

REPORT TO THE LEGISLATURE PURSUANT TO ACT 59 OF 2019, SECTION 20

Report on Methods to Increase the Use of Public Transit in Vermont

January 2020

submitted to

The Vermont House and Senate Committees on Transportation

**Vermont Agency of Transportation
Policy, Planning, and Intermodal
Development Division**



EXECUTIVE SUMMARY

Purpose

Section 20 of Act 59 (2019) of the Vermont Legislature directed the Agency of Transportation to develop a report on methods to increase the use of public transit in Vermont. This report responds to the legislative directive. It includes an overview of the policy goals related to increasing transit ridership, the potential target markets for increased ridership, and a series of recommendations derived from a literature review, analysis of existing Vermont transit services, and stakeholder input. The report estimates the costs of the recommendations when possible and offers criteria to use to determine the priority of potential actions.

Policy Goals

Prior to describing potential methods to increase public transit ridership, the report discusses five policy goals that together establish why increasing ridership is valuable and important:

1. Make the most effective use of existing resources

Vermont invests roughly \$40 million annually in public transit including federal, state, and local funds. The State has an interest in seeing that the service is well used.

2. Address the unmet needs for mobility

The [2019 Public Transit Policy Plan \(PTPP\)](#) includes an extensive analysis of unmet needs in Vermont. The major themes that emerged from the analysis included the following needs:

- ▶ More transit access in rural areas
- ▶ Additional resources to meet the needs of vulnerable populations both today and in the future
- ▶ Additional transportation for access to jobs
- ▶ Improvement in service levels of existing transit and connections

3. Reduce energy use and greenhouse gas emissions

Increasing ridership on public transit can result in a net decrease in energy use and greenhouse gas emissions to the extent that the new riders would otherwise be driving their own cars.

4. Reduce traffic congestion and wasted time

With service increases on commuter bus routes and priority treatments to make bus travel more time-competitive with driving, transit could reduce traffic congestion and reduce wasted time both for the new riders, and for drivers who may see slightly less congested roads.

5. Free up resources used on automobiles

The final broad reason why increasing ridership would benefit society is that it would result in spending less money on automobiles and associated infrastructure, thereby freeing up those resources for other priorities.

Addressing the Target Markets for Increased Transit Ridership

Potential new riders may be broadly divided into two groups: those people with unmet transportation needs, and people who have transportation options but who are open to using transit service. Population groups likely to have individuals with unmet transportation needs include older adults, in particular those over 80 years of age, people with disabilities, individuals with low incomes, and youth aged 13-18. In recent years, the number of people with substance abuse disorders has grown significantly. This population often needs transportation assistance to get to treatment and to participate in the labor force.

People who have transportation options but who are open to using transit include younger generations born after 1980 and often referred to as “Millennials and Generation Z,” people who live in cities, people who are environmentally conscious, and people who commute long distances. As transit service becomes more convenient, greater percentages of these population groups are likely to use transit and drive less.

Serving People with Unmet Transportation Needs

There are three broad ways that the system could change to meet the needs of these populations:

1. Provide more convenient and available demand-response service
2. Operate evening/weekend service for job access and other purposes
3. Employ mobility managers for training and coordination

Attracting People with Transportation Options

There are four themes that encompass the types of improvements required to attract the people who have transportation options, but who are open to using transit:

1. Improve the convenience of transit relative to driving
2. Enhance comfort and image of transit
3. Improve pedestrian and bicycle access to bus stops
4. Make information more readily available

Recommendations

The recommendations are divided into short-term actions, longer-term initiatives, and policy levers that can significantly increase the role of public transit and its ability to attract riders. Short-term actions are summarized in Table ES-1, which shows criteria to help determine priorities for these investments.

Short-term Actions, Costs and Next Steps (1-3 years)

The following eight actions reflect the findings from the literature review and the discussion of policy goals and target markets. Many of the actions described here also appear as recommendations in the PTPP. It is important to note that implementing these actions in a coordinated way will have synergistic effects: a marketing campaign associated with improved service will increase ridership more than a marketing campaign and improved service implemented separately in an uncoordinated manner.

1. Improve local access connections

Promote local access connections to help make “first mile/last mile” connections. Work with municipalities and non-profit organizations to explore options such as car sharing, scooter sharing, bike sharing (including eBikes), ridesharing, and on-demand ride service. Expand volunteer driver pool to increase options in rural areas. No specific cost estimate is provided for this recommendation as it is too dependent on the type of connections chosen, and some of the options may entail little or no cost to the State.

Next steps: Pursue Mobility for All grant to explore and pilot “Community Rides” concept. Pursue pilot project for microtransit in Montpelier.

2. Expand partnerships with employers, institutions, community organizations

VTrans and individual transit providers have worked for years to establish partnerships with large employers including ski resorts, community institutions such as universities and hospitals, and human service agencies. These partnerships should continue and be expanded. Work should also include ongoing coordination and partnering with Transportation Management Associations. Developing partnerships does not have a significant cost, other than the amount of staff time that would be required to attend meetings and develop

cooperative agreements. This staff time is already accounted for in the Go Vermont budget. The partnerships themselves may result in a net gain in revenue, if private sector entities are convinced to participate in supporting public transit in a robust way.

Next steps: Pursue new partnerships and strengthen existing ones. Working with regional economic development agencies, reach out to employers who are voicing concerns about labor force availability. Continue to work with and promote the value of Transportation Management Associations.

3. Pursue marketing campaign to change image of transit

VTrans and its transit agency partners should pursue a marketing campaign to spread a new story about public transit. This effort will be more effective if it is coordinated with actual improvements and service and capital/technology investments as described in other recommendations below. The campaign can also include incentives to use transit like those already available through Go Vermont. The messaging should include linkages to key themes that are important to the intended audiences:

- Taking the bus instead of driving is an important step to fighting climate change.
- Taking the bus improves your individual health and public health in general by leading to more walking and reducing harmful emissions from motor vehicles.
- Taking the bus is a step toward reducing dependence on automobiles and oil companies while promoting independent mobility for all.

With the goal of changing the image of transit, it is assumed that a large campaign would be necessary, that it would last more than a year, and that all of Vermont would be the target audience. Initial creative work is estimated at \$75,000 followed by three years of advertising and promotion at \$300,000 per year for a total cost of \$975,000.

Next steps: Work with media consultants to design new campaign, coordinated with service and capital improvements as they occur.

4. Explore Fare Free policy

Fare free transit is an option that could make transit more attractive, but it would not have a large impact on rural transit ridership because much of the rural transit service in Vermont is already free or low fare. However, in Chittenden County, eliminating fares could increase ridership by up to 40% based on the experience of similar areas, but it would leave a budget hole of more than \$2 million and would not result in a significant decrease in automobile travel. Rather, most new trips would be made by existing riders taking more trips on the bus, and by people who currently walk or don't take trips at all taking advantage of the free service. A more moderate approach may be found in employer subsidized transit-pass programs such as the Capital Commuters program.

Next steps: Consider State budget implications of Fare Free transit for all rural systems in Vermont; evaluate the cost and benefit of expansion of the Capital Commuters program to all state employees.

5. Further invest in technology and information

VTrans and its partners are already making significant investments in technology and information, including, but not limited to the expansion of the capabilities of the Go Vermont website and the dissemination of real-time information on bus locations and arrivals through the Transit app. VTrans needs to maintain its emphasis on technology and stay abreast of new developments in the field. In order to have a noticeable impact on public awareness and convenience/ease of use, an outlay of \$300,000 per year for new technology and \$150,000 over two years for website integration is recommended.

Next steps: Continue work with technology vendors to procure additional modules for trip-planning, passenger information and operations.

6. Plan and prepare for paradigm shift in demand response transit

A central recommendation of the PTPP is to begin planning for a transformation of the way demand response service is delivered in Vermont. New technology makes it possible to provide on-demand service rather than the traditional method of calling a day or two in advance to schedule a trip. Trip request software on a smartphone could show all the options available—including buses, vans, volunteer drivers, taxis, etc.—and the prices and travel times associated with each. The system could incorporate existing eligibility-based programs as well as pay-as-you-go systems for the general public. Prior software to handle demand response scheduling cost on the order of \$5 million. It seems likely that a new system would have a lower up-front cost, but that each ride would generate some revenue for the vendor.

Next steps: Work with the industry to explore software and partners through a Request for Information. Develop plan of action for 2021 and beyond.

7. Increase capital investments in vehicles and passenger amenities

Consider investing in heavy duty vehicles in place of the typical cutaway van more frequently. Heavy duty transit vehicles provide a more comfortable ride, last longer, and generally connote a more professional service. Place a priority on electric or hybrid buses to reduce emissions and expand the environmental appeal of public transit. VTTrans and its transit agency and municipal partners should also place a higher priority on passenger facilities and amenities. Older shelters should be replaced by newer, more inviting ones to signal to existing and potential bus riders that they are valued customers. The annualized capital cost of maintaining the fleet of cutaways is approximately \$2.9 million per year. Upgrading to heavy-duty buses would increase capital expenses by \$3.5 million per year over the baseline and upgrading to electric heavy-duty buses would increase capital expenses by \$8.5 million per year. If 100 passenger shelters were to be installed at the most frequently used bus stops, the capital cost would be roughly \$1.2 million, not including site preparation costs.

Next steps: Contact bus manufacturers and APTA to inquire about availability of small heavy-duty buses, especially ones with electric or hybrid motors. Gather information on appropriate locations for new/enhanced bus shelters and program installation.

8. Operate higher levels of service where density warrants

In places with sufficient population density, such as a residential density of at least 6 households per acre, operate a higher level of service with at least 2 or 3 buses per hour on key routes, and service hours extending into the late evening and weekends. Applying this increase to a set of urban, small town and commuter routes, the annual gross operating cost would increase from the current \$22.5 million annually to \$37.0 million, an increase of \$14.5 million. Additional buses would need to be procured to operate this level of service at a cost of approximately \$23 million.

Next steps: Conduct more detailed analysis of these bus routes to determine appropriate amount of service increase and begin process of procuring vehicles.

The table below lists each of the short-term actions and three criteria to help determine priorities. In some cases, the criteria apply differently for the one urban area and transit provider (Green Mountain Transit) and for the rural areas and providers in the rest of the state. As noted earlier, the ridership impact of several actions bundled together would result in a whole that is greater than the sum of its parts. Changing the perception and image of transit is easier and more effective when service, vehicles, technology and capital facilities have noticeably improved to make the system more convenient, comfortable and attractive.

Table ES-1 Short-term Actions and Criteria

Action	Cost	Ridership Impact	Ease of Implementation
Local access connections	Low (variable)	Low	Moderate
Expand partnerships	Low	Low	Easy
Pursue marketing campaign	Moderate	Low to moderate	Easy
Fare Free policy	Moderate, high for GMT	Low in rural areas, high for GMT	Easy for rural areas, moderate for GMT
Invest in technology	Moderate	Low to moderate	Moderate
Paradigm shift for demand response	Moderate	Low in urban area, moderate in rural areas	Moderate to difficult
Capital investments	High	Low to moderate	Moderate
Service increases	High	Moderate	Moderate

The short-term recommendations above can result in increased ridership, but major shifts in travel choices, which would increase transit’s mode share from below 1% in rural areas and about 3% in the Chittenden County urbanized area, would require long-term changes in land use and/or shifts in policy and pricing.

Longer-term Recommendations (several years to decades)

1. Complete Streets and other bicyclist and pedestrian-friendly improvements

In the medium-term, implementing “complete streets” policies as well as “road diets” and pedestrian zones would lessen the dominance of automobiles on roadways in urbanized parts of Vermont’s cities and towns. Improving the pedestrian infrastructure on roads served by bus routes will also help increase ridership.

2. Active management and planning of transit services

With a constantly changing landscape and travel market, it is critical that transit agencies evaluate their routes on an ongoing basis and consider alterations and expansions of service to best address the needs of the residents and employees in their service area.

3. Better coordination of land-use and transit planning

The most significant and lasting impact on ridership would come from a change in land use, with more development focused in city, town and village centers and less rural sprawl development in remote areas. As described in the PTPP, work needs to begin now to shape the future Vermont that has been described in numerous planning and policy documents: a future of less dependence on automobiles, reduced energy use, and greater mobility through transit and non-motorized modes of transportation.

Policy Levers (indeterminate timing)

1. Parking availability and pricing

In areas that are served by bus routes (primarily the urbanized part of Chittenden County as well as other urban clusters such as Rutland, Barre-Montpelier, Brattleboro, the Upper Valley, etc.) a policy that instituted universal charges for parking could result in a major shift from driving to transit.

2. Fuel taxes

Increasing fuel prices through taxation could lead to increased transit usage.



TABLE OF CONTENTS

- Purpose..... 1
- Policy Goals..... 1
- Addressing the Target Markets for Increased Transit Ridership..... 1
- Recommendations 2
- 1. Introduction..... 1
 - Legislative Mandate 1
 - Methodology..... 1
 - Overview of Report..... 2
- 2. Increasing Ridership..... 3
 - Policy Goals..... 3
 - Target Markets for Increased Ridership..... 5
 - Addressing the Markets..... 7
- 3. Recommendations 10
 - Short-term Recommendations..... 11
 - Longer-term Recommendations..... 16
 - Policy Levers to Change Competitive Balance between Driving and Transit..... 18
- 4. Costs and Next Steps 21
 - Short-term Actions 21
 - Policy Levers..... 23
 - Longer-term Outlook..... 24
- Appendix A: Literature Review 25
 - Methodology..... 25
 - Primary Source Documents 25
 - Secondary Source Documents 28
- Appendix B: Summary of Analysis 37
 - Analysis of STIC Successes 37
 - Analysis of Vermont Bus Routes 37



1. INTRODUCTION

Legislative Mandate

The Vermont Legislature included in its transportation legislation for 2019 (Act 59) a provision for a study of “methods to increase use of public transit in Vermont.” The full text of the provision, which is Section 20 of the act, is as follows:

The Agency of Transportation shall, in consultation with stakeholders, study methods to increase use of public transit in Vermont for both residents and visitors. This study shall review the Agency’s current initiatives and those in other territories, states, and countries; review literature, marketing, and activities regarding methods to increase ridership with special emphasis on rural areas; determine unmet needs from current studies; examine the benefit of providing local connectivity to transit; and evaluate what factors affect public transit ridership in Vermont.

The Agency shall deliver a written report of its findings and recommendations including where and how to make the most effective improvements in service and criteria to use to determine the priorities of investments.

The Agency shall evaluate recommendations for potential inclusion in its fiscal year 2021 budget proposal and estimated funding necessary to achieve the recommendations for any new initiatives identified in the study.

As indicated in the first paragraph, there are several components to the study and several streams of information feeding into it. The performance of transit services both in Vermont and elsewhere is looked to as the source for guidance on what makes a transit service attractive and productive, especially in rural areas.

The phrase “unmet needs from current studies” refers primarily to the 2019 Public Transit Policy Plan, which was in the midst of a needs assessment when the legislature was drafting this bill, but also to other concurrent studies of needs by other state and regional agencies. The conclusions of the needs assessment are discussed below in chapter 2.

The term “local connectivity to transit” is sometimes called the “first mile/last mile problem” and concerns expanding access to fixed route bus services beyond the typical walking distance of one quarter to one half of a mile (5- to 10-minute walk). Potential solutions to the problem are discussed in chapter 3.

Methodology

The study began with a literature review, searching for prior studies on the factors that affect transit ridership and for examples of small urban and rural regions that had achieved high transit ridership. The results of the literature review are presented in detail in Appendix A, but references to relevant findings are made throughout this document. The next phase was an analysis of existing Vermont services to identify the factors that lead to or are a hindrance to high ridership. This analysis was conducted using the 2019 Route Performance Report, which consists of data from State Fiscal Year 2018 (July 1, 2017 through June 30, 2018). The results of that analysis are presented in Appendix B.

As prescribed in the legislation, VTrans and the study team, led by Steadman Hill Consulting, Inc., convened a committee of stakeholders representing a broad cross-section of Vermont, both in terms of geography and in terms of constituencies with an interest in public transit. The stakeholders had two meetings during the project: the first in September to introduce the study and present initial findings from

the literature review, and the second in November to present the results of the analysis and draft recommendations. The organizations represented on the stakeholders committee include the following:

- Vermont Agency of Transportation
- Vermont Senate (Northeast Kingdom)
- Vermont House of Representatives (Windham County)
- Green Mountain Transit (urban system)
- Tri-Valley Transit (rural system)
- Vermont Center for Independent Living
- Rutland Regional Planning Commission
- Vermont Natural Resources Council
- Vermont Department of Health
- Sierra Club
- North Central Vermont Recovery Center
- Lamoille Economic Development Corporation

Overview of Report

The results of the study are presented in three chapters following this introduction. Chapter 2 discusses the policy goals related to increasing transit ridership and the potential target markets for increased ridership. In other words, it tries to answer the questions of why it is important to increase ridership, and who would be the new riders we attract to the system. Chapter 3 describes a series of recommendations that were derived from the literature review and the analysis of existing Vermont transit services. These recommendations include short-term actions, longer-term initiatives and policy levers that can have a significant impact on the role of public transit and its ability to attract significantly more riders. The final chapter summarizes the costs of the recommendations and presents a longer-term outlook for transit in Vermont.

2. INCREASING RIDERSHIP

Why should Vermont work to increase public transit ridership? What are the benefits to residents and visitors if ridership increases? And if ridership were to increase, who would be the new riders? Why would they be using the system and how are they getting around now if they are not using public transit? This chapter will attempt to answer these questions.

Policy Goals

The Public Transit Policy Plan (PTPP) discusses current and future policy surrounding public transit service in Vermont. Current policy is codified in [24 V.S.A. Chapter 126 §5083](#) and contains five specific policy goals that the transit system is intended to address. In the context of this study, the question is more focused on the policy goals of increasing ridership and why that is important from the State's perspective. The five reasons why increasing ridership is important have a good deal of overlap with the policy goals in statute.

1. Make the most effective use of existing resources

Vermont invests roughly \$40 million annually in public transit including federal, state, and local funds. On a per capita basis, that investment is much higher than similarly rural states in the US.¹ All of the governmental entities and private sector partners that invest in public transit, of which the Vermont Agency of Transportation is by far the largest investor, want to see the service well used. While it is not possible, nor reasonable to expect, that transit buses and vans will be full of passengers all the time, there is a reasonable expectation that they will be full some of the time, and at least moderately used most of the time.

Increasing ridership overall will help fill up those transit vehicles. Various tools to encourage people to ride will be discussed in more detail in chapter 3, but providing better information about existing service, making it more convenient and reliable, and improving the level of comfort are all key factors.

2. Address the unmet needs for mobility

The PTPP included an extensive analysis of unmet needs in Vermont. Among eleven regional forums, nine meetings of regional committees responsible for the Elders and Persons with Disabilities Transportation Program, nine stakeholder interviews, and over 1,200 responses to an online survey, the PTPP study team received plenty of input regarding unmet needs for mobility.

The major themes that emerged from the analysis included the following:

► Lack of transit access in rural areas

- While it is the case that traditional bus services cannot operate efficiently in areas without a significant amount of population density, the need for public transit access outside of urban areas and small towns exists and is likely to grow as the population ages. The challenge is both one of service supply—having sufficient resources available to operate appropriate service in rural areas—and one of information and awareness in that people may not know that resources exist nor how to gain access to them.

¹ The nearly \$8 million in State dollars invested by Vermont (\$12.65 per capita) is more than 9 times the amount of State funds per capita invested by the ten other most rural states. (If North Dakota is removed from the mix, the Vermont investment is about 16 times that of the nine other most rural states.) There is not sufficient information available about *total* transit funding to estimate the multiple for that figure, but given that Vermont uses nearly \$20 million in federal highway funding to expand public transit service, it is likely that the multiple is at least as high for total transit funding.

- ▶ **Lack of resources to meet the needs of vulnerable populations both today and in the future**
 - Compared to most rural states, Vermont is very generous in the expenditure of state and federal funds to assist older adults and people with disabilities, as well as low-income individuals. In spite of that, there are significant unmet needs, especially with regard to trips for wellness and social activities. The expected large increase in Vermonters over the age of 80 in the coming decade will increase the gap between needs and available resources.
- ▶ **Lack of transportation for access to jobs**
 - The need for improved access to jobs was raised in all eleven regional forums. The need was expressed both as critical to low-income Vermonters who face challenges reaching their jobs, especially if they work second or third shift, but also critical to employers, many of whom face labor shortages and cannot fill open positions because the portion of the labor force looking for work cannot overcome the transportation barrier to get to those jobs.
- ▶ **In areas that have bus routes, improved service levels and connections are needed**
 - Various outreach channels indicate that there are many Vermonters, especially young ones, who would like to use public transit but do not because the schedules do not work for them, or because there are missing links in the system. Increased evening and weekend service would be attractive to many, and improved first mile/last mile connections via a variety of modes would make the core bus routes accessible to a wider area.

Another way to consider the issue of unmet needs is to consider the challenges faced by Vermonters who cannot afford an automobile or who cannot drive for other reasons such as disability, substance abuse, or age. These Vermonters face barriers to maintaining their health, their ability to work, their ability to obtain groceries and other life necessities, and their ability to have ongoing social interactions with friends, family, and peers. The large investment that Vermont already makes in public transit and human service transportation allows many people to overcome these barriers, provided that they have done sufficient planning and research to obtain eligibility for assistance programs and schedule trips with transit providers or volunteer groups at least a day or two in advance of when they need to travel. The ultimate barrier faced by people who cannot drive, and who don't have easy access to bus service with a generous span of service and reasonable frequency (at least a trip per hour), is that almost no trips can be undertaken spontaneously.

3. Reduce energy use and greenhouse gas emissions

Increasing ridership on public transit can result in a net decrease in energy use and greenhouse gas emissions to the extent that the new riders would otherwise be driving their own cars and that the new ridership occurs on already-existing transit services. In Vermont cities and towns where bus routes are now operating, it is a win for the environment if more people start riding those buses instead of driving. Carpooling and other ridesharing is better than driving alone but riding a bus route is better yet in terms of reducing energy use. Encouraging transit use in urban areas is essential to Vermont meeting its goals for reducing energy use.

The result is less clear in rural areas when the comparison is between driving and demand-response transit. If an agency van or volunteer driver needs to make a trip for a pickup at a rural location, and a second trip later to drop that rider back off at their home, then public transit may result in a net increase in energy use, as there could be four one-way trips involved instead of two. Of course, if the rider is picked up by an agency van that is already in the neighborhood and there are several other riders on the van, then the transit option would likely result in a net decrease in energy use.

Vermont's [Comprehensive Energy Plan](#) (CEP) contains goals for increased use of public transit (see page 140 of the CEP) as well as several recommendations regarding land use and other policies that would promote efficient transportation.

4. Reduce congestion and wasted time

Public transit can also be part of the solution to reducing traffic congestion. In Vermont, traffic congestion is only a serious problem at the heart of Chittenden County.² While there are numerous locations all over the state where there is occasional or even regular congestion at particular intersections, public transit only works as a solution to congestion where the service would be robust enough to draw many people out of their cars. Given the current state of transit service in Vermont, this could only happen in the Burlington metropolitan area.

With increases in service on commuter-oriented bus routes and priority treatments to make bus travel more time-competitive with driving, transit could reduce overall traffic congestion and reduce wasted time both for the new riders enjoying a faster trip, and for other drivers who may see slightly less congested roads. For there to be a significant shift from driving to transit, pricing and other policies would likely need to change, as discussed more in chapter 3.

5. Free up resources used on automobiles

The final broad reason why increasing ridership would benefit society as a whole is that it would result in spending less money on automobiles and the infrastructure needed to accommodate them. Suppose that in Burlington or in the Upper Valley or any other economically-vital area, a major employer or institution is considering a large expansion of their facilities which would, when completed, bring in hundreds of new workers. Standard practice in Vermont, as is true across the US, is to build a sufficient amount of parking to allow most or all of those new workers to drive to their new jobs. In densely developed urban areas, that new parking may need to be in the form of a garage, at the cost of tens of thousands of dollars per parking space. Even a surface parking lot can cost upwards of \$10,000 per space. There is not only that expense, but also the cost of automobile ownership to the workers. Standard estimates of auto ownership and operational costs range from \$8,000 to \$10,000 per year per car.

Suppose instead that the employer or institution decided to invest its money into improving transit service rather than building parking spaces and strongly encouraged its workers to use the bus to commute. Those millions of dollars would not be spent on using up land for parking and paying for gas and maintenance of cars, but rather for efficient transportation that would require minimal or no land. Many others would also benefit from the increased transit service, resulting in less congestion and energy use.

Target Markets for Increased Ridership

The above reasons may explain why it is important to increase transit ridership, but the question remains as to who those new riders would be. Even with expanded service, public transit would not work well for everyone, and, as documented in public opinion surveys, a portion of the public would not ride transit under any circumstances.³ For people who chain multiple trips together, or for a parent with several small children (needing car seats), using the public transit system may be infeasible for the foreseeable future.

Even setting aside the portion of the population for whom transit would never be convenient, there are still many who could potentially ride. For the purpose of this discussion, these potential riders are divided into two groups: people who need transit service and people who are open to using transit service.

² It should be noted that even the most congested parts of Vermont have much less traffic congestion than large metro areas such as Boston, New York, Washington DC and many others.

³ A 2016 survey conducted as part of the 2040 Long Range Transportation Plan found that 30% of respondents said that nothing that could be done to improve transit service would make them drive less.

People with Unmet Transportation Needs

As discussed in much greater detail in the PTPP, certain segments of the population are much more likely to need public transit service than others. The four segments typically cited in transit studies include the following:

- Older adults, especially those over age 80
- People with disabilities
- Individuals with low incomes
- Youth, mostly those age 13 to 18

Many people in these population segments cannot drive because of physical limitations or because they cannot afford to own and operate a car. People with substance abuse disorders and in recovery may also have special transportation needs and require public transit options.

When people in these population groups live in areas served by bus routes, they most likely use them regularly. Unfortunately, there are many Vermonters in these groups who live in areas far removed from traditional bus services.⁴ They rely on demand-response service if they are eligible under the two largest programs: Medicaid transportation (specifically for trips to medical services) and the “E&D” program for people who are over the age of 60 or have a disability. Vermont has pilot programs in place to help people reach medical and wellness appointments ([Rides to Wellness](#)) and to help people in recovery to get therapy and have access to jobs. VTrans hopes to expand these efforts statewide after the pilot phase is complete.

In the near future, the number of older adults in Vermont is forecast to increase substantially. By 2030, the number of Vermonters age 65 and older is predicted to increase to 175,000 (from 110,000 in 2017), and the fastest growth will occur in the cohort over the age of 80. Thus, within 10 years, the number of people needing public transit service will very likely be much greater than the number today.

People with Transportation Options

The other large source of potential riders are people who are open to the idea of using transit but have not yet done so, at least on a regular basis. There has been a significant amount of research showing that people born between 1980 and 1996, sometimes referred to as “Millennials”), and those people born after 1996, aka “Generation Z” are more open to using transit than prior generations.⁵ Many people in these age groups have delayed purchasing automobiles and have expressed a preference for living in more urbanized areas where public transit service is generally more available and convenient.

Beyond these broad age cohorts, people who live in cities generally are more open to using public transit. The high densities of urban environments lend themselves to efficient public transit while discouraging automobile use because of traffic congestion and the challenges of parking. Certainly, not all city dwellers are open to using transit, but the desire to live in a more densely developed environment with more activity

⁴ There may be many reasons why people with mobility challenges live in areas not served by bus routes. They may depend on family assistance for child care (and that family member lives in the remote community), there may be a household member who needs to live in the remote area for work, or they may not be able to afford to move to an area that is transit accessible.

⁵ See, for example, <https://www.citylab.com/transportation/2014/09/new-study-millennials-love-transit-most-boomers-still-stuck-on-cars/380380/> and <https://uspig.org/blogs/blog/maf/millennials-want-more-public-transportation> and <https://www.agilitypr.com/pr-news/public-relations/gen-zs-perspective-on-transportation-ushers-in-new-mobility-culture/>

and people in close proximity is generally correlated with the willingness to share rides and use mass transit services.

The other population characteristic that indicates an openness to using transit is environmental consciousness. In spite of the overwhelming popularity of automobile use, almost everyone recognizes that it is harmful to the environment. Those who feel more strongly that they would rather not damage the environment would likely choose to use transit if it were available and convenient enough so that their travel time by transit would be not vastly greater than their time by automobile.

People who commute long distances may also be more open to using transit, at least for their worktrips. Commuting trips of 10 miles or more leads to a great amount of wear and tear on automobiles, and those workers may appreciate being able to use commuting time for productive purposes, if there were a bus service that was convenient for them.

Addressing the Markets

The two markets described above require very different approaches to convert the potential riders into actual riders.

Serving People with Unmet Transportation Needs

For the first group, those who need transit service, the transit system must expand and evolve to *meet their needs*. Prior to discussing specific recommendations in the next chapter, there are three broad ways that the system could change to meet the needs of these populations.

1. More convenient and available demand-response service

In the past 50 years, there has been relatively little change in the way demand-response service is scheduled and operated, but just within the last couple of years, the potential for significant change has arisen. Fifty years ago, someone needing a ride called their local transit agency and spoke to a reservationist who wrote down the information about where and when they wanted to travel. The call had to be at least a day in advance of the travel, and preferably two or three days. The reservationist gave the information to a scheduler who worked with other trip requests and then put together a driver manifest, listing each of the trips the driver would do the next day. While some steps of this process are automated today, and sophisticated software is available to maximize the efficiency of the driver manifests, requesting a ride still requires advance planning and calling into a reservationist a day or more in advance.⁶

With the advent of tablet computers, new software and new business models, the old paradigm of ride scheduling is starting to change. Transportation Network Companies (TNCs) such as Uber, Lyft, Via and others have introduced and popularized the concept of on-demand rides whereby someone requests a trip via smartphone (or telephone) and it is incorporated into driver schedules in real-time and communicated to drivers on the street via their tablets. The technology allows for people to request and receive rides in a small window of time, as little as a few minutes in busy urban areas and within 10-15 minutes in moderate density areas. This technology has the potential to make demand response service much more convenient and available to more riders.

⁶ Many of Vermont's transit providers will make every effort to accommodate same-day requests, but they are often limited in their ability to do so because the available drivers, both agency personnel and volunteers, have already been tightly scheduled to maximize efficiency.

2. Evening/weekend service for job access and other purposes

Throughout the outreach process during the PTPP, one of the most common gaps in service mentioned was the lack of evening and weekend service both for access to jobs with non-traditional work hours and for other purposes. While it is not feasible to run the full daytime transit system late into the evenings and on weekends given current funding constraints, it may be possible to offer targeted services that address identified needs with participation from employers and other institutions that generate travel demand outside of regular weekday service spans. The PTPP has specific recommendations in this area.

3. Mobility managers for training and coordination

In addition to more convenient and more available service for people who need transit, another key element that is essential to connecting riders to services is mobility management and travel training. Mobility managers help passengers, especially ones new to the system, navigate through the many programs and transportation resources available in their area. Travel training can make it possible for people who might otherwise be afraid or reluctant to use a bus service to become a regular rider. A mobility manager can also assist in coordination so that riders from different programs can share the same vehicles so that costs for everyone can be reduced.

Attracting People with Transportation Options

For the second group, those who are open to using transit but have other options available, the system has to evolve and be supported in several ways so that it becomes *competitive and attractive*. There are four themes that encompass the types of improvements that would need to happen to attract the riders who are open to using transit.

1. Convenience

In survey after survey, when people are asked why they chose the transportation mode they use, the number one answer is “convenience.” Unless faced with strong external influences or significant cost incentives, people will use whatever is most convenient. While the term convenience can mean different things to different people, it normally centers around flexibility and access and egress time. A mode that allows you to travel whenever you want is convenient; one you have to wait for is not convenient. A mode that lets you get within a very short distance of your destination is convenient; one that forces you to walk long distances (for instance, if there is no parking close to your destination) is not convenient.

In most cases, it is difficult for transit to compete with the convenience of the automobile. In order for transit to become more convenient, and thus more competitive and attractive, it must do everything it can to provide service when the rider wants it, and to provide a direct connection from the origin point to the destination point, without requiring too long of a walk on either end. Within the realm of fixed route bus services, this effort would encompass greater frequency of service, so that the waiting time between trips is minimized, longer span of service, so that it is available more hours of the day, and more direct coverage of the most important origin and destination locations, so that the greatest number of riders will have short walks on both ends of their trips. In small towns and rural areas, the on-demand rides discussed above could be an attractive option if the level of service were high enough to ensure short response times (less than 15 minutes).

The reality of public transit is that the great need for public transit service coupled with constraints on funding has typically led to service being operated as cheaply as possible, so that the greatest number of people can be served. This means spreading service over as wide an area as possible so that the many people who have no other transportation options at least have some service available to meet their basic needs. The drawback of that policy choice is that the level of service suffers, with perhaps one trip per hour or even less, and a limited span of service. This level of service is not attractive to members of the second group.

2. Comfort and image

The constrained funding for public transit also means that agencies seek out the cheapest vehicles that can operate the service, which for most Vermont providers means cutaway vans. The general public may associate cutaway vans with transportation for senior citizens and people with disabilities rather than service for younger people or professionals. Furthermore, federal guidelines stipulate that a vehicle needs to remain in service for its full useful life, which is typically seven years for a cutaway. By the time a cutaway is past five years, the ride has become significantly noisier and less comfortable, making it even less attractive to people who have a choice about their means of transportation.

Another aspect of capital investment is the provision of facilities and amenities for passengers. Most bus stops in Vermont have no facilities or amenities at all; just a sign on a pole. In smaller cities and towns, some of the stops used most frequently by passengers have a bench or shelter and some have lighting and information signs. Vermont has invested significant funds in transit centers at the hub of transit systems, including the multimillion-dollar Downtown Transit Center in Burlington and the recently completed transit center in Montpelier. But the lack of facilities in most locations is a strong disincentive for people with other options to choose to use transit.

If more capital funds were available to install shelter and amenities at more locations, and if agencies could afford to buy “cooler” buses that were more comfortable and quiet and did not have the stigma of cutaways associated with them, it would be much easier to attract members of this second group. New buses that operate on electric power would also be more attractive to those who would like to use transit for environmental reasons.

3. Pedestrian environment and bicycle access

The great majority of transit riders become pedestrians at one or both ends of their trip, and many of those who do not use a bicycle to travel that last distance to their destination. In order for riders to be willing to use public transit, they must feel safe before they board the bus and after they exit when they walk or ride between their origin and destination locations and the nearest bus stops. Ideally, the pedestrian path they travel would not only be safe and accessible, but also well maintained and interesting. For cyclists, the transit vehicle would need to accommodate the bike on a rack, or the rider would need to be able to lock it up securely at their bus stop. Similar to the issue with the lack of passenger facilities, if a rider feels like they are being treated as a second-class citizen because of the lack of a safe, comfortable and attractive pedestrian environment, they will be unlikely to choose transit as their travel mode.

4. Information

The last theme that is essential to drawing new riders onto the system is information. At a basic level, all people who live within the service area of a bus route should know that the route exists and where and when it travels, at least in general terms. When that level of awareness is accomplished, the next leap is to provide real-time information to riders on the location and expected arrival time of the next bus on the route. Automatic vehicle location (AVL) and real-time information for passenger has been around for nearly 20 years, but until the past few years, it has been prohibitively expensive for small transit operations. Technological advances and widespread availability of smartphones has greatly reduced the cost of transmitting this operational data to passengers. The Vermont Agency of Transportation is actively working to implement real-time information on a statewide basis. Coupled with more convenient service, other capital investments and an improved pedestrian environment, better information about transit service can result in more willingness to leave the car in the driveway and use transit for local and regional travel needs.

3. RECOMMENDATIONS

In December 2018, the National Cooperative Highway Research Program (NCHRP) published a report entitled *Best Practices and Marketing to Increase Rural Transit Ridership and Investment*. A more detailed summary of this report is presented in Appendix A, but the key findings from the research are distilled in the following seven points:

1. Strengthening community awareness and marketing transit service remains a critical part of attracting new riders.
2. Successful rural transit agencies actively manage their services.
3. “Old tricks” like regional connecting services, university pass programs, and free ride days are still important strategies.
4. “New” ideas and technologies are creating opportunities to grow rural transit ridership.
5. Partnerships are an essential part of successful rural transit services.
6. Transit agencies can maximize efforts to increase ridership by doing all of these things.
7. Active engagement from State DOTs can help rural transit services be successful.

The report contains numerous case studies of successful initiatives to increase ridership. The headings under which these case studies are organized include the following:

- Rebranding
- Education and Outreach
- Statewide Marketing
- Service Planning
- Regional Services
- New Routes
- Funding partners
- Resource Sharing
- Community Partnerships
- Partnerships with Health Care Providers
- Partnerships with Universities
- Financial Incentives – Fare Free
- Technology

It must be noted that VTrans and its transit agency partners already engage in many of these activities. Indeed, Go Vermont is one of the case studies under “Statewide Marketing” and VTrans’ GTFS-Flex initiative is one of the case studies under “Technology.”

As will be seen in the following sections, the recommendations for Vermont to increase public transit ridership fall under the same general headlines as the NCHRP study.

Short-term Recommendations

The following eight types of short-term actions reflect the findings from the literature review and the discussion of policy goals and target markets in chapter 2. Many of the actions described here also appear as recommendations in the PTPP. Costs and benefits associated with these actions, when they are quantifiable, are described in chapter 4.

1. Improve local access connections

Given the lack of sufficient population density around most Vermont bus routes to support a higher level of service, transit providers need to do everything possible to increase local access to existing routes. Park & Ride lots are a traditional method of expanding access and have been successful in many locations in Vermont, especially when served by express commuter routes. Providing additional lots and expanding capacity at selected lots will allow more people to make use of commuter services. The Comprehensive Energy Plan has specific goals for increased Park & Ride capacity.

In addition, there are a growing number of options to increase local access, often called solutions to the “first mile/last mile problem.” Many Vermont bus routes already allow for route deviations for some distance (one quarter mile, up to three quarters of a mile) from the regular alignment, but these usually require an advance reservation (day before) and come at the cost of extra travel time for other passengers and reduced on-time performance. Other options available, as summarized in a [report](#) by the University of California at Berkeley Transportation Sustainability Research Center, include the following:

- Car sharing
- Scooter sharing
- Bike sharing (including eBikes)
- Ridesharing
- On-demand ride service

Many areas across the US have experimented with bike share or e-scooter systems⁷, which allow a rider to rent a bike or scooter at low cost from a docking station or just on the sidewalk and ride to their destination, leaving the bike/scooter at another docking station or sidewalk. Such a program could include electric bikes. Vermont has limited experience with these systems, including [Greenride Bike Share](#) in Burlington (ongoing) and Bird scooters in Montpelier (Fall 2018). Winter conditions in Vermont are a barrier to these types of systems running year-round, but for at least a portion of the year, bike and scooter systems can solve the first mile/last mile problem for those riders who are able to use these vehicles comfortably and safely.

Car sharing also exists in Vermont, with the largest implementation in Burlington. Ridesharing is promoted on a statewide basis by Go Vermont, but it is unusual for ridesharing to be used as a means of access to a bus route rather than a complete trip to a destination. Nationally, the car sharing, ridesharing, and on-demand ride service options tend to be used mostly in large metropolitan areas to expand access to rail systems. Smaller community-based systems would likely have more success in Vermont. VTTrans is pursuing a pilot project for microtransit in Montpelier to test the viability of on-demand service in a small city environment. It is also pursuing a Mobility for All grant to pilot a “Community Rides” program. A key part of expanding mobility in rural areas is to encourage more people to sign up as volunteer drivers. The PTPP has several recommendations on this topic.

⁷ <https://www.bts.gov/topics/passenger-travel/bikeshare-and-e-scooters>

2. Partnerships with employers, institutions, community organizations

VTrans and individual transit providers have worked for years to establish partnerships with large employers including ski resorts, important institutions such as universities and hospitals, and community organizations and human service agencies. These partnerships should continue and be expanded upon. The PTPP has several recommendations about new transportation programs that will work best when initiated as partnerships. These relationships can bring some new funding to the table to support additional service, add more voices to the positive messaging about public transit, and raise awareness of the existence of and the benefits deriving from public transit service. These partnerships may also involve Transportation Management Associations (TMA), such as the [Chittenden Transportation Management Association \(CATMA\)](#) based in Burlington, and the [Upper Valley TMA](#) based in White River Junction. These organizations work to promote awareness of commute options and access to transportation alternatives to the automobile, including public transit.

3. Marketing campaign to change image of transit including incentives to ride

Public transit service in the US, particularly bus service, suffers from an image problem. Many people associate bus routes with social services for low-income, elderly or disabled people, especially when the quality of service on the bus routes is not high and there is no obvious capital investment in passenger facilities and attractive vehicles. People assume that if they board a bus, they will have to sit next to someone who might be scary or aggressive or aromatic and that it will be an unpleasant experience. The fact that the vast majority of passengers do not have unpleasant experiences like that does little to reduce the negative image of transit services.

As part of a coordinated effort to attract new riders, improvements in the quality of service, investments in vehicles and passenger facilities, and better information can be joined by a marketing campaign to spread a different story about public transit. The multiple signals of significant investments will reinforce a new image of transit that it is not just a social service for poor people, but that it is an integral part of the transportation network for everyone. The messaging should include linkages to key themes that are important to the intended audiences:

- Taking the bus instead of driving is an important step to fighting climate change.
- Taking the bus improves your individual health and public health in general by leading to more walking and reducing harmful emissions from motor vehicles.
- Taking the bus is a step toward freedom from ongoing patronage of automobile and oil companies while promoting independent mobility for all.

The [Health Impact Assessment](#) of the State Employee Commuter Benefit Program found that the annual health benefit for State employees who participated in the program amounted to \$245,000, with 70% of the benefits attributable to increased physical activity and 27% to reduced injuries and fatalities. The air quality benefit of reduced emissions applied to the population overall but was not quantified in dollar terms.

Sometimes people need a little nudge to try something new. Go Vermont and the public transit providers already offer incentives for ridesharing or riding the bus including discounts at select retailers or free ride days on bus routes that normally charge fares. An example is “DumpthePump,” a national campaign sponsored by the American Public Transportation Association, in which many Vermont providers participated in 2018. The marketing campaign described above could incorporate other possible incentives, such as the chance to win a gift card, cash rewards from an employer from riding the bus instead of driving, or even occasional free food on the bus. The incentives would need to conform to rules set by the federal and state governments, but there is room for creativity in enticing people to give transit a try.



4. Explore Fare Free policy

There is a significant amount of research on fare free transit, and Appendix B includes a detailed summary of a report from the Transit Cooperative Research Program (TCRP): [Synthesis 101](#) – Implementation and Outcomes of Fare Free Transit Systems. The primary conclusions of the report are that eliminating fares on transit systems can result in significant increases in ridership—there are many cases when ridership rose by 40% or more—but that most of the new trips are a result of existing riders using the system more frequently, as well as new riders who were formerly pedestrians or cyclists or people who would not have made the trip otherwise. The report states that “[c]ommuters in private vehicles are not attracted in large numbers to fare-free public transit.” Based on its research, the study states that only 5% to 30% of new riders are people who formerly used motorized modes (cars).

In Vermont, the possibility of fare free transit is really two separate stories: one for the urban portion of GMT, and one for the rest of the state. In the rural areas of the state, the total fare revenue collected in FY2018 was only \$522,000. Many of the rural routes are already fare free, including those operated by Rural Community Transportation, Advance Transit, and the MOOver, and many others have very low fares of only 50 cents, including routes in Rutland and Bennington. While it would not be very difficult to replace the \$522,000 in fare revenue with other funds, given the fact that much of the rural area already has free or low fares, it would be unlikely that there would be a significant increase in ridership. Rather, the limiting factor for rural ridership is the level of service operated and the overall population density.

In Chittenden County, eliminating fares would result in a significant increase in ridership. Based on the experience of Corvallis, OR, which is similar to the Burlington area in several ways, a ridership increase of 35% to 40% would be expected. However, based on the conclusions of the TCRP study, it is unlikely that even a majority of those new trips would be made by people who now drive. Rather, current riders who pay cash fares would likely use the system more often, and people who now walk would find it easy to hop on a bus instead. People who are now not making trips because they cannot afford the bus fare would benefit by having more mobility.

The problem with eliminating fares in Chittenden County, however, is that unlike the rural areas where only \$522,000 would be needed to fill the budget gap, in the urban area more than \$2.2 million would be needed.⁸ Although it is not inconceivable that VTtrans, GMT and its municipal partners could come up with a way to fill that budget gap, such as a regional gas tax or sales tax, it would not be simple. Indeed, with that

⁸ Total fare revenue in FY19 was about \$2.2 million, but GMT raised its fares at the end of the fiscal year, and so fare revenue in FY20 is likely to be higher.

much additional ridership, GMT would face crowding on some of its routes and the budget situation would worsen because of the need to operate more service.

In December 2019, the Kansas City Area Transportation Authority announced that bus routes in Kansas City would go fare free in its next fiscal year. In doing so, it would be the largest transit system in the US offering free fares on its routes.⁹ The move to a fare free system was approved by the City Council on a unanimous vote. The \$8 million in fare revenue that will be lost will be covered by other City funds; it is a relatively small part of a \$1.7 billion City budget. It is worth noting that KCATA already had one of the lowest fare recovery ratios among large city transit systems in the country.

A similar but more moderate approach to fare-free service is to offer a significant discount to riders. This is often done in partnership with a major employer for a specific employee base. The State of Vermont itself has had success in this approach through the Capitol Commuters program. Vermont has incentivized public transit use for its many state employees based in Montpelier by subsidizing fares at 50%. This incentive increases ridership on the Montpelier-destined commuter services operated by Green Mountain Transit (GMT) and provides the additional benefit of relieving parking pressure in the downtown.

5. Further investment in technology and information

VTrans and its partners are already making significant investments in technology and information, including, but not limited to the expansion of the capabilities of the Go Vermont website and the dissemination of real-time information on bus locations and arrivals through the Transit app. Transit signal priority may be applicable in Chittenden County and the Upper Valley to help buses save time at congested intersections. The field of Transit Intelligent Transportation Systems (ITS) continues to evolve rapidly; VTrans needs to maintain its emphasis on technology and stay abreast of new developments in the field. Millennials and younger generations have high expectations of the integration of technology in all aspects of modern life, and transit will be unappealing to them if it appears to be 10 years or even 5 years out of date.

6. Paradigm shift in demand response transit

A central recommendation of the PTPP is to begin planning for a transformation of the way demand response service is delivered in Vermont. As described on page 7 of this report, new technology makes it possible to provide on-demand service rather than the traditional method of calling a day or two in advance to schedule a trip. The concept is to take the rider interface of microtransit and broaden it to encompass all transportation resources available in the local area. Microtransit is essentially a technology-enabled demand-response service that schedules rides in real time. Ride requests are either made on a smartphone or by calling into a reservation center (for those who do not have smartphone access).¹⁰ A database algorithm aggregates these ride requests into a driver manifest in real time and communicates that immediately to one of the vehicles on the road that can accomplish the trip most efficiently.

Broadening the interface would allow the software to show all of the options available and the prices and travel times associated with each. These options could include the following:

- Regular bus routes
- Flexible bus routes (route deviation services)
- Transit agency vans
- Volunteer drivers overseen by the transit agency
- Participating taxi companies

⁹ The free fare only applies to routes that start or end in Kansas City. KCATA operates other routes in surrounding areas.

¹⁰ Technology-based solutions require universal cellular coverage in Vermont, which does not currently exist.

- TNC drivers

In rural areas where volunteer drivers and agency vans may be the only nearby options, as envisaged, the software would send out the trip request to all volunteer drivers in the area, many of whom may be sitting at home. Among all who respond to the request within a short amount of time (say, 3 minutes), the software would assign the trip to the driver who could accomplish the trip most efficiently. At the same time, the software would be looking for any other trip requests that could be grouped with that first one, so that the driver could carry two passengers instead of just one. If an agency van is already in operation in that area, the software would likely assign the rider to the van, rather than calling another vehicle (the volunteer driver) into service.

The system would also need to be able to handle multiple ways to pay for the trip. If the rider is eligible for Medicaid transportation and the trip is to a health care location for a medical visit, then the charge would go to Medicaid. If the rider is over 60 or has a disability, the trip would be charged to the E&D program. If the rider is not eligible for any of these (or other) subsidy programs, then the rider would be charged directly for the trip. The software would track the costs incurred for each program or individual and then process the billing accordingly.

None of the parts of this new model are infeasible with currently available technology. However, putting all of the pieces together and working with a vendor to coordinate all of the transportation resources and funding programs would be a significant effort. The potential for increased mobility and increased efficiency is very large.

7. Capital investments in vehicles and passenger amenities

As discussed earlier, most of the transit vehicle fleet in Vermont consists of cutaway vans. These vehicles seat 12 to 18 people and can accommodate two or more wheelchairs. They have an expected useful life of seven years and up to 200,000 miles. Cutaways dominate the fleet because they are relatively inexpensive compared to heavy duty transit buses (which can cost up to \$500,000 per bus, compared to roughly \$100,000 for a cutaway), because they are appropriate for the demand response service which forms a large part of the operations of rural providers, and because they are an appropriate size for the limited demand on most of the small town and rural bus routes.

The minimum length for a heavy duty transit bus is 29 feet with a seating capacity of about 30 passengers, and there are relatively few options on the market for smaller buses other than cutaways of various sizes. At the smaller end of the scale, the Mercedes Sprinter advertises itself as a luxury option, and this type of vehicle might be more appealing to Millennials than a standard cutaway, but the passenger capacity in a wheelchair-accessible version is likely limited to ten or so. VTrans and other state DOTs should consider discussing with major bus manufacturers the potential for new and more attractive options for heavy duty buses smaller than 30 feet. Ideally, these would be manufactured with electric or hybrid motors to reduce future greenhouse gas emissions and further appeal to the environmental consciousness of younger generations.

VTrans and its transit agency and municipal partners should also place a higher priority on passenger facilities and amenities. Analysis of ridership patterns should identify new locations for passenger shelters, and these should be installed with lighting and heating appliances powered, at least in part, by photovoltaic panels. Older shelters should be replaced by newer, more inviting ones, to signal to existing and potential bus riders that they are valued customers.

8. Higher levels of service where density warrants

As stated before, compared to similarly rural states, Vermont devotes a much greater amount of money to public transit on a per capita basis. This investment results in levels of service that are higher than these peer states. Nonetheless, if the goal is to attract more riders, especially the Millennials and others discussed in chapter 2, the level of service needs to improve further. Ultimately, high levels of service only make sense in areas with enough population and employment density so that the number of seats operated could conceivably be filled with riders. An area or corridor with a residential density of at least 6 households per acre is normally necessary to support a bus route with two trips per hour (30-minute headway) and density of at least 10 households per acre is needed for service with four trips per hour (15-minute headway).¹¹

There are relatively few places in Vermont with these densities, especially outside of Chittenden County, and where they do exist, they tend to be small areas, confined to a few blocks in the center of a small city or town. Thus, the potential deployment of high levels of service (15-minute headways or better) is very limited, but there are many opportunities to improve routes that currently run hourly or worse. While not competitive with the convenience of an automobile, service running every 30 minutes may be attractive enough to some of the people open to using transit (especially if implemented with other improvements discussed below) to convert them into actual riders.

Longer-term Recommendations

Three longer-term or ongoing activities are also recommended. Putting them in a long-term category does not mean they should be ignored in the short-term, but rather that they will take several years or even decades to fully implement and begin to have impacts on transit ridership.

1. Complete Streets and other bicyclist and pedestrian-friendly improvements

Over the past decade, municipal planners in some cities have adopted principles that change the way roadway space is conceived. Rather than treating the pavement between the curbs as the sole domain of the automobile, more and more it is being thought of as space shared by cars, cyclists, transit vehicles and pedestrians. A “complete street” apportions roadway space among all of these users in an attempt to improve safety and maximize people through-put rather than just vehicle through-put. Priority treatments for bus routes, such as exclusive lanes, queue jumpers and transit signal priority can help reduce bus travel times and make public transit more convenient and competitive with automobile travel.

Another concept gaining popularity is a “road diet” which refers to reducing the number of travel lanes on a road and devoting more of the space to pedestrians and alternative modes. A four-lane road may be converted to a two-lane road, or a three-lane road with turn lanes in the middle. Research has found that traffic congestion may actually be improved as a result of dropping lanes.

As a complement to the recommended short-term investments in passenger facilities, it is recommended that VTTrans and the transit providers work actively with municipalities to improve the pedestrian environment in corridors served by bus routes. This encompasses the construction of sidewalks and crosswalks on major streets on which buses operate, as well as on intersecting streets that lead into surrounding residential neighborhoods. Going beyond sidewalks, the municipalities should consider other streetscape improvements such as street trees, lighting and street furniture to enhance the pedestrian

¹¹ See <http://www.reconnectingamerica.org/assets/Uploads/Appendix-C-Transit-Supportive-C.pdf> for more information. The guidelines in that document are based on dwelling units per acre rather than households. These are similar measures but not precisely equivalent, and so the numbers used here do not match the numbers in that document exactly.

environment generally. Municipal plans should incorporate principles such as bringing storefronts up to the sidewalk and moving parking lots to the rear, rather than setting back the buildings behind the parking.

Bicycle access should also be incorporated into roadway design so that a greater portion of the traveling public feels safe riding their bikes. Virtually all transit vehicles in Vermont already accommodate bicycles, but few bus stops incorporate secure bicycle locking facilities, much less ones protected from the weather. Transit agencies should work with local bicycle advocates to identify corridors and stops that should be priority locations for bicycle-related investments.

2. Active management and planning of transit services

Until 2011, VTTrans required all transit provider to update their short-range transit plans at least every 5 years. While some providers have continued to update their plans periodically, others have not. With a constantly changing landscape and travel market, it is critical that transit agencies evaluate their routes on an ongoing basis and consider alterations and expansions of service to best address the needs of the residents and employees in their service area.

The PTPP recommends that VTTrans assist the transit providers to pursue transit development plans (TDPs) on a periodic basis. The annual Route Performance Report (RPR) is a tool to identify underperforming and high performing routes, but it does not include any planning recommendations to improve service. The results of the RPR can build a “planning agenda” for each region, which, along with the regional needs analysis from the PTPP, sets the stage for the work in a TDP. As mentioned earlier, when services change and improve, there is an opportunity to gain the attention of and attract new riders to the system.

3. Better coordination of land use and transit planning

Perhaps the most important factor affecting the long-term ridership potential for public transit is the way development occurs and where people choose to live and work. Vermont has experienced sprawling development with new housing often being built in rural areas outside of urban centers. People commute from these locations on larger, less expensive lots in the countryside into employment centers such as Burlington, Essex, Montpelier, the Upper Valley and others. This development pattern was facilitated by the automobile, especially vehicles equipped with all-wheel drive. The benefits of idyllic scenery, privacy and quiet, however, come at the cost of requiring an automobile for virtually every trip that rural resident will make. There is no walking to the store for a pound of butter when the nearest grocer is five miles away.

The PTPP includes a significant amount of discussion of land use, existing state policy on compact development in village and town centers, and recommendations for the coordination of transit and land use planning. To the extent that Vermont engages in a serious effort to build infrastructure capacity in existing cities and towns, encourages residential and commercial development there and coordinates transportation investments with the new development, the limitations on transit ridership would be lifted. The statements earlier in this report about the scarcity of places that could support high quality transit service would no longer hold, as more places would accrue the needed density. This does not entail a major urbanization of Vermont’s historic towns and villages, but it does imply that infill housing and new development consistent with the character of those towns and villages would replace the rural sprawl that has occurred in the recent decades.

Vermont’s overall population has been stable for some time, and as stated earlier, our population is aging. While it is only speculation, one possible effect of climate change is an influx of refugees from coastal areas to places, like Vermont, that may be somewhat more insulated from the near-term impacts. If such an influx were to occur, the pace of development would quicken, and it would become even more critical to assure

that the development occurs in a way that would promote the viability of transit rather than more rural sprawl.

Policy Levers to Change Competitive Balance between Driving and Transit

The vast majority of person trips in Vermont are currently made using private automobiles. Although precise estimates are not available, according to data from the National Household Travel Survey in 2017, there are about 741 million annual person trips in Vermont. Total annual transit ridership in State Fiscal Year 2018 was 4.7 million. While there are many walking trips and a significant number of bicycle trips, especially in warmer months, the number of person-trips by automobile is at least 100 times greater than the number of transit trips.¹²

In order to see a substantial shift from driving trips to transit trips, Vermont will have to do more than just improve the transit system through actions such as those listed above. Rather, the State would need to enact policies that change the competitive balance between driving and transit so that people who live in areas with access to bus services would be much more likely to use them rather than driving. This would still leave out rural areas where there is no bus service, but even in the heart of Chittenden County, where there is a robust transit system, Green Mountain Transit only attracts about 3% of person trips.¹³

Three potential policy levers are considered in this section, each of which would affect the competitive balance between driving and transit. The most effective of these would make driving less convenient and more expensive, but these impacts would also make them the most politically challenging to implement, since the great majority of people depend on cars for their mobility. For any of these more drastic policy changes to be feasible, they would need to be accompanied and coordinated with a large investment in public transit service so that the convenience and attractiveness, not to mention the passenger-carrying capacity, of transit increases simultaneously with the reduction of convenience in driving. These policy levers are most relevant for the Burlington metropolitan area, but they could be applicable to varying degrees in smaller urban clusters across Vermont where there is existing fixed route bus service.

1. Parking availability and pricing

Just as a safe and comfortable pedestrian environment is an essential part of an attractive transit trip, a parking space is an essential part of an automobile trip. In Vermont, as in most of the US, drivers demand and expect convenient and inexpensive/free parking close to their destination. Few areas in Vermont have scarce or expensive parking; indeed, the vast majority of parking in the state is free to the driver.

The areas in the US where transit mode share is highest are precisely those places where parking is scarce or very expensive. Manhattan, downtown Boston, San Francisco, downtown Chicago—parking in these cities can cost upwards of \$25 per day, ranging up to \$50 per day in some locations. Not coincidentally, transit captures large shares of the travel market, especially the commuting market. The Long Island Railroad and Metro North capture 80%¹⁴ or more of the commuting market into Manhattan from the suburbs on Long

¹² This is not the same thing as saying the number of automobile trips is 100 times greater, because a car with three people in it counts as 3 person trips by automobile while it would only count as 1 automobile trip.

¹³ This figure is based on analysis performed by Steadman Hill Consulting for CCTA/GMT over a period of 7 years, tracking the transit mode share annually. The mode share covers trips in the seven Chittenden County communities served most intensively by GMT bus routes: Burlington, South Burlington, Essex, Shelburne, Williston, and Winooski. The rural communities outside of the local bus service area are excluded from the calculation.

¹⁴ <https://capntransit.blogspot.com/2009/09/magic-of-metro-north.html>

Island and those in Connecticut and Westchester County. The transit mode share to downtown Boston is lower, at 36%,¹⁵ but still substantial.

Parking in these major cities is expensive because of market forces, but there is nothing, other political opposition, to prevent parking charges to be imposed as a matter of policy. As Donald Shoup points out in his seminal work on parking, *The High Cost of Free Parking*, there is no such thing as free parking. Unless we are talking about a grassy lot in the country, every parking space has a cost associated with it—for the value of the land, the construction cost, and the maintenance cost—and *someone* is paying that cost. In Vermont, as in most of the US, the person paying that cost is usually not the automobile owner who is using it. That driver, then, is being subsidized by others, such as local governments, employers, or retail landlords so that they do not bear the burden of that cost. That makes driving cheaper than it ought to be in purely economic terms and tilts the competitive balance toward the automobile. Imposing a charge so that the driver faces some of the actual cost of having that parking space available levels the playing field a bit.¹⁶

There are several ways parking charges could be imposed on drivers. Perhaps the most onerous but effective way would be to require all parking facilities within a specified zone to have hardware to collect parking fees. This would not necessarily require moving gates and attendants, as all vehicles could be outfitted with EZ-pass style transponders and cameras could take photos of license plates for cars that did not have a transponder. The fee could be a flat charge or a time-based charge or a variable charge depending on the time of day. The fees should *not* be structured as monthly permits but rather as daily fees, because once a person pays the cost of a monthly permit, they have an incentive to drive as much as possible to make the investment worthwhile.

Another way that parking fees could be imposed is to require employers to “cash out” the parking benefit they provide to their employees. Free parking for employees is now a hidden benefit, and employees who do not use a parking space see no benefit from their employer who has avoided the cost associated with providing a space for that employee. If parking benefits are cashed out, all employees would receive a cash benefit of, say, \$1,000 per year, and if they drive to work every day, they would pay that benefit back to the employer. Employees who do not use parking spaces would be able to keep the cash. In this way, drivers are no worse off than they are now, but people who do not drive see the benefit of their alternative commuting choice. Prior to the State requiring employers to do this, it would be prudent for the State to implement this policy for its own employees.

This is a complicated subject and if the State were to consider pursuing this path, it would require a study of its own, but it is the conclusion of this study that imposing charges on parking would be the single most effective means of increasing public transit ridership, particularly in areas already served by bus routes.

2. Fuel taxes

The only operational cost that most drivers think about is fuel. Even though fuel is only one component of the overall cost of operating a vehicle, it is the most obvious to drivers and the one they see most frequently. The other costs—depreciation, insurance, tires, maintenance, other parts—are less visible and less frequently paid, and do not seem as tightly correlated to the number of miles driven as the cost of fuel is.

¹⁵ https://www.boston.gov/sites/default/files/document-file-03-2017/go_boston_2030_-_3_boston_today_spreads.pdf

¹⁶ It is important to note that all of the roadways a driver uses between their home and destination are also not free and are subsidized by taxpayers. Even if some of the construction and maintenance costs are paid for by motor fuel taxes, there is still a large subsidy to provide roadway capacity to users with no additional charges.

Since its last peak in 2012, the price of gasoline has dropped steeply, and in real terms is cheaper now than it has been at any time since 2006. The drop over the past seven years is correlated with a drop in transit ridership both nationally and in Vermont, especially on commuter routes.

The Vermont legislature has the power to increase fuel prices through increased taxes. The last change in motor fuel taxes occurred in 2013 when an increase of about 6 cents per gallon was imposed, though it was a combination of a per gallon tax and a percentage tax on the wholesale price of gasoline. The tax was indexed to the price of gasoline so that as the cost rose, so would the tax revenue. Unfortunately for revenue purposes, the price of gasoline has only dropped since 2013 and so the revenue has been stuck each year at the floor the legislature set. Further increases have been proposed and debated, but none have been enacted.

In order for a fuel tax to have a noticeable impact on transit ridership, it would need to increase substantially. An analysis conducted as part of the PTPP concluded that if gas prices were to double (to \$5.50 per gallon), transit ridership would increase on the order of 30% to 50%, with the greater increases happening in the urbanized area of Chittenden County. For the motor fuels tax to result in that drastic a price increase, it would need to be increased ten-fold over its current 26 cents per gallon. Such an increase, besides being politically impossible, would cause significant border effects with Vermonters traveling to neighboring states to fill up their cars.

In summary, increased fuel taxes should be considered as part of a strategy to change the competitive balance between driving and transit, but it cannot feasibly achieve the rebalancing on its own.

4. COSTS AND NEXT STEPS

The language in Section 20 of H. 529 requires the report to include “estimated funding necessary to achieve the recommendations for any new initiatives identified in the study.” This chapter includes cost estimates for those recommendations that are quantifiable, at least in an approximate way. Given the scope of the study, the cost figures are only intended to provide order of magnitude estimates rather than precise pricetags.

Short-term Actions

1. Improve local access connections

The cost of local access connections is highly dependent on which type is deployed. If feeder bus service is used, it would create a significant cost for the transit agency, as it would essentially be a new bus route. The various sharing options all have a much lower cost, as they are often supplied by private vendors and charge a small user fee to the rider. The State may face no cost at all for bike sharing, scooter sharing or even car sharing options. An on-demand ride service that functions as local access to fixed routes would likely require subsidy from the State or local transit providers. The cost may be similar to a local bus route, running into the hundreds of thousands of dollars depending on the size of the service area, the hours of service operated, and the number of vehicles on the street. Given these many variables, no specific cost estimate is provided for this recommendation.

Next steps: Pursue Mobility for All grant to explore and pilot “Community Rides” concept. Pursue pilot project for microtransit in Montpelier.

2. Partnerships with employers, institutions, community organizations

Developing partnerships does not have a significant cost, other than the amount of staff time that would be required to attend meetings and develop cooperative agreements. This staff time is already accounted for in the Go Vermont budget. The partnerships themselves may result in a net gain in revenue, if private sector entities are convinced to participate in supporting public transit in a robust way.

Next steps: Pursue new partnerships and strengthen existing ones. Working with regional economic development agencies, reach out to employers who are voicing concerns about labor force availability.

3. Marketing campaign to change image of transit including incentives to ride

The cost of a marketing campaign could range from small (\$25,000) to large (more than \$1 million) depending on how large an audience the proponent is trying to reach, the duration of the campaign, and the degree of change one is hoping to achieve. With the goal of changing the image of transit, it is assumed that a large campaign would be necessary, that it would last more than a year, and that all of Vermont would be the target audience. Initial creative work could cost \$75,000 followed by three years of advertising and promotion at \$300,000 per year for a total cost of \$975,000.

Next steps: Work with media consultants to design new campaign, coordinated with service and capital improvements as they occur.

4. Explore Fare Free policy

If the State were to replace all rural fare revenue with state funds, the cost would be roughly \$525,000. The cost to replace all fare revenue in Chittenden County would be more than \$2.2 million.

Next steps: Consider State budget implications of Fare Free transit for all rural systems in Vermont.

5. Further investment in technology and information

In order to provide a reasonable cost estimate for this recommendation, it would need to be better defined. As with most areas of technology, costs tend to drop over time, so that a system that cost a million dollars five years ago may now be available (or its functional equivalent) at a much lower cost. In order to have a noticeable impact on public awareness and convenience/ease of use, an outlay of \$300,000 per year for new technology and \$150,000 over two years for website integration is recommended.

Next steps: Continue work with technology vendors to procure additional modules for trip planning, passenger information and operations.

6. Paradigm shift in demand response transit

It is difficult to estimate a cost for a new program whose details are yet to be worked out. Prior software to handle demand response scheduling cost on the order of \$5 million. It seems likely that the new system described on pages 13 and 14 would have a much lower up-front cost, but that each ride processed through the system may generate some revenue for the vendor. As more research is done on this concept, an ongoing cost estimate will be developed.

Next steps: Work with the industry to explore software and partners through a Request for Information. Develop plan of action for 2021 and beyond.

7. Capital investments in vehicles and passenger amenities

At this time, it is unknown whether the bus manufacturing industry will introduce new options for heavy-duty small buses, and if they do what the cost would be. If such options do become available, the cost is much more likely to resemble that of large heavy-duty buses (between \$400,000 and \$500,000) than that of cutaways. Further, if the new vehicles will have electric propulsion the cost is likely to be even higher, perhaps at \$800,000 or more.

There are approximately 200 cutaway vehicles currently in service in Vermont operating on bus routes. These include van cutaways and larger truck-based cutaways up to 32 feet in length. The best way to consider the cost implications of replacing them with heavy-duty buses is to consider the annualized capital cost, which takes into account that heavy-duty buses last longer than cutaways. Current federal guidelines suggest a heavy-duty bus should last 14 years, while a cutaway should last 7 years.

The annualized capital cost of maintaining the fleet of cutaways is approximately \$2.9 million per year. Assuming that they would be replaced by buses costing \$450,000 (non-electric small heavy-duty buses), the annualized capital cost would increase to \$6.4 million per year. If they were replaced by electric heavy-duty small buses at an assumed cost of \$800,000, the annualized capital cost would increase to \$11.4 million per year. Thus, upgrading to heavy-duty buses would increase capital expenses by \$3.5 million per year, and upgrading to electric heavy-duty buses would increase capital expenses by \$8.5 million per year.

The costs for passenger shelters and other amenities can vary widely depending on their style and the types of amenities added. For an attractive shelter with a bench and solar lighting, a unit cost of \$12,000 is assumed, which includes basic installation but not preparatory site work such as excavation, installation of a concrete pad and sidewalk and accessibility features. If 100 shelters were to be installed at the most frequently used bus stops, the capital cost would be \$1.2 million.

Next steps: Contact bus manufacturers and APTA to inquire about availability of small heavy-duty buses, especially ones with electric or hybrid motors. Gather information on appropriate locations for new/enhanced bus shelters and program installation.

8. Higher levels of service where density warrants

To estimate the cost of this measure, it was assumed that all urban routes would operate with a headway of 15 minutes and all small town routes with a headway of 30 minutes or better. GMT's core urban routes currently operate at a 20-minute headway during the daytime, and so service would need to increase by one third to achieve a 15-minute headway. Routes in Rutland and in the Upper Valley serve relatively dense areas, and so service at a 20-minute headway was priced out for those routes. In some cases that required a 50% increase in service and in other cases a doubling or tripling of current service. For all commuter routes, a doubling of service was assumed. No changes were assumed for demand response, tourism, rural, or intercity bus routes. The current and potential gross operating cost by route class is shown in the table below.

Route Class	Current Gross Operating Cost (FY2019) in millions	Potential Operating Cost in millions	Cost Increase in millions of 2019 dollars
Urban	\$8.7	\$11.0	\$2.3
Express Commuter	\$2.8	\$5.6	\$2.8
Rural Commuter	\$4.2	\$8.4	\$4.2
Small Town	\$6.8	\$12.0	\$5.2
TOTAL	\$22.5	\$37.0	\$14.5

Some of the potential \$14.5 million in operating costs would be covered by fare revenue, though only routes in the Urban and Express Commuter classes have more than minimal fare recovery ratios. Thus the net increase in operating costs would still be in excess of \$13 million.

In addition to increased operating expenses, additional buses would need to be procured to operate this level of service. For the purpose of this estimate, it is assumed that the future expanded fleet would resemble the current fleet, rather than an enhanced fleet as discussed immediately below. Approximately 35 new heavy-duty buses and 54 cutaways would be required for the added service, adding up to about \$23 million in capital costs. Thus the total cost for this expanded service would be \$36 million up front and then \$13 million annually thereafter (with capital replacement costs beginning after seven years).

Next steps: Conduct more detailed analysis of these bus routes to determine appropriate amount of service increase and begin process of procuring vehicles.

Policy Levers

1. Parking pricing

Policy changes regarding parking are likely to result in new revenues rather than new costs. Under the more dramatic option of charging for parking in all areas within designated zones, there would be capital costs to build "tollgates" and to distribute transponders to all residents, but over time, the parking revenue would more than pay for those costs. Under the less dramatic parking cash out policy, there would not be significant costs to the public sector and there may be savings over time if parking demand is reduced and less money has to be spent in the future on constructing and maintaining parking spaces.

2. Fuel taxes

Increases in motor fuel taxes would generate revenue for the State. Simply increasing the current tax would involve no new administrative costs.

Longer-term Outlook

This section has not provided cost estimates for longer-term recommendations, such as improved pedestrian and bicycle facilities, future planning studies, or the transformation of land use in Vermont's rural areas. Costs associated with these changes are beyond the short-term needs of the legislature in considering budget priorities for 2021 and the following few years.

However, the transformation of land use, a revision in the way we think about street space, and active planning for transit service are all critically important for the long-term viability of public transit, especially outside of Chittenden County. A society where most people rely on public transit for their mobility, where bus routes are efficiently operated and well used, and where car ownership is not necessary, is one that is built differently from what currently exists in Vermont. More people will need to live in town and village centers and fewer people out in the hills. In some ways, it will be a return to how Vermont looked in the middle of the 19th century, when the only people living in the hills were farmers. Until the automobile remade the landscape in the past 50 years, people could accomplish their travel on foot or other shared means of transportation. A future where more rural residents have mobility without depending on cars will look more like the distant past than like today.

Land use changes are always placed in the "long-term" category because they take many years to happen. It is only when a substantial portion of the changes have taken place that they have an effect on travel patterns and transit ridership. However, if these land use changes are always considered to be long-term, then they will never actually happen. As described in the PTPP, work needs to begin now to shape the future Vermont that has been described in numerous planning and policy documents: a future of less dependence on automobiles, reduced energy use, and greater mobility through transit and non-motorized modes of transportation.

APPENDIX A: LITERATURE REVIEW

Methodology

The literature review collected information from regional, national, and international sources on innovative methods to increase ridership. The research began with the list of documents published as part of the Transit Cooperative Research Program (TCRP) included in the proposal for this task. Searches were conducted on State DOT sites, National Transportation Library, American Public Transportation Association and The National Academies of Sciences, Engineering, and Medicine. Search terms included factors affecting urban transit ridership, flexible transit, community transit, increase transit ridership, state DOT's public transit policy plans, barriers to accessing public transit, fare impacts on public transit, feeder routes, transit partnerships, and marketing transit. International information was sought through web sites such as Transport Canada and European local transport information service.

Primary Source Documents

Best Practices and Marketing To Increase Rural Transit Ridership and Investment

(National Cooperative Highway Research Program Project No. 20-65 Task 73)

Perhaps the most relevant document found for this study was this report done as part of an NCHRP project. In its summary of findings, the report highlights six strategies to increase ridership in rural areas:

1. Strengthening community awareness and marketing transit service remains a critical part of attracting new riders.
2. Successful rural transit agencies actively manage their services.
3. "Old tricks" like regional connecting services, university pass programs, and free ride days are still important strategies.
4. "New" ideas and technologies are creating opportunities to grow rural transit ridership.
5. Partnerships are an essential part of successful rural transit services.
6. Transit agencies can maximize efforts to increase ridership by doing all of these things.

It also highlights the role that State DOTs play to support rural transit agencies and focuses on the return on investment of state resources in generating ridership and financial participation from other partners.

The majority of the study focuses on case studies organized under 14 themes. The following list identifies the agencies that were successful attracting ridership under these themes. In some cases, more detail is provided as to what those agencies actually did.

- Rebranding
 - Douglas Rides (Oregon)
 - CARTS (San Marcos TX)
- Education and Outreach
 - Northern Transit Interlocal (Montana)
 - Website and social media
 - Riverside CA
 - Travel training (move DR riders to fixed route)
- Statewide Marketing
 - Go Vermont
 - Washington State DOT (training for marketing)
- Service Planning

- Cascades East Transit (Bend, OR)
 - Service increases – new routes, longer span
- Regional Services
 - JAUNT Rural Regional Connector (central VA)
 - Big Sky (Bozeman, MT)
 - Link Express between Bozeman and Big Sky resort as well as Walmart and intercity bus routes – 13 round trips daily
- New Routes
 - Roaring Fork TA (Western CO)
 - “BRT” between Aspen (7,000 residents) and Glenwood Springs (10,000 residents)
 - 12-minute headway
 - Connection to Denver in Glenwood Springs
 - Serves major ski areas and associated employment
- Funding partners
 - Oregon DOT – Columbia Gorge Express
 - 14 funding partners, but majority from Federal Lands Access Funds
- Resource Sharing
 - Delta Rides (Mississippi)
 - Regionalization of prior disjointed service
 - Asotin County (Washington)
 - Joint call center for DR service among many providers
- Community Partnerships
 - Columbia County (Washington)
 - Funding from Columbia Rural Electric Assn and Prescott Swimming pool
 - Targeted funding requests
 - North Central Montana Transit
 - Boys and Girls Club provides \$2K
- Partnerships with Health Care Providers
 - HealthTran (South Central Missouri)
 - Membership based (\$37.50 for 20 one-way trips per month)
- Partnerships with Universities
 - Kern Transit (California)
 - Agreement with Bakersfield College
 - Bloomington Transit (Indiana)
 - UPass program with IU
- Financial Incentives – Fare Free
 - Corvallis OR saw 28% increase
- Local Taxes
 - Columbia County (Washington)
 - 0.4% sales tax for transit
- Technology
 - GTFS-Flex in Vermont
 - Bloomington Transit
 - Qryde paratransit scheduling software

Implementation and Outcomes of Fare-Free Transit Systems

(TCRP Synthesis 101, 2012)



This report provided an excellent summary of the experience of transit systems, both in the US and abroad, with fare-free transit. The most important conclusion is that “[a]bsent other types of transit-supportive policies such as restricting parking, the vast majority of commuters will continue to prefer driving. Hence, without disincentives to using private vehicles, minimal gains toward the goals of reducing congestion and air pollution would usually be expected.” The study states that most new trips are made by existing riders using the system more often, and that most new riders are formerly pedestrians and cyclists or people who would not have otherwise made the trip.

The report included several instructive case studies:

- In Templin, Germany, a city of 14,000 residents, the transit system went fare free in 1997. Within two years, ridership had increased 12-fold. Most new riders, however, were children and adolescents.
- In Hasselt, Belgium, a city of 70,000 residents, municipal leaders chose to pursue a major transformation of local transportation. The transit system grew from two bus routes to nine, a ring road in the inner city was converted to a pedestrian corridor, parking downtown was restricted, and the transit system was made fare free. In four years, a 12-fold increase in ridership was seen.
- Asheville, NC tried a three-month experiment with fare-free transit. It saw a ridership increase of 60%, but that mostly disappeared once fares were reimposed.
- Chapel Hill, NC also had an experiment with fare-free transit, seeing a 43% increase in ridership.
- Milton, Ontario removed fares from its off-peak service in 2007. Ridership rose 63% in response to the change.

Corvallis, OR represents the most instructive example for Vermont. A city of 55,000, including 20,000 Oregon State University students, it is similar in several ways to Burlington, other than that the City operates the transit system directly, rather than transit being a separate regional authority as in Chittenden County. Prior to going fare free in 2011, students comprised 43% of all riders and faculty and staff comprised an additional 4%. These users were already riding for free through an unlimited access program and students paid a nominal fee of \$2.76 per term. Cash fares amounted to \$330,000, about 14% of the total operating budget of \$2.4 million. There are 10 routes in the system and they mostly operate with hourly service. Daily ridership was 2,100 passengers.

In going fare-free in 2011, revenue from cash fares, student fees and local property taxes was replaced by a monthly fee on utility bills, ranging from as little as \$2.75 per month for individual households, to more than \$1,000 per month for large businesses and industrial customers. The results from going fare free were dramatic, with ridership increasing 24% in the first month and 43% in the second month. Over the course of the first year, total ridership increased by 38%. The City expected issues with homeless people riding the bus more frequently and potentially causing problems for other passengers, but found that because many of the homeless people had already been riding the bus to get to shelters, that there were no significant issues with behavior.

Current fees are slightly higher than those in 2011, with an individual household paying \$3.16 per month and multi-family residential customers paying only \$2.18 per month. The utility fees bring in \$925,000 in revenue. Total ridership in FY2019 was 1.08 million, or about 3,000 per day. This represents a 43% increase over the total before the system went fare free.

Watching the Swiss: A network approach to rural and exurban public transport

(Transport Policy, May 2016)

This report discusses the transit system in a rural area in Switzerland, which has a similar population density to some of the most rural parts of Vermont. The bus system in Germany, Austria and Switzerland is built around Postbuses, a concept developed in the early 20th century. Vehicles traveling between towns and villages to deliver the mail were also used to carry passengers, thus creating a dual revenue stream to support the service. The Postbus system became embedded in European culture, and people of all ages and socioeconomic classes used it to travel from town to town. Between 2000 and 2010, passenger and mail transport was split apart and the transit service was spun off as a subsidiary or transferred to the regional rail operator.

The area of focus in this article is the Lower Engadine Valley, the most rural part of Graubünden Canton, which is the largest by land area in Switzerland. The total population of Graubünden is 198,379 and the average population density is 72 people per square mile, similar to Vermont's 68 people per square mile. In the Lower Engadine Valley, which borders Italy and Austria, the total population is 9,200 with an average density of only 20 people per square mile. The largest city is Scuol, with a population of 2,245. For reference, the density of Orleans County in Vermont is 37, and the density of Essex County, Vermont's least populated, is 9 people per square mile. There are no large cities within commuting distance of the Lower Engadine Valley.

In spite of the low density, the valley has a robust transit system with feeder routes connecting to mainline routes linking villages together. The system operates as a pulse, with timed transfers every 60 minutes. There is some demand response taxi service in the least populated areas. The system achieves a 35% fare recovery ratio and the rest of the cost is subsidized by the federal and cantonal governments at a 69/31 ratio. The total subsidy per person is \$631 annually. If that level of subsidy were applied to Vermont, the state would spend about \$400 million on public transit, ten times what it currently spends.

Secondary Source Documents

Ridership and Mobility

The Factors Influencing Transit Ridership: A Review and Analysis of the Ridership Literature

(University of California Transportation Center, 2003)

Identified certain external factors the transit provider has no control over, but that does affect ridership. Also identified internal factors and what impact they have on ridership:

- Some of the external factors include land-use, socio-economic, gasoline prices and parking availability.
- Some internal factors include fares, customer service, and an adequate facility at each bus stop.
- Deep discounts, induce an increase in ridership

Shared Mobility and the Transformation of Public Transit

(National Academies of Sciences, Engineering, and Medicine, 2010)

Presents actions that public entities (transit providers, DOTs and regional agencies) take to promote cooperation between public and private mobility partners. It details the increase of public support for shared modes and the direct relation to use transit.

Public Transit's Impact on Rural and Small Towns a Vital Mobility Link

(Community Transportation Association of America, 2012)

On the National level, rural areas still have many quality of life attributes. With a decline in population and many and an aging population, these rural areas continue to experience a lack of effective and efficient transit service:

- America's rural population is declining, but ridership has increased from 2007 to 2015.
- Rural residents with disabilities rely on public transit: they take about 50% more public transit trips than able-bodied people do.
- The number of rural and small town public transit agencies has increased over the past two decades to approximately 1,400 agencies (2014).
- Rural poverty rates exceed urban poverty rates in all regions
- Rural public transit spending per capita is lower than in urban areas.

Understanding How to Motivate Communities to Support and Ride Public Transportation

(National Academies of Sciences, Engineering, and Medicine, 2008)

Marketing to potential key transit riders and other stakeholders the benefits of public transit would provide additional information that some of them have never considered. Some of the marketing statements could include:

- Public transportation has economic consequences: enhanced property/real estate values, employment opportunities, growth of communities.
- Public transportation has environmental benefits: reduced congestion, reduced pollution.
- Public transportation saves productive time by lessening traffic congestion.
- Public transportation makes the United States less dependent on foreign oil.
- Public transportation saves people money on gas.
- Public transportation enhances quality of life through reduced personal stress and provision of independence for non-drivers.

Evaluation of Recent Ridership Increases

(National Academies of Sciences, Engineering, and Medicine, 2004)

There was an increase in ridership in 18 out of the 28 transit agencies that participated in this study. Below are the four general initiatives that influenced an increase in ridership in the agencies. The increase was proven based on implementing two or more these initiatives:

- Service adjustments – including service re-configuration, service expansion and new service.
- Fare and pricing adaptations – including introduction of new fares and technology
- Marketing and information initiatives
- New Efforts in service coordination, collaboration, and partnering

Mobility and the Sharing Economy: Potential to Overcome First- and Last-Mile Public Transit Connections

(UC Berkeley: Transportation Sustainability Research Center, 2016)

The first and last mile connection focuses typically on improving the front door to transit connection with safe, comfortable, accommodating multi-modal options. This report discusses these options:

- Sharing a Vehicle
- Sharing of a Passenger Ride
- Car Sharing – roundtrip, one-way, personal vehicle sharing
- Ride Sharing- Carpooling, Vanpooling
- Scooter Sharing
- On-Demand Ride Services – Ride Sourcing/TNCs
- Bike Sharing – Public bike sharing, closed campus sharing
- Microtransit – fixed routes, flexible routes

Elements Needed to Create High Ridership Transit Systems

(National Academies of Sciences, Engineering and Medicine, 2007)

This report includes a number of TCRP studies on this topic. It also contains relevant case studies, including one on Advance Transit. Some of the cost effective factors to increase ridership include:

- Identification of needs
- Service environment and strategies
- Service adjustment
- Partnerships/Coordination initiatives
- Marketing
- Fare collection
- Ridership amenities

Getting Around in Rural America

(Journal of the American Society of Aging, 2019)

This article reviews what is known about rural transportation for older adults, discusses actions that rural communities might take to address growing mobility needs, and presents successful approaches that have worked in rural areas to meet the transportation needs of older adults.

- Mobility Managers and travel training
- Volunteer transportation
- Diversified funding
- Coordination of transportation across boundaries

Flexible Services

A Guide for Planning and Operating Flexible Public Transportation Services.

(National Academies of Sciences, Engineering, and Medicine, 2010)

Identified flexible service routing by creating a hybrid from fixed-route, fixed-schedule mode, and demand-responsive operation for a limited portion of the route. Some types of this hybrid approach, suited for rural areas, are:

- Demand-responsive connector. This service works best when there are no viable trip origins but there are public transportation connections to viable trip destinations within a defined area.
- Request stops. This service works best when passengers are given the opportunity to use the fixed-route system (even a deviated fixed route) along the corridor.
- Flexible route segments. This service works best when there is an area where no viable trip origins exist, but a transit-dependent trip demand is prevalent.
- Zone routes. This service works best when no corridor exists, but viable trip origins and/or trip destinations exist within a defined zone

Operational Experiences with Flexible Transit Services

(TCRP Synthesis 53, 2004)

The primary source of information for this paper are survey responses from 24 (out of 81) transit systems regarding flexible services. Some of the key responses and conclusions include:

- Operators have developed strategies to reduce the inefficiency of demand-responsive operation in flexible services. In many cases, operators place limits on the degree of demand-responsive service that will be provided, or they give discretion to dispatchers or drivers in the way that they accommodate demand-responsive service requests.
- When transit agencies employ flexible operation for their entire transit service, it may have higher ridership and productivity than when flexible service is limited to hard-to-serve areas. In these cases, compared with potential fixed-route service in the same area, it is possible that deviations limit ridership and productivity, and increase passenger travel times. It also appears that the cost advantage of combining service to the general public and people with disabilities is an overriding concern for these agencies.
- Although many flexible services require previous-day reservations for demand responsive pick-ups or drop-offs, the experiences of other systems shows that much shorter advance notice requirements are possible, with or without the use of advanced technology.

Recent Developments in Flexible Transport Services

(University of Aberdeen, 2010)

This paper focuses on adjusting flexible transport service from just serving dedicated special groups to serving the general public as well. The proposed system, Flexible Agency for Collective Mobility Service analyzes the organizational and business model for flexible transit service including:

- Increasing sophistication of booking and reservation devices to increase the capacity and efficiency services.
- A key challenge to be overcome in the further development of FTS relates to a wide range of juridical issues.

A Structured Flexible Transit System for Low Demand Areas

(University of Illinois, 2011)

This report compares the certain proposed transit routes and shows the advantages to each one (e.g. fixed-route, taxi). The analysis looks at the optimum network layout, service area of each bus, and bus headway, to minimize the total system cost. Under flexible-route:

- Each bus travels “flexibly” along a tube to pick up and drop off passengers at their origins and destinations
- The expected agency and user costs of the network of tubes are derived and optimized with closed-form formulas
- The proposed system outperforms alternatives at low demand levels by eliminating

A Methodology to Derive the Critical Demand Density for Designing and Operating Feeder Transit Services

(Texas A&M University, 2009)

This report addresses the differences between fixed-route and demand responsive, and flexible transit services to accommodate demand and be more cost effective. The paper proposes an analytical model and solution of the problem to assist decision makers and operators in their choice of when flexible transit service should be implemented.

- The Demand Responsive Connector (DRC), also known as “feeder” transit line, is one type of flexible transit service.
- Identification of the condition justifying the operating switch is often hard to properly evaluate.
- The comparison between the two services (FRT and DRT) can be made by considering only the service quality provided to customers

Technology Impacts on Ridership

The Impact of Real-Time Information on Bus Ridership in New York City

(Transportation Research Part C: Emerging Technologies, Volume 53, April 2015, Pages 59-75)

- The objective of this research was to assess the effect of real-time information provided via web-enabled and mobile devices on public transit ridership.
- An empirical evaluation was conducted for New York City, which was the setting of a natural experiment in which a real-time bus tracking system was gradually launched on a borough-by-borough basis beginning in 2011.
- Panel regression techniques were used to evaluate bus ridership over a three year period, while controlling for changes in transit service, fares, local socioeconomic conditions, weather, and other factors.
- A fixed effects model of average weekday unlinked bus trips per month revealed an increase of approximately 118 trips per route per weekday (median increase of 1.7% of weekday route-level ridership) attributable to providing real-time information.
- Further refinement of the fixed effects model suggests that this ridership increase may only be occurring on larger routes; specifically, the largest quartile of routes defined by revenue miles of service realized approximately 340 additional trips per route per weekday (median increase of 2.3% per route).

- Although the increase in weekday route-level ridership may appear modest, on aggregate these increases exert a substantial positive effect on farebox revenue.
- The implications of this research are critical to decision-makers at the country's transit operators who face pressure to increase ridership under limited budgets, particularly as they seek to prioritize investments in infrastructure, service offerings, and new technologies.

Ridership Effects of Real-Time Bus Information System: A Case Study in the City of Chicago

(Transportation Research Part C: Emerging Technologies, Volume 22, June 2012, Pages 146-161)

- Using longitudinal data on route level monthly average weekday ridership in the entire Chicago Transit Authority (CTA) bus system from January 2002 through December 2010, the ridership effects of the CTA real-time bus information system were evaluated.
- This bus information system, called CTA Bus Tracker, was incrementally implemented on different CTA bus routes from August 2006 to May 2009.
- To take account of other factors that might affect bus ridership, data was included on unemployment levels, gas prices, local weather conditions, transit service attributes, and socioeconomic characteristics during the study period.
- Based on a linear mixed model, the provision of Bus Tracker service did increase CTA bus ridership, although the average increase is modest.
- The study findings suggest that there are temporal variations of the ridership effects among the routes, with the “winning” routes more likely to have the technology implemented in the later phases of the overall “roll-out” period.
- The results are less conclusive regarding geographical variations in the effects of Bus Tracker.

Evaluating the Impact of Real-time Transit Information on Ridership and Mode Share

(National Center for Transportation Systems Productivity and Management, Contract # DTRT12GUTC12 with USDOT Office of the Assistant Secretary for Research and Technology (OST-R), Final Report, June 2015)

- The objective of this dissertation was to quantify the impact of real-time information on public transit ridership.
- Statistical and econometric methods were used to analyze passenger behavior in three American cities that share a common real-time information platform: New York City, Tampa, and Atlanta.
- Each study utilized different data sources and quantitative methods to assess changes in transit ridership.
- The results varied between cities and suggest that the impact of real-time information on transit travel is greatest in locations that have high levels of transit service.

An Experiment Evaluating the Impacts of Real-Time Transit Information on Bus Riders in Tampa, Florida

(National Center for Transit Research (NCTR), the National Center for Transportation Systems Productivity and Management (NCTSPM), and USDOT, 2016)

- The objective of this research was to quantify the benefits of RTI provided to bus riders.
- The method used is a behavioral experiment with a before-after control group design in which RTI is only provided to the experimental group.
- Web-based surveys were used to measure behavior, feeling, and satisfaction changes of bus riders in Tampa, Florida over a study period of approximately three months.
- The results show that the primary benefits associated with providing RTI to passengers pertain to waiting at the bus stop. Analysis of “usual” wait times revealed a significantly larger decrease (nearly 2 minutes) for RTI users compared to the control group. Additionally, RTI users had significant decreases in levels of anxiety and frustration when waiting for the bus compared to the control group.
- Similarly, they had significant increases in levels of satisfaction with the time they spend waiting for the bus and how often the bus arrives at the stop on time.
- Taken together, these findings provide strong evidence that RTI significantly improves the passenger experience of waiting for the bus, which is notoriously one of the most disliked elements of transit trips.

Assessing the Impacts of Real-Time Transit Information

(TR News 303 May–June 2016, pp. 43-44)

- In some cases, real-time information may have contributed to an increase in transit ridership.
- The studies conducted in Seattle showed that riders reported an increase in trips, particularly in the off-peak periods when the transit system has additional capacity.
- Studies conducted in Tampa and Atlanta, in contrast, did not find a substantial change in transit travel associated with use of real-time information; the study methodologies in Tampa and Atlanta, however, did not consider completely new transit riders.
- Econometric methods controlled for other factors that affect bus ridership levels, and the models suggested that real-time bus information was associated with a median increase of 1.7 percent in weekday route-level bus ridership.

A Literature Review of the Passenger Benefits of Real-Time Transit Information

(Journal of Transport Reviews, Volume 39, 2019 - Issue 3, Pages 327-356, 14 May 2018)

- The main objective of this research was to compile a literature review of studies that assess the passenger benefits of RTI provision.
- The results suggest that the primary behavioural changes associated with providing RTI to passengers pertain to decreased wait times, reductions in overall travel time due to changes in path choice, and increased use of transit.
- RTI may also be associated with increased satisfaction with transit service and increases in the perception of personal security when riding transit.

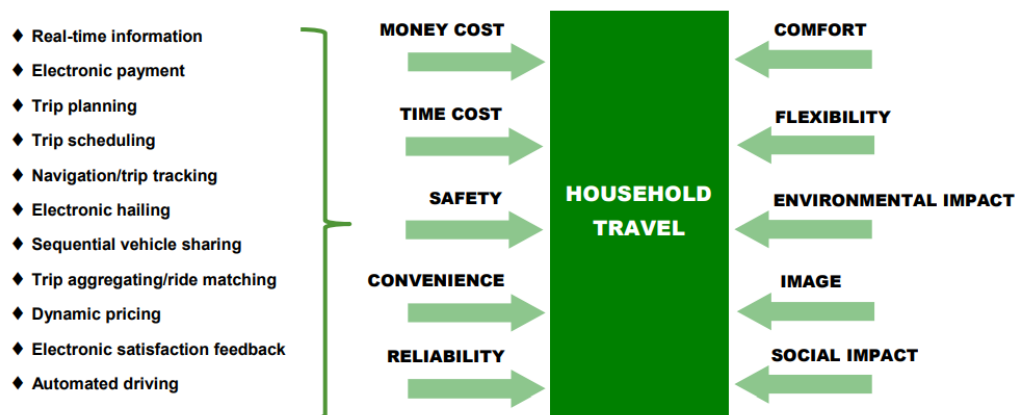
Implications to Public Transportation of Emerging Technologies

(National Center for Transit Research, November 2016)

- This paper speculated on possible consequences associated with movement toward greater technology being integrated into vehicles and transportation systems.
- The core technologies that enable meaningful changes in transportation include global satellite positioning, wireless communications, high-speed portable computer processing, sophisticated affordable sensing, battery power storage, and associated technologies and software, including machine learning, all of which are collectively influencing a multitude of aspects of transportation.
- Technology is influencing virtually all aspects of travel, from planning to payment to in-travel entertainment in addition to controlling vehicle functions.
- Technology has enabled electronic communications as a substitute for travel (e-commerce, distance learning, webinars, etc.), and expectations for virtual reality include the prospect of reducing the need for physical presence in more social interactions and activity functions.
- Technology-related influences on travel are impacting virtually all recognized travel characteristics that influence travel decisions.
- Technologies are enabling a transformation of the historic business models and economic structure of transportation.
- Technologies' impacts on transportation are occurring simultaneously with other changes in demographics and the economy that are influencing travel.
- The influence of technology on transportation will occur simultaneously with these same technologies, having potentially transformative impacts on other industries.
- The magnitude of the envisioned changes is such that estimating the ultimate technical/performance impacts and consumer reactions to them are subject to a great deal of uncertainty.
- The impact on public transportation in a world moving toward autonomous vehicles is not wholly dependent upon the pace of technology development, business strategies, and consumer reactions. It also may be impacted by policy initiatives emerging from legislative and administrative actions of various levels of government.

Figure 1 characterizes how various new technologies can influence the factors known to effect travel behavior.

Figure 1. Technology Factors that Influence Travel Behavior



Trends in Public Transportation Ridership: Implications for Federal Policy

(Congressional Research Service 7-5700, R45144, March 26, 2018)

- Technological changes on the horizon, such as autonomous highway vehicles, might revolutionize transportation mobility, but whether this will increase or decrease transit ridership is by no means clear.
- The introduction of driverless vehicle technology is perhaps the biggest unknown, but potentially the most disruptive factor for future public transportation ridership. Estimates of when fully autonomous vehicles will be in use in urban environments vary wildly from a few years to a few decades. Based on the introduction of past vehicle technology, it is likely that even if fully autonomous vehicles are available in a few years, it will take decades for them to become ubiquitous.

Can Accessing the Internet while Travelling Encourage Commuters to Use Public Transport Regardless of Their Attitude?

(Sustainability 2019, 11, 3281, 14 June 2019)

- This study focused on how Internet use while commuting or travelling is associated with commuting mode choice, and how the results show that attitude is a very important determinant of commuting mode choice.
- This study found a significant and positive association between the frequency of Internet use while commuting or travelling and using public transport for commuting.
- This result implies that providing facilities such as free Wi-Fi on trains or buses could increase ridership and reduce car dependency for commuters. In addition, our results also showed that this policy may be effective for commuters who dislike public transport.
- It is not clear if this increase in ridership will induce people who prefer private cars to public transport to consider using public transport.

On To 2050: Harness technology to improve travel and anticipate future impacts

(Chicago Metropolitan Agency for Planning, 2018)

- Personal ownership of AVs (Automated Vehicle) would result in more inefficient land development, less public transit use, and increased traffic from low-occupancy or even unoccupied vehicles.
- Another and more preferable future suggest that fleets of shared vehicles would reduce individual car ownership, facilitate more dense, walkable development patterns, and increase transit ridership, walking, and biking.
- Technology could enable safer, more independent mobility for residents throughout the region, particularly seniors and those with disabilities. Yet they also could exacerbate existing disparities. The most likely outcome is a mix of these impacts that vary across the U.S., highly dependent on how much AVs cost, how quickly they predominate among vehicles, and how local policy makers address these converging challenges.

APPENDIX B: SUMMARY OF ANALYSIS

Two types of analysis were undertaken to try to identify the factors that lead to high ridership among transit routes. The first analysis was focused on the Burlington metro area, while the second had a statewide scope.

Analysis of STIC Successes

The Small Transit Intensive Cities, or STIC, program is a performance-based incentive funding program offered by the Federal Transit Administration. The program consists of six ratios that measure the amount of service offered and the productivity of that service among transit systems in small metropolitan areas of between 50,000 and 200,000 people. FTA calculates the performance of those factors for larger metropolitan areas (greater than 200,000) and any small metro area that exceeds the performance of the average of the larger metro areas receives a bonus in funding. The bonus amount in FFY2019 was about \$260,000 per STIC measure achieved. Green Mountain Transit achieved four of the STIC measures in this past fiscal year.

For this analysis, all metro areas that achieved 4, 5, or 6 STIC measures were identified. The study team then researched these 37 metro areas to summarize key characteristics about their local transit systems. A few metro areas (in Connecticut) were set aside because their STIC performance was affected by commuter rail lines that connected to the New York metropolitan area.

As might be expected, there was a lot of diversity among the metro areas, but four factors were common to almost all of the high-performing systems:

1. Headways of 30 minutes or better on the majority of local routes
2. Long span of service, with buses running late into the evening
3. Presence of a large university
4. An unlimited access program through which students, faculty and staff associated with the university could ride for free

Green Mountain Transit, the lone urban system in Vermont, already has these four factors in place, with headways of 20 minutes on its core routes and 30 minutes on other routes, service until midnight on its four core routes and agreements with the University Vermont and other educational institutions for unlimited access for students, faculty and staff.

No other transit providers in Vermont have the same conditions as GMT, but Advance Transit in the Upper Valley benefits from its relationship with Dartmouth College and Dartmouth-Hitchcock Medical Center. An unlimited access program is not applicable to that relationship, since Advance Transit does not charge fares to any riders. Four of AT's routes have 30-minute headways, at least during peak hours, and while AT does not currently offer late evening or weekend service, it does have plans to extend service hours as more funding comes available.

Analysis of Vermont Bus Routes

The annual Route Performance Report produced by VTrans for the Vermont legislature provides a wealth of information about the performance of each bus route and other transit service operated in Vermont. The report also sets standards for performance and all routes are classified as either successful, acceptable, or underperforming in terms of their productivity (boardings per unit of service operated) and cost effectiveness (cost per boarding).

To aid in this analysis, the study team focused on those routes that were most successful in terms of overall ridership and productivity and also those that were the least successful. For the high performers, the team identified the key factors that made those routes successful. For the underperformers, the factors limiting their success were identified. The results of the analysis are summarized in the following tables. Note that the analysis is based on FY18 data and does not reflect changes made to route names and structures since that time.

Urban High Performers











● =high performer; ◐ =moderately high performer

Successful route	Ridership	Productivity	Characteristics
College St Shuttle	◐	●	Free fare; wholly within dense area; high frequency (every 15 min)
Essex Junction	●	●	Major commuter corridor; Fort Ethan Allen; UVM MC; 15-min peak service; high parking charge at destination
North Ave	●	●	Highly linear/few alternatives; dense development; high parking charge at destination
Riverside/Winooski	◐	●	Dense development for whole route; tailored service (less during off-peak); serves low-income area
Williston	●	●	Serves major traffic generators (downtown, UVM, Taft Corners and UMall)

Small Town/Rural High Performers

Successful route	Ridership	Productivity	Characteristics
AT Brown/Green/Orange	●	●	Free fare; major traffic generators (Dartmouth/downtown Hanover/ West Lebanon); limited service on Orange boosts productivity but may limit ridership
GMT City Commuter/Midday	●	●	Serves two downtowns and developed corridor in between; 30-min peak service
MVRTD City Fixed routes	●	●	Serve second largest city in VT; 30-minute service all day; low fare (50 cents;\$15/mo)
MVRTD Rutland-Killington Commuter	●	◐	Hourly route serving downtown, major corridors and Killington
SEVT MOOver	●	●	Mt. Snow major generator; add'l generators along Route 100; free fare; hourly service plus additional trips during peak ski season; branding

Commuter High Performers

Successful route	Ridership	Productivity	Characteristics
GMCN Brown			Serves Bennington College and Southern VT College plus downtown; low fare; limited service 5-6 trips/day) boosts productivity but may limit ridership
MVRTD Fair Haven			Serves four colleges and four towns plus Rutland; limited service (5 round-trips/day)
GMT Richford-St. Albans			Very limited service (one round-trip per day) but connects to major employer (Peerless in St. Albans)
SEVT West Dover			Very limited service (one trip to Dover school)
SEVT Wilmington-Brattleboro			Limited service; school ridership; important corridor in southern VT; free fare
Montpelier LINK Express			Eleven trips; bidirectional demand; park & ride access; subsidy by CATMA and State

Among these high-performing routes, productivity is often a function of limited or targeted service. For example, the Richford-St. Albans commuter operated by GMT operates only one southbound morning trip and one northbound evening trip, but that trip is keyed to the work start and end times of employees at Peerless in St. Albans. The bus is well used, but it does not have high ridership compared to other commuter routes, because it runs such limited service.

In general, only the best transit corridors, in terms of overall residential and employment density, which results in high travel demand density, can have high productivity with a high level of service. The best examples of these are the Essex Junction, North Ave, and Montpelier LINK Express routes operated by GMT, as well as most of the Small Town routes in the middle table, which attain relatively high ridership for that classification, but not as high as the urban routes.

It can also be seen that high ridership is related to several factors:

- The presence of major trip generators including large employers, hospitals, universities and ski resorts
- Dense and continuous development (mainly seen in GMT Urban route corridors)
- Frequent and direct (time-competitive) service

Indeed, in Vermont, success of transit services is often tied to the presence of a major university or ski area. Low or free fares are also factors that help boost ridership, and unlimited access programs with universities and hospitals strongly encourage students, faculty and staff to use transit services.

Low Performance Routes

● =poor performer; ◐ =moderately poor performer

Successful route	Ridership	Productivity	Characteristics
GMT Sunday Service	●	●	Limited service; circuitous routing; Sunday demand
GMT Williston/Essex	●	●	Low service level; lack of continuous development; free parking at both ends; poor walking environment in Williston
GMT Capital Shuttle	●	●	Limited demand in non-legislative season; overlap with Montpelier Circulator
SEVT Bellows Falls	◐	◐	Circuitous routing; small population base; limited service
SEVT Bellow Falls-Springfield	◐	●	Limited service; small population base; confusing schedule

Low Performance Commuters

Successful route	Ridership	Productivity	Characteristics
SEVT/MVRTD Bellows Falls-Rutland	◐	●	Long route with limited service; many segments very rural; limited demand to Okemo outside of ski season; very few riders going all the way btn BF and Rutland
RCT Twin City	●	●	Still a new route; limited service
SEVT Okemo seasonal	●	●	Long route with limited service; many segments very rural
TVT 89er North	◐	◐	Unclear if schedule serves VTC well – no midday service; takes twice as long as driving
TVT 89er	◐	●	Schedule confusing with many request stops and route extensions; parking mostly free at DHMC and other large employers in Lebanon

There are many reasons why bus routes underperform. In some cases, small towns and villages may have mobility needs, but still not have enough population to generate enough demand to support a traditional bus route. An example of this is Bellows Falls. In other areas, the lack of a supportive pedestrian environment

and ample free parking limit the potential ridership of a route. The Williston-Essex route is an example of that situation.

Commuter routes in Vermont, and nationally, have been facing headwinds for the past five years as gasoline prices have dropped. Unless parking at the workplace destination is difficult or expensive, transit options are not competitive with driving when people feel that it is inexpensive to drive themselves.

In some cases, low ridership can be a result of confusing or poorly designed schedules. SEVT recently redesigned its Brattleboro service to be simpler, more consistent and easier to understand. Ridership has increased following the change, even though the amount of service operated remained about the same in total.

Finally, the lack of capital investment in passenger facilities and comfortable vehicles is a barrier to attracting choice riders, especially in rural areas where the overall level of service is low.