

# Technology to Improve the First-Mile/Last-Mile Experience in Tompkins County

Final Report | Report Number 23-29 | December 2023



**NYSERDA**

## **NYSERDA's Promise to New Yorkers:**

NYSERDA provides resources, expertise, and objective information so New Yorkers can make confident, informed energy decisions.

### **Our Vision:**

New York is a global climate leader building a healthier future with thriving communities; homes and businesses powered by clean energy; and economic opportunities accessible to all New Yorkers.

### **Our Mission:**

Advance clean energy innovation and investments to combat climate change, improving the health, resiliency, and prosperity of New Yorkers and delivering benefits equitably to all.

# **Technology to Improve the First-Mile/Last-Mile Experience in Tompkins County**

*Final Report*

Prepared for

**New York State Energy Research and Development Authority**

Albany, NY

Richard Mai  
Project Manager

Prepared by

**Tompkins Consolidated Area Transit, Inc (TCAT)**

Ithaca, NY

Matthew Yarrow  
Service Development and Project Manager

## Notice

---

This report was prepared by Tompkins Consolidated Area Transit, Inc. in the course of performing work contracted for and sponsored by the New York State Energy Research and Development Authority (hereafter “NYSERDA”). The opinions expressed in this report do not necessarily reflect those of NYSERDA or the State of New York, and reference to any specific product, service, process, or method does not constitute an implied or expressed recommendation or endorsement of it. Further, NYSERDA, the State of New York, and the contractor make no warranties or representations, expressed or implied, as to the fitness for particular purpose or merchantability of any product, apparatus, or service, or the usefulness, completeness, or accuracy of any processes, methods, or other information contained, described, disclosed, or referred to in this report. NYSERDA, the State of New York, and the contractor make no representation that the use of any product, apparatus, process, method, or other information will not infringe privately owned rights and will assume no liability for any loss, injury, or damage resulting from, or occurring in connection with, the use of information contained, described, disclosed, or referred to in this report.

NYSERDA makes every effort to provide accurate information about copyright owners and related matters in the reports we publish. Contractors are responsible for determining and satisfying copyright or other use restrictions regarding the content of reports that they write, in compliance with NYSERDA’s policies and federal law. If you are the copyright owner and believe a NYSERDA report has not properly attributed your work to you or has used it without permission, please email [print@nyserda.ny.gov](mailto:print@nyserda.ny.gov)

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

## Preferred Citation

---

New York State Energy Research and Development Authority (NYSERDA). 2023. “Technology to Improve the First-Mile/Last-Mile Experience in Tompkins County.” NYSERDA Report Number 23-29. Prepared by Tompkins Consolidated Area Transit, Inc., Ithaca, NY. [nyserda.ny.gov/publications](https://nyserda.ny.gov/publications)

## Abstract

---

NYSERDA’s Public Transit Technology and Innovation Program’s mission is to help transit agencies improve energy efficiency and to improve transit accessibility, especially in underserved areas known as “transit deserts.” The program focuses on underutilized technologies and encourages development of innovative public transportation technology strategies that have the potential to reduce greenhouse gas (GHG) emissions and energy consumption among existing New York State transit systems, especially those in upstate areas. This evaluation report quantifies the impact of the “Technology to Improve First-Mile/Last-Mile Experience in Tompkins County: Tconnect” pilot from October 7, 2019 through May 28, 2022, during which time the program was disrupted by the Covid-19 pandemic. The evaluation scope included surveys and collecting data on ridership, transfers between modes, passenger miles traveled, and passenger trip-length revenue miles and utilization. While metrics show lackluster ridership, the project team concludes that on-demand service in low-density areas can provide a real lifeline to transportation-disadvantaged individuals and communities. These services may not always net large ridership, but they provide an important and valuable public good and can create a positive ripple effect on local economies. Conversations on spreading the cost of these services from the transportation provider to employers, health-care providers, housing developers, and county government will be needed to help ensure the success of similar programs in the future.

## Key Words

---

On-demand transit, software-as-a-service, first-mile/last-mile, user interface, transit deserts

## Table of Contents

---

|  |             |
|--|-------------|
| <b>Notice</b> .....                                  | <b>ii</b>   |
| <b>Preferred Citation</b> .....                      | <b>ii</b>   |
| <b>Abstract</b> .....                                | <b>iii</b>  |
| <b>Key Words</b> .....                               | <b>iii</b>  |
| <b>Acronyms and Abbreviations List</b> .....         | <b>vi</b>   |
| <b>Executive Summary</b> .....                       | <b>ES-1</b> |
| <b>1 Summary of the History of the Project</b> ..... | <b>1</b>    |
| 1.1 Original Project Concept .....                   | 2           |
| 1.2 Pre-COVID Planning .....                         | 4           |
| 1.3 Phase A Planning and Iterations .....            | 7           |

|          |   |            |
|----------|---|------------|
| 1.3.1    | Revised Tconnect Phase A Service Area .....   | 8          |
| 1.4      | Phase A Go-Live and Operation Notes.....  | 11         |
| 1.5      | Phase A Rider App Redesign Process .....  | 14         |
| 1.6      | Phase B Planning and Operations.....  | 18         |
| <b>2</b> | <b>Outreach and Surveys.....</b>  | <b>22</b>  |
| 2.1      | Outreach Highlights.....  | 22         |
| 2.2      | Survey Overview .....   | 25         |
| <b>3</b> | <b>Tconnect Data and Metrics .....</b>  | <b>28</b>  |
| 3.1      | Ridership .....   | 28         |
| 3.2      | Transfers between Modes.....  | 30         |
| 3.3      | Passenger Miles Traveled/Passenger Trip Length.....   | 30         |
| 3.4      | Revenue Miles and Utilization of Service.....   | 32         |
| 3.5      | Impact on GHG emissions .....   | 33         |
| <b>4</b> | <b>Review and Discussion of Tconnect Service Model .....</b>  | <b>35</b>  |
| 4.1      | Review of the Tconnect Experience .....   | 35         |
| 4.2      | Lansing/Etna Tconnect (Phase A) versus Dryden Tconnect (Phase B).....   | 36         |
| 4.2.1    | Operational Factors.....  | 36         |
| 4.2.2    | Communications and Outreach.....  | 37         |
| 4.2.3    | Historical, Cultural, and Behavioral Factors.....   | 38         |
| <b>5</b> | <b>Recommendations for Future On-Demand Transit and Similar Programs<br/>in Tompkins County and Other Areas of New York State .....</b> | <b>41</b>  |
| 5.1      | Commercialization of the HyperCommute Software.....   | 42         |
| 5.2      | Conclusion.....   | 44         |
| <b>6</b> | <b>References .....</b>   | <b>46</b>  |
|          | <b>Appendix A. Survey 1: Existing Habits .....</b>  | <b>A-1</b> |
|          | <b>Appendix B. Survey 2: Awareness/Satisfaction/Need.....</b>   | <b>B-1</b> |
|          | <b>Appendix C. Survey 3: “What Happened in Dryden?” .....</b>   | <b>C-1</b> |
|          | <b>Appendix D. Survey 4: “What Happened with Lansing/ Etna?” .....</b>  | <b>D-1</b> |

# List of Figures

---

|   |    |
|---|----|
| Figure 1. Map of the Dryden Area with Population Numbers.....   | 3  |
| Figure 2. Targeted Housing in the Dryden Area: Poet's Landing (left) and Pleasant View Mobile Home Park (right) ..... | 3  |
| Figure 3. Tconnect Logos .....  | 5  |
| Figure 4. UM Driver Interface.....  | 6  |
| Figure 5. Initial TCAT/Tconnect schedule.....   | 6  |
| Figure 6. Phase A - First Iteration Service Area Map .....  | 9  |
| Figure 7. On-Demand Service Models.....   | 10 |
| Figure 8. Phase A Service Area Map—Spring 2021.....   | 13 |
| Figure 9. Milton Meadows Near Lansing Town Hall—February, 2021 .....  | 13 |
| Figure 10. Screenshots of HyperCommute App .....  | 15 |
| Figure 11. Legend for Destination Buttons on First Iteration of HyperCommute App.....                                 | 16 |
| Figure 12. Screenshots of the Revised HyperCommute App .....  | 17 |
| Figure 13. Mailer and Service Map for First Iteration of Dryden Tconnect.....   | 19 |
| Figure 14. Second Iteration of Dryden Tconnect, Extended to Include Freeville .....                                   | 20 |
| Figure 15. Tconnect Branded Minibus in Dryden.....  | 21 |
| Figure 16. Map of Tconnect Bus Stop Sign Locations in Dryden Area .....   | 25 |
| Figure 17. Tconnect—Rides Per Weekend .....   | 28 |
| Figure 18. Comparison between Monthly Tconnect and TCAT Ridership .....   | 29 |
| Figure 19. Tconnect—Rides by Day of Week.....   | 29 |
| Figure 20. Rides by Trip (time of day).....   | 30 |
| Figure 21. Tconnect—Heatmap of Pick-Up and Drop-Off Locations .....   | 31 |
| Figure 22. Histogram of Tconnect Trip Distances in Miles .....  | 32 |

# List of Tables

---

|   |    |
|---|----|
| Table 1. TCAT Weekly Service Provision Statistics.....            | 7  |
| Table 2. Dryden Tconnect Service Hours—Weekdays.....              | 19 |
| Table 3. Tconnect Trip Miles Data from Jan 2021 to May 2022 ..... | 33 |
| Table 4. On-Demand versus Fixed-Route Emission Comparison .....   | 34 |

## Acronyms and Abbreviations List

---

|      |  |
|------|--|
| AI   | Artificial Intelligence  |
| ACS  | American Community Survey, a program of the United States Census that provides ongoing demographic data  |
| ADA  | Americans with Disabilities Act, which requires fixed transit agencies to provide parallel service to persons with disabilities  |
| GHG  | Refers to greenhouse gas emissions from transportation   |
| FMLM | First-Mile/Last-Mile trips are those that link transit to destinations that may be beyond walking distance from a bus stop.  |
| SOV  | Single-Occupancy Vehicle trips – generally considered the most inefficient way of commuting  |
| SaaS | Software as a Service, which is software accessed online with a subscription   |
| TCAT | Tompkins Consolidated Area Transit Inc. the private not-for-profit transit operator serving Ithaca and Tompkins County   |
| TNC  | Transportation Network Company   |
| TRIP | Transportation Reimbursement Incentive Program, which lowers transportation costs for commuters who can use before-tax dollars to pay for qualified transportation expenses, such as transit passes and parking. |
| UI   | User Interface   |
| UM   | Urban Mobility, Inc., the technology startup that designed and supplied the HyperCommute platform  |
| UX   | User experience  |
| VMT  | Vehicle miles traveled   |



# Executive Summary

---

Communities in Upstate New York and across the United States continue to seek first-mile/last-mile solutions to reduce transportation barriers to low-density areas, some of which are desperately in need of better access to public transit networks. It is inefficient for large buses to travel far off the main route to reach small population clusters. At the same time, it can be impractical for those living in low-density areas to walk to bus stops located a quarter-mile or more away. As a result, many villages and rural areas in Upstate New York are effectively “transit deserts,” where residents, especially if they cannot afford to own their own vehicles, can face myriad disadvantages.

This project posited that providing better access to transit for populations with uncertain access to private transportation will improve economic and social outcomes. Housing costs in the Ithaca urbanized area have been increasing for decades, a pattern that has become more pronounced in recent years. The housing price index increased 30.5% in the last two years and 65.7% over the last decade. Housing prices in outlying towns and villages also have been increasing, but nonetheless tend to be more affordable than those in Ithaca. As a result, finding operational models and affordable technology to support public transportation in the lower density areas of Tompkins County has been of critical importance to the project team.

This project started in October of 2019, five months before the COVID-19 pandemic. After the pandemic began escalating in the area in March of 2020, the project team paused for a few months, and then embraced an iterative approach within the context of great uncertainty. With adjustments to the scope of work, the team was able to move the project ahead and to generate local knowledge about the design and operation of on-demand transit on the low-density periphery of Ithaca’s urbanized area. Sections 4 and 5 in the document capture lessons learned that will be useful to other small transit operators in Upstate NY. Below is a table showing a summary of project metrics.

**Table S-1. Summary Metrics Table**

Source: <https://fred.stlouisfed.org/series/ATNHPIUS27060Q>

| <b>Metric</b>  | <b>Value</b> |
|--|--------------|
| Phase A Total Ridership  | 2,613        |
| Days Phase A operated  | 178          |
| Phase A Avg Rides per day  | 15           |
| Phase A Avg Rides per trip   | 1.5          |
| Phase A Max rides per trip   | 6            |
| Phase A Avg trip length  | 3.7          |
| Estimated Passenger miles traveled on Tconnect   | 9,688        |
| Estimated passenger miles including miles on fixed-route transit                             | 15,437       |
| Phase B Total Ridership  | 1            |
| Days Phase B operated  | 98           |
| Potential reduction in CO <sub>2</sub> emissions moving from fixed-route to Tconnect service | 242%         |

# 1 Summary of the History of the Project

---

The intent of this first-mile/last-mile (FMLM) pilot was to extend public transportation to lower-density areas in Tompkins County, NY, where residents currently have few to no transportation options. By providing a new service to these areas, the project team looked to increase access, especially to vulnerable members of the community; to decrease single-occupancy vehicle (SOV) trips; and to reduce greenhouse gas (GHG) emissions.

The project was launched October 7, 2019, at the Tompkins Consolidated Area Transit Inc. (TCAT) facility with Richard Mai of the New York State Energy Research and Development Authority (NYSERDA) in attendance. Also present were representatives from TCAT and its project partners, Urban Mobility (UM), Gadabout, Way2Go, and Tompkins County government. During this meeting, the group discussed the project's goals that included:

- Establishing the primary objective, which was reaching commuters and rural low-income residents who may not live near a fixed-route corridor.
- Improving access and equity for the targeted populations. (Meeting participants noted that low-income households are frequently pushed outside the more-expensive Ithaca urban center but find that public transportation options are insufficient in rural areas and small hamlets.)
- Urban Mobility, the app developer, bringing a customer focus to the final app interface design.
- Matching public transportation vehicle size with demand. (Lower-density areas can be served with smaller vehicles and, in some very low-density areas, volunteer drivers may offer the best solution.)
- Increasing efficiency of fixed-route services by reducing route deviations.
- Providing a service as inexpensively as possible, which would increase the likelihood of it serving as a model elsewhere across New York State.
- Meeting NYSERDA's objectives that, in addition to improving energy efficiency and greenhouse gas (GHG) reduction, are to foster equity and increase public transportation ridership.

Within the first few months of the project, the team decided to call the new FMLM on-demand service *Tconnect*. The "T" stood for either Tompkins or TCAT and the word "connect" was chosen to emphasize that the service could connect users with fixed-route service and important destinations in their daily lives.

The following sections recount the project team's work prior to the COVID-19 pandemic and how the project had to adapt once the pandemic hit. Many of the routine details that were reported during the quarterly progress reports have been omitted from this document to report the experiences more effectively, and to underscore lessons learned from this project.

## 1.1 Original Project Concept

The initial project plan was to pilot an app-based ride-hailing service using an Americans with Disabilities Act (ADA)-compliant mini-bus to transport riders to existing fixed routes from their residences in rural areas and outlying villages. The service was to be provided solely by TCAT's paratransit subcontractor, Gadabout Transportation Services, Inc., a not-for-profit company that has been operating in Tompkins County for 40 years. Gadabout, with whom TCAT contracts to provide its parallel ADA service, has been able to keep its operating costs down by co-locating with TCAT, and by using volunteer drivers in addition to paid drivers.

The on-demand Tconnect service was conceived of as primarily an FMLM service to connect riders with TCAT's fixed-route service. Gadabout vehicles would operate in a localized service area, as opposed to making lengthy trips from rural areas to and from Ithaca. The team saw these short trips as a way of maximizing the number of rides per hour and keeping the overall service costs reasonable. The project was to feature a Phase A pilot service in Dryden, NY, meant to test the model and understand opportunities for service growth and improvements. Phase B was left vague, but the idea was that it would help the team to further evaluate the HyperCommute technology and the FMLM operational model.

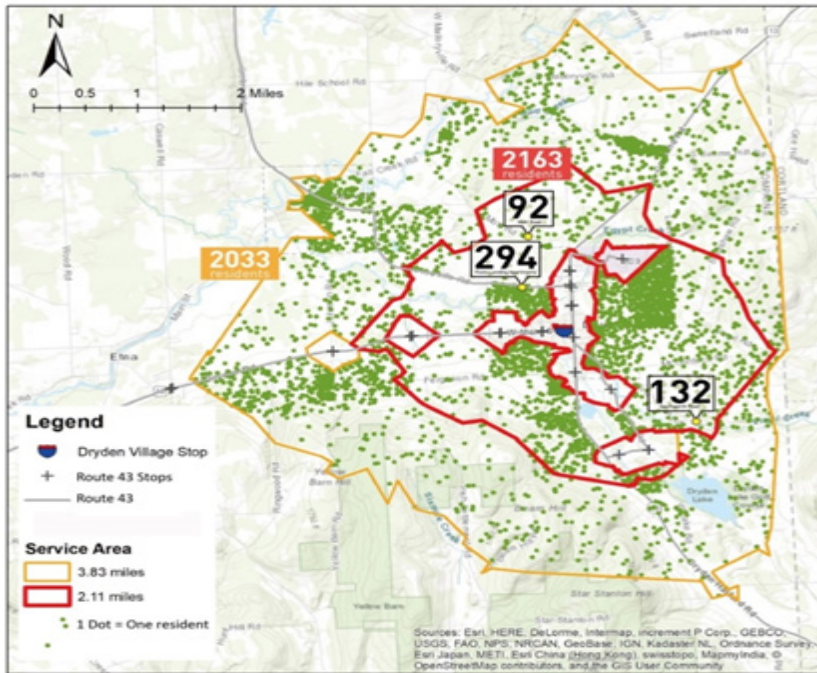
The team chose to focus on the Dryden area for the pilot for several reasons:

- TCAT's fixed-route 43 had 14 weekday trips, a relatively frequent service for an outlying village.
- Dryden has a large enough population to support a new transportation mode.
- There are pockets of low-income populations (~14% of the population was below the poverty line, according to recent American Community Survey [ACS] data).

The potential exists in the Dryden area to support a volunteer driver FMLM service, as there are small communities farther afield (e.g., McLean) that currently have no transit service.

The map (see Figure 1) is a draft version of the pilot area in Dryden that shows an inner service area containing one large low-income apartment complex and two mobile home parks outside of the fixed-route transit walkshed. If a second vehicle is added in Phase B, the service area could be expanded, reaching another 2,000+ potential riders.

**Figure 1. Map of the Dryden Area with Population Numbers**



**Figure 2. Targeted Housing in the Dryden Area: Poet's Landing (left) and Pleasant View Mobile Home Park (right)**



At the start of the project, the HyperCommute platform featured a trip-matching engine and a rider app, which never had been applied to a first-mile/last-mile service model. The concept for the app was to connect both paratransit (Gadabout) and fixed-route transit (TCAT) operators to coordinate the rider's trip. This would ensure that the connection from the minibus to transit bus (or the reverse) is made.

Riders without access to an app would be able to call in to a dispatcher with a trip request for the same service. Upon submission of a trip request, the HyperCommute engine would determine what FMLM service is available within the time and destination parameters submitted, and then display the closest matching trips. When users selected their preferred trip, they would be added to the manifest. Riders would be given a pick-up location (usually their driveway, but potentially centralized locations for apartment complexes and mobile home parks) and a time window for pick-up. From the start of the trip, users could get trip updates.

Phase B was to include one of the following:

- Adding a minibus in the same geographical area.
- Extending pilot areas in Tompkins County.
- Adding other carrier(s) such as volunteer driver organizations, transportation network communities (TNCs), or taxis.

If Phase A demonstrated insufficient FMLM capacity, adding another bus in the Dryden area would have allowed the team to test the added flexibility and efficiency from having two or more FMLM vehicles in a given area. Expanding the pilot area to other townships would produce more information on what geographic and demographic contexts support the FMLM model.

Finally, by engaging existing volunteer driver organizations and by working with the county to establish a Transportation Reimbursement and Information Program (TRIP), the volunteer driver model would allow the project team to assess the multimodal robustness of HyperCommute and extend FMLM service farther from transfer hubs to less-dense areas.

## **1.2 Pre-COVID Planning**

The project team met regularly after the October 2019 kick-off, and formed several subcommittees to focus on surveys, outreach, and app development and testing. Upon confirmation of the “Tconnect” name, TCAT’s graphic artist designed two versions of a logo for service branding:

**Figure 3. Tconnect Logos**



The team held the first public meeting for local officials in the Dryden area on October 31, 2019, to include elected and planning officials from the Village and Town of Dryden. The meeting drew five participants: Clay Converse (Village of Dryden Trustee); Deb Fisher (Village of Dryden Trustee); Mike Murphy (Village of Dryden Mayor); Ray Burger (Town of Dryden Director of Planning); and Jason Leifer (Town of Dryden Supervisor). It was important to the team that local stakeholders knew of the project before embarking on public outreach. They offered helpful suggestions on how to get the word out about the new service among their respective communities.

Some additional accomplishments and tasks completed before the COVID-19 pandemic were:

- The website went live on January 17, 2020: <https://tcatbus.com/tconnect/>
- In February, Way2Go and TCAT staff organized and led three public meetings in the Dryden Area. Meetings were lightly attended despite the team's concerted efforts to publicize via newsletters, press interviews, flyers and posters, and social media. However, those who did attend expressed excitement about the new service and offered meaningful feedback.
- Urban Mobility, Inc (UM) focused on intensive testing of the driver app in February and March. Testing occurred in the Dryden area prompting several software adjustments (Figure 4).
- UM staff implemented a virtual testing platform that simulated driver behavior, enabling the team to test various scenarios in real-time.
- The Operations subcommittee analyzed TCAT's route 43 service to Dryden and designed a draft schedule for the Tconnect service (Figure 5).
- The project team estimated a launch date for late May or early June 2020.

Figure 4. UM Driver Interface

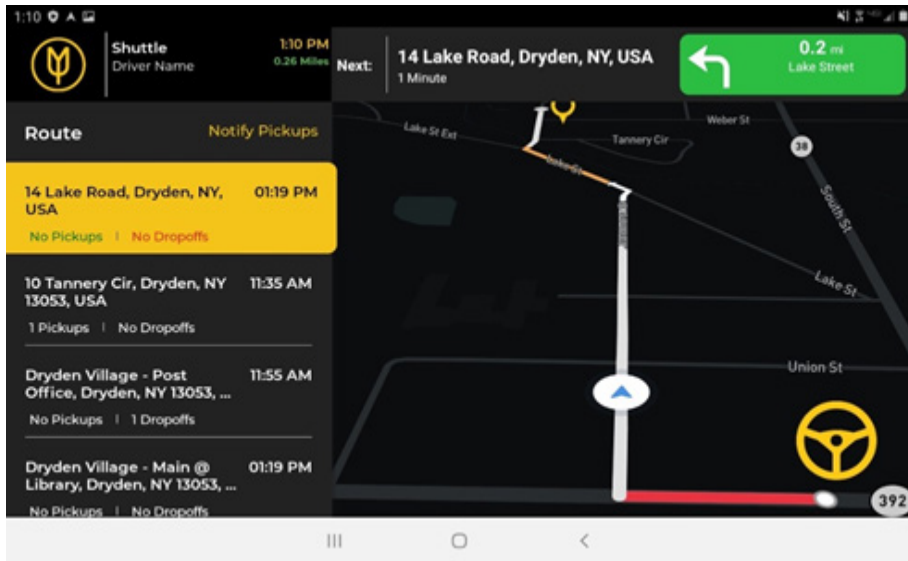


Figure 5. Initial TCAT/Tconnect schedule

**First Mile Segment: Home to TCAT Route 43**

| Tconnect Pickup Window | Arrive Dryden Village Stop | TCAT Dryden Departure | TCAT Arrive Green St |
|------------------------|----------------------------|-----------------------|----------------------|
| 6:27 AM - 6:47 AM      | 6:57 AM                    | 7:01 AM               | 7:29*                |
| 7:02 AM - 7:22 AM      | 7:32 AM                    | 7:36 AM               | 8:09 AM              |
| 8:09 AM - 8:29 AM      | 8:39 AM                    | 8:43 AM               | 9:13 AM              |
| 8:44 AM - 9:04 AM      | 9:14 AM                    | 9:18 AM               | 9:48 AM              |
| 10:57 AM - 11:17 AM    | 11:27 AM                   | 11:31 AM              | 12:01 PM             |
| 12:57 PM - 1:17 PM     | 1:27 PM                    | 1:31 PM               | 2:01 PM              |

**Last Mile Segment: TCAT Route 43 to Home**

| TCAT Leave Green St | TCAT Dryden Arrival | Tconnect Trip Start | Tconnect Dropoff Window |
|---------------------|---------------------|---------------------|-------------------------|
| 12:03 PM            | 12:33 PM            | 12:36 PM            | 12:46 PM - 1:06 PM      |
| 2:05 PM             | 2:35 PM             | 2:38 PM             | 2:48 PM - 3:08 PM       |
| 3:05 PM             | 3:35 PM             | 3:38 PM             | 3:48 PM - 4:08 PM       |
| 4:30 PM             | 4:58 PM             | 5:01 PM             | 5:11 PM - 5:31 PM       |
| 4:55 PM             | 5:29 PM             | 5:32 PM             | 5:42 PM - 6:02 PM       |
| 5:45 PM             | 6:18 PM             | 6:21 PM             | 6:31 PM - 6:51 PM       |



### 1.3 Phase A Planning and Iterations

In March 2020, after the planning phase was nearly complete, Tompkins County began confirming its first cases of COVID-19. Shortly thereafter, it was evident that the pandemic would change public transportation conditions dramatically. As employers adopted remote work policies and local academic, business, civic, and cultural activities came to a halt, TCAT’s ridership dropped from around 18,000 rides on weekdays to less than 1,000. Table 1 shows the impact.

**Table 1. TCAT Weekly Service Provision Statistics**

| TCAT Weekly Service Provision Statistics |                         |                           |                                     |
|--|-------------------------|---------------------------|-------------------------------------|
| Parameter                                | Spring 2020 - Pre-COVID | Spring 2020 - After-COVID | Spring '20 % reduction due of COVID |
| Revenue Hours                            | 2,806                   | 1,111                     | 60%                                 |
| Revenue Miles                            | 31,885                  | 13,990                    | 56%                                 |
| Trips                                    | 6,130                   | 2,377                     | 61%                                 |

The FMLM Tconnect service had been designed to connect people to fixed-route 43 for a morning commute into Cornell and Ithaca and a return trip in the afternoon. With the number of reported Covid-19 cases quickly escalating, these peak hour trips essentially disappeared from the transit system. The riders that TCAT continued to serve were essential workers with irregular shift times, or others needing to run short errands to pick-up essential supplies.

At the same time, local transportation providers scrambled to address public health concerns by implementing safety measures to protect both riders and drivers from the spread of the coronavirus. Under these circumstances, the project team was unable to move ahead with Phase A of the pilot FMLM service.

As the team transitioned from spring 2020 into the summer, there was still quite a bit of uncertainty in determining whether conditions would change enough to support the FMLM service as originally envisioned. As a result, the Tconnect team began to evaluate how to adapt the original plan’s technology and concepts that would better intersect with the actual fixed-route service in Tompkins County. TCAT staff used a transit-planning platform from Remix Software Inc. to outline several other potential service areas in Tompkins County, and to glean population estimates and demographic characteristics.

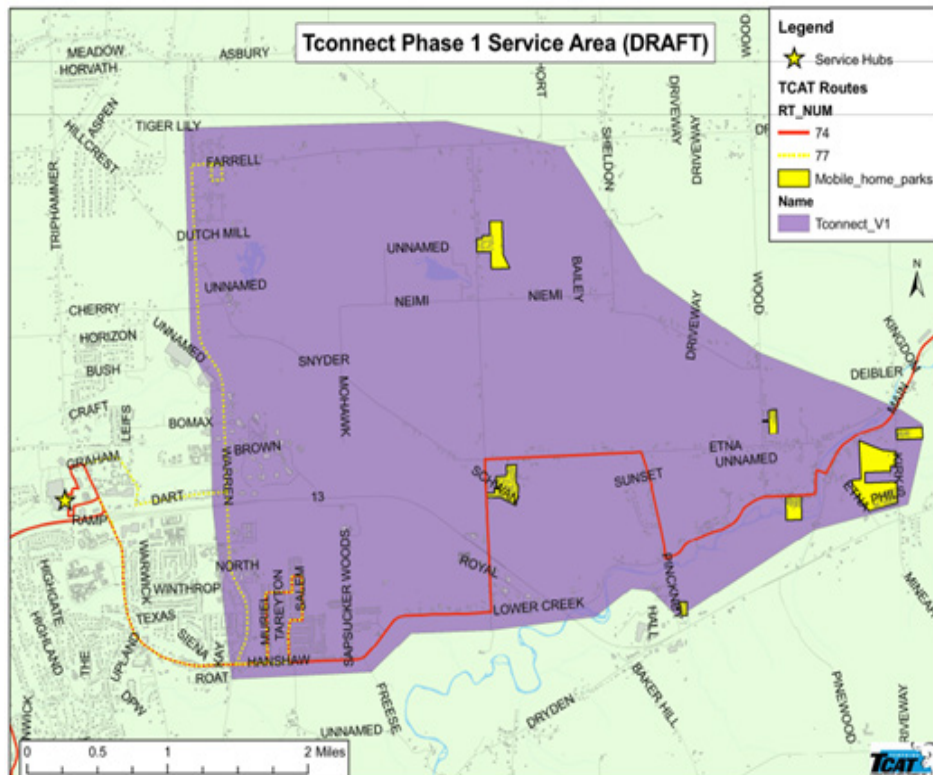
The team proposed to adapt to the realities of the COVID-19 pandemic by maintaining a fixed-route connection, and by making the on-demand model more flexible to allow trips to various destinations within the on-demand service area. HyperCommute's on-demand technology was tuned for FMLM connections to fixed-route service. Under an updated Phase A model.

HyperCommute would now be extended for a combination of multiple destinations, including connections to fixed routes. This model demonstrated the software's capabilities to adapt to constraints-and-supply variations, which are core to the success of scaling FMLM services. A description of the updated service area and service-delivery model for Phase A is as follows:

### **1.3.1 Revised Tconnect Phase A Service Area**

The TCAT route 41, at that time, was a weekday-only, demand-responsive route (not on-demand) that connects Cornell University and an area between Sapsucker Woods Road and Etna. This area is not densely populated, but is near the Ithaca urbanized area, and includes low-income apartment complexes, mobile home parks, and medical facilities. It is also near the Shops at Ithaca Mall, which enjoys a high level of fixed-route service throughout the week. The team's proposal was to join the weekend-only fixed-route 77 and the route 41 service areas to create a weekend on-demand service. This would replace route 77 and serve a low-density rural area with pockets of higher-density apartments and mobile home parks.

Figure 6. Phase A - First Iteration Service Area Map



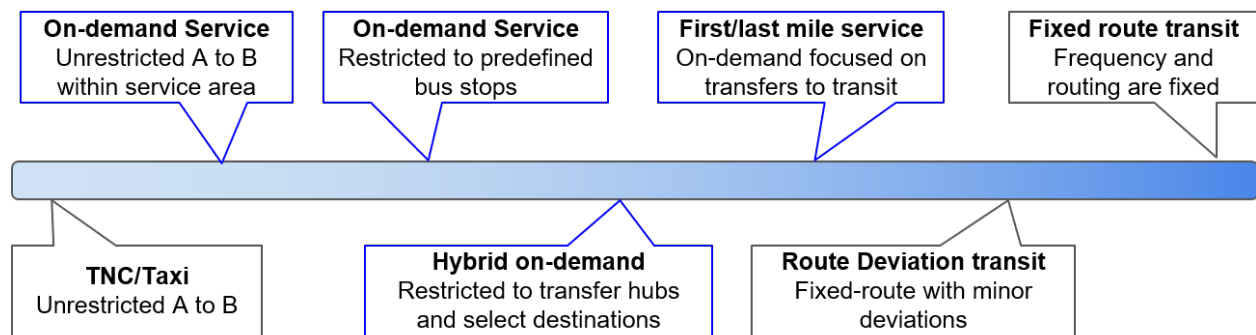
The first iteration of this service was implemented on weekends only between 7:35 a.m. and 11:30 a.m., and then again between 1:35 p.m. and 6:30 p.m. The service was anchored at the Shops at Ithaca Mall, meaning that the transition from one trip and the next trip, and any driver layover, was already occurring there. Testing in the proposed service area determined that certain trip patterns can be accommodated in 30 minutes. However, if one vehicle is assigned for pick-ups and drop-offs throughout the service area, a single trip may extend to 45 minutes.

Instead of having fixed pick-up/drop-off windows that are visible to the riders, the HyperCommute software would decide how to optimally schedule riders with service guarantees. The project team found it useful to consider a range of transit service models to home in on to determine what might work during the pandemic. Figure 7 shows an overall trade-off between the degree of trip personalization and service efficiency.

The original Tconnect model was an FMLM service and would be ill-suited for local trips within the on-demand service area itself. The team considered moving to an on-demand service that would provide unrestricted A to B service within the designated service area. In the context of uncertainty, this model gives users the most flexibility. On the other hand, it could easily turn into a taxi-like service, which would make it difficult to group riders together efficiently. As a result, the team termed the model as “hybrid on-demand.” This means that it was set up to serve as an FMLM service with certain trips internal to the service area also being available to the rider.

Trips would either start or finish at select destinations or bus stops, and the other end of the trip would be open so that riders could get picked up or dropped off at any address in the service area, not both. The idea was that in the “inbound” direction, a rider can enter their address and then select from a predetermined list of destinations. In the opposite direction, they start with the same predetermined list, but can input any address as their destination. The project team tried to group these predetermined destinations in a mile or two of the Shops at Ithaca Mall, to the extent it would reinforce a directionality to the service and make it more feasible for the HyperCommute platform to group passengers on the same trip.

**Figure 7. On-Demand Service Models**



The destination list included the Cayuga Mall, the Warren Road United States Post Office, the Tompkins County Jail, the Kendal retirement community, Tops supermarket, and Convenient Care, an urgent care facility. Since Gadabout had many of its volunteer drivers unwilling to drive during the pandemic, the service was operated with a TCAT driver and either one of the 25-foot or 35-foot TCAT buses.

## 1.4 Phase A Go-Live and Operation Notes

The revised Phase A service went live in the Lansing/Etna area on August 30, 2020. TCAT's previous route 77 offered five trips per day on Saturdays only prior to COVID-19. The project team attached the route 77 name to emphasize that the service still served the Lansing area was indeed a TCAT service and marketed it as "Route 77 Tconnect."

TCAT and UM staff trained TCAT operators, supervisors, and dispatchers ahead of the August 30 Phase A service launch. The team created dispatcher and driver guides with step-by-step instructions on how to use the HyperCommute app and made sure the first drivers and weekend supervisors had on-the-bus training. Although there were only two to four drivers scheduled to operate the Tconnect service, there was a rotating staff of untrained stand-by drivers who often ended up on the route. Because TCAT did not have regularly scheduled weekend supervisors, the best assurance that standby drivers received training was to pair them with an experienced Tconnect driver for a few hours out on the road. This was much more effective than the written guide.

Outreach for Phase A consisted of:

- TCAT staff riding TCAT routes in the service area and informing riders directly of the new Tconnect service.
- Tconnect being included in TCAT regular service change press release that went out a week before the service change on September 30.
- A radio interview
- An update of the Tconnect website to include information on how to use the service and how to use the rider app.
- Drivers providing passengers with flyers on buses.
- The creation of a postcard mailer to all residents in the service area a few weeks after the service launch.

After operating for several months, drivers complained that the original eight-inch tablet purchased for the project was too small for them to read. The team had already planned to purchase a second tablet and chose a ten-inch tablet. Testing was done with the larger tablet, and it seemed to have helped drivers with readability.

Concerns arose when some riders incorrectly set pickup locations on the app. The origin would then default to the centroid of the service area. Staff alerted drivers of the issue and worked with these passengers to instruct them how to correctly enter their information. This was one of the issues that the team would try to fix during the app redesign process.

Another initial problem occurred when the weekend dispatcher did not record the phone number of call-in riders, an problem that was subsequently remedied. This step is important for several reasons:

1. Riders with a flip-phone would get SMS messages if their phone number was entered correctly.
2. If there was a service delivery issue, staff could call riders and inform them.
3. For surveys/troubleshooting, it is good to have rider contact info. After operating Phase A service for five months, the project team decided to implement an updated service area for TCAT's spring 2021 service, effective February 7, 2021, as there was available capacity to extend service to areas that had no weekend transit service.

The service area was expanded to the north and west to the area around Lansing Town Hall. During weekdays, TCAT's routes 36 and 37 serve this area, but there is no weekend service. In 2019, Milton Meadows, a 72-unit, \$17.3 million affordable housing complex opened near Lansing Town Hall, and TCAT had been monitoring demand on its fixed-route buses in the area.

The team conducted direct outreach by delivering informational flyers at the new complex. Anecdotally, staff observed that personal vehicles were prevalent at Milton Meadows, but also found that there were households with no vehicles. Some residents said that they would occasionally take taxis on weekends, adding that it was a significant cost to their household budgets. Ridership from Milton Meadows was slow to develop, but once the branded vehicle had regular visibility in the area, residents started to catch on to the service.

A map of the second iteration of Phase A Tconnect service is shown in Figure 8. This service area was operated from February 2021, through May of 2022. Analysis of the ridership in this area is included in section 4 of this report.

Figure 8. Phase A Service Area Map—Spring 2021

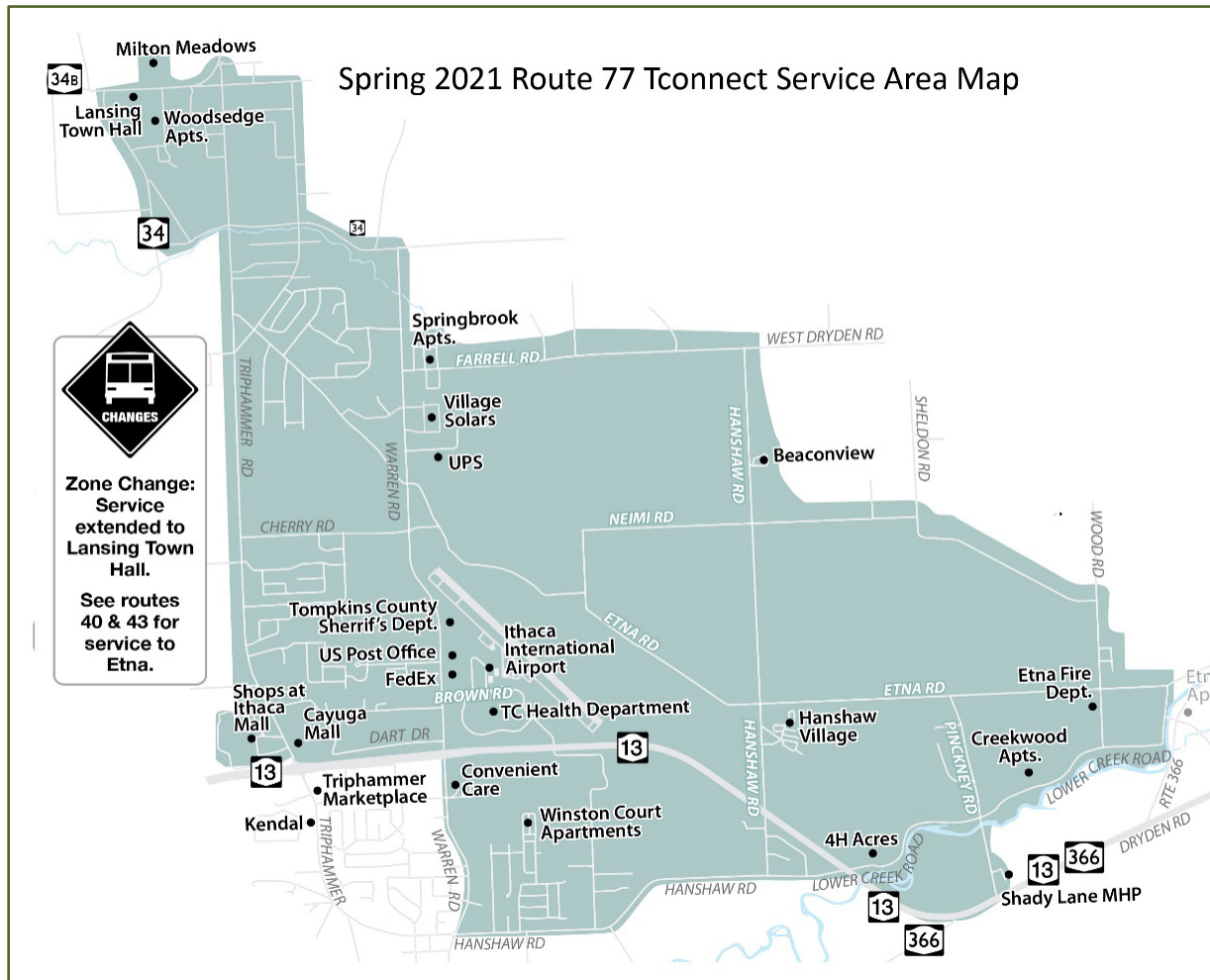


Figure 9. Milton Meadows Near Lansing Town Hall—February, 2021



## 1.5 Phase A Rider App Redesign Process

Realizing from the outset that some adjustments to the rider app would be needed along the way, the team created Task 7—HyperCommute Interface Adjustments—as a part of the original scope of work. After some months of the Phase A operation, a clearer picture began to form of what kinds of app changes would improve the customer experience. To focus on this task a small committee—App Design Subcommittee—was formed that met about 10 times.

The subcommittee’s work involved designing a better process to gather as much feedback as possible; and then determining an optimal feedback form that could be used by UM. The group established that although UM could be expected to make occasional software bug fixes and small functional changes, any larger adjustments to the app layout and flow should be aggregated into one overall app redesign process. The subcommittee planned two focus group sessions to which current riders and people in the transportation community were invited. The subcommittee created a list of questions about the app’s functionality and produced a questionnaire for team members and TCAT staff to provide feedback in a real-world test situation. The focus group sessions drew only three rider participants, but their feedback nonetheless was useful.

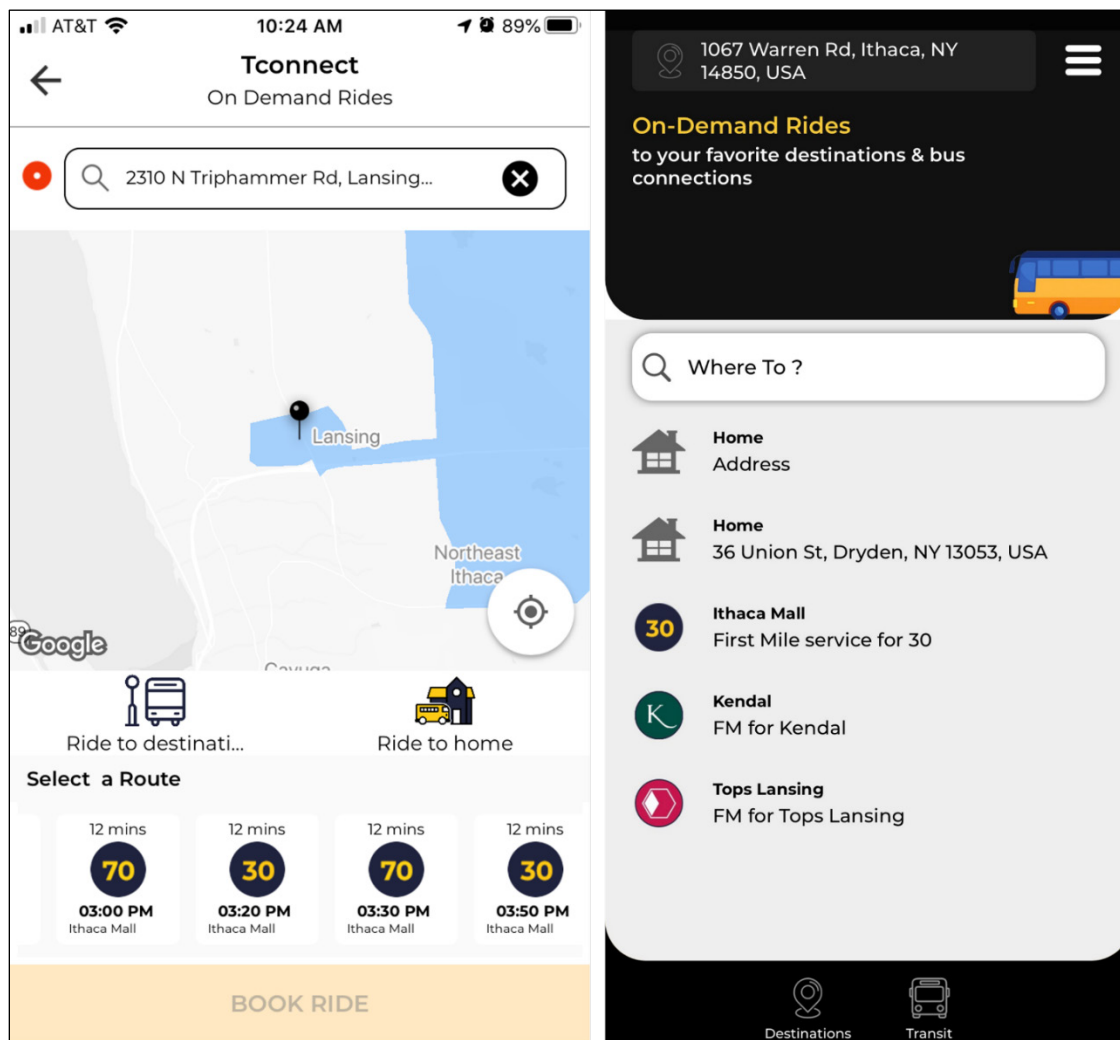
The app design subcommittee spent several hours discussing the new app flow. The idea was that the flow for both “inbound” and “outbound” trips should be consistent and understandable by the user. Because of the “hybrid on-demand” service model, as described above, some of the origins and destinations needed to be limited to a select list. This is hard to describe to a new user, so it was important to make the user experience understandable with little training or previous exposure to the app.

A screenshot of the app (Figure 10) shows how the team’s design separated FMLM trips as “ride-to-destination” and “ride-to-home” buttons, which seemed understandable to riders. However, despite their comprehension, riders didn’t always click on these functions.



**Figure 10. Screenshots of HyperCommute App**

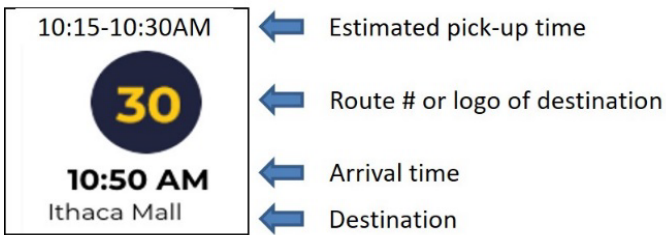
On left, interface from Fall 2020; on right, from Fall 2021



Another challenge resulting from the first iteration was the default map location (which was the centroid of the service area). If users did not adjust their destination on the map, then the app understood the default location as the trip's origin or destination, creating trip request errors and user confusion.

Finally, the destination buttons available for selection at the bottom of the screen were not always clear to users. Figure 11 shows where a legend was added to decode these buttons. The team found that many people did not read the user guide and that the buttons were not as intuitive as originally thought. Some users did not scroll the buttons left to right as instructed and, consequently, would miss the available trip options for later in the day.

**Figure 11. Legend for Destination Buttons on First Iteration of HyperCommute App**



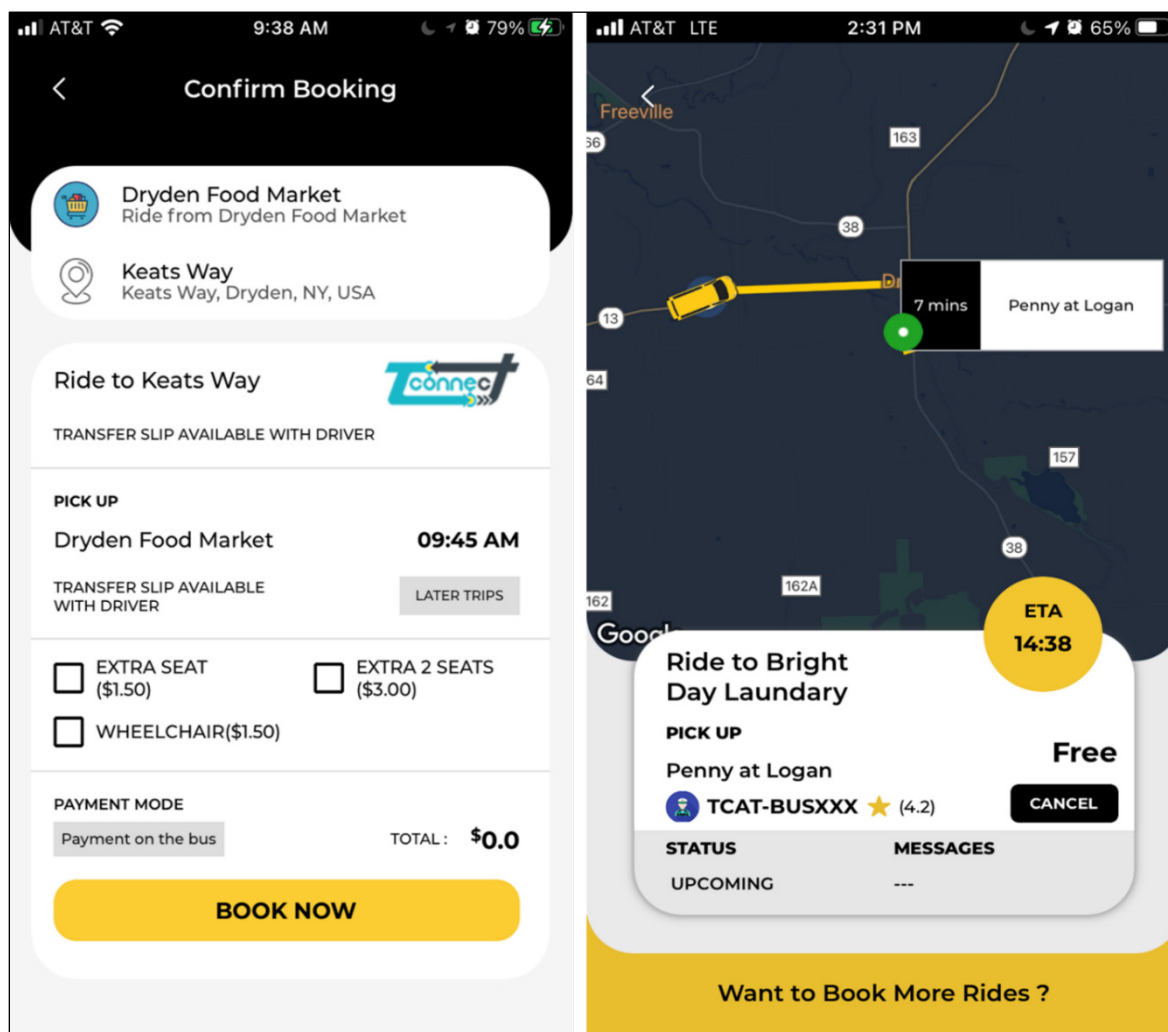
The new app was an attempt to improve the user interface and flow of app screens so that these issues would be eliminated or minimized. The first screen of the revised app asked only where the user wanted to go, thus simplifying the first interaction with the interface. The app would then use improved intelligence to determine if it was an FMLM ride. The user was able to select from a preselected stop or to key in an address, or to choose a location on the map. Of note, this was so that the user would have to scroll the map before the “pin” appears—indicating that they had selected a destination on the map. This eliminated the “default map destination” problem that the team encountered with the app’s first iteration.

The updated app led the user through the app screen: (1) starting with a destination, (2) confirming that destination, (3) selecting a pickup location, (3) confirming the pickup location, (4) confirming the booking, (5) selecting the trip time, and (6) additional information. (Figure 12, left pane.) Once a trip was booked, the user would see a screen that would show the location of the vehicle, and the estimated time of arrival for the vehicle (Figure 12, right pane).

By separating the destination and the pickup locations and keeping that order consistent despite the inbound or outbound nature of the trip, the new app was more usable, and caused significantly less confusion as compared to app’s first iteration.

**Figure 12. Screenshots of the Revised HyperCommute App**

On left, booking screen; on right, tracking screen.



Over the summer of 2021, the project team began evaluating the revised app in the Dryden service area. The UM team worked on a walkshed functionality while members of the operations team met to determine the boarding points that define each walkshed (a latitudinal/longitudinal boarding point and a walkshed radius in meters.) The walkshed function was created to help group riders to single-stop or boarding points. The intent also was to help prevent the driver app from directing a driver onto narrow and/or dead-end streets that could not accommodate larger vehicles.

The UM team also worked on tool tips for new users, and then created an app pointing to a test server to enable field testing.

Collecting input on the app's first iteration and documenting errors that caused user confusion were successful in remediating the issues that surfaced. The team then worked with UM to create wireframe screen mockups and flow of the user-booking and tracking process. Staff distributed user guides for the app update on the Tconnect buses ahead of the app update. The app update, including the interface redesign, was completed over the summer of 2021 before going live in August in the Lansing/Etna service area.

## **1.6 Phase B Planning and Operations**

In spring of 2021, the Tconnect team discussed Phase B of the project. Originally, as mentioned earlier, Phase B was to include either expanding the fleet, extending it to other areas in Tompkins County, or incorporating volunteer drivers or other modes, such as TNCs.

It was determined that an additional vehicle for the Lansing route 77 Tconnect service was not needed on weekends. Providing weekday service would have required a substantial adjustment of TCAT's fixed-route service. Adding another transportation provider was not feasible either. Volunteer driver programs throughout Tompkins County and Upstate Ne have encountered problems retaining and recruiting volunteer drivers since the onset of the COVID-19 pandemic.

The team learned from program representatives that volunteer drivers are mostly seniors and retirees who said that driving others was too risky during the pandemic. As another alternative, a member of the UM team approached taxi companies in Tompkins County about using the HyperCommute app while the team considered what impact this would have on the Tconnect service. As for-profit entities, taxi companies were much more interested in identifying high-travel demand areas and shorter trips, as these characteristics are most likely to be profitable. The project team decided to return to the original idea of working in Dryden and using Gadabout vehicles and drivers to operate the service.

Aware that Cornell University was continuing to allow administrative employees to work at home, the team analyzed TCAT route 43 ridership and, as expected, found that in spring of 2021, few commuters had returned to the system.

Consequently, it made sense to adopt the "hybrid on-demand" service model used in Phase A in Lansing/Etna so that local destinations in Dryden would be accessible by using the service. Staff looked at the route 43 trips and devised a schedule that could link users to five inbound trips and four outbound trips to and from Ithaca daily.

This seemed like a good balance between having both schedule flexibility and operational affordability. The main connection between Tconnect and TCAT’s Route 43 was at the Dryden Village Stop, near the Dryden Library and the Dryden branch of the United States Post Office.

Tconnect service started in Dryden on August 9, 2021. No ride requests came in through the app during the first month of operations, although Gadabout dispatch did use the Tconnect vehicle to provide rides in Dryden.

**Table 2. Dryden Tconnect Service Hours—Weekdays**

| Block | Leave Garage | Tconnect Start | Tconnect End | Return to Garage |
|-------|--------------|----------------|--------------|------------------|
| AM    | 7:27         | 7:45           | 12:00        | 12:17            |
| PM    | 13:12        | 13:30          | 17:45        | 18:02            |

**Figure 13. Mailer and Service Map for First Iteration of Dryden Tconnect**

**Tconnect**  
**DRYDEN**

Powered by  
**HyperCommute**  
 in partnership with **TCAT**  
 and **Gadabout Transportation**

**LOCAL POSTAL CUSTOMER**

**ON-DEMAND TRANSPORTATION**  
 in the Dryden area, starts  
**AUGUST 4!\***  
 \* Test Phase: August 4, 5, & 6  
 Official Launch: August 9

**WEEKDAYS**  
 7:45 AM-12:00 PM  
 & 1:30 PM-5:45 PM

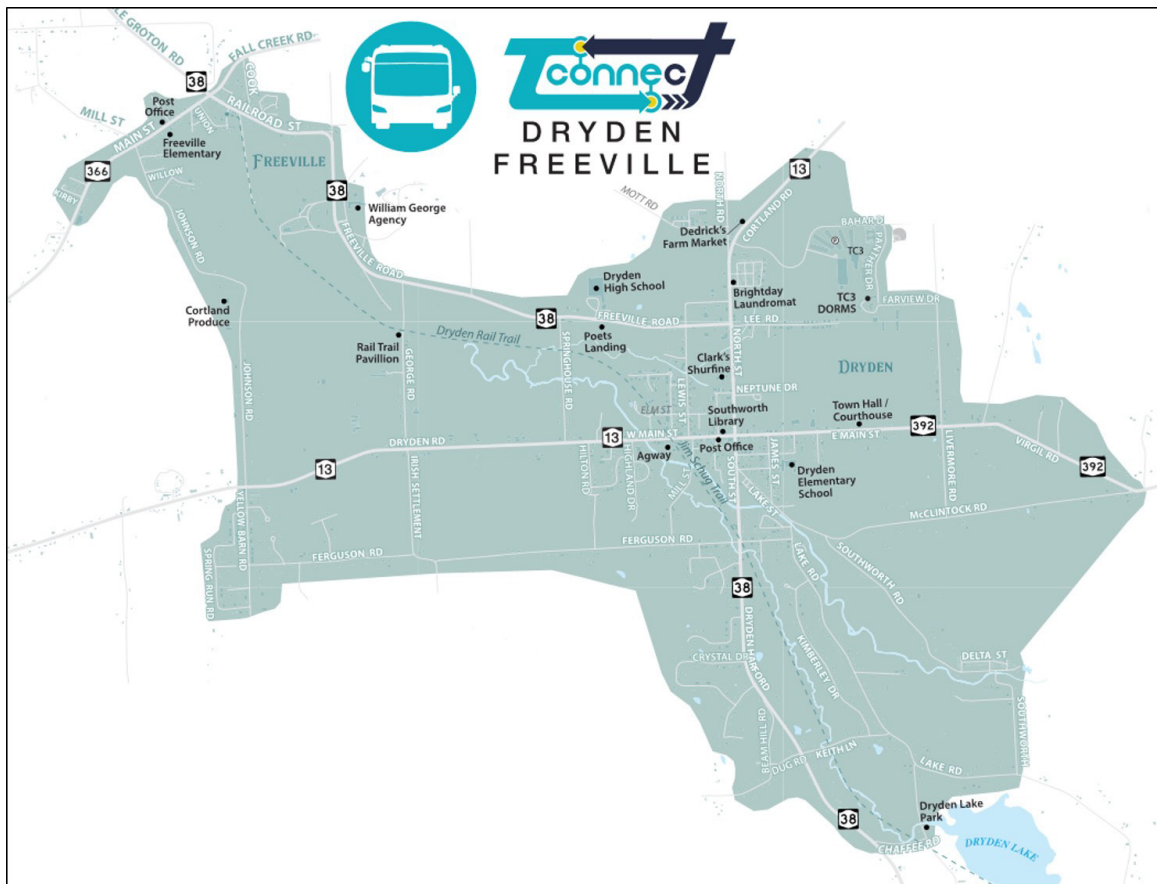
**\*Tconnect service is only available within the service area.**

**Tutorials and More**  
 To learn how to use the app to book a ride or for more information about Tconnect, use your smart phone's camera to scan the QR code or visit:  
[www.tcatabus.com/tconnect/](http://www.tcatabus.com/tconnect/)

In early September, the project team began discussing service modifications that could attract more riders. The team conducted a significant amount of outreach in Dryden as described in the next section. Given that there was effectively no ridership, the team decided that including Freeville in the service area made sense. Serving farther-away hamlets, such as McLean, was not possible with only one bus and driver.

The team looked at Freeville’s demographics and found that 9.3% live below the poverty line, and that the median household income is well below that of Tompkins County as a whole. Freeville residents living in Lehigh Crossing Apartments—a 24-unit low-income apartment complex that is far from any convenient access to TCAT—seemed a good match for the Tconnect service. A team member went into the field to distribute flyers at the complex and, for broader appeal in the area, issued a press release to announce an October 4 launch.

**Figure 14. Second Iteration of Dryden Tconnect, Extended to Include Freeville**



During the first month of service in Dryden, TCAT’s operations team collaborated closely with the Gadabout team. Gadabout’s dispatchers learned how to monitor the service using the HyperCommute web interface. Tconnect staff used the app to book test rides in Dryden during the first two weeks of service to ensure that everything was working properly, and that the Gadabout driver was able to navigate using the tablet. After a few weeks with no ridership, Gadabout began to use the Tconnect-allocated driver and bus to transport their regular riders in the eastern part of Tompkins County, but while remaining on alert in the event a Tconnect ride was requested. This was a reasonable compromise because ridership did not materialize, and the Gadabout driver was spending many hours parked at the main Dryden bus stop. While there were several Dryden-based rides that Gadabout provided during this period, they did not come through the HyperCommute app, and were therefore not considered to be Tconnect rides. On Dec. 21, Tconnect finally netted its first Dryden trip from Dryden Library to the mobile home park on Southworth Road, but it was not requested via the app.

**Figure 15. Tconnect Branded Minibus in Dryden**



The lack of ridership, despite a significant outreach effort, was disappointing to the project team. It was obvious that the pilot service would need to be discontinued.

The team agreed that the Dryden/Freeville service would cease operation by the end of 2021, and turned to surveying in the area to collect data that could help illuminate what happened. This data is described in the next section—Outreach and Surveys—and in Section 4: Review and Discussion of the Tconnect Service Model.

## 2 Outreach and Surveys

---

### 2.1 Outreach Highlights

Reaching out to the public is always essential to raise general awareness about any new project, but it was also important for the project team to collect feedback from riders on the finer details of the service proposal. The first part of this section describes the public outreach conducted over the duration of the project.

Pre-COVID, the Way2Go team created an outreach plan for the project that laid out the goal's strategies, activities, and timing of the outreach and survey tasks. Once COVID-19 hit, the plan became useless, prompting the creation of an outreach and survey subcommittee that revised and updated outreach strategies before and during the rollout of Phase A and B of the project.

- A. The first public meeting for local leaders was on October 31, 2019, with all elected and planning officials from both the Village and Town of Dryden invited. This meeting drew five participants: Clay Converse (Village of Dryden Trustee); Deb Fisher (Village of Dryden Trustee); Mike Murphy (Village of Dryden Mayor); Ray Burger (Town of Dryden Director of Planning); and Jason Leifer (Town of Dryden supervisor). The team realized the importance of ensuring that local officials knew of the project before embarking on public outreach. This stakeholder group offered helpful suggestions about how to inform their respective communities about the new service.
- B. In the beginning of 2020, three public meetings were held in the Dryden area: the Village of Dryden on Wednesday February 12:00 at 8:00 a.m. (with an additional meeting with the town and village clerk and local police department) (eight external attendees); Southworth Library on February 17 at 2 p.m. (five external attendees); and Poet's Landing residential complex on Saturday, February 22 at 10:00 a.m. (three external attendees). The team varied the dates and times of the meetings to accommodate different types of work schedules for the community. TCAT publicized the three public meetings with a press release to all local media, which generated coverage via WHCU radio; the Ithaca Times; the Ithaca Voice; Tompkins Weekly; and the Ithaca Journal. In addition, the team publicized the meetings by posting on the Tompkins County Human Services listserv (3,200 subscribers); by placing posters at the major Dryden businesses; and by distributing flyers door-to-door at the 48-unit Pleasant View Mobile Home Park. Project staff also attended open hours at the Dryden Food Pantry in early March 2020 to discuss the proposed service with participants and to gauge their travel needs.



After the first round of meetings, it was clear that the COVID-19 pandemic was in full force and that the project would need to be put on hold. The team did not relaunch outreach until a new Phase A service was established with a rollout date of August 30, 2020. Staff brainstormed over how to conduct effective outreach in the wake of a pandemic and determined that a comprehensive strategy would be needed that included direct mailers, a broadly distributed press release, flyers on TCAT buses, and contact with larger property owners.

Additionally, the following are the field activities in the Phase A, Lansing/Etna service area that the project team carried out in the lead-up to the launch:

- Door-to-door outreach—Hanshaw Village MHP—Low-income mobile home park.
- Door-to-door outreach—Fall Creek Parke—12 Creek Rd, Dryden NY, 14850—Low-income mobile home park.
- Dropped flyers and posters at main office—Creekwood Apartments—Low-income apartment complex.
- Dropped flyers and posters at main office—Village Solar Apartments—Large market-rate apartment complex.
- Door-to-door outreach—Milton Meadows Apartment Complex—February 2021—Low-income housing.
- Flyer drops at Woodsedge, 100 Woodsedge Dr, Lansing, NY 14882—February 2021—Seniors and persons with disabilities housing.
- Staff riding on Tconnect Route 77 on inaugural launch day.

It is important to note that Route 77 had an existing fixed-route service before it was converted to Tconnect on-demand service. This meant that there were a small number of riders that had come to expect service in this area on weekends; the team was able to capture some of them on the Tconnect service. Having a pre-established route number emphasized to riders that the service was a part of the TCAT system.

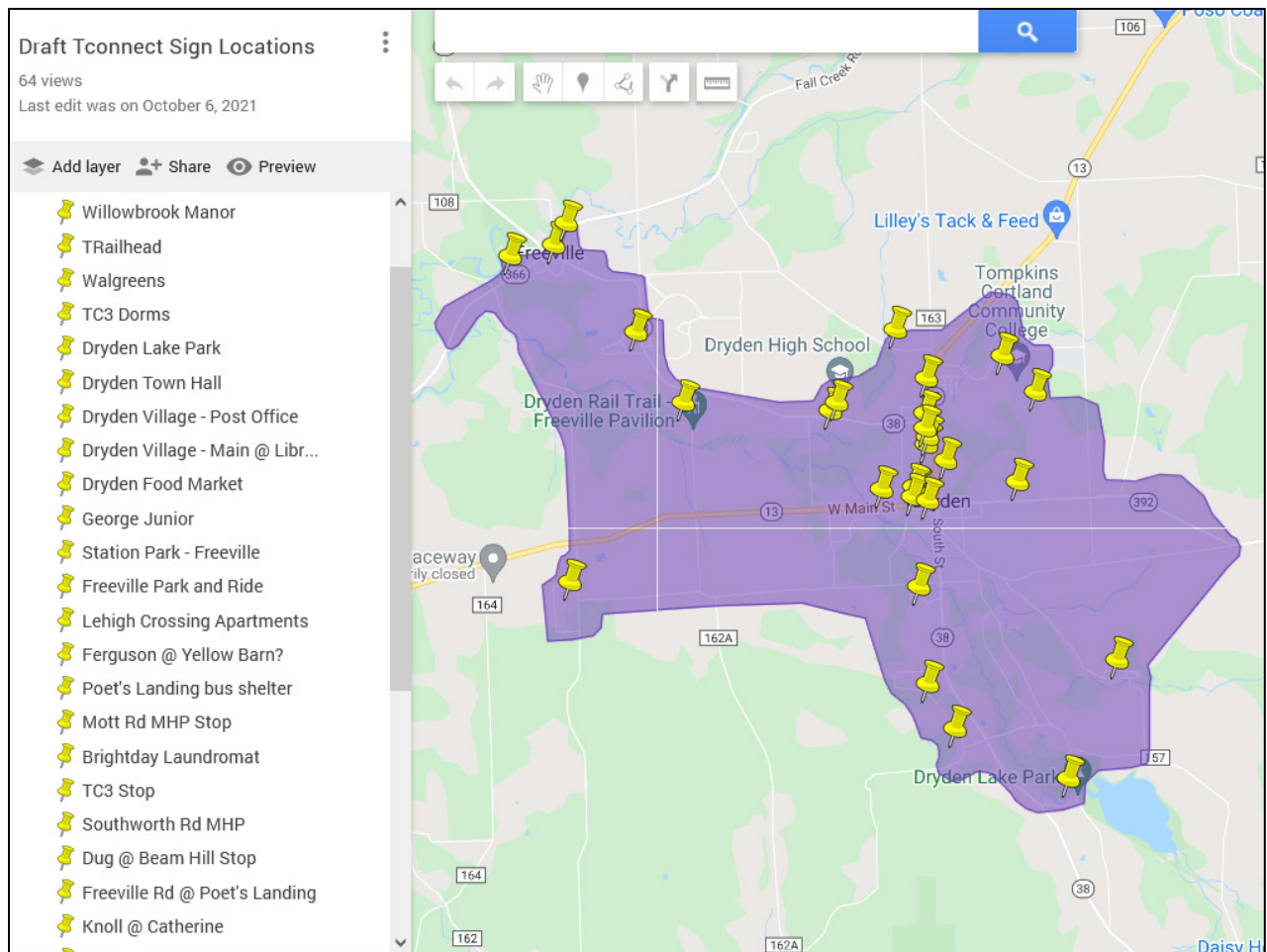
As the team approached Phase B—the rollout of Tconnect service in Dryden—it was apparent that intense outreach was needed. There was no pre-existing local transit service in Dryden—only the Ithaca to Dryden route 43, which was more focused on commuter trips. The entire team spent a significant amount of time discussing and working on outreach to the Dryden service area and subsequently:

- Designed and sent direct mailers to all residents in the Dryden service area.
- Designed and procured magnetic bus signage for the Gadabout bus. Signage was displayed on both sides of the bus, with a vertical sign near the front door facing forward.
- Press release regarding the new service.

- A two-page HyperCommute user guide with images. This was provided to Lansing/Etna riders by TCAT drivers on weekends and handed out during door-to-door outreach in Dryden.
- Created a video with instructions on how to use the app and posted it to the Tconnect website.
- Handed out flyers at Poets Landing, the biggest apartment complex in the service area. The team returned on several occasions over a period of several weeks to follow up at apartments where no one had answered the first time.
- TCAT added a plug for Tconnect to the announcements of key stops in Dryden on route 43.
- Flyers and posters were distributed to Dryden Family medicine, Agway, the Clark's supermarket, and other businesses in the area.
- The teams "tabled" at the Clark's supermarket in Dryden twice, handing out flyers to customers coming and going from the store.
- An email was sent out to the Dryden School District Parent-Teachers' Association.
- Informed elected officials about the service and asked them to let their constituents know.
- Reached out to the Dryden food pantry. Contacted TC3 and attended a student activity fair held on September 15, 2021.
- Printed Tconnect Bus Stop signs, which the amenities supervisor placed at key stops and landmarks in the service area (see map below).
- Staff presented at the Dryden Town Board Meeting on October 21, 2021.
- Reached out to Dryden School District and found that there was little interest. (There was an outbreak of COVID-19 at the time and in person classes were only meeting intermittently.)
- Posted announcements on Dryden Facebook groups.
- In the fall of 2021, a TCAT intern researched and then created a Facebook ad. A total of 8,324 people responded to the ad, which generated about 250 clicks on the Tconnect website.

In addition to the activities listed above, the team investigated events in each service area to try to "piggyback" on pre-existing events. Unfortunately, there were few events that happened due to the COVID-19 pandemic. The typically well-attended annual Dryden Dairy Days had been scaled back and organizers no longer accepted organizational or sponsor tables.

**Figure 16. Map of Tconnect Bus Stop Sign Locations in Dryden Area**



## 2.2 Survey Overview

The team invested a great deal of time designing and administering surveys to help inform the project. At the outset, project members decided to create an initial survey to further understand the demographics of potential riders. Overall, the number of responses was underwhelming, but nonetheless still useful for later discussions about ridership numbers.

The first survey was short and focused on respondents' commuting patterns and preferences. The plan was to offer this survey in paper form at public meetings and then as an online survey for approximately one month.

A second survey was created and administered to all those who signed up for the service to collect data that could help calculate metrics associated with the NYSERDA grant, and to evaluate the project's impact and success.

To evaluate how rider behavior changed with their first use of the Tconnect service, a third survey was launched. Finally, the team administered the fourth and final survey to gauge rider sentiment and riding habits in the Lansing/Etna area.

The first survey was given to attendees at the three public meetings that occurred pre-COVID to gain information regarding transportation habits, internet access, and comfortability with technology among the wider Dryden Community (see appendix A for questionnaire and discussion).

After collecting only four meaningful responses, the team was careful not to draw general conclusions to the following results:

- When asked how they travel to work or school, half of the respondents said they use public transit with the other half saying they drive alone.
- Most said they spend less than \$75.00 a month commuting.
- All said the fare should be no higher than \$2.00 per day.
- All said they had access to a smartphone.

The team created a second survey to be administered a month after the start of Phase A service in Fall of 2020. Seven surveys were filled out at that time. The team distributed the survey again in the Spring 2021 after the Phase A service area had been expanded to the Lansing Town Hall area. Although time-consuming, we found it effective to have staff ride the Tconnect vehicles for riders to directly fill out the surveys. Below are the results of the 16 total responses we received to the second survey. (appendix B has the questionnaire and discussion.)

- Most said they learned about Tconnect from a TCAT driver.
- Work, shopping, and connecting to TCAT routes were the top three reasons to use Tconnect.
- Most used TCAT before using Tconnect.
- The majority said they have no access to a vehicle.
- Most said they would recommend Tconnect.

With the difficulties recruiting Dryden Tconnect riders, the team did not have a captive audience for the third survey. The most burning question was “What happened in Dryden?” As there were no riders, the only effective way of finding answers was to go door-to-door. In total, the team received results from 27 in-person surveys. Additionally, there were 19 on-line surveys, out of which 11 were deemed valid. (appendix C has the questionnaire and discussion.)

Of those responses:

- 70% said they had previously heard about Tconnect.
- 73% said that they either understood or somewhat understood how the service works.
- More than half said Tconnect's service covers where they need to go.
- Most said that the service covers or somewhat covers the days and times they need to travel.
- Only a third said they were regular users of TCAT's Dryden route 43.
- Just over 25% of households did not own a car. At least one person with a car had had it in the shop for a month, so was functionally carless. In addition, there were households that only had one car for multiple adults.
- The majority said they were not affiliated with Tompkins-Cortland Community College (TC3).
- Less than half said the barrier to using Tconnect was that they preferred using their own vehicles.

The final survey was administered on Tconnect vehicles over a couple days in the spring of 2022 and netted 16 responses. The contents were similar to survey 3, but with more focus on usage. (appendix D has the questionnaire and discussion.)

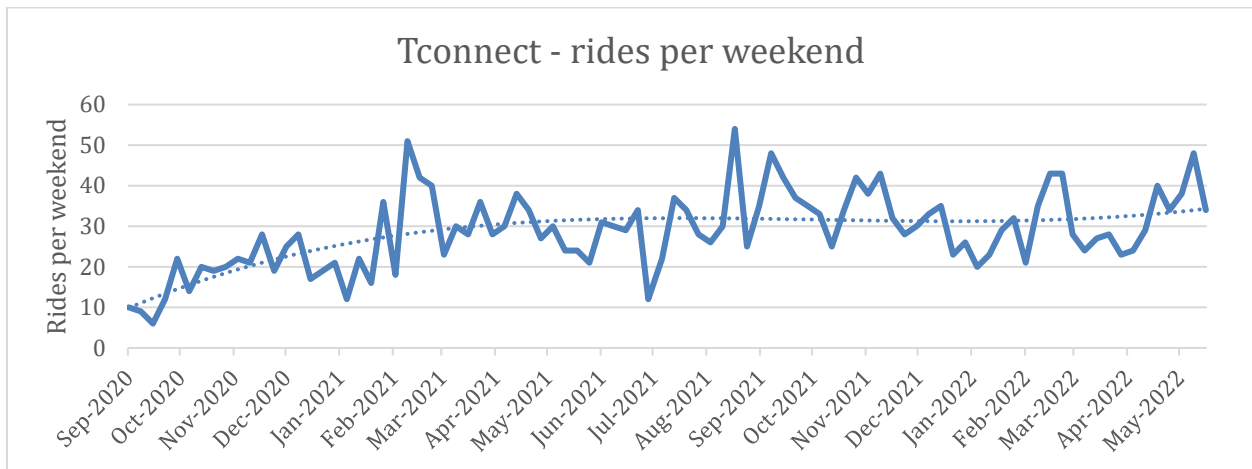
- When asked how long they have been using Tconnect, 44% said since the beginning of the service; 19% said two to three months; 19% said less than one month 13% said eight to 10 months; and 6% said one year.
- 73% said they used Tconnect between one and three times a week; 13% said four times a week; and 13 % said four times a month.
- 87% said they used TCAT during the week.
- When asked about common destinations respondents were allowed to select multiple places: 63% said Shops at Ithaca Mall; 44% said the mall to connect to fixed route 30; 25 % said to connect with other shopping destinations; and 6% each said either Kendal retirement community; the Warren Road post office; and recreation.
- Most respondents in this survey indicated they lived alone and did not have a vehicle.
- 64% said they were concerned about climate change and GHG emissions.
- All said fully electric on-demand and fixed-route service seven-days-a-week would be useful to their households.

### 3 Tconnect Data and Metrics

#### 3.1 Ridership

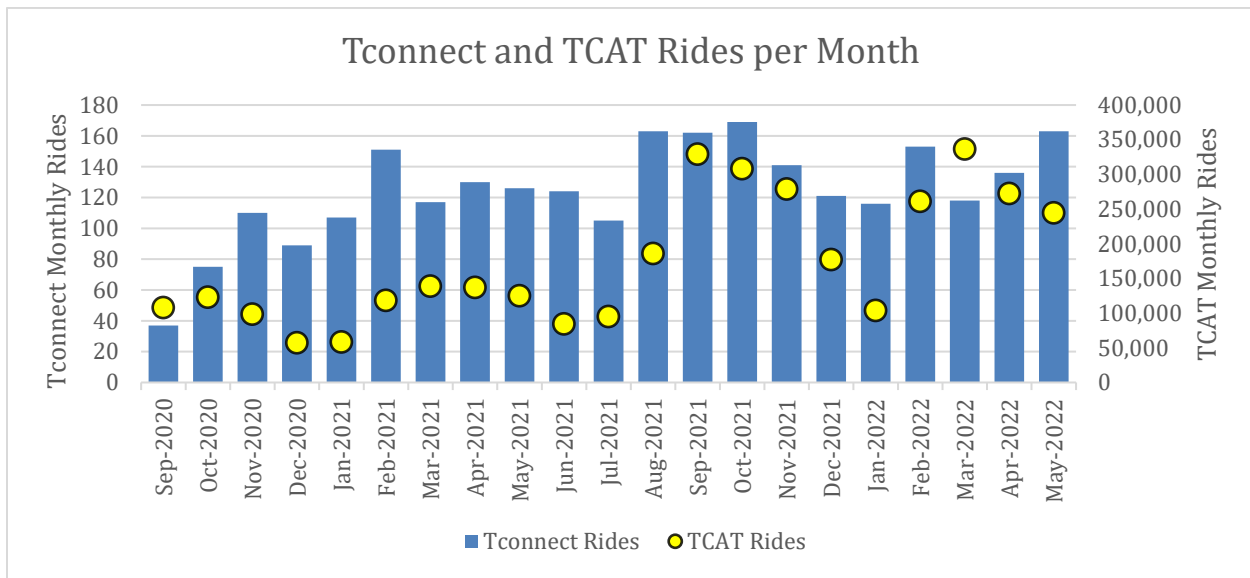
The ridership presented in this section is entirely for the Lansing/Etna Tconnect service. This service operated from September 5, 2020 to May 28, 2022, over which time it recorded 2,613 rides—about 125 rides per month or 29 rides per weekend. The service operated for 178 days and ran about 1,700 total trips. This means that over the entire length of the pilot, the service averaged about 1.5 rides per trip. These rides were not distributed equally, and the most popular travel time—1:30 p.m.—averaged 2.5 rides per trip. In examining the most popular trip during the last year of service (once the service had become established), the average increases to three rides per trip. And finally, there were 17 instances where trips had five plus rides. While clearly this was a small percentage of total trips, it does show that the service could manage five to six rides per hour.

**Figure 17. Tconnect—Rides Per Weekend**



Figures 17 through 20 slice the Lansing/Etna Tconnect data in several different ways. From looking at these graphs, it can be deduced that ridership generally increased during the first six months of operation, then leveled off, with variation from day-to-day, week-to-week and month-to-month. The Tconnect ridership was correlated with the overall TCAT ridership monthly—the coefficient of correlation was at 0.6 (0 representing no correlation, and 1 representing perfectly correlated). This shows that Tconnect ridership, as with fixed-route ridership, was probably responding to large-scale factors, like academic calendar and weather. However, as the team discovered through the survey, many Tconnect riders are residents who have little access to their own vehicle. This is likely why the Tconnect ridership was somewhat steadier month-to-month as compared to the TCAT ridership.

**Figure 18. Comparison between Monthly Tconnect and TCAT Ridership**



**Figure 19. Tconnect—Rides by Day of Week**

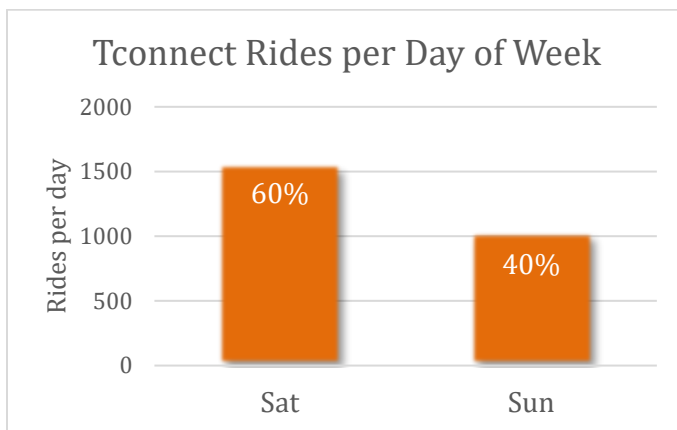
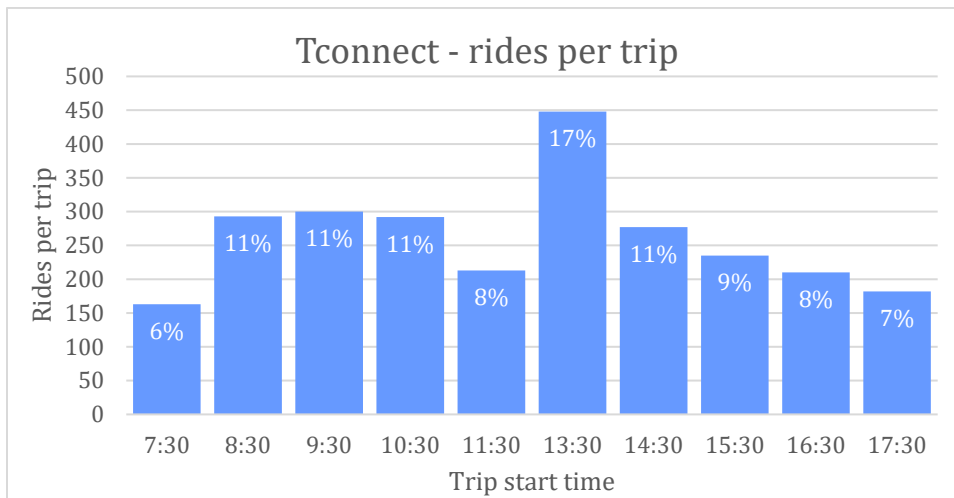


Figure 19 shows that Saturdays are more popular among riders, recording about 60% of total ridership, while Sundays contribute about 40% of total rides. Likewise, the mid-morning and early afternoon trips recorded about 60% of ridership, while the early-morning and late-afternoon trips constituted about 40% of the ridership (Figure 20). It seems that the bulk of the riders using the service to do errands could be accommodated by reducing the service span from mid-morning though mid-afternoon. This could make the service more productive on an hourly basis. However, this would render the service unavailable to the relatively small number of people who use the service to commute to work on weekends. The project team decided to keep the service span consistent over the course of the pilot to see if ridership might grow on the slower trips as more people discovered the service.

**Figure 20. Rides by Trip (time of day)**



Because of the project reorganization due to COVID-19, the team did not collect conclusive data on how Tconnect affected ridership on other routes. For the Lansing/Etna Tconnect service, there were no other routes with overlapping geography on the same days of operation. For the Dryden Tconnect service, the team did not generate enough ridership to see if there was an impact on route 43 from Ithaca to Dryden. In addition, the ridership on other routes was primarily responding to changes related to COVID-19, such as schedule adjustments and remote work policies.

### **3.2 Transfers between Modes**

In survey four, 44% of respondents listed “Downtown/Route 30” as a reason they use the Tconnect service. Another data point worth noting is that 78% of trips had a start or end point at the mall, supporting the conclusion that a substantial number of riders are using the service as a first/last mile service. The evidence indicates a relatively equal split between riders that used Tconnect to go directly to a destination versus those that are leveraging the first/last mile option that Tconnect offers.

### **3.3 Passenger Miles Traveled/Passenger Trip Length**

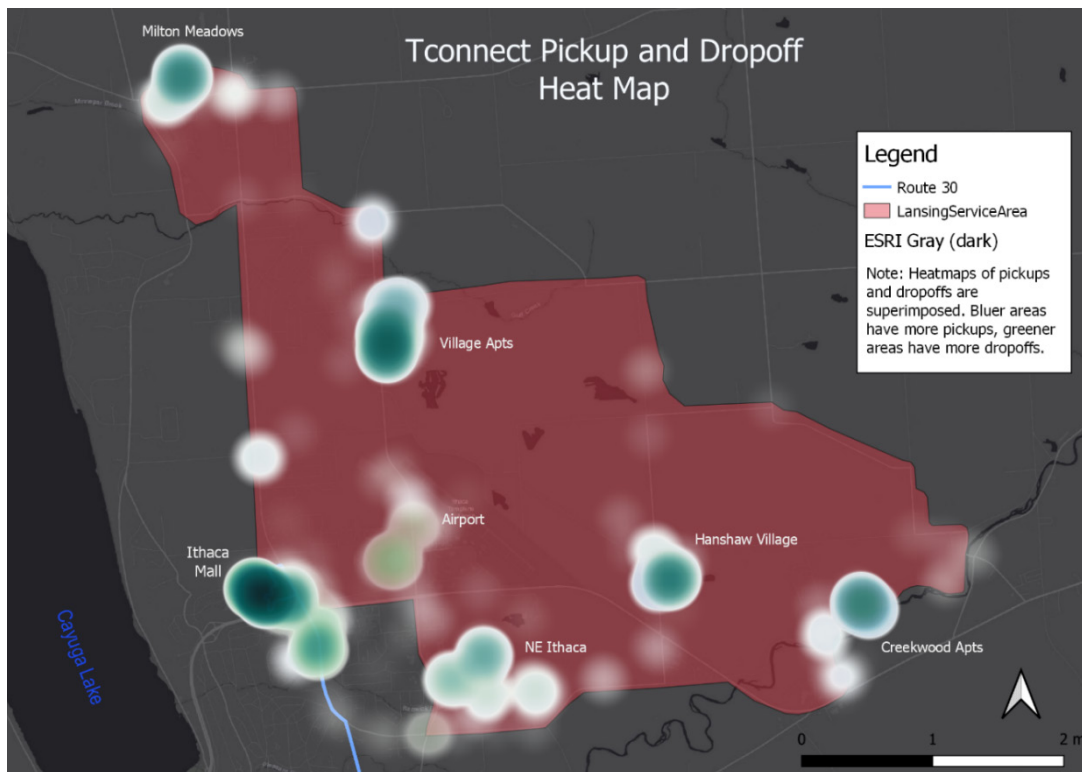
To estimate the distance of the trips taken on Tconnect, the team used a pickup and drop-off heat map (Figure 21) and latitudinal/longitudinal coordinates from the HyperCommute data export. To get accurate distances, we took a sample of ~440 trips from the total of 2,613 and then fed them to the Google Maps API to get driving distance (as a car travels). Our sample returned an average Tconnect trip length of



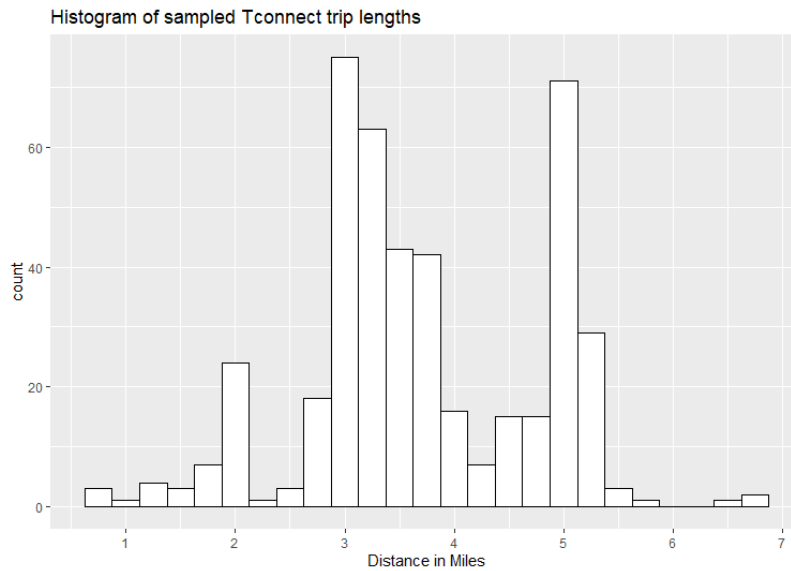
3.7 miles. Figure 22 is a histogram of passenger trip distances, showing two peaks, one around 3 miles and the other about 5 miles in length. The average passenger trip distance multiplied by the total number of trips provides an estimate of 9,688 passenger miles traveled over the course of the Lansing/Etna Tconnect pilot.

It can be approximated that 40–50% of trips on Tconnect either originated or terminated with a trip on TCAT’s route 30. It is approximately 5 miles from the bus stop at the Ithaca Mall to the Ithaca Commons, so we could add between 5,225 and 6,500 passenger miles to the 9,688 calculated above. This can also be considered the SOV mileage avoided (if riders would have driven by themselves if they had had the means to do so).

**Figure 21. Tconnect—Heatmap of Pick-Up and Drop-Off Locations**



**Figure 22. Histogram of Tconnect Trip Distances in Miles**



### 3.4 Revenue Miles and Utilization of Service

UM began to collect miles-per-trip in January of 2021. This is the distance that the vehicles traveled following their computer manifests, whether there were passengers on the vehicles or not. Looking at the data from January 2021 through July 2022, about 31% of the trips did not have passengers and therefore ran no revenue miles. The remaining trips averaged about 14.4 miles per trip.

The miles-per-rider metric (Table 3) illustrates that the average distance traveled to accommodate a rider was higher than the average passenger trip length. This is not surprising given that vehicles often start or end a trip with no riders on board. If there are few riders per hour, the benefit of having multiple passengers in the vehicle simultaneously is not fully realized. As ridership increases, the likelihood of shared rides increases and the miles-per-rider metric decreases. The 7:30 a.m. trip likely counted deadhead miles from the garage to the service area and thus was somewhat inflated. (Note: the team did not report data from the final trip due to data collection issues.)

**Table 3. Tconnect Trip Miles Data from Jan 2021 to May 2022**

| Trip  | Percentage of trips | Average miles per trip | Total rides | Rides/trip | Miles/Rider |
|-------|---------------------|------------------------|-------------|------------|-------------|
| 7:30  | 36%                 | 14.1                   | 139         | 1.5        | 9.5         |
| 8:30  | 22%                 | 15.9                   | 244         | 2.1        | 7.4         |
| 9:30  | 21%                 | 14.1                   | 249         | 2.2        | 6.5         |
| 10:30 | 23%                 | 14.2                   | 240         | 2.1        | 6.7         |
| 11:30 | 30%                 | 14.0                   | 204         | 2.0        | 7.0         |
| 13:30 | 8%                  | 16.3                   | 380         | 2.8        | 5.8         |
| 14:30 | 20%                 | 14.6                   | 242         | 2.1        | 7.1         |
| 15:30 | 29%                 | 12.5                   | 204         | 2.0        | 6.4         |
| 16:30 | 32%                 | 12.9                   | 178         | 1.8        | 7.2         |
| 17:30 | Data                | Incomplete             | 150         | N/A        | N/A         |

### 3.5 Impact on GHG emissions

For those riders who were surveyed, few had reliable access to a vehicle, so they would not have been taking SOV trips before using Tconnect. This indicates that the Tconnect service did not lead to a reduction in SOV trips. There are two primary reasons for this:

- The COVID-19 pandemic reduced overall ridership on TCAT’s system; households that had cars but had previously chosen transit for some trips shifted almost entirely to driving their private vehicles.
- The weekend service does not favor converting commuters who have cars to using public transportation. Weekend service operates fewer days overall, making it harder for riders to establish consistent commuting patterns. In addition, service workers in lower-wage jobs are primarily the ones needing to get to work on the weekend.

Even though Phase A of Tconnect has not shown evidence of creating a mode shift from SOV to transit, there are a couple estimates that we can make based on the current data that show how Tconnect can have a positive impact on GHG emissions. First, if we consider a fixed-route vehicle covering a similar geographic area to Tconnect, the route would be about 24 miles. Tconnect did not have to traverse the entire service area because it went only where the riders needed to go; Tconnect averaged about 14 miles per trip. In addition, for off-peak service in a low-density area, Tconnect had the advantage of not burning any fuel if there were no trip requests. As a result, we take into consideration that 31% of Tconnect trips had zero riders and therefore zero miles traveled (Table 4). Working through simple math, a comparison of fixed-route versus Tconnect service in the same geographic area for the

same service hours per day and using the same vehicle indicates that the fixed-route service would release 2.4 times the CO<sub>2</sub>. This comparison is a little exaggerated, because TCAT would not operate this level of fixed-route service in a low productivity environment. However, it does show that the Tconnect model has the potential to reduce GHG emissions over fixed-route service. And this exercise does not account for the fact that a permanent on-demand service would use a smaller, more fuel-efficient van.

**Table 4. On-Demand versus Fixed-Route Emission Comparison**

| <b>Parameter</b>  | <b>Value</b> |
|---|--------------|
| Average Tconnect miles per trip   | 14           |
| Miles if run by Fixed route   | 24           |
| Percent of Tconnect trips not operated                                    | 31%          |
| Hours of service/day  | 10           |
| Estimated Tconnect miles/day  | 99           |
| Estimated fixed-route miles/day   | 240          |
| Est. gallons fuel consumed per day - Tconnect                             | 15           |
| Est. gallons fuel consumed per day - fixed-route                          | 36           |
| Est. CO <sub>2</sub> emissions from one day of service - Tconnect (kg)    | 151          |
| Est. CO <sub>2</sub> emissions from one day of service - fixed-route (kg) | 365          |

## 4 Review and Discussion of Tconnect Service Model

---

### 4.1 Review of the Tconnect Experience

Tconnect was initially conceived as a first-mile/last-mile service that would extend the reach of public transportation into lower density areas of Tompkins County. The proposal predicted positive financial and environmental ramifications to creating a service that uses smaller vehicles that could be operated by Gadabout, Tompkins County’s paratransit provider. The service would dovetail with Gadabout’s current demand-responsive service mode and keep on-demand trips relatively short by leveraging the existing fixed-route network. Previous on-demand pilots had been hampered by either low ridership, high operational costs, or both. The project team thought that by using existing vehicles and emphasizing links to fixed-route transit, the costs could be kept low. There was also a social equity component that has a particular urgency in the Ithaca urbanized area. Housing costs have pushed households with lower incomes to more rural areas where access to services and jobs is limited.

The project team’s experience with Tconnect was quite different than the project’s vision. No one could have predicted the length and intensity of the pandemic’s impact on travel behavior, employment, funding, supply chains, and more.

The team’s actual experience with Tconnect reflects that these pandemic-era challenges rendered some of the originally proposed outcomes as simply impossible. However, there were certain insights to be gained by proceeding with an adjusted version of the project. The team adopted an iterative planning approach that accepted the many unknowns and dealt with them by making changes midstream. One of the adjustments resulted in a “hybrid” service model that would support both FMLM service and selected “local” trips only within the on-demand service area. The technology platform used for this project, likewise, was forced to evolve and change throughout the project to accommodate the service model change, and rider, and driver feedback. In terms of outreach and communications, project stakeholders brainstormed as many ideas as they could and gathered information about what worked through surveys. Finally, there was an unexpected and dramatic difference in the success of the Phase A and Phase B service pilots, as discussed in the next section.

## **4.2 Lansing/Etna Tconnect (Phase A) versus Dryden Tconnect (Phase B)**

The Lansing-Etna Tconnect service went through initial growing pains and a revised service area, but ultimately had a dedicated ridership that needed little administrative oversight for week-to-week operations. The Dryden-Freeville service only had one ride originating from the app (although Gadabout did accommodate some of its riders onto the service when needed.) This was dismaying to the project team, and there was frustration in not fully understanding this divergent result. With the tools on hand, it was impossible to precisely determine the relative importance of distinct factors; an in-depth and statistically significant survey would have been necessary. However, the surveys that were conducted do provide some information as do studies on transportation choice behavior, demographic data, etc. Factors that seem to have played a role in the outcome of the Phase 2 service are described in this section.

### **4.2.1 Operational Factors**

A major difference between the Lansing service and the Dryden service is that the Lansing area had an existing fixed-route service on weekends, route 77, as opposed to the Dryden area, which did not have any previous local circulator services. By maintaining the route 77 name along with the Tconnect brand, the service was able to capture previous fixed-route riders and to signal to riders that the route would serve a similar geography and service period. Having riders from the start of the pilot was important for the project team and operational staff as it showed the concept could work in the real world, and it was helpful in terms of the visibility of a Tconnect-branded vehicle in service. In the case of Dryden, since that service did not generate regular ridership, the impact of word of mouth was insignificant. In the Lansing/Etna area, the use of smaller TCAT buses with TCAT-branded signs (along with Tconnect branding) essentially advertised to curious observers that this was an open-to-all public service and that they could contact TCAT to find information about Tconnect.

In the Dryden service area, the vehicle used was a yellow Gadabout minibus. The team attempted to rebrand the buses with magnetic signs on both sides and on the front of the vehicle. However, if people did not try to read the signage, the dominant yellow color probably conveyed that the service was not linked to TCAT service and available to the general public.

In anticipating the potential confusion, the team made sure all the flyers and advertisements featured a yellow Gadabout bus with the Tconnect signage on the side. However, for those not tuned into public transportation messaging, the service may not have been widely understood. The vehicles assigned to the Dryden service spent hours parked at the Dryden Library, a location the team thought had good visibility. For targeted housing developments, however, it was only driven during testing and not a regular presence in those areas.

#### **4.2.2 Communications and Outreach**

Earlier in this document, we listed the outreach efforts in Dryden, which for a small pilot project were significant and required a substantial amount of time. In fact, the outreach efforts in Lansing were not as comprehensive as in Dryden; clearly the ridership did not correlate with the effort spent on communications and outreach. Survey 3 did ask respondents if they had heard of the service and how they had heard about it. A full 71% indicated they heard of the service and a similar amount said they understood or “somewhat” understood how the service worked. Under most conditions, this would be considered a positive outcome of outreach efforts. The main problem is that those that heard of the service didn’t become users of the service. Somewhere there was a disconnect that may relate to how the service was presented. Just as likely, however, this outcome could have been a result of cultural factors and individual decision-making behavior.

The survey 3 responses showed that direct outreach, flyers, mailers, and radio or print advertisements had reached a substantial number of respondents. The TCAT website was only mentioned by 6% of respondents and no one specifically mentioned the targeted Facebook advertisement for the Dryden/Freeville area, or the listserv announcement put out by the Village of Dryden. It seems that for the targeted populations, digital means of communication were not very effective.

One strategy that was not implemented in Dryden was an ambassador program that could have drawn on personal connections among residents. TCAT created a transit ambassador program for its Transit Development Plan (TDP) that staff carried out in 2020-2021. This program was successful in getting input from communities that TCAT was not regularly engaged with. However, the program was labor intensive, and TDP ambassadors were paid a competitive hourly rate to attract low-income individuals, and not just people with the ability and willingness to volunteer. With the effort and budget on the

Tconnect project being directed to other tasks as the Dryden service was being ramped up, the ambassador program did not appear feasible. In retrospect, this type of program would have been useful. Ambassadors could have provided feedback on outreach materials, outreach strategies, and could have been effective in talking to people in their social network. On the other hand, while the team worked on establishing close community contacts in its pre-COVID work, once the pandemic hit, in-person interactions were minimized for a significant period, making an ambassador program challenging.

### **4.2.3 Historical, Cultural, and Behavioral Factors**

As mentioned previously, a survey was conducted in the Dryden area once it was clear that the Dryden Tconnect service was not attracting customers as well as expected. It was soon obvious that respondents who had a personal car or one available to them (as in a shared situation when one vehicle is split between more than one adult in the household), did not question how they were going to travel—the vehicle was available, they were paying for it—why not put it use? The project team grappled with how to break this dominant behavioral pattern. For those who did not have a car(s) in their household (27% of Dryden survey respondents) the question explored was: Why did these potential riders not utilize the new, low-cost, public transportation option? This group made up the bulk of Tconnect riders in Lansing, so what was different in Dryden? Below, the team looked through the scientific literature for any insights.

A 2015 synthesis of 56 polls about transit in the United States indicated that some of the benefits seen by survey respondents were related to a reduction in traffic congestion, reduction in air pollution, lower commute costs, and a contribution to a strong economy (Agrawal, 2015). In Dryden, while many people did seem to work outside of the Village of Dryden, congestion did not seem to be a concern; it was only ever mentioned when respondents were talking about why they preferred shopping in Cortland over Ithaca. Dryden is rural and not close to major industry or urban areas; air pollution was not a challenge to residents. Commuting costs might be a factor that could get people to consider transit, but then again, most feel like the money put into a personal vehicle is a sunk cost and the cost of driving is only the immediate cost of gas to cover the trip in question. Ultimately, the main reasons that people support transit nationally seem to be insignificant or minor in the lives of Dryden residents, and this could help explain the results of the Dryden Tconnect pilot.

A 2019 analysis of the demographics and behavior of electric vehicle (EV) owners found several statistically significant factors: gender, age, education, income, marital status, race/ethnicity, political affiliation, and household size (Berg and Ihlstrom, 2019). Individuals that were of a conservative political



persuasion and had lower income levels, were less likely to purchase an EV. When they did, they were more likely to consider price and status over efficiency or environmental concerns. This seems to indicate that programs purporting to have positive environmental incomes are not as attractive to the demographic groups that lean conservative or have a lower income.

The election districts that Tconnect operated in Dryden were more conservative (based on local party affiliation data) than Tompkins County as a whole, but conservative voters still made up less than 50% of the registered voters. It is likely that the targeted populations in Dryden were less interested in sustainable transportation options and focused more on cost and convenience.

A recent academic essay that delved into the history of rural alienation from government had some interesting points about how government agencies and government-sponsored programs are perceived (Eisenberg, 2022). Author Ann Eisenberg writes that government-sponsored processes are often “perceived as top-down and uninformed by local conditions.” Federal rural development programs (in particular) are seen by residents as “piecemeal, scattered, and neither ambitious nor effective.”

As a result, the author concludes that “rural residents” disaffection from the regulatory state is not merely ideological, nor irrational. It is at least in part based on real experiences and meaningful living conditions that are all too easy for urbanites and urban-centric policymaking to overlook.” This work highlights the importance of a ground-up approach in rural communities and the value of human-to-human collaboration. It cautions against reading too much into the nation’s current political divide.

Tconnect was envisioned as a bottom-up approach, where local knowledge would figure into service planning. However, COVID-19 derailed the original outreach plan and the team relied on a small number of surveys, conversations with residents, and demographic data.

Many studies of rural transportation note the centrality of the car as the dominant transportation mode and the gold standard in terms of flexibility. A paper that reported on in-depth interviews of rural households in Sweden states: “Many participants have two cars in the household and, although they regard it as expensive, they do not question their use of it... Reasons given for car use are convenience, force of habit, and the perception of owning a car as a norm in contemporary society” (Berg and Ihlstrom, 2019).

Indeed, as Aldred and Woodcock put it: “The car supports the creation of distances and obstacles only it can overcome” (Aldred and Woodcock, 2008). It is clear, then, that Dryden residents, presented with a new public transportation service may not have seen it as an opportunity because cars are the norm and their centrality in daily life is not regularly questioned (at least by a car owner when making personal decisions about how to organize the day’s trips). Even those with no or partial access to private cars may look first to car-based solutions to transportation needs, such as carpooling with a neighbor and using food-delivery services that expanded in the service area during the COVID-19 pandemic.

Furthermore, while Tconnect tried to provide a comprehensive service during weekdays by leveraging existing transit, there were clearly desired trips among those surveyed that were simply too expensive or logistically difficult to provide with a local on-demand service. Many people wanted to go to Cortland to shop, where unsurprisingly parking is generally free and plentiful and where the conditions support car-centric behavior. The Tconnect pilot in Dryden cannot be divorced from the context of a car-centric culture and a physical environment built over a century that clearly favors car travel.

While cultural, historical, and political factors do influence transportation decision-making, one recent study in Vermont did provide some optimism (Hamre, 2020). The study authors used cluster analysis to identify three groups with different orientations toward transportation: (1) car-oriented, (2) car tolerant, and (3) alternative oriented (transit/bike/walk). The car tolerant cluster made up almost 50% of all respondents and represents a group that has a high willingness to change travel behavior. The authors indicated that this group may respond well to concentrated marketing.

That this group represented such a high proportion of the population provides optimism that a dominant car culture is not inevitable going forward. Another study used cluster analysis to identify transportation-disadvantaged groups. As the authors note, cluster analysis has commonly been used in social sciences but less commonly in transportation research into disadvantaged populations (Mattson and Molina, 2022). The Tconnect project team learned that identifying transportation-disadvantaged populations demographically and geographically was not that challenging, but that understanding what influences and drives different groups in their decision-making around transportation is harder and perhaps even more important. Cluster analysis represents one tool that can help future projects link the target population with solutions and with strategies for outreach and marketing based on a clearer understanding of their behavioral preferences.

## 5 Recommendations for Future On-Demand Transit and Similar Programs in Tompkins County and Other Areas of New York State

---

Based on the above survey results, operational metrics, and discussion about some of the cultural and behavioral aspects of transportation planning, the project team gathered recommendations.

For TCAT, the team suggested the continuance of the Tconnect branded on-demand service on weekends in the Lansing/Etna area. Eventually, a similar service could operate on non-peak times during weekdays, with peak weekday service still provided by fixed-route transit. Also, when looking at the on-demand recommendations in the TDP, apply some of the insight gained during the Tconnect pilot.

For other transportation providers interested in offering rural on-demand services, here are some specific recommendations:

1. Siting service in areas that have had some prior or existing transit service can help with predicting demand. It also makes it easier to attract first adopters among those who were users of that prior or existing transit service.
2. Initial surveys should be robust and include cultural and behavioral questions that can inform service design and outreach.
3. An ambassador program made up of individuals that live or work in the service area is highly recommended. Examples show that ambassador programs have successfully recruited in transportation-disadvantaged communities, and provided insight before, during, and after a pilot has been offered.
4. Cost savings can be realized from operational cooperation among fixed-route, paratransit, and volunteer-driver transportation providers.
5. Service design can and should be flexible to meet different travel needs. Where possible try to avoid door-to-door service on every trip. Rides should be encouraged to meet at common stops where there is density and pedestrian infrastructure.
6. Real-time data for passengers is much appreciated when the service is not fixed route. There is a level of uneasiness among new riders as to whether an on-demand vehicle will show up. Be careful about your call takers being overwhelmed by confused and anxious riders.
7. Branding does need to stand out from existing services. In the Dryden example, a brightly and uniquely branded vehicle may have attracted residents' attention.
8. Try to be nimble enough to attempt several iterations. This will help the team test their understanding of the major factors leading to the success of the pilot and hopefully show riders that the team can respond to input and fix mistakes quickly.
9. Real GHG emission reduction gains will come from using smaller electric vehicles for demand-responsive services. In low-density areas, it is hard to get the ridership to make these trips very efficient with existing gas or diesel vehicles.

10. On-demand service in low-density areas can provide a lifeline to transportation-disadvantaged individuals and communities. These services may not be highly productive, but they provide an important and valuable public good. Conversations on spreading the cost of these services from only the transportation provider to employers, health-care providers, housing developers, or county government will be needed.
11. Regular county-wide surveys of travel preferences and barriers to transportation access are important. Identifying barriers can provide evidence for the need for future on-demand services, especially in rural areas. Cluster analysis can be used on survey data to identify transportation-disadvantaged groups and can provide insight into the behavioral proclivities of these groups.
12. Improve funding for intercounty mobility options. The Tconnect experience in Dryden found that many people want and need to travel to Cortland County. The county line is an artificial boundary to public transportation services and, unfortunately, transit funding is determined at a county level. Funding for pilot projects that would address intercounty travel needs and require participation from both residents and officials in two or more counties could lead to some creative solutions.
13. Consider projects that experiment with combining delivery of goods with movement of people in low-density areas. This might be challenging because it would likely involve private and public entities; technology platforms not designed to talk to one other; and mismatched infrastructure (e.g., a van for the movement of groceries is not necessarily adequate for the movement of people because it has limited seating and passenger safety features). However, the distances in rural areas are significant and ideas that could reduce total vehicle miles traveled (VMT) while increasing mobility and access for transportation-disadvantaged people deserve further exploration.
14. Loan guarantees for lending institutions should be considered to make it possible for households in the lower-income brackets to access loans for used or low-cost EVs. Electric vehicles are not a panacea in a dense urban environment, but a project that could encourage rural residents to swap old, gas-guzzling vehicles for EVs would be beneficial.
15. Connecting State and county-level housing funding for rural residents with accessibility studies and transportation-demand management plans for residents. Often rural municipalities have few or no zoning requirements and it is easy for developers to build low-income housing in areas that are not conducive to shared-use transportation modes. Since a significant amount of low-income housing is built with government funding or incentives, it should be possible to require more planning for transportation as a part of larger rural low-income housing projects.

## **5.1 Commercialization of the HyperCommute Software**

UM had built the core-trip matching functionality and had an initial working version of the HyperCommute platform up and running as the project started. HyperCommute had not been previously deployed at a transit agency and the user interface (UI) had not been tested by the public. This project allowed UM to develop insights into the UI for a transit-operated on-demand workflow. UM was able to understand the requirements of skilled workers (drivers and dispatchers in transit) and design interfaces to successfully operate the on-demand service. With AI and machine intelligence at the heart of HyperCommute, UI is paramount for HyperCommute's success as UM aims to (1) capture the

data, (2) understand the user inputs or user decisions, and (3) build intelligence, and seamlessly integrate the insights back into the on-demand workflow. The goal is to evolve a UI that is packed with enough intelligence and automation to turn operators into instant experts. UM was able to gain important lessons from the data collected in a limited period. UM particularly paid attention to this aspect as it had plans to source the workforce from the local community (volunteer drivers).

HyperCommute is distinct from other on-demand platforms in the marketplace because it is built with “users in the loop.” This means that UM utilizes input and decisions from dispatchers drivers and end-users in evolving the service and iteratively building an optimal model. It makes on-demand transit more effective, not just by extracting insights from the data captured but by seamlessly integrating those insights back into the on-demand workflow, creating a level of machine intelligence assistance that feels like “magic” (e.g.: providing UI options for dispatchers to control the matching criteria to deal with tardiness and later integrating those inputs to automatically adjust the parameters for coping up with the delays. This approach was also used to provide drivers with recommended wait times at pickup locations. The platform captured the road networks preferred by “good” drivers and used them for route planning. UM’s strategy was to build its UI to add assistance and fortify the worker’s knowledge rather than replacing it.

Being a startup company in this space, UM’s best commercialization strategy is to build partnerships with transit consulting, transit route-planning, scheduling companies, or a transit workflow company offering a “holistic” package. A combined software suite will offer customers a broader and more fully integrated product and technology portfolio in a timeframe that better enables them to address urgent and complex challenges. HyperCommute is a powerful SaaS tool that can enable an excellent on-demand service. It performed without fail and successfully adapted to the working conditions. UM also added a lot of context to their AI expertise, which makes it even more attractive and increases the probability of success.

UM has put some thought into demand-forecasting but was not able to demonstrate it during this pilot because they were given a service area to operate, rather than generate their own service area and service parameters. But opportunity is available, as there are vast amounts of enterprise and open data accessible in various data silos, whether web or on-premises. Making connections between the data may provide valuable insights. Though beyond the scope of the Tconnect project, there is a possibility to amass an enormous amount of data and build knowledge.

Opportunity also exists in building assistance/training tools for the transit workforce and seamlessly integrate them into the workflow. It is important to capture the knowledge of workers and use it to assist new or unskilled workers. This can solve the driver-mechanic shortage problem and save thousands of dollars on training. AI can help build the same level of ease and learning into the transit workflow, enabling the workforce to transform into skilled labor more quickly.

UM highlights the following operational challenges and accomplishments during the Tconnect pilot:

- Balancing engineering with product research and design early on.
- Estimating the deployment costs (consulting services, set-up costs, customer service), in addition to the core product, is an important consideration. UM miscalculated this aspect and promised much more than what could be delivered within the original budget.
- To scale, one must also consider the pros and cons of offering it as SaaS/API/Open Source.
- UM excelled on the algorithmic and technology aspects, such as demand grouping, location tracking, ETA etc., but they spent a lot on the UX design. UX requires significant investment going forward.
- Not all transit agencies are ready for adoption. Some challenges that arise when enlisting a tech partner can result in poor demand estimation; workflow that is not tech-integrated, and short commitment period.
- Buyers are mostly non-technical (or don't have enough domain knowledge to understand the core of what UM does). It is important to appreciate the efforts involved in the sales cycles.

Overall, this was a challenging project for UM, but one that resulted in many improvements for the HyperCommute UI, as well as better ideas of how to interface with on-demand providers and other local stakeholders. UM has used this knowledge to respond to on-demand RFPs in other regions of NYS and continues to work to advance its product in the marketplace.

## **5.2 Conclusion**

The Tconnect project provided TCAT and its partners with hands-on experience with operating on-demand service in lower-density areas, located on the periphery of a small urban fixed-route transit system. Phase A service in the Lansing/Etna area has proven successful and stable while Phase B service in Dryden-Freeville was not successful in attracting riders.

The difference between these experiences has led to insights that instruct future transportation planners in Tompkins County and other areas of Upstate New York. The analysis from this report contain a lot of details from these two pilot phases that may be useful for future service planning.

The project was thwarted with the onset of the COVID-19 pandemic just as the project team was ramping up for the Phase A service. While this disruption was an exception to the norm, it led the way for the team to embrace an iterative approach—to quickly assess assumptions in the real world, and then to make changes to service areas and other service parameters. Pilot projects that adopt such an approach can work through problems more nimbly and make better use of pilot funding than static pilots that don't change over their implementation period.

Overall, Tconnect team members have gained enough experience to offer recommendations for future on-demand transit and similar programs in Tompkins County and other areas of the State. And finally, the Tconnect project team is grateful to NYSERDA for its financial support and flexibility, which enabled the project to move forward under challenging circumstances.

## 6 References

---

- Agrawal, AW (2015) What Do Americans Think about Public Transit? A Review of U.S. Public Opinion Polling Survey Questions, MTI Report WP 12-03. <https://transweb.sjsu.edu/research/What-Do-Americans-Think-about-Public-Transit-Review-U.S.-Public-Opinion-Polling-Survey-Questions>
- Aldred, R and Woodcock, J (2008) Transport: challenging disabling environments. *Local Environment: The International Journal of Justice and Sustainability*.  
<https://www.tandfonline.com/doi/abs/10.1080/13549830802259847>
- Berg, J and Ihlstrom, J (2019) The Importance of Public Transport for Mobility and Everyday Activities among Rural Residents. *Social Sciences*. <https://www.mdpi.com/2076-0760/8/2/58>Eisenberg, A (2022) Rural Disaffection and the Regulatory State. *PENN STATE LAW REVIEW*.  
<http://www.pennstatelawreview.org/wp-content/uploads/2022/07/4-Eisenberg.pdf>
- Hamre, A, et al. (2020) Travel Behavior and Transportation Planning Insights from the Small Urban Area of Chittenden County, Vermont: An Application of Traveler Segmentation. Western Transportation institute. [https://westerntransportationinstitute.org/wp-content/uploads/2020/10/4W8510\\_Chittenden-County-Full-Report.pdf](https://westerntransportationinstitute.org/wp-content/uploads/2020/10/4W8510_Chittenden-County-Full-Report.pdf)
- Mattson, J and Molina, A (2022) Travel Behavior of Transportation-Disadvantaged Populations: Trends and Geographic Disparities. SURTCOM 22-10.  
<https://www.ugpti.org/resources/reports/details.php?id=1057&program=surcom>Shin, H et al. (2019) An Analysis of Attributes of Electric Vehicle Owners' Travel and Purchasing Behavior: The Case of Maryland. *International Conference on Transportation and Development 2019*.  
<https://ascelibrary.org/doi/abs/10.1061/9780784482582.008>



## Appendix A. Survey 1: Existing Habits

The first survey was given to attendees at the three public meetings that occurred pre-COVID to gain information regarding transportation habits, internet access, and comfortability with technology among the wider Dryden Community. Five survey responses were received. Below (Table A-1) is a description of some of the results, but due to the low number of responses, the team was careful not to draw sweeping inferences based on this data.

In response to a question about how the participants currently commute to work or school, two of five listed public transportation; two indicated that they drive alone; and one was an advocate helping rural youth get to jobs. This last participant indicated that he was interested in Tconnect to help high school-age youth commute to and from part-time jobs in the afternoon and on weekends. He indicated that many of these teenagers did not have their own vehicle and, because they lived in far-flung areas of the Town of Dryden, transportation was a serious challenge to them. He found that employers indicated that they would be able to hire a youth if only they had a reliable way to get to and from work.

**Table A-1. First Survey Results—Important Service Design Factors**

How important are the following factors in influencing your choice to use Tconnect?

| Factors  | pers 1 | pers 2 | pers 3 | pers 4 | pers 5 | Average |
|--|--------|--------|--------|--------|--------|---------|
| How easy the app is to use?  | 3      | 4      | 5      | 4      | 4      | 4.0     |
| How easy it will be to schedule a ride since I don't have a smartphone/can't use data? |        | 4      |        | 2      | 4      | 3.3     |
| Time waiting for Tconnect minibus.   | 5      | 4      | 3      | 3      | 2      | 3.4     |
| Time on the Tconnect minibus before connecting with TCAT.                              | 3      | 4      | 3      | 4      | 2      | 3.2     |
| Reliability (Tconnect minibus shows up on time; transfer to TCAT is reliable).         | 5      | 4      | 5      | 5      | 5      | 4.8     |
| Price of the Tconnect Service  | 2      | 5      | 3      | 4      | 2      | 3.2     |
| Convenience and flexibility.   | 5      | 5      | 3      | 4      | 2      | 3.8     |
| Lack of other alternatives.  | 1      | 5      | 5      | 2      | 2      | 3.0     |

1= Not Important; 5= Extremely Important

In Table A-1, the respondents were asked to indicate the importance of a range of factors in their decision to use a hypothetical Tconnect service. Reliability and ease of use were especially important.

## Appendix B. Survey 2: Awareness/Satisfaction/Need

---

The team created an initial survey to be administered approximately a month after the start of Phase A service—in Fall of 2020. Seven surveys were filled out at that time. The team distributed the survey again in the Spring 2021 after the Phase A service area had been expanded to the Lansing Town Hall area. Although time-consuming, staff found it effective to have ridden the Tconnect vehicles and fill-out surveys directly with riders. Below is a synopsis of the 16 total responses received from the second survey.

Question one (Table B-1) below asked how the rider found out about the service. Surprisingly, the most common response was that a bus driver told them about it. On rural routes, drivers and passengers often get to know each other and this response may reflect this pattern. This response does highlight the importance of keeping bus operators informed about service changes so that they can accurately share this information with riders.

**Table B-1. Survey 2—Question 1: Finding Out About Tconnect Service**

| <b>Q1: How did you find out about the Tconnect service?</b> | <b>Number of Responses</b> |
|---|----------------------------|
| A bus driver told me about it.                              | 7                          |
| TCAT website  | 3                          |
| TCAT Flyer or Poster  | 3                          |
| Google Maps   | 1                          |
| It replaced my weekend Route #77.                           | 1                          |

Question two (Table B-2) below asks why the respondents are using Tconnect. The answers show a clear preference for the first three options: going to work, connecting to TCAT routes, and going shopping. These answers are not that surprising, except the number of respondents using the service to go to work. This reflects the high number of service jobs in the Tconnect service area. Also note that half of the respondents do use Tconnect to connect to other TCAT routes.

Question three (Table B-3), seeks an understanding of riders’ previous travel patterns. It looks like most respondents were already TCAT riders. However, it also appears that some Tconnect rides replaced Uber and Lyft rides, walking and carpooling. It is notable that 5 respondents listed walking in this primarily rural service area. Finally, zero people indicated they were driving alone and switched to Tconnect. On the one hand, this is unfortunate, as it indicates the service has not gotten people out of their cars. On the other hand, it might be hard to convince people to give up car trips on weekends only. Many of these trips are for shopping, which is more convenient if one has access to a car. It may be easier to convince commuters to give up their cars on weekdays because weekday service is often a more routine part of rider’s schedules.

**Table B-2. Survey 2—Question 2: Purpose for Using Tconnect**

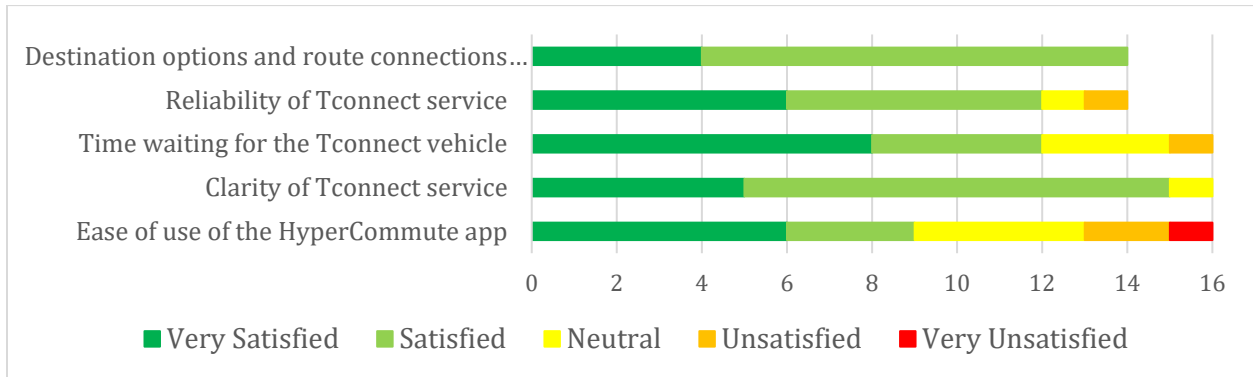
| <b>Q2: What is your main purpose for using Tconnect? Select all that apply:</b> | <b>Number of Responses</b> |
|---|----------------------------|
| Work  | 9                          |
| Connecting to TCAT routes   | 8                          |
| Shopping  | 7                          |
| Medical Appointments  | 1                          |
| Recreation  | 1                          |
| Don't have a car  | 1                          |

**Table B-3. Survey 2—Question 3: Mobility Options before Tconnect?**

| <b>Q3: How were you getting to shopping centers, appointments, bus routes etc. before you started using the Tconnect service? Select all that apply:</b> | <b>Number of Responses</b> |
|--|----------------------------|
| TCAT   | 14                         |
| Uber/Lyft  | 5                          |
| Walk   | 5                          |
| Carpool  | 2                          |
| Drive alone  | 0                          |

Question 3 noted in Table B-3 above asked riders whether they had regular access to a car. Most people did not, indicating that the service filled a gap in public transportation service.

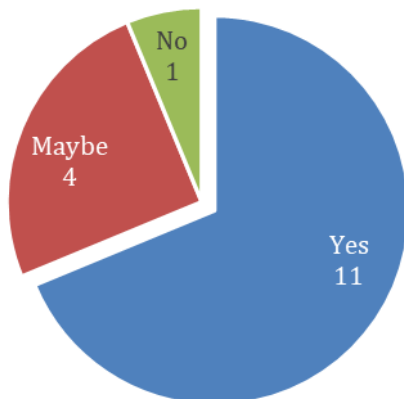
**Table B-4. Survey 2–Question 4: Rate the Following Attributes of Tconnect Service**



Question four illustrated in Table B-4 above asked whether respondents would recommend the service, 11 of 16 people responded that they would, while only one responded that they would not recommend the service. This seems to be a particularly good indicator that the current ridership appreciates the service and finds it usable enough to recommend it to others.

Responses from the second survey’s final question (Figure B-1 below) showed that most people would recommend the service for other parts of Tompkins County.

**Figure B-1. Survey 2–Question 5: If Tconnect were offered in other areas in Tompkins county, would you recommend or use the service?**



## Appendix C. Survey 3: “What Happened in Dryden?”

---

With the difficulties recruiting Dryden Tconnect riders, the team did not have a captive audience for the final survey. The project team thought that the most essential question to try to answer for part of this NYSERDA-funded project was “What happened in Dryden?” This could only be answered by people who had not actually ridden the service; the only effective way of getting surveys filled by Tconnect’s target population was to go door-to-door.

The survey field work focused on two of the prioritized residential areas in Dryden: Poets Landing—an apartment complex with about 120 units, and Pleasant View Mobile Home Park with 49 mobile homes. Poets Landing is served only by four trips a day by the fixed route 43, with no AM or PM peak trips. The Pleasant View Mobile Home Park has no transit service whatsoever. We were also able to get five people to fill out surveys at Clark’s supermarket in Dryden, since this is the largest business in town. In total, we received results from 27 in-person surveys and 19 on-line surveys, out of which we used 11. We provided a free 7-day bus pass for online respondents and \$10 to in-person respondents to increase engagement and to show respect for people’s time.

The first question asked whether people had heard about Tconnect previously, with 71% saying they did. (See Table C-1) It wasn’t surprising to see that the percentage was higher in the prioritized residential areas, which shows that handing out flyers door-to-door had raised awareness of the service. In a sense, this question validates all the outreach work that the team did over the course of the project. At least it is clear that people didn’t ride because they were unaware of the service.

**Table C-1: Survey 3—Question 1: Have You Heard about Tconnect before Today?**

| <b>Q1: Have you heard about Tconnect before today?</b> |    |     |             |
|--|----|-----|-------------|
| Location   | No | Yes | Percent Yes |
| Clarks Supermarket                                     | 3  | 2   | 40%         |
| Poets Landing  | 3  | 11  | 79%         |
| Southworth MHP   | 1  | 7   | 88%         |
| Online   | 4  | 7   | 64%         |
| Total  | 11 | 27  | 71%         |

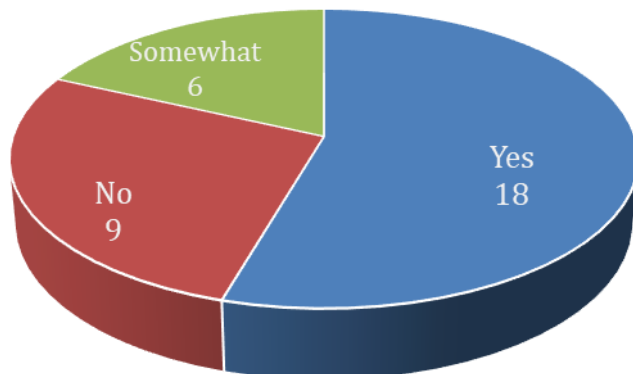
The next question asked of those who said they heard about Tconnect, was how. In the table below (Table C-2), is a list of responses. Note, some people listed checked that they learned through more than one communication medium. Staff sent a mailer before the service started to all residents of the service area, and once the service started in August 2021, repurposed the mailers as fliers and distributed them door-to-door in the prioritized housing areas. This seems like it was effective in getting the word out. Interestingly, the team did a fair amount of advertising using Facebook, but no one specifically mentioned the social media platform.

**Table C-2. Survey 3—Question 2: How Did You Hear about Tconnect?**

| How did you hear about Tconnect? | Number | Percent |
|----------------------------------|--------|---------|
| Flier                            | 6      | 19%     |
| Door-to-door                     | 5      | 16%     |
| Advertisement (radio and print)  | 4      | 13%     |
| Mailer                           | 4      | 13%     |

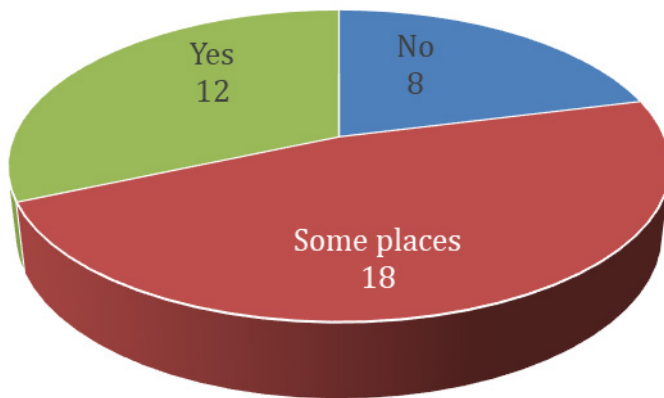
Because Tconnect was a new service mode in Tompkins County, we wanted to gauge whether people who had heard about it understood what was being offered. Those who responded “Yes” or “Somewhat” comprised 73% of the total, aligning with the 71% who had heard about the service. The project team did ask a follow-up question about what aspects of the service respondents found confusing, but only a few people answered this question in ways that were not particularly illuminating. However, Figure C-2 on the next page shows that some people did not understand the service.

**Figure C-1. Survey 3—Question 3: Do you understand what Tconnect is and how it works?**



In Figure C-2 below, the Tconnect service area did not cover most respondents' main destinations completely. However, only 21% of respondents did not mention any destinations in the service area. So, Tconnect represented a viable partial solution for most people. It was notable that a lot of people mentioned that they preferred to shop in Cortland rather than Ithaca or even Dryden itself. Cortland is a little closer to Dryden at about 10.5 miles as compared to 13.5 miles to Ithaca. Unfortunately, Cortland is not in Tompkins County and the Tconnect service could not provide out-of-county service. TCAT service from Dryden to Ithaca has about 12 trips per day while Cortland Transit's route 6 only has 4 trips per day between Cortland and Dryden.

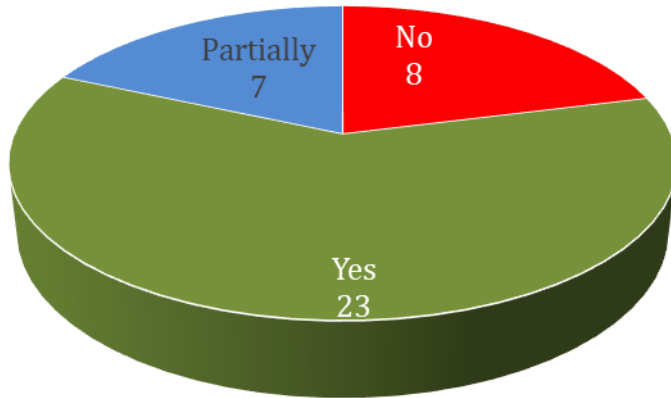
**Figure C-2. Survey Question 4: Does Tconnect's service area cover where you need to go? (Number of responses)**



The survey also asked people about their common destinations. This allowed the project team to get a sense of which trips could be taken using the Tconnect service. Just over half of all destinations mentioned were reachable using Tconnect or the combination of Tconnect and TCAT route 43. An additional 13-14% of destinations could be reached if riders were willing to transfer to other TCAT routes, and about 30% of destinations were in Cortland and could not be reached as they were outside the service area. One thing to note is that the targeted populations did appear to go to destinations in Dryden at a high rate, possibly because these destinations could be reached on foot by those who had no other transportation. But since Tconnect could have easily accommodated these trips, it doesn't explain why the populations surveyed did not adopt the service. Also of note: The single most mentioned destination was the Walmart in Cortland. Cortland was seen as being easier to get to and did not have traffic or parking restrictions like areas of Downtown Ithaca and Cornell. More respondents mentioned medical destinations in and around Ithaca than in Cortland, but often these trips would have required a longer transit trip with two transfers.

The team also asked respondents about what time of day and day of week they wanted to travel. Most people did travel during Tconnect’s service hours. (See Figure C-3.) There was a substantial number that indicated that they did their errands and shopping on weekends and Dryden Tconnect only operated on weekdays. This indicates that Tconnect was well-positioned to supplement an individual or household’s travel needs, but perhaps not to entirely replace a private vehicle.

**Figure C-3. Survey 3–Question 5: Does Tconnect cover the days and times you need to travel?**

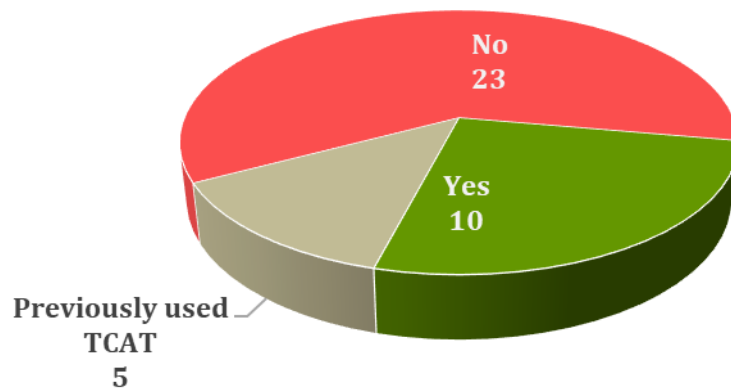


The project team wanted to get a sense of how many people were regular TCAT riders; our hypothesis being that this group had no bias against public transportation. Ten of the 38 indicated they were current Route 43 users and another five indicated they had used TCAT at a previous point in their lives. (See Figure C-4 next page.)

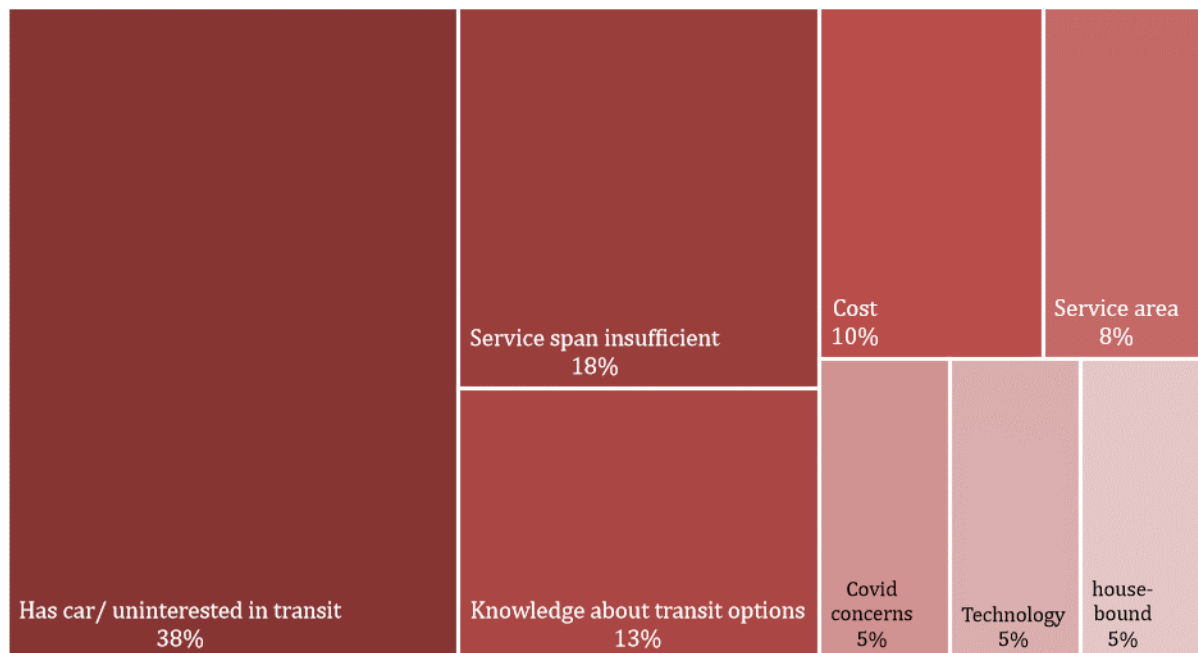
According to the Ithaca Tompkins County Transportation Council’s Long- Range Transportation Plan (American Community Survey data), about 2.6% of commuters use public transportation in the Village of Dryden. Given this statistic, the survey results do show that the project’s targeted population already used transit more than the local average. For those that did not indicate they were a regular transit user, most of them were likely dependent on their own vehicle, with carpooling being another frequent way for those without reliable cars to get around (9.6% of commuters use carpooling in the Village of Dryden).



**Figure C-4. Survey 3—Question 6: Are you a regular user of TCAT Route 43 to Dryden?**



**Figure C-5. Survey 3—Question 7: Barriers to Tconnect mentioned by survey respondents**



This survey was geared toward understanding whether the project team made any major errors in the Dryden Tconnect service design or outreach. Our final question asked respondents about barriers to their adoption of Tconnect. We coded responses to this question into the categories seen in Figure C-5. Many respondents answered the question by saying they had a car. This leaves the impression that anyone who has a car is not motivated to look at alternative modes of transportation, even if they are convenient or inexpensive. Where car culture is dominant, it is hard to get the message across to potential riders that other means of transportation have benefits. It was interesting that the service span was mentioned more often than service area. This is because many folks mentioned they needed to run errands on weekends

when the service was not running, but a handful of people also mentioned they had to be at a job early or late on weekdays, and the existing schedule could not accommodate this need. Some respondents stated that they did not know Tconnect was an option and others answered in ways that indicated a lack of knowledge about the service. Cost was only mentioned by 10% of respondents and it is worth noting that the survey results were gleaned primarily from lower-income housing developments; cost was a minor barrier. Finally, two people each mentioned the last three barriers: COVID-19; technology; and lack of need due to being housebound.

The results of survey 3 are interesting but not conclusive. First, most respondents had heard about the service through a variety of media and that they claimed to have understood how the service worked or at least had some idea about what was being offered. When we looked at questions relating to the service area and service span, there was also no obvious reason why people did not utilize the service. It seemed that while the service may not have worked for all people on all trips, it would have been convenient for at least some to take on a weekly basis.

Of note is the connection that Dryden residents have to retail and other services in Cortland. While the project team was aware of this, the number of people specifically mentioning their desire to shop at the Cortland Walmart was surprising and may represent a missed opportunity. While some respondents had no experience with TCAT, the percentage of active TCAT riders was higher than numbers from ACS data, indicating that we had identified a segment of the population willing to use public transportation. This was supported by the questions on car ownership and household size: just over 25% of households did not own a car and some of the larger households had fewer cars than adults in the household. We also talked with people who indicated they depended on friends for rides with some frequency and, if there was no one available to provide a ride, they would not take the trip. This indicates that the team had identified a transportation-vulnerable population that, in theory, should have been interested in having additional transportation options.

As TC3 is the largest employer in Dryden, we hypothesized that there would be some staff living in the surveyed communities. What we found was that there is no evidence of TC3 being a large draw for staff or students in the target population; TC3 pulls students and staff from farther afield. Finally, the biggest identified barrier was that people had their own cars and therefore did not show that much interest in other

transportation options. Having a car was deemed to be the most convenient option; there did not seem too much thought among respondents as to whether car ownership was more expensive than public transportation. All the above indicates that the team did not appear to make any major mistakes in setting up the service in Dryden.

Granted, the service might have been offered in flashier/custom wrapped vehicles or provided more service over the course of a week to give people more of a chance to try it out. However, after spending a significant amount of time going door-to-door administering surveys, it began to appear that a cultural affinity to private vehicles is the largest barrier to on-demand adoption.

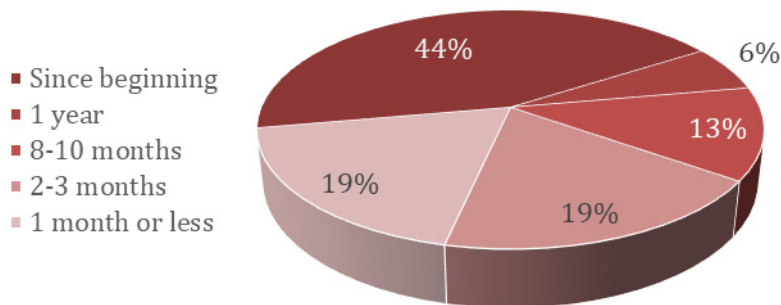
## Appendix D. Survey 4: “What Happened with Lansing/ Etna?”

---

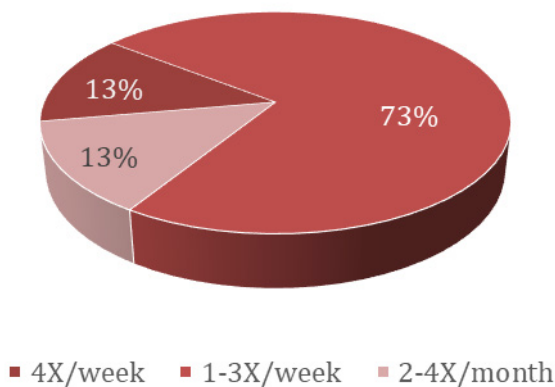
Survey 4 was the final survey, which was administered in the Lansing/Etna area. It was delivered to riders on Tconnect vehicles over a couple days in the spring of 2022 and resulted in 16 completed surveys. The questions were similar to those from survey 3 but were focused more on actual usage of the service.

The first question was designed to gauge how long the respondent has been using the service. There was a range of responses, but it was good to see that some riders were long-term riders and had become accustomed to the service. Most used the service every weekend and it was common for them to use the service inbound and outbound every week to run errands or to travel to work.

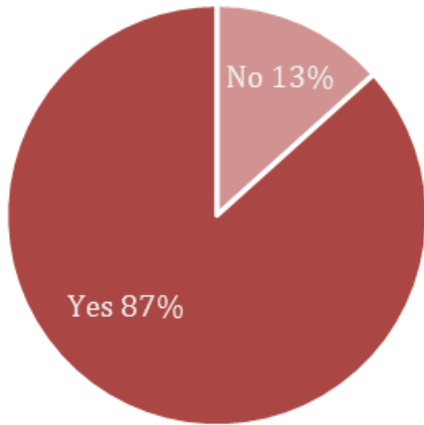
**Figure D-1. Survey 4—Question 1: How long have you been using the Tconnect service?**



**Figure D-2. Survey 4—Question 2: Approximate number of rides per week/month?**

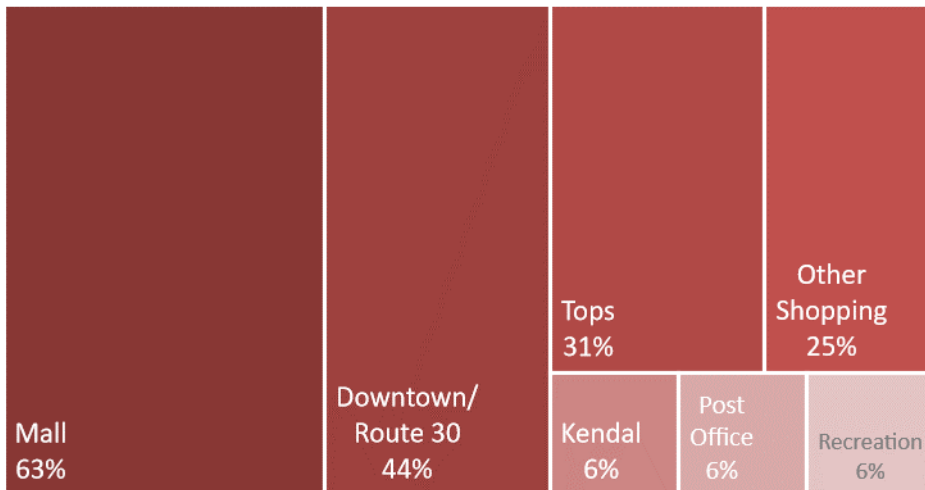


**Figure D-3. Survey 4–Question 3: Do you ride TCAT fixed-route service during the week?**



As shown by the survey results above (Figure D3), Lansing Tconnect riders used TCAT fixed-route service during the week. This would indicate that a lot of the riders were already familiar with TCAT and saw Tconnect as an extension of TCAT service. It also indicated that many riders were transit dependent and rode the service available to them.

**Figure D-4. Survey Question 4: Common destinations when using Tconnect?**



Question 4 asked respondents about their most common destinations, with more than one answer allowed. Over 60% listed the Ithaca Mall, indicating that basing the Tconnect service there seemed appealing to riders and that they were able to make use of businesses in the mall and nearby services. Just under half of respondents mentioned that they would use connections to route 30 at the mall to go downtown or other destinations. It was gratifying to see that the connection to and from fixed-route service was easy enough for a high percentage of respondents to actively make this connection.

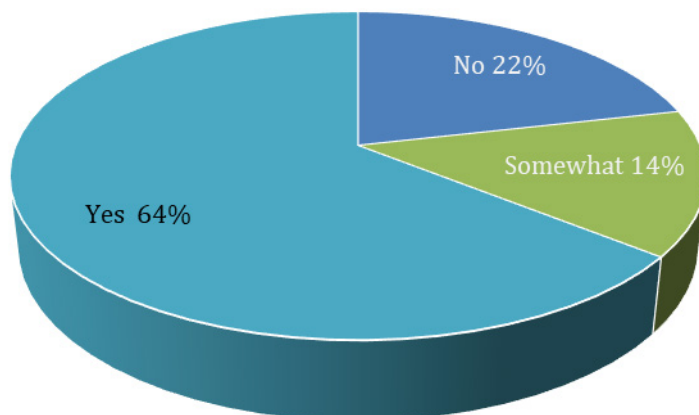
When asked about the number of people and vehicles in their household, it was clear that most respondents lived by themselves and did not own a car. This matches responses from other questions that indicate that most users of this service really do depend on the service on weekends and are not choice riders. Those who did have access to a car lived in larger households where one vehicle was shared among the adults in the household.

**Table D-1. Survey—Question 5**

| How many people do you live with (Incl. yourself)? | Number of vehicles in your household? |           | Total     |
|--|---------------------------------------|-----------|-----------|
|  | No vehicles                           | 1 vehicle |           |
| 1  | 10                                    |           | <b>10</b> |
| 2  | 1                                     | 2         | <b>3</b>  |
| 3  |                                       | 1         | <b>1</b>  |
| 4  | 1                                     |           | <b>1</b>  |

The aim of the next question was to determine whether the effect of GHG emissions on the climate was one of the potential motivations for using transit. It turns out that the majority said they are worried about climate change with only two people saying otherwise.

**Figure D-5. Survey 4—Question 6: Are you concerned about GHG Emissions/ Climate Change?**



The final question was posed to determine which of several transportation programs riders might find the most useful in the future. (See Table D-2, next page.) Results show that Tconnect riders did support electric transit service overall, with the total number supporting on-demand versus fixed-route at about the same level. This would indicate little preference between modes, but a strong preference for more transit service in general.

When asked about an app that would allow them to plan and pay for trips across existing transportation modes (transit, on-demand, bike-share, car-share, taxi, Gadabout, most respondents indicated that it would be useful. This question is about Mobility-as-a-Service, and it shows that the concept did have some initial appeal. MaaS can be quite complex, and it may require more of an introduction before potential users can see how it would benefit them. The next program was a concept generated from a discussion with Luis Aguirre-Torres, who was then the Director of Sustainability for the City of Ithaca, and who brought some compelling ideas about making electric vehicles affordable for low-income households.

About half of respondents said they would find a program that would allow them to lease a used electric car below cost, (regardless of credit rating) useful. Again, a program like this might be hard to fully explain in a survey, but it does indicate that some respondents would appreciate having their own electric vehicle if there was a program available to offset costs.

Following on this idea, we asked about subsidies for an electric bike, and about half of respondents said they would find this useful. This is an interesting result given the more rural nature of the Lansing/Etna Tconnect service area. There are few sidewalks in the area and bike riders would need to travel on high-speed county roads and deal with the region's cold winter climate.

However, as electric bikes become more powerful, with larger batteries and the ability to travel with a companion or carry purchased items onboard, they may be sufficient to meet the travel needs or a least a portion of their travel needs. Transit would be a necessary back-up in inclement weather. Only 30 percent of respondents said a subsidized electric carshare program would be useful. Carshare can be great for running errands, but for someone who doesn't live near one of the shared vehicles or in need of commuting, it becomes less of a solution.

**Table D-2. Survey 4–Question 7**

| <b>Please rate the following potential programs in terms of how useful they might be to your or members of your household:</b>                  | <b>Very useful</b> | <b>Somewhat Useful</b> | <b>Not useful</b> | <b>% Useful</b> |
|---|--------------------|------------------------|-------------------|-----------------|
| Fully electric on-demand service operating 7-days a week?   | 12                 | 2                      | 0                 | <b>100%</b>     |
| Fully electric fixed route service operating 7-days a week?   | 11                 | 2                      | 0                 | <b>100%</b>     |
| An app allowing you to plan and pay for trips across existing transportation modes (transit, on-demand, bike-share, car-share, taxi, Gadabout?) | 5                  | 3                      | 5                 | <b>62%</b>      |
| A program that would allow you to lease a used electric car below cost, regardless of credit rating?  | 5                  | 2                      | 6                 | <b>54%</b>      |
| Subsidies for the purchase of an electric bike?   | 6                  | 1                      | 6                 | <b>54%</b>      |
| Subsidized access to an electric carshare program?  | 2                  | 1                      | 7                 | <b>30%</b>      |

The survey invited respondents to note any additional comments on Tconnect or offer any ideas for the future of shared transportation in Tompkins County. Of the 11 people who commented, five said that they liked the way the Tconnect service was operating and its on-demand feature.. Two respondents indicated that the service should be run with smaller vehicles, but ones that do not have steep steps, which pose a challenge for shoppers.

Three respondents (tending to be among an older demographic) indicated that they didn’t like the app and preferred the call-in option.

In general, the service had a core group of users that found what worked best for them (travel day and time, app versus call in) and followed similar patterns each week. It seems clear that many liked the service and would like to see more of it. The service did not appeal to those who had their own vehicles, but it did provide a lifeline to people in outlying areas around the Ithaca urbanized area and made purchasing a car less of a necessity for those that did ride.





NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and support to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

To learn more about NYSERDA's programs and funding opportunities, visit [nyserda.ny.gov](http://nyserda.ny.gov) or follow us on X, Facebook, YouTube, or Instagram.

**New York State  
Energy Research and  
Development Authority**

17 Columbia Circle  
Albany, NY 12203-6399

**toll free:** 866-NYSERDA  
**local:** 518-862-1090  
**fax:** 518-862-1091

[info@nyserda.ny.gov](mailto:info@nyserda.ny.gov)  
[nyserda.ny.gov](http://nyserda.ny.gov)



**NYSERDA**

**State of New York**

Kathy Hochul, Governor

**New York State Energy Research and Development Authority**

Richard L. Kauffman, Chair | Doreen M. Harris, President and CEO