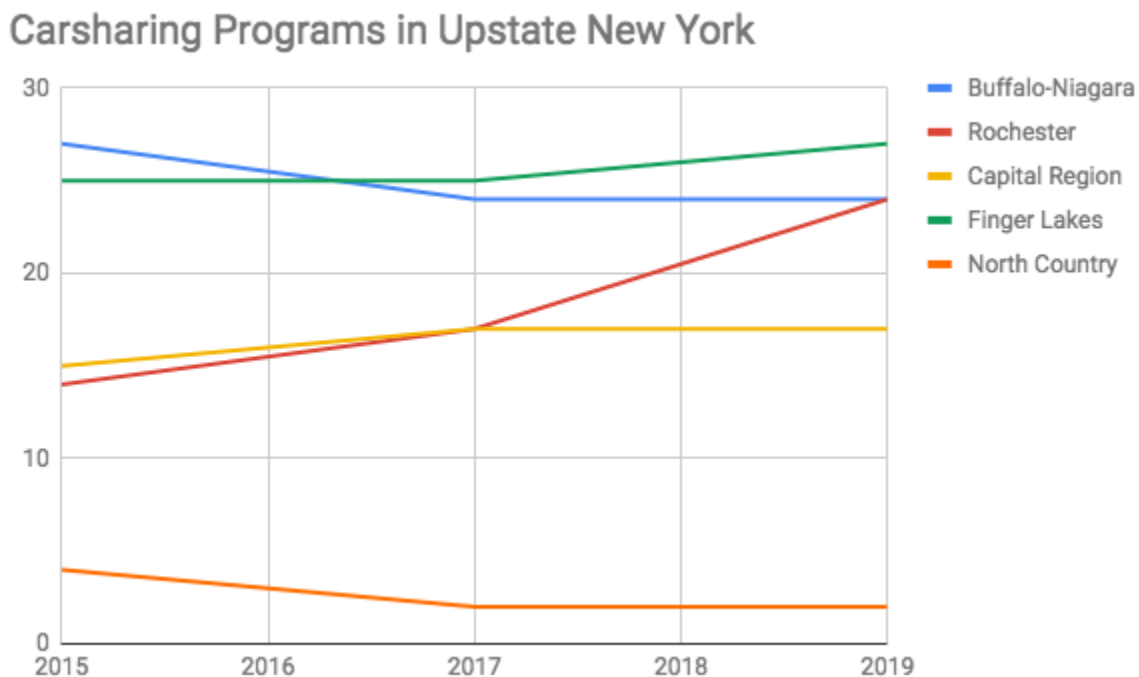
Lastly, shared mobility has created a new pathway to innovation in New York State with companies such as Zagster, JUMP Bikes, and Lime using upstate cities as testbeds for their new operation models. JUMP Bikes leveraged its flexible bike sharing model, that was piloted in Buffalo, into its international business operations and was acquired by Uber in 2018. Other models such as low-income, community-focused carsharing were developed by Buffalo CarShare and have been the basis for programs nationwide including the BlueLA carsharing program in Los Angeles with $30 million in total public and private investment.

6   Project Continuation and Next Steps

Above all else, the project has provided a platform for Shared Mobility Inc. to continue to invest in the research, development, and implementation of shared transportation programs in New York State and beyond. Active new projects for the contractor that have grown out of the project include the following:

- Continued coordination with, and in some cases, service contracts to support bike sharing in Niagara Falls, Rochester, Ithaca, and the Capital region (at least 1,300 bikes expected to be in service in these cities from 2019 onward).
- Partnership with the City of Rochester to assist launch of its 15–20 car, all-electric carshare program in and around downtown Rochester in 2019.
- Partnership with growth of the VTC platform in Western New York beginning in late 2018 as well as deployment in other rural markets such as the San Joaquin Valley in California.

The contractor also continues to pursue strategic opportunities to support replication of programs nationally that have been incubated in Upstate New York. In Buffalo, the contractor will continue to maintain and grow the Reddy Bikeshare program that was both launched and renewed through contracts with Independent Health totaling $2.3 million during this contract period (from the original NYSERDA/NYSDOT investment of $150,000).

In consideration of their tremendous environmental, social, and economic impacts of shared mobility, the contractor seeks to (1) continue working in partnership with NYSERDA and NYSDOT toward ongoing program development with a particular eye on leveraging outside financial investments, (2) continue increasing impacts, and (3) include disadvantaged communities in the design and distribution of innovative technologies and models. All three of these priorities have been part of the contractor's operational strategy beginning with Buffalo CarShare.

Electric bike sharing, shared scooter systems, electric vehicle carsharing, volunteer transportation, and microtransit systems are just some of the items that are on the contractor's development radar moving through 2018 and beyond. The groundwork laid during the execution of this contract will allow for the contractor to continue to make meaningful developments in this subfield. Shared mobility programming brings multifaceted benefits to communities and is one of the best means to bridge existing equity gaps by providing underserved communities an efficient, cost-effective means to access social, cultural, and economic opportunities. The contractor continues to be grateful for the continued support that NYSERDA and NYSDOT show in embracing these cutting-edge concepts year after year, and the Shared Mobility team looks forward to an exciting, and productive second decade of work in partnership with New York State.

Appendix A

Table A-1. Total Annual Impacts by Mode: 2015–2019

	Carshare Savings			Bike Share Savings			Vanpool Savings			Total Savings		
	Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Cars Shed	VMT Reduced (mi)	GHG Savings (MT)
2015	873	9,815,450	3,905	12	134,928	50	325	3,651,377	1,363	1,210	13,601,754	5,318
Annual Change 15-16	-1.2%	-1.2%	-1.2%	220.0%	220.0%	220.0%	3.9%	3.9%	3.9%	2.4%	2.4%	2.2%
2016	863	9,699,974	3,859	38	431,770	161	337	3,794,625	1,417	1,239	13,926,369	5,437
Annual Change 16-17	1.2%	1.2%	1.2%	221.7%	221.7%	221.7%	12.4%	12.4%	12.0%	11.1%	11.1%	10.7%
2017	873	9,815,450	3,905	124	1,388,859	519	379	4,265,299	1,593	1,376	15,469,608	6,016
Annual Change 17-18	1.2%	1.2%	1.2%	70.0%	70.0%	70.0%	7.9%	7.9%	7.9%	9.2%	9.2%	8.9%
2018	883	9,930,926	3,951	210	2,360,340	881	409	4,601,495	1,718	1,502	16,892,761	6,550
Annual Change 18-19	1.2%	1.2%	1.2%	3.8%	3.8%	3.8%	5.7%	5.7%	5.7%	2.8%	2.8%	2.7%
2019	893	10,046,402	3,997	218	2,450,292	915	432	4,861,681	1,815	1,544	17,358,375	6,727
Total Savings 15 - 19	**4,385**	**49,308,201**	**19,615**	**602**	**6,766,189**	**2,527**	**1,883**	**21,174,476**	**7,907**	**6,870**	**77,248,866**	**30,048**

Table A-2. Cumulative Impact by Mode, County, and City: 2015–2017 (Baseline Period)

Note: City totals are not subtracted from county totals. Regionwide totals are the sum of county totals.

	Carshare Savings			Bike Share Savings			Vanpool Savings			Total Savings		
	Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Cars Shed	VMT Reduced (mi)	GHG Savings (MT)
Regionwide Total	2,609	29,330,874	11,668	174	1,955,556	730	1,042	11,711,301	4,373	3,824	42,997,731	16,771
Erie County	750	8,429,739	3,353	89	998,467	373	307	3,449,659	1,288	1,145	12,877,866	5,014
Buffalo + University	647	7,274,980	2,894	89	998,467	373	100	1,125,524	420	836	9,398,972	3,687
Vil. of Williamsville	0	0	0	0	0	0	6	67,239	25	6	67,239	25
Niagara County	0	0	0	0	0	0	40	444,363	166	40	444,363	166
City of Niagara Falls	0	0	0	0	0	0	9	99,397	37	9	99,397	37
Albany County	401	4,503,559	1,792	12	136,727	51	64	716,243	267	476	5,356,529	2,110
City of Albany	277	3,117,849	1,240	12	136,727	51	9	102,320	38	299	3,356,896	1,330
Saratoga County	0	0	0	4	50,373	19	83	938,424	350	88	988,797	369
City of Saratoga Springs	0	0	0	4	50,373	19	16	181,253	68	21	231,626	86
Rensselaer County	21	230,952	92	4	50,373	19	35	397,588	148	60	678,913	259
City of Rensselaer	0	0	0	0	0	0	7	78,933	29	7	78,933	29
City of Troy	21	230,952	92	4	50,373	19	6	64,316	24	31	345,641	135
Schenectady County	62	692,855	276	4	50,373	19	47	532,066	199	113	1,275,294	493
City of Schenectady	62	692,855	276	4	50,373	19	29	324,502	121	95	1,067,730	416
Monroe County	493	5,542,842	2,205	54	611,674	228	330	3,706,922	1,384	877	9,861,438	3,818
City of Rochester	329	3,695,228	1,470	54	611,674	228	87	979,352	366	470	5,286,254	2,064
Jefferson County	0	0	0	0	0	0	22	242,646	91	22	242,646	91
St. Lawrence County	113	1,270,235	505	0	0	0	46	520,372	194	159	1,790,607	700
Lewis County	0	0	0	0	0	0	15	172,483	64	15	172,483	64
Tompkins County	770	8,660,691	3,445	5	57,569	21	53	590,535	221	828	9,308,795	3,687
City of Ithaca	770	8,660,691	3,445	5	57,569	21	8	90,627	34	783	8,808,887	3,501

A-2

Table A-3. Annualized Impact by Mode, County, and City: 2015

Note: City totals are not subtracted from county totals. Regionwide totals are the sum of county totals.

	Carshare Savings				Bike Share Savings				Vanpool Savings			Total Savings		
	Shared Cars	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Shared Bikes	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)
Regionwide Total	85	873	9,815,450	3,905	75	12	134,928	50	325	3,651,377	1,363	1,210	13,601,754	5,318
Erie County	27	277	3,117,849	1,240	75	12	134,928	50	119	1,341,859	501	409	4,594,636	1,792
Buffalo + University	25	257	2,886,897	1,148	75	12	134,928	50	31	347,889	130	300	3,369,714	1,329
Vil. of Williamsville	0	0	0	0	0	0	0	0	4	43,852	16	4	43,852	16
Niagara County	0	0	0	0	0	0	0	0	10	111,091	41	10	111,091	41
City of Niagara Falls	0	0	0	0	0	0	0	0	3	38,005	14	3	38,005	14
Albany County	13	134	1,501,186	597	0	0	0	0	14	154,942	58	147	1,656,129	655
City of Albany	9	92	1,039,283	413	0	0	0	0	1	14,617	5	94	1,053,900	419
Saratoga County	0	0	0	0	0	0	0	0	28	309,885	116	28	309,885	116
City of Saratoga Springs	0	0	0	0	0	0	0	0	6	64,316	24	6	64,316	24
Rensselaer County	0	0	0	0	0	0	0	0	9	105,244	39	9	105,244	39
City of Rensselaer	0	0	0	0	0	0	0	0	2	23,388	9	2	23,388	9
City of Troy	0	0	0	0	0	0	0	0	1	5,847	2	1	5,847	2
Schenectady County	2	21	230,952	92	0	0	0	0	12	137,402	51	33	368,353	143
City of Schenectady	2	21	230,952	92	0	0	0	0	7	76,009	28	27	306,961	120
Monroe County	14	144	1,616,662	643	0	0	0	0	96	1,081,673	404	240	2,698,335	1,047
City of Rochester	10	103	1,154,759	459	0	0	0	0	28	318,655	119	131	1,473,414	578
Jefferson County	0	0	0	0	0	0	0	0	6	67,239	25	6	67,239	25
St. Lawrence County	4	41	461,904	184	0	0	0	0	12	137,402	51	53	599,305	235
Lewis County	0	0	0	0	0	0	0	0	4	49,698	19	4	49,698	19
Tompkins County	25	257	2,886,897	1,148	0	0	0	0	14	154,942	58	271	3,041,839	1,206
City of Ithaca	25	257	2,886,897	1,148	0	0	0	0	4	43,852	16	261	2,930,749	1,165

Table A-4. Annualized Impact by Mode, County, and City: 2016

Note: City totals are not subtracted from county totals. Regionwide totals are the sum of county totals.

	Carshare Savings				Bike Share Savings				Vanpool Savings				Total Savings		
	Shared Cars	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Shared Bikes	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)		Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)
Regionwide Total	84	863	9,699,974	3,859	240	38	431,770	161	337	3,794,625	1,417		1,239	13,926,369	5,437
Erie County	22	226	2,540,469	1,011	240	38	431,770	161	90	1,008,587	377		354	3,980,826	1,54istory8
Buffalo + University	14	144	1,616,662	643	240	38	431,770	161	33	374,200	140		215	2,422,632	944
Vil. of Williamsville	0	0	0	0	0	0	0	0	0	0	0		0	0	0
Niagara County	0	0	0	0	0	0	0	0	14	157,866	59		14	157,866	59
City of Niagara Falls	0	0	0	0	0	0	0	0	3	35,081	13		3	35,081	13
Albany County	13	134	1,501,186	597	0	0	0	0	25	280,650	105		158	1,781,837	702
City of Albany	9	92	1,039,283	413	0	0	0	0	4	46,775	17		97	1,086,058	431
Saratoga County	0	0	0	0	0	0	0	0	24	268,956	100		24	268,956	100
City of Saratoga Springs	0	0	0	0	0	0	0	0	5	58,469	22		5	58,469	22
Rensselaer County	0	0	0	0	0	0	0	0	11	119,861	45		11	119,861	45
City of Rensselaer	0	0	0	0	0	0	0	0	2	23,388	9		2	23,388	9
City of Troy	0	0	0	0	0	0	0	0	2	20,464	8		2	20,464	8
Schenectady County	2	21	230,952	92	0	0	0	0	16	175,406	65		36	406,358	157
City of Schenectady	2	21	230,952	92	0	0	0	0	11	122,784	46		31	353,736	138
Monroe County	17	175	1,963,090	781	0	0	0	0	109	1,230,768	460		284	3,193,858	1,241
City of Rochester	12	123	1,385,711	551	0	0	0	0	30	333,272	124		153	1,718,983	676
Jefferson County	0	0	0	0	0	0	0	0	8	84,780	32		8	84,780	32
St. Lawrence County	5	51	577,379	230	0	0	0	0	17	190,024	71		68	767,403	301
Lewis County	0	0	0	0	0	0	0	0	5	52,622	20		5	52,622	20
Tompkins County	25	257	2,886,897	1,148	0	0	0	0	20	225,105	84		277	3,112,002	1,232
City of Ithaca	25	257	2,886,897	1,148	0	0	0	0	0	0	0		257	2,886,897	1,148

Table A-5. Annualized Impact by Mode, County, and City: 2017

Note: City totals are not subtracted from county totals. Regionwide totals are the sum of county totals.

	Carshare Savings				Bike Share Savings				Vanpool Savings			Total Savings		
	Shared Cars	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Shared Bikes	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)
Regionwide Total	92	944	10,623,781	4,226	772	124	1,388,859	519	379	4,265,299	1,593	1,447	16,277,939	6,388
Erie County	24	246	2,771,421	1,102	240	38	431,770	161	98	1,099,213	410	383	4,302,404	1,674
Buffalo + University	24	246	2,771,421	1,102	240	38	431,770	161	36	403,435	151	321	3,606,625	1,414
Vil. of Williamsville	0	0	0	0	0	0	0	0	2	23,388	9	2	23,388	9
Niagara County	0	0	0	0	0	0	0	0	16	175,406	65	16	175,406	65
City of Niagara Falls	0	0	0	0	0	0	0	0	2	26,311	10	2	26,311	10
Albany County	13	134	1,501,186	597	76	12	136,727	51	25	280,650	105	171	1,918,564	753
City of Albany	9	92	1,039,283	413	76	12	136,727	51	4	40,928	15	108	1,216,938	480
Saratoga County	0	0	0	0	28	4	50,373	19	32	359,583	134	36	409,956	153
City of Saratoga Springs	0	0	0	0	28	4	50,373	19	5	58,469	22	10	108,842	41
Rensselaer County	2	21	230,952	92	28	4	50,373	19	15	172,483	64	40	453,808	175
City of Rensselaer	0	0	0	0	0	0	0	0	3	32,158	12	3	32,158	12
City of Troy	2	21	230,952	92	28	4	50,373	19	3	38,005	14	28	319,330	125
Schenectady County	2	21	230,952	92	28	4	50,373	19	20	219,258	82	45	500,583	193
City of Schenectady	2	21	230,952	92	28	4	50,373	19	11	125,708	47	36	407,033	158
Monroe County	17	175	1,963,090	781	340	54	611,674	228	124	1,394,481	521	353	3,969,244	1,530
City of Rochester	10	103	1,154,759	459	340	54	611,674	228	29	327,425	122	186	2,093,858	810
Jefferson County	0	0	0	0	0	0	0	0	8	90,627	34	8	90,627	34
St. Lawrence County	2	21	230,952	92	0	0	0	0	17	192,947	72	38	423,899	164
Lewis County	0	0	0	0	0	0	0	0	6	70,163	26	6	70,163	26
Tompkins County	25	257	2,886,897	1,148	32	5	57,569	21	19	210,488	79	281	3,154,954	1,249
City of Ithaca	25	257	2,886,897	1,148	32	5	57,569	21	4	46,775	17	266	2,991,241	1,187

Table A-6. Projected Impact by Mode, County, and City: 2018

	Carshare Savings				Bike Share Savings				Vanpool Savings			Total Savings		
	Shared Cars	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Shared Bikes	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)
Regionwide Total	93	956	10,741,257	4,271	1312	211	2,360,339	880	409	4,601,493	1,716	1,576	17,703,090	6,867
Erie County	24	246	2,771,421	1,102	300	48	539,712	202	83	938,424	350	378	4,249,557	1,654
Buffalo + University	24	246	2,771,421	1,102	300	48	539,712	202	39	441,439	165	334	3,752,572	1,469
Vil. of Williamsville	0	0	0	0	0	0	0	0	2	17,541	7	2	17,541	7
Niagara County	0	0	0	0	150	24	269,856	101	20	225,105	84	44	494,961	185
City of Niagara Falls	0	0	0	0	150	24	269,856	101	2	20,464	8	26	290,320	109
Albany County	13	134	1,501,186	597	160	26	287,846	107	34	380,047	142	193	2,169,079	846
City of Albany	9	92	1,039,283	413	160	26	287,846	107	6	67,239	25	124	1,394,368	545
Saratoga County	0	0	0	0	60	10	107,942	40	31	347,889	130	41	455,831	170
City of Saratoga Springs	0	0	0	0	60	10	107,942	40	5	58,469	22	15	166,411	62
Rensselaer County	2	21	230,952	92	60	10	107,942	40	13	143,249	53	43	482,143	185
City of Rensselaer	0	0	0	0	0	0	0	0	3	38,005	14	3	38,005	14
City of Troy	2	21	230,952	92	60	10	107,942	40	3	35,081	13	33	373,975	145
Schenectady County	2	21	230,952	92	60	10	107,942	40	17	192,947	72	47	531,841	204
City of Schenectady	2	21	230,952	92	60	10	107,942	40	11	125,708	47	41	464,602	179
Monroe County	24	246	2,771,421	1,102	490	78	881,530	329	154	1,727,753	645	479	4,572,373	1,755
City of Rochester	24	246	2,771,421	1,102	490	78	881,530	329	33	365,430	136	285	2,401,719	924
Jefferson County	0	0	0	0	0	0	0	0	10	111,091	41	10	111,091	41
St. Lawrence County	2	21	230,952	92	0	0	0	0	20	228,028	85	41	458,980	177
Lewis County	0	0	0	0	0	0	0	0	7	78,933	29	7	78,933	29
Tompkins County	26	267	3,002,373	1,194	332	53	597,281	223	20	228,028	85	340	3,827,682	1,502
City of Ithaca	26	267	3,002,373	1,194	332	53	597,281	223	3	38,005	14	324	3,637,659	1,430

Table A-7. Projected Impact by Mode, County, and City: 2019

Note: City totals are not subtracted from county totals. Regionwide totals are the sum of county totals.

	Carshare Savings				Bike Share Savings				Vanpool Savings				Total Savings		
	Shared Cars	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Shared Bikes	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)	Est. HH Cars Shed	VMT Reduced (mi)	GHG Savings (MT)
Regionwide Total	94	966	10,854,733	4,317	1,362	219	2,450,291	913	432	4,861,679	1,815	1,617	18,166,703	7,045
Erie County	24	246	2,771,421	1,102	350	56	629,664	235	74	836,104	312	376	4,237,189	1,649
Buffalo + University	24	246	2,771,421	1,102	350	56	629,664	235	43	479,444	179	345	3,880,529	1,516
Vil. of Williamsville	0	0	0	0	0	0	0	0	1	14,617	5	1	14,617	5
Niagara County	0	0	0	0	150	24	269,856	101	26	295,267	110	50	565,123	211
City of Niagara Falls	0	0	0	0	150	24	269,856	101	1	14,617	5	25	284,473	106
Albany County	13	134	1,501,186	597	160	26	287,846	107	46	514,525	192	206	2,303,557	896
City of Albany	9	92	1,039,283	413	160	26	287,846	107	9	105,244	39	127	1,432,373	559
Saratoga County	0	0	0	0	60	10	107,942	40	28	315,732	118	38	423,674	158
City of Saratoga Springs	0	0	0	0	60	10	107,942	40	5	52,622	20	15	160,564	60
Rensselaer County	2	21	230,952	92	60	10	107,942	40	11	119,861	45	42	458,755	177
City of Rensselaer	0	0	0	0	0	0	0	0	4	43,852	16	4	43,852	16
City of Troy	2	21	230,952	92	60	10	0	0	2	26,311	10	33	257,263	102
Schenectady County	2	21	230,952	92	60	10	107,942	40	17	192,947	72	48	531,841	204
City of Schenectady	2	21	230,952	92	60	10	107,942	40	10	116,938	44	41	455,832	176
Monroe County	24	246	2,771,421	1,102	490	78	881,530	329	164	1,847,614	690	417	4,692,234	1,800
City of Rochester	24	246	2,771,421	1,102	490	78	881,530	329	37	415,128	155	218	2,451,417	943
Jefferson County	0	0	0	0	0	0	0	0	13	149,095	56	13	149,095	56
St. Lawrence County	2	21	230,952	92	0	0	0	0	24	268,956	100	45	499,908	192
Lewis County	0	0	0	0	0	0	0	0	8	87,703	33	8	87,703	33
Tompkins County	27	277	3,117,849	1,240	332	53	597,281	223	21	233,875	87	351	3,949,005	1,550
City of Ithaca	27	277	3,117,849	1,240	332	53	597,281	223	2	20,464	8	332	3,735,594	1,471

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