TRANSPORTATION

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Taftsville Bridge | © John Knox

A. Vision for Our Regional Transportation System

Our vision for our transportation system is one that efficiently and effectively moves people and commerce, is resilient to natural hazards, and is funded sufficiently to maintain and grow the system throughout the TRO Region.

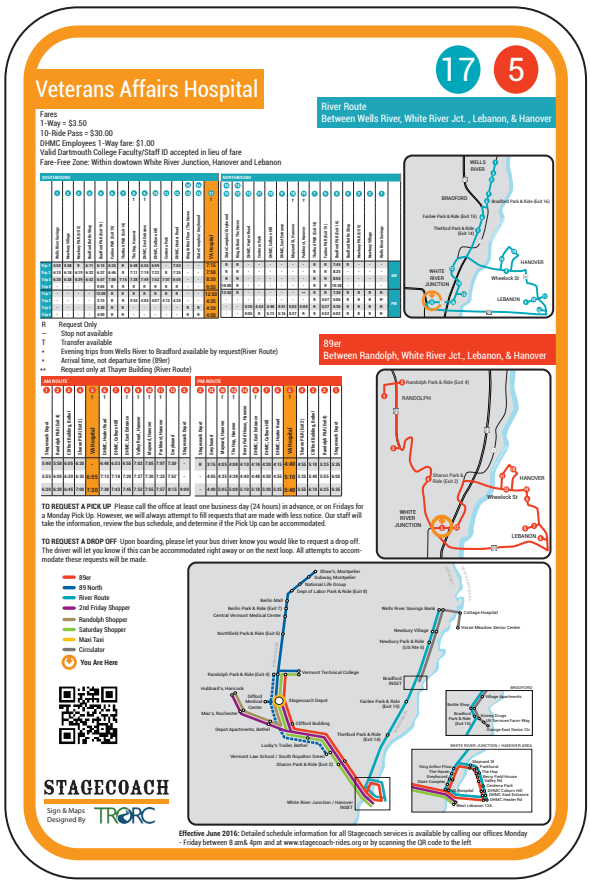
The purpose of this chapter is to identify goals, policies, and recommendations that will achieve a more sustainable transportation system in line with the desired outcomes of the East Central Vermont HUD Sustainable Communities planning efforts, including, but not limited to:

- More local, state, and federal budgeting for infrastructure needs
- Highway design built around context sensitive solutions, multi-modal uses, and transparent and open planning, design, and project management
- A more integrated transportation network with lower fuel consumption and emissions
- Greater concentration of development in previously built areas
- Improved infrastructure to accommodate local accessibility to daily needs
- Minimal impacts to the natural environment
- More resilient infrastructure that can withstand climate change
- A pattern and form of land use that is more efficient, affordable, safe, and healthy

While strategies in this chapter speak directly to our transportation goals, we recognize that similar polices may exist in other chapters, creating an interactive and supportive set of plan-wide strategies.

B. Introduction

When we plan for “transportation,” or even “mobility,” the word used in transportation circles to generally signify movement along roads, the primary goal is actually access: access to desired goods and services at an affordable price and a



Stagecoach Signage | *Source: TRORC*

convenient time. We may drive to the store by ourselves to get groceries, but what we need are the groceries, not the drive. If the groceries were delivered, that would work just as well. Most of us need to physically go to work, but if we live close, we can walk or bike there instead of driving. We can carpool if we live near enough to workmates, and we can take transit if there is a suitable route. If our job can be done online, all we need is good broadband to telecommute. Business and tourism needs are much the same as for households; they need access, not a specific means of transport.

The regional "transportation system" is not just the built network of roads. It also includes railways, airports, sidewalks, and even rivers and trails. Even the Internet can rightly be considered part of the built network. However, the transportation system is much more than this. It includes both public and private transit services. And it includes us: our feet, wheelchairs, bikes, and cars, and all the fuel we buy. Lastly, it includes the wider built system outside the Region that connects us to other areas, as well as a whole slew of support services, from gasoline tankers to road salt suppliers.

The bulk of this chapter focuses on the transportation facilities we use for vehicular access. This primarily is the road network, but the chapter also looks at means of access to these facilities (cars, transit, bikes, etc.), as well as other issues that affect our ease of access or the impacts of the transportation system. For example, how do access needs get served for those who cannot drive? And what have our roads done to our streams? This chapter also reviews transit services, rail, and carpooling facilities. We have no airports of any size, but residents, businesses, and visitors use smaller regional airports in Lebanon, New Hampshire, and Rutland, Vermont. Larger airports within an easy drive are located in Manchester, Boston, Hartford, and Burlington.

It is important that we understand our system in its full complexity, context, and cost as we head into the future. This way, we can adjust to changes and craft a system that has the most access and the fewest negative impacts, all while trying not to spend more money.

This chapter of the Regional Plan sets forth an agenda for the development and improvement of the regional transportation system, in all its parts. As transportation is constantly evolving alongside the technologies, environmental challenges, and values of our communities, it requires adaptive planning. A regional planning effort helps to ensure a consistent, coordinated, and proactive response among all 30 of our member towns, Vermont, New Hampshire, and the various other providers of services. Regional transportation planning promotes transportation as a complete system that addresses the diverse access needs for all people, while also emphasizing decisions made for the greater enhancement of safety, community livability, economic development, and the preservation of the environment.

This chapter is intended to be used for the following purposes:

- To provide a wealth of information regarding the condition of the existing transportation system in the Region;
- To provide a means to express the Region's transportation planning concerns and priorities at the state and local levels;
- To guide public investment in transportation infrastructure;
- To be consistent with state planning goals (24 VSA, Chapter 117 §4302);
- To implement the Transportation Planning Initiative and fulfill the duties of Regional Planning Commissions in accordance with 19 VSA, Chapter 1 §10l(b);
- To serve as a basis for evaluating transportation programs and projects that impact the Region, including the regional and State Transportation Improvement Plan (STIP); and
- To be used to evaluate development proposals within state regulatory processes.

Taken in its totality, this chapter is intended to guide TRORC in evaluating public and private recommendations affecting the Region's transportation system and is the foundation for TRORC's annual transportation work program. Any and all recommendations contained within this document, while extensive, do not constitute a complete and final listing of the Region's transportation needs over the eight-year lifespan of this document. Rather, it is a living, working document that will be used to guide the recommendations of all levels of transportation and development, from local to state levels.

Regional Transportation Characteristics

Most of the travel in the Region and by our residents is done in cars, and most of that is done alone. This is extremely expensive, polluting, and wasteful. However, it is (or at least has appeared) very convenient. Virtually any other mix of transportation would be better for us physically, financially, and environmentally, but we are accustomed to jumping in our cars and driving where we want when we want. To achieve a lower cost of living, fewer greenhouse gas emissions, better water quality, and improved health while still enjoying access to jobs, goods, and services, residents of our Region will need to drive less. This also fits with our demographic needs, since we are rapidly becoming more elderly.

In 2015, residents of Windsor and Orange Counties travelled more than 980 million miles, using over 45 million gallons of gasoline—that's more than 500 gallons and 11,500 miles per person. More than three-quarters of commuters in Orange and Windsor Counties drive to work alone, while just 9 percent carpool. Six percent of commuters walk, bike, or use public transportation.[1] Bike paths, transit, and other transportation options are limited, though some commuter transit routes exist.

The Regional Plan points out that scattered and uncoordinated residential development ("rural sprawl") continues to expand into rural areas, and commercial development has taken the form of automobile-dependent strip development along highways. These land use decisions limit people's transportation options while increasing their transportation costs, both in terms of direct costs (e.g., gas and ownership costs) and

Stagecoach Office, Randolph | *Source: TRORC*

opportunity costs (e.g., time spent driving instead of addressing other priorities like family needs). Ultimately, this translates into a higher overall cost of living for households.

TRORC's longstanding transportation priorities are maintaining the existing transportation system and diversifying transportation choice by expanding bicycling, walking, and public transportation. These two transportation priorities have been consistently stated as the lead priorities since transportation issues could be discussed on a regional level.

Undoubtedly, transportation networks and opportunities bring us benefits—especially economic benefits. Transportation networks allow Vermonters to commute to work and fulfill their other needs, such as shopping, connecting with friends, and seeing family. Critically, transportation networks allow Vermont businesses to function. Vermont's roads carry most of its visitors—in 2017, over 13 million visitors brought in nearly $3 billion and supported more than 32,000 jobs in the State.[2] However, we do benefit from more than just roads; bicycling and walking-related recreation are key components of the state's tourism economy.[3]

C. Background Trends and Challenges

Regional Transportation Trends and Challenges

The TRO Region is exemplified by a series of rural towns and one state-designated growth center. While all distinct in nature, these areas have a common theme of having a network of roadways and supporting infrastructure that emanates from town and village cores, roughly mirroring historical settlement patterns. In the past half-century, this transportation pattern has been challenged by the advent of cheaper cars, cheaper fuel, and larger, faster highway systems that connect once-remote villages and towns to larger growth centers throughout the Region.

The regional transportation system needs to be dynamic as the population, economy, land use patterns, and traffic demands continue to change over time. Changing regional needs have placed new limitations on transportation planning and present new challenges for future planning efforts.

Funding Constraints

Significant shortfalls in federal and state transportation dollars, owing in part to declining gas tax revenues and insufficient reserves in the Federal Highway Trust Fund, stymie statewide efforts to maintain and improve roadways and infrastructure. It is no secret that funds for transportation are tight. According to the Vermont Agency of Transportation (VTrans) 2018 Transportation Asset Management Plan, as of 2019, "current funding provides approximately 67 percent of the monetary resources needed to maintain Vermont's transportation system in a state of good repair. In 2018, the gap was approximately $258 million."[4] Funding levels have not allowed the State or towns to keep up with routine preventative maintenance. This is compounded by the fact that scattered rural development imposes additional fiscal pressures at the municipal level to maintain and improve local roadways and infrastructure year-round. Costly repairs in the wake of recent flood disasters have further strained local budgets. Towns have had to increase the resiliency of their infrastructure at a pace and cost that outstripped local capital budget planning.

Aging Roadways and Infrastructure

Many of the Region's roadways date back to the 1970s, including many of the Region's bridges. Currently, many of the roads and bridges are aging and require investment, while traffic volumes and vehicle miles traveled continue to increase. Maintaining the roads and bridges in safe and passable condition is essential for the safety of residents and economic health of the Region. Maintenance of the existing highway infrastructure is prioritized over the construction of new roads for added capacity. In the interest of

safety and environmental resilience, significant investments are required to improve what is, in some instances, crumbling infrastructure.

Habitat and Farmland Protection

Roadways can have detrimental effects on recreational activities, wildlife migration, and natural resource conservation by fragmenting or marring our landscapes and natural communities. Road projects may have the net effect of destroying or hampering habitats that provide key ecosystem services (such as wetlands).

Air and Water Quality

Impervious surfaces; undersized, blocked, or failing culverts; improperly designed or nonexistent roadway ditches; road salt, brine, and sand usage; and the release of petroleum and other chemicals into the environment from vehicular travel have a direct impact on our Region's air and water. These issues can have repercussions for the overall health and well-being of residents, causing illness and disease while also exacerbating climate change impacts.

Public Health

Driving is an inherently sedentary activity. For many, if not most, it is the most common means of travel to work, school, activities, shopping, and other routine needs. An increased reliance on this mode of travel often comes at the expense of physical activity. Land use patterns that emphasize smart growth principles around compact town and village centers with pedestrian and bike opportunities, in contrast, promote healthy habits.

Community

Time spent traveling, be it for a routine commute, shopping trip, or other journey, detracts from investments in personal social interactions. Time spent away from family, friends, and neighbors is time that could otherwise be utilized to improve an individual's connection to—and sense of—community.

Demographic Shifts

According to U.S. Census figures for 2010, the portion of the Region's population aged 65 or older is 18.4 percent. This number is set to climb appreciably in coming years, and the Region has to consider the distinct needs of this age bracket when adopting transportation policies. Ensuring that the elderly population has safe access to and within town and village centers as well as regional growth centers is imperative as their mobility likely declines. (These safe access needs can be echoed for the Region's youth population, though for different reasons.) Well-maintained, well-lit sidewalks, improvements to road signage visibility, and improved regional transit opportunities are key ways to ensure that elderly residents are afforded a chance to age in place. Strengthening the Region's multi-modal transportation networks may also help to attract and retain younger residents.

Access

Some segments of the population find that access to transportation is difficult within our predominantly rural region. Those who are under legal driving age, those who cannot afford the costs of vehicle ownership and maintenance, the disabled, the elderly, and others may find it hard to find safe, affordable transportation options within their towns.

Housing

Housing affordability and availability have pushed residents farther from historical downtowns and job centers in recent decades, increasing reliance on vehicular travel. While housing in areas outside of town centers may, on the surface, appear more affordable to residents, it belies the fact that this increased distance from work, retail, and recreational opportunities often increases costs of living significantly compared with in-town housing opportunities due to increased travel expenses. Average transportation costs in Orange and Windsor Counties are 26 percent of annual median household income ($14,233), nearly as much as housing costs (30 percent of annual median household income). Transportation costs are considered affordable if they do not exceed 15 percent of a household's

annual income.[5] And sprawl doesn't just hurt household budgets; it also negatively impacts the economic health of our Region's villages and community centers.

Energy

As of 2016, transportation continues to be the chief source (43%) of greenhouse gas emissions in Vermont,[6] and consequently remains a major focus in statewide planning for climate change mitigation. (For further discussion of climate change, see the Energy chapter.) Current transportation trends in the Region are heavily skewed toward reliance on fossil fuels.[7] Increasing the number of fuel-efficient and electric vehicles on the road is a critical step toward divesting from fossil fuel intensive technologies and achieving statewide energy and emissions goals. It is also imperative to improve transit and other multi-modal opportunities. Freight and passenger rail, both underutilized statewide, could, for example, receive investments to promote alternative transportation opportunities to residents to decrease this dependence as much as public bus, trail, and sidewalk improvements will.

Costs

As mentioned in the beginning of this chapter, our transportation system is not just a system of highways; it is literally everything that allows us to move around, from our feet to airplanes, from roads to rails. Its costs are the costs to build and maintain the network of roads, rails, airlines, trails, sidewalks, and bike lanes; the costs to purchase and operate (including fuel, repair, and insurance) all of the vehicles that use this system; and the costs that we often don't pay (but that are real costs) of the pollution, road kill, and other impacts of all of the ways that we get around.

We do not have a very good idea of the total sum of these costs, nor do we understand the impacts of these costs yet. Transportation is often the largest cost a family faces after housing, and we pay a particularly heavy price for the convenience of automobile travel. There are tens of thousands of vehicles in the Region that easily cost over a billion dollars to buy and tens of millions of dollars to operate every year, and yet the average vehicle sits idle for the majority of the day. Our road network cost us billions to construct and costs us many millions to maintain every year; most of this is funded by the state and federal government. Town highway expenses are typically the second largest local expenditure after school budgets, averaging several thousand dollars per mile to maintain. Local road salt alone can cost one to two million dollars per year. When floods come, the repair costs are largely due to road and bridge damages.

A list of the Region's priority infrastructure projects, along with costs and potential funding sources, can be found in Appendix E.

Willard Bridge, Hartland | *© John Knox*

Goal, Policies, and Recommendations: **Overall Transportation**

Goal

1. Our transportation system's costs are sustainably funded, including costs to remediate impacts.

Policies

1. Construction design, maintenance initiatives, or policies that help to minimize costs of maintaining state and local road networks are necessary.
2. Towns and the State must build roads to withstand or avoid future flooding.

Recommendations

1. TRORC will assist towns to develop capital improvement plans that address paved and gravel road maintenance costs.
2. Towns and the State should maintain roads and bridges in good condition and must design new transportation facilities to be flood resilient.
3. Towns should consider options to reduce winter maintenance costs, including, but not limited to, downgrading winter road maintenance policies combined with a public information campaign to alter traveler expectations of snow removal.
4. Towns should identify dead-end Class 3 town roads that serve few structures and consider reclassification to Class 4 to reduce town expenses.
5. Towns should identify any local bridges that are redundant and can be abandoned or removed, or that need not be rebuilt if destroyed.
6. TRORC will support efforts to better estimate the full cost of the transportation system.
7. TRORC will support regional coordination efforts by transit providers to achieve cost efficiencies, provided that services are not negatively affected.
8. TRORC should look into developing a capital budget for the Region.

D. Land Use and Transportation: Overview

Settlement patterns and transportation systems interact in ways that profoundly influence the well-being of our communities and the natural environment, so they must be closely coordinated. The consequences of unplanned development can be costly and long lasting. Development that does not take into consideration its impact on existing or future transportation systems can strain municipal budgets; reduce communities' resiliency to natural hazards; trigger long-lasting changes in the character of our communities; or degrade livability by creating noise pollution, safety hazards, visual blight, or barriers to passage or access. Likewise, expansions of or changes to our transportation systems must be context-sensitive to minimize harmful impacts and maximize beneficial impacts to the communities, human and natural, that they traverse. This section broadly outlines the relationships between land use and transportation; for more detailed discussion of current and prospective development, refer to the Land Use chapter of this Regional Plan.

Historical Overview

Improvements in Vermont's road system, particularly after the flood of 1927, were vital to the continued growth and development of Vermont's villages. Use of the automobile further cemented Vermont's position as a tourist destination; where before tourists who arrived by train were forced to hire transport to reach other destinations in Vermont, now they could travel freely. But it was not until the late 1960s, when Interstates 89 and 91 were completed, that Vermont became truly auto-accessible. The interstates brought the benefits of fast-moving transport, but they also destroyed some historic

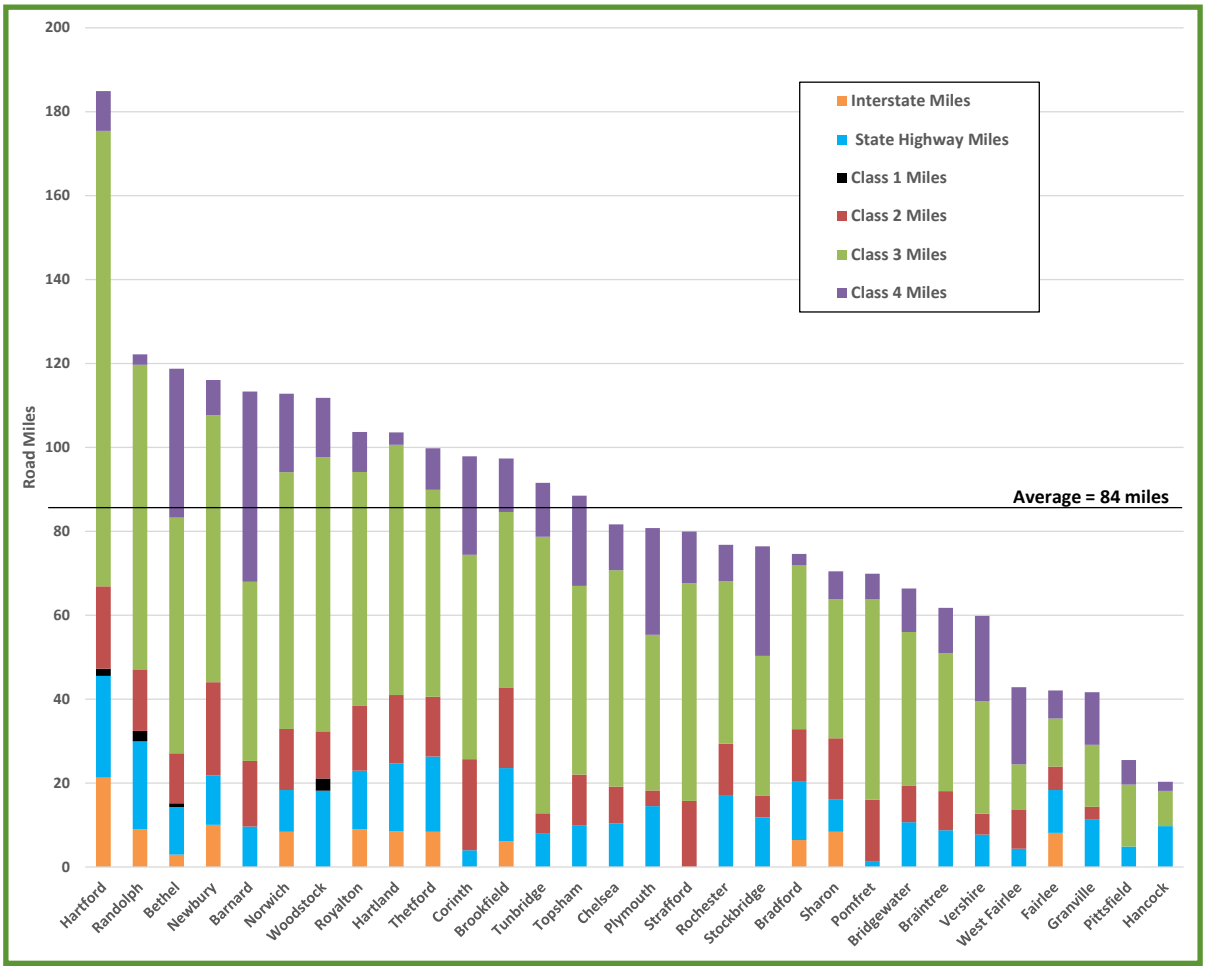
resources and physically divided some towns, creating a distinct separation between their villages and the rest of the community.

Current Land Use and Transportation

The TRO Region contains a number of key transportation corridors, including Interstates 89 and 91 as well as several state routes that are utilized for statewide trucking. In addition, our communities have extensive road networks of their own, with each town averaging roughly 84 miles of roads (see Figure 4-1). Most of the traffic generated by any given community involves residents driving to and from work. The bulk of residential development in our towns is located outside of village areas on rural roads, which increases the need for roads and road improvements. In response, some communities have instituted policies that restrict the construction of new public roads or that require private construction, improvement, or maintenance of roads serving certain development projects. It is not uncommon, though, for residents on a private road to eventually request that the municipality take over the road. Even without taking on new roads, additional traffic on small Class 3 roads can lead to costly upgrades to widen the road or make it a passable school bus route.

Twenty-three communities in TRORC's 30-town Region have some form of land use regulations, not counting flood regulations. While the towns with land use regulations control rural density to some extent, many of them do so in

Figure 4-1: Road Miles by Town



Source: TRORC

a manner that still allows a substantial amount of development outside villages and away from major transportation corridors. Vermont law requires local zoning to be consistent with the Town Plan, but there is no enforcement mechanism to ensure this happens.

The relationship between transportation and land use is especially evident in the TRO Region's interstate Interchange Areas. These areas are often magnets for development due to their high traffic volumes and easy access to the interstate highways, and can therefore compete with traditional villages and downtowns in Vermont. It is important to protect the aesthetic and natural resources of the land around interchanges and the economic and cultural viability of traditional village and town centers.

Future Land Use and Transportation

The complex relationships between land use and transportation need to be addressed through context-sensitive design of transportation infrastructure. Context-sensitive design entails comprehensive consideration of all the ways that a community relates to and is affected by transportation infrastructure, which go far beyond the fundamental goals of mobility and accessibility to include safety, environment, aesthetics, history, culture, and other community values. Ensuring that infrastructure is well integrated into its community context requires meaningful local participation in decision-making processes.[8] Context-sensitive design is supported by the goals, policies, and recommendations outlined throughout this Regional Plan, not exclusively in the Transportation and Land Use chapters. For example, the Natural Resources chapter discusses minimizing habitat fragmentation by roads, and the Historical, Cultural, Archeological, and Scenic Resources chapter addresses the preservation of scenic landscapes visible from public transportation corridors.

To ensure a future in which greenhouse gas emissions are reduced and the transportation system is safe, efficient, and economically sustainable, regional and municipal land use planning will need to encourage higher density development, particularly residential development, within villages and community centers. Possible approaches include raising permitted development heights and reducing parking requirements. Within growth centers, commercial development that requires trucking should be located adjacent to major roads to reduce the need for additional investments in transportation infrastructure and to reduce the

Hartford I-91 Bridge | *© EIV Technical Services*

potential for vehicle and multi-modal conflicts. That said, the task of increasing density in growth centers is challenged by the lack of municipal water and sewer infrastructure in many towns.

In Interchange Areas, many of the uses associated with serving travelers are also associated with the creation of sprawl or strip development. Development in these areas must therefore be controlled in accordance with the use descriptions detailed in the Land Use chapter of this Regional Plan. Transportation systems within Interchange Areas should focus on traffic and pedestrian safety, public transportation, and access management.

For development proposals that trigger Act 250 (10 VSA §6086) review, conformity with regional and municipal land use plans is considered under Criterion 10. Potential impacts on transportation facilities and systems—including bicycle, pedestrian, and transit access—are evaluated under Criteria 5 and 9K. This analysis is particularly important with large-scale developments, such as ski areas or retail shopping centers that are pulling from a regional customer base. Developments that are of a substantially larger scale than is common within our Region can have a considerable impact on existing facilities and infrastructure. The Implementation chapter of this Plan identifies those transportation impacts that meet TRORC's "substantial regional impact" definition for the purposes of Act 250 review.

Many large-scale developments are not completed in a single construction event. Generally, these types of developments are phased in or built over a number of years. Potentially negative impacts from large-scale phased-in development are challenging to identify based on the plans submitted during the Act 250 permit process. Therefore, it is common practice for developers to be required to conduct transportation impact studies through each phase of development until the ultimate project is completed. If a developer seeks, or a District Environmental Commission requires, a Master Plan permit, then transportation impact studies must be included in the permit application.

Goals, Policies, and Recommendations: **Land Use and Transportation**

Goals

1. The Region's transportation system is well integrated with current and future land uses of the communities in the Region, maintaining and enhancing the character of our downtowns, villages, hamlets, and rural areas.
2. Land uses appropriate to the unique circumstances of each Interchange Area (consistent with more detailed use descriptions in the Land Use chapter) are built in a manner that protects public safety and discourages strip development and sprawl, especially in rural areas.
3. The Region's transportation infrastructure is adequately funded, well-designed, well-maintained, and well-constructed.

Policies

1. Transportation infrastructure must be context-sensitive to surrounding development. Road and vehicle impacts should be ameliorated through context-sensitive solutions, signage, safety improvements, improved streetscapes, and design that fit the adjacent landscape.
2. Development that creates land use patterns associated with strip development and sprawl, especially in rural areas, are not consistent with this Plan.
3. High density development should be concentrated in areas served by public transportation in order to support reduction of single-occupant vehicle trips and associated greenhouse gas emissions.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Land Use and Transportation**

Policies (continued)

4. New development shall not significantly degrade the functionality (level of service) or safety, nor cause unreasonable congestion, of existing transportation infrastructure. Development that generates a substantial amount of truck traffic is only appropriate within Regional and Town Centers if it does not put an undue burden on traffic safety or the character of the area. Development that generates a substantial amount of truck traffic is only appropriate in rural areas that are immediately adjacent to Regional Growth Areas (as defined by this Plan), and only if existing infrastructure is sufficient to maintain traffic safety and rural character.
5. High density development, including residential subdivisions or multi-family housing, is not appropriate for rural areas if it results in a degradation of the roadway level of service (LOS) to D or worse. If the impact is LOS C or better, a traffic study may be required.
6. Transportation projects in Rural Areas should not focus on expanding or adding additional roads. Instead, the focus should be on improving existing infrastructure for safety and flood resiliency.
7. Commercial uses that generate a substantial amount of truck traffic, such as trucking terminals and manufacturing, are appropriate in those Interchange Areas that are not located within the Regional Center, consistent with more detailed use descriptions in the Land Use chapter.
8. Public and private transportation infrastructure investments in Interchange Areas are not appropriate if they encourage development that will have the effect of eroding the economic vitality and quality of life of the Regional Center.
9. Development within Interchange Areas shall utilize internal circulation systems that are conducive to multi-modal forms of transportation and shall be designed to share access points, reducing the potential for vehicle conflicts with main highways.
10. Large-scale developments that meet this Plan's definition of "substantial regional impact," whether they are located within the TRO Region or in a neighboring region, shall include transportation impact studies for each phase of development and shall mitigate any impacts identified as part of their permit.
11. Ski area development or other large-scale phased development shall be reviewed by the District Environmental Commission under the Master Plan permitting provisions of Natural Resources Board Rule 21.

Recommendations

1. TRORC will continue to review and participate in Act 250 permit proceedings.
2. TRORC will continue to work with towns to ensure Town Plans are consistent with the Regional Plan and state policy.
3. TRORC will work with towns and the Vermont Agency of Transportation to achieve context-sensitive solutions that enhance historic, scenic, and agricultural properties of roadways consistent with public safety through transparent public processes and project development.
4. The Natural Resources Board must revise Act 250 rules regarding Master Plans to make Master Plans a mandatory requirement for large-scale, multi-phase developments that have the potential for substantial regional impact.
5. TRORC shall support efforts to develop context-sensitive municipal parking facilities in Regional and Town Centers.
6. TRORC will encourage communities to develop land use regulations that promote reduced density in Rural Areas consistent with state planning law.
7. TRORC will seek out new ways its municipalities can approach issues of density in Rural Areas.
8. TRORC will update this Transportation chapter to coincide with any future updates to the Land Use chapter.

E. Housing and Transportation

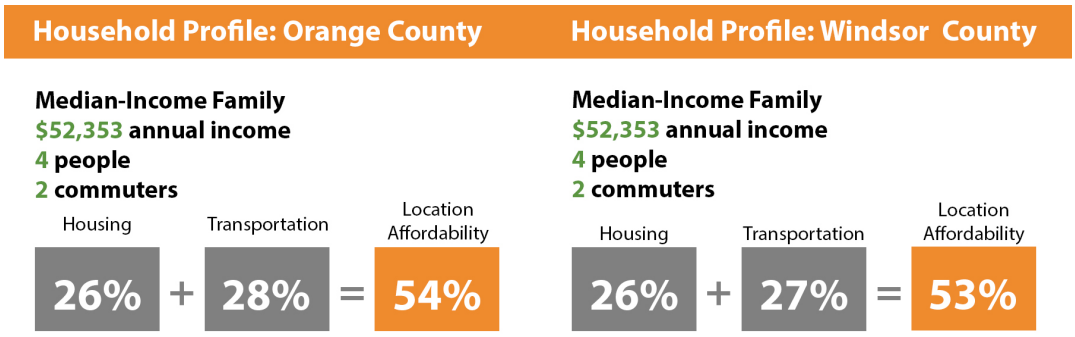
The housing market is costly and tight for residents to live affordably, particularly for the elderly population and those in need of workforce housing (largely those who are in the low- to moderate-income brackets).

New, rehabilitated, and infill housing opportunities should be located near—and supported by—regional transportation opportunities (both roadways and regional public transit) that provide access to growth centers, where jobs and retail shopping opportunities are most abundant. Housing should be accessible to town and village centers (per our historic settlement patterns). Encouraging housing growth along bike lanes, trails, sidewalks, and other access routes leading to local shops and services supports physically healthy and economically vibrant communities while also creating communities that are attractive from an in-migration perspective.

Traditional housing affordability numbers look just at the cost of the housing itself. Transportation costs are not included, yet these costs are heavily reliant on housing according to the Center for Neighborhood Technology. The Housing and Transportation (H+T®) Affordability Index combines both housing and transportation costs in an effort to present a more complete view of neighborhood affordability. Typically housing affordability is capped at 30 percent of household income; the H+T Index adds in 15 percent of income for transportation to set a combined affordability threshold of 45 percent of household income. According to the 2017 H+T Affordability Index, all towns within the Region exceed the 45 percent affordability threshold.[9] (Figure 4-2 demonstrates H+T Affordability for Orange and Windsor Counties.)

Places that are compact, are close to jobs and services, and offer transportation choices allow people to spend less time, energy, and money on transportation.

Figure 4-2: Location Affordability Index: Orange and Windsor Counties



Housing and Transportation should not exceed a combined 45% of household income.

Source: H+T® Affordability Index

Goals, Policies, and Recommendations: **Housing and Transportation**

Goals

1. Housing growth is largely located in areas served by transit services or within walking or biking distance to jobs and services.
2. All dense residential areas have transportation options beyond a single-occupant vehicle.

Policies

1. Housing developments' locations must be seen within a transportation context.
2. New housing developments that trigger Act 250 must minimize reliance on single-occupant vehicles as the sole means to access jobs and services by locating close enough to these areas, along transit routes, or through provisions that increase carpooling or additional transit.
3. Multi-unit housing developers shall be required in Act 250 to coordinate with public transit agencies prior to construction to seek input on potential transit service access.
4. Multi-unit housing development proposals alongside roads will include sidewalks, or their proportional cost of such, connecting the development to the main road when sidewalks are present and distances are such that walking is a viable option.
5. New affordable housing and assisted living facilities shall provide a mobility plan that evaluates mobility needs of residents and how they will be met.

Recommendations

1. TRORC will work with housing providers and developers to ensure that new multi-family housing, assisted living facilities, and health and human service facilities be located in close proximity to services in village and regional growth centers and along public transportation fixed routes.
2. TRORC will work with member towns during plan and bylaw revisions to further connect housing needs to transportation system efficiency, reducing the need to travel solely by car and increasing access to goods and services.

F. Environmental Considerations and Transportation

Flooding and Resiliency

In August 2011, Tropical Storm Irene impacted most of the towns in the TRO Region, isolating several for days. With bridges washed out, roads gone, homes taken downstream, and culverts squashed, the Region's transportation infrastructure was turned upside down. Post-Irene efforts to repair the infrastructure directly relate to mitigating damages when the next disaster hits. Hazard mitigation techniques have included upsizing culverts and lengthening bridges based on stream hydraulic studies, as well as improved bank stabilization. Climate change is expected to bring more frequent heavy rainfall events, increasing the risk of flooding.[10] Planning, not only for the next federally declared disaster but also for any upcoming extreme weather event, will require learning from past hazard events and continued coordination between the towns, TRORC, and state and federal agencies.

Not all impacts can be controlled, but there are mitigation strategies that TRORC can help implement. Funding has been the primary limiting factor. Replacing deficient culverts and bridges carries the greatest potential for addressing water quality; appropriately designed and scaled structures can handle flood events and stormwater runoff, promote fish passage, and minimize the discharge of road sediment. These upgraded culverts and bridges, operating in greater harmony with the natural environment, will also be less likely to fail during storm events. This is a particular concern as officials from the Agency of Natural Resources (ANR) and VTrans plan for the possibility of another storm event

equivalent to the 1927 flood. This has been illustrated in recent years as adjacent regions have suffered infrastructure damage and loss of life during flood events.

Ensuring that infrastructural concerns that arose from Irene and ensuing events are addressed is key to improving regional transportation resiliency; however, it is necessary to also consider the lay of the land in general terms and how to prevent growth that encroaches upon fluvial erosion hazard areas. Using river corridor maps provided by ANR, we can more readily discern the areas that ought to be avoided or where transportation infrastructure and roadway growth should be limited so as to not exacerbate the damage caused to life and property during flood events. Many towns have already or may be considering the downgrading or relocation of existing roadways to promote resilience. These efforts serve to improve public safety as well as to restore and protect our waterways and habitat for the public benefit and overall ecosystem health.

Flood Damage of the Lilliesville Road Bridge in Stockbridge in April 2019 | *Source: TRORC Staff*

Wildlife

Our transportation system impacts wildlife directly through vehicle strikes that lead to animal injury or death, as well as through less direct means. Vehicles generate air pollution harmful to adjacent vegetation. Transportation is one of the major sources of greenhouse gas emissions that are changing the climate. (In turn, climate change is shifting habitats northward or to higher altitudes and increasing flood frequency, straining plant and animal communities.). Road salt browns nearby plants. Roads have fragmented forests and fields, encouraging the spread of invasive species, creating barriers to smaller animals, and stressing organisms that require large continuous habitat blocks. Undersized or poorly placed bridges and culverts block aquatic and amphibious passage, reducing habitat or reproduction. Policies and recommendations to address these issues in addition to those below can be found in the Land Use chapter.

Stormwater

Stormwater, more so than piped discharges, is a major contributor to sediment and nutrient loading in the Region. Transportation facilities such as roads and parking lots create enormous amounts of impervious surface, nearly all of which was built before stormwater runoff standards were in place. These facilities generate swift-moving stormwater runoff that carries pollution and exacerbates flood risk. Runoff from paved areas contains nutrients, oils, silt, salt, and heavy metals. Evaluating the full effect of existing and proposed transportation facilities and working to install detention areas or other measures will reduce both flood peaks and water pollution.

As of July 1, 2017, per requirements of Act 64 and the Vermont Clean Water Act, municipalities are required to apply for the Municipal Roads General Permit coverage on all town roads. The Municipal Roads General Permit is intended to achieve significant reductions in stormwater-

related erosion from municipal roads, both paved and unpaved. Each municipality will implement a customized, multi-year plan to stabilize their road drainage system. The plan will include bringing road drainage systems up to basic maintenance standards as well as additional corrective measures to increase infiltration into soil and reduce erosion as necessary to meet a total maximum daily load (TMDL) or other water quality restoration effort.

Energy

The state's Comprehensive Energy Plan seeks to reduce Vermont's total transportation energy use by 20 percent from 2015 levels by 2025. A number of regional targets have been extrapolated from statewide goals, and these are outlined in TRORC's *Regional Energy Implementation Plan*. They include capping vehicle miles traveled per person, reducing the number of single-occupant vehicle trips, increasing the number of park and ride spaces, boosting transit ridership, and growing the fleet of electric vehicles on the road.

The Region has been making strides toward reducing its transportation energy usage. Hybrid buses have been introduced into Advance Transit's fleet, and track upgrades have improved the fuel efficiency of the Amtrak "Vermonter" passenger rail service. Park and ride lots continue to be built and expanded throughout the Region, and some are outfitted with electric vehicle charging stations. Some employers offer van services or incentives for carpooling or transit to reduce their employees' single-occupant vehicle trips. Nevertheless, significant changes in our transportation systems are still needed if the Region is to meet its targets. Meeting the regional target for electric vehicle fleet growth (82 percent of all cars by 2050) will be a particular challenge; the Region currently lacks sufficient charging station infrastructure to support consumers in making the transition.

The goals, policies, and recommendations in this chapter are consistent with TRORC's *Regional Energy Implementation Plan*, and are complemented by policies and actions outlined in the Land Use and Energy chapters of this Regional Plan.

Goals, Policies, and Recommendations: **Environmental Considerations**

Goals

1. The Region's transportation system is resilient to natural hazards and respects quality of life and environmental considerations.
2. Transportation development activities avoid adverse impacts to biodiversity and ecosystem function while also minimizing greenhouse gas emissions and water pollution.
3. Built infrastructure and roadways support the function and health of wildlife habitats and landscapes.
4. Roadway extensions avoid encroaching on conservation and resource areas.

Policies

1. New road systems, or expansions of existing systems, should avoid fragmentation of large blocks of land and shall not adversely affect critical wildlife habitat.
2. Where permitted, transportation development must be planned to minimize reduction of the resource value of forest and farmlands by furthering reasonable population densities, using cluster development, and ensuring that new community planning economizes on the costs of roads, utilities, and land usage.
3. Major highways should minimize barriers to movement of wildlife, terrestrial or aquatic, especially in high priority wildlife crossings (as mapped by the Vermont Agency of Natural Resources), through more wildlife-friendly culverts, bridges, railings, and signage designed to avoid collisions.

Goals, policies, and recommendations continued on next page

Goals, Policies, and Recommendations: **Environmental Considerations**

Policies (continued)

4. Efforts to reduce total vehicle miles traveled and vehicle emissions are encouraged.
5. Future road and parking development shall not adversely affect flooding, and opportunities to reduce flood flows from existing pavement and gravel roads are encouraged. However, in certain cases, transportation infrastructure developments within the floodway shall be allowed where there is a benefit to health, safety, or transportation.
6. New construction, upgrades, and maintenance should maximize resiliency to natural hazards.
7. It is the policy of this Regional Plan to require that developments subject to Act 250 should demonstrate that they have taken or will take reasonable steps to incorporate parking spots with electric vehicle charging stations.

Recommendations

1. The Vermont Agency of Transportation and TRORC's Transportation Advisory Committee will work to reduce wildlife crossing collisions through improved signage and wildlife passage facilities.
2. TRORC will work with local highway departments as requested to assist with compliance with the Municipal Roads General Permit to minimize stormwater runoff, minimize road/river conflicts, and minimize roadway erosion.
3. Towns should consider minimizing the use of impervious surfaces for parking through shared parking, reduced parking requirements when supported by data, or phased parking development when demand arises.
4. The Vermont Agency of Transportation, FEMA, ANR, the Vermont Department of Public Safety, and others involved in flood recovery should address wildlife and aquatic passage needs in new construction and upgrades of bridges and culverts when feasible.
5. TRORC will pursue funding opportunities to advance the planning and construction of projects that preserve or enhance water quality.
6. TRORC shall encourage agricultural and silvicultural businesses to use required or best management practices that minimize damage to roadways, land, and waterways.
7. With support from the State, TRORC will work with towns to implement the strategies and actions outlined in the *Regional Energy Implementation Plan*, thereby helping to shift the Region to more energy efficient and less polluting transportation systems.
8. Towns should track damages to highways during all hazard events.

G. Economic Development and Transportation

As previously mentioned, tourism is a critical sector of Vermont's economy, bringing in nearly $3 million in 2017. Visitors arrive by car, air (at the Lebanon Municipal Airport in neighboring New Hampshire or the private airport in Post Mills, Thetford), rail, bus, bike, or even on foot via long-distance hiking trails. Vermont is expected to see continued growth in tourism,[11] and the TRO Region in particular has many recreational assets that visitors will seek to access. As cars are the primary mode by which visitors access the Region, maintaining and improving the road network is an important investment in the regional economy.

The Region's transportation infrastructure must strike a balance between facilitating public access to its recreational resources and maintaining and enhancing the character of those resources and surrounding communities. This is particularly true of outdoor recreational assets. The public can find information about state owned and managed lands, including information about how to access these lands, on the Vermont Fish & Wildlife Department's website.[12] TRORC supports

the development of transportation infrastructure that improves public access to noncommercial outdoor recreational opportunities. For example, TRORC has assisted with planning efforts for the proposed Velomont Trail, a multi-use 130-mile mountain bike trail along the Green Mountains through the entire state. TRORC has also lent support through grant assistance to and participation in town projects that create and improve bicycle and pedestrian access to local trails.

Goal, Policies, and Recommendations: **Economic Development and Transportation**

Goals

1. The Region's transportation system facilitates a strong regional economy.

Policies

1. Public access to noncommercial outdoor recreational opportunities, such as lakes and hiking trails, should be provided and protected wherever appropriate.
2. Transportation facilities should be developed and maintained in a manner that supports the tourism economy, while maintaining and enhancing the character of the Region's communities and protecting important natural and historic features of the Vermont landscape.

Recommendations

1. TRORC will continue to assist towns with their efforts to improve public access to outdoor recreational opportunities, while ensuring consistency with local and regional land use plans.
2. TRORC will continue to ensure that regional transportation planning activities are integrated with land use planning and economic development planning efforts.

H. Health

As stated in Chapter 2 (Healthy Communities) of this

, increasing transit access is a key strategy for creating healthy communities. The availability of transit services can impact whether or not some community members are able to access medical care. It is also important to expand the Region's network of infrastructure for pedestrians and cyclists, which is currently limited and often requires access by personal automobile. Improvements in these areas can be achieved through the Complete Streets program, especially in downtowns, where the need is greatest. It has been proven that the implementation of such projects promotes healthier lifestyles. In our Region, it is imperative that these systems are designed to be accessible to the elderly, youth, and people with disabilities. The Region's priorities with respect to health and transportation are discussed further in the Healthy Communities chapter.

I. Mobility and Access

To move toward a more sustainable transportation system, we need to improve mobility and accessibility by expanding transportation options, changing land use patterns based on our new understanding of land use and transportation connections, increasing transit funding and services, and by building better infrastructure for safe walking and bicycling.

Mobility Status

A person's ability to effectively use the present transportation system significantly impacts their access to goods and services and consequently impacts their well-being. The present transport system in the Region is designed around the personal automobile; the inability to own or operate a vehicle severely limits an individual's mobility and thus their access to goods and services. Factors that affect mobility in the Region include age, disability status, and access to an automobile. The following is a list of demographic groups within the Region who are likely to have decreased mobility, along with their respective population shares according to the 2010 Decennial Census and the 2008-2012 American Community Survey:

- Children ages 15–19 (6.3% of the Region's population)
- Residents below the poverty line (10.6% of the Region's population)
- Disabled residents ages 18–64 (6.7% of the Region's population)
- Seniors ages 65+ (16% of the Region's population)
- Auto-less households (5.1% of the Region's households)

Because of their decreased ability to use a private vehicle to connect to goods and services, these groups are potentially more dependent on alternative forms of transportation such as public transit and ridesharing. They are consequently referred to as "transit-dependent populations." Examining the prevalence of transit-dependent populations within a town helps to shed light on that town's transit needs.

For the majority of towns, the transit-dependent demographic group that makes up the greatest share of the town population is seniors (ages 65+). However, in Bradford, Corinth, West Fairlee, and Royalton, residents below the poverty line are the largest transit-dependent group. In most (73.1%) of the towns where senior residents are the primary transit-dependent group, residents below the poverty line are the second-largest transit-dependent group. For transit-dependent demographic data by town, see Appendix A.

Although absolute numbers of transit-dependent residents can be used as a determinant of a town's transit needs, it is important to acknowledge that towns vary in the proportions of their populations that are transit dependent. Some towns in the Region have small numbers of potential riders but large percentages of their populations that are transit-dependent. For instance, Hancock had 323 residents in 2010, at least 20% of whom were transit-dependent. Despite offering relatively low numbers of potential transit riders, smaller towns still exhibit high need for public transit that might not be met if prioritization is based solely on potential ridership numbers. Taking into account the proportion of an individual town's population in need of transit services is an important step in increasing equity between towns.

There are limited data that shed light on the demographics of people who actually use local transit. Recent (2017) passenger surveys conducted by Advance Transit (as part of their Transit Development Plan update) and by Tri-Valley Transit suggest that lack of car access is a significant driver of local transit demand.[13]

With the exception of auto-less households, all of the aforementioned demographic groups are protected under various federal and state non-discrimination statutes and regulations. Through

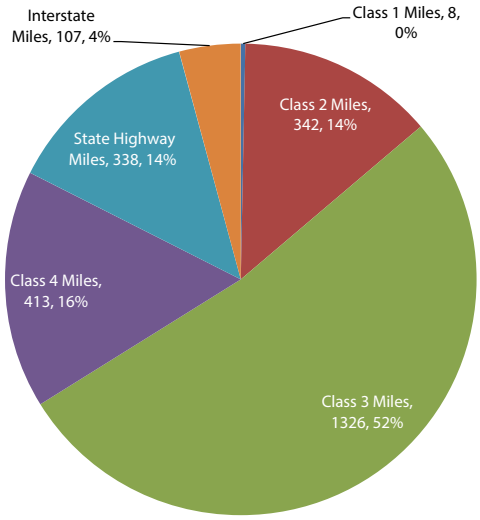
its Title VI Public Participation Plan, TRORC works to ensure that no members of protected groups are excluded from participation in, denied benefits of, or otherwise discriminated against under any of TRORC's programs or activities.

Driving

The Road Network

As roadways are the major transportation infrastructure in the Region, the population depends on and expects safe and good condition roads to get where they need to go in the Region. Figures 4-3 and 4-4 illustrate the various types of roads in the Region.

Figure 4-3: Road Miles in the TRO Region



Class 1:
Extension of a state highway, maintained by a town
Class 2:
Primary local roads
Class 3:
Minor local roads maintained year-round
Class 4:
Minor local roads not maintained year-round

Source: TRORC

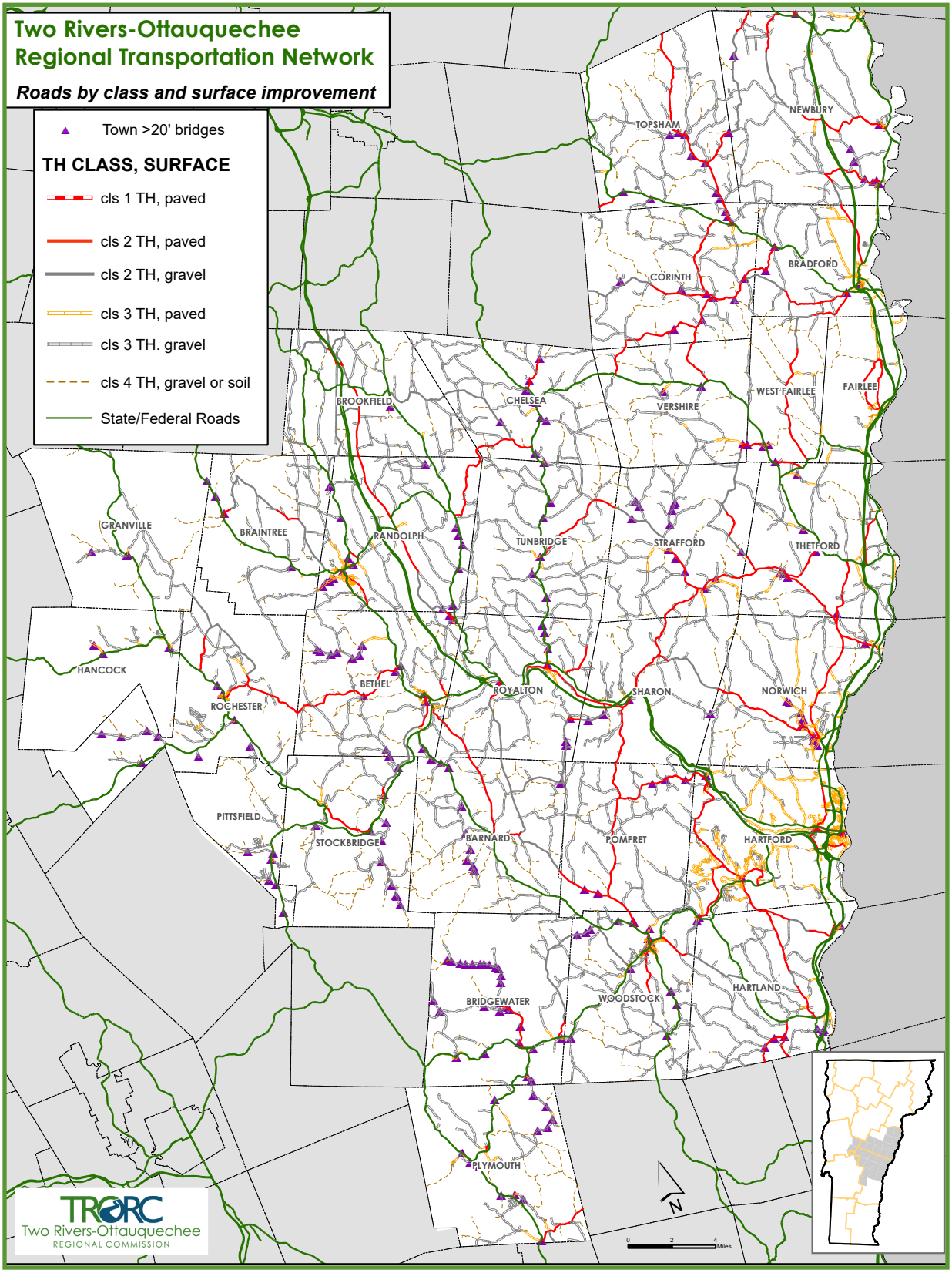
Of the state and federal highways in the Region, Interstates 89 and 91 carry the bulk of traffic (over 10,000 vehicles a day), followed by U.S. Route 4 and U.S. Route 5 (roughly 5,000 to 10,000 vehicles a day). The Region rarely encounters traffic congestion, even during peak hours. Population growth may exacerbate existing congestion along U.S. Route 5 in Hartford, VT-10A in Norwich, and the Route 4 corridor during peak hours (see Figure 4-5).[14]

In 2017, VTrans published pavement condition data for about 69 percent of federal and state highway miles in our Region. Approximately 16 percent of those miles were in Poor or Very Poor condition (see Figure 4-6).[15] There has been a concerted effort from VTrans to actively address poor pavement conditions, although demand continues to outstrip available funds for project implementation. Roads and bridges will be subjected to additional structural stress as climate change increases the frequency of extreme heat events in the Region.[16] At the municipal level, the high costs of building and maintaining local roads and related infrastructure can strain town budgets. Capital budget planning specifically for transportation facilities (including equipment) can help towns ensure they are maximizing the impact of their limited financial resources.

After obtaining adequate roadway funding, improving safety is the single greatest transportation issue for the Region. TRORC works with VTrans to reduce the Region's crashes through the state's Systemic Local Roads Safety Program. The program identifies and prioritizes safety risks on locally maintained roads traveled by fewer than 5,000 vehicles per day. VTrans addresses most risks through low-cost safety improvements (e.g., traffic signs or signals, centerline rumble strips, and pavement markings), though more significant construction may be undertaken in areas with high crash rates if needed. Summarizing the latest crash data received from January 1, 2012, to December 31, 2018 (5,149 records, mapped in Figure 4-7),[17] here are some interesting trends in the Region:

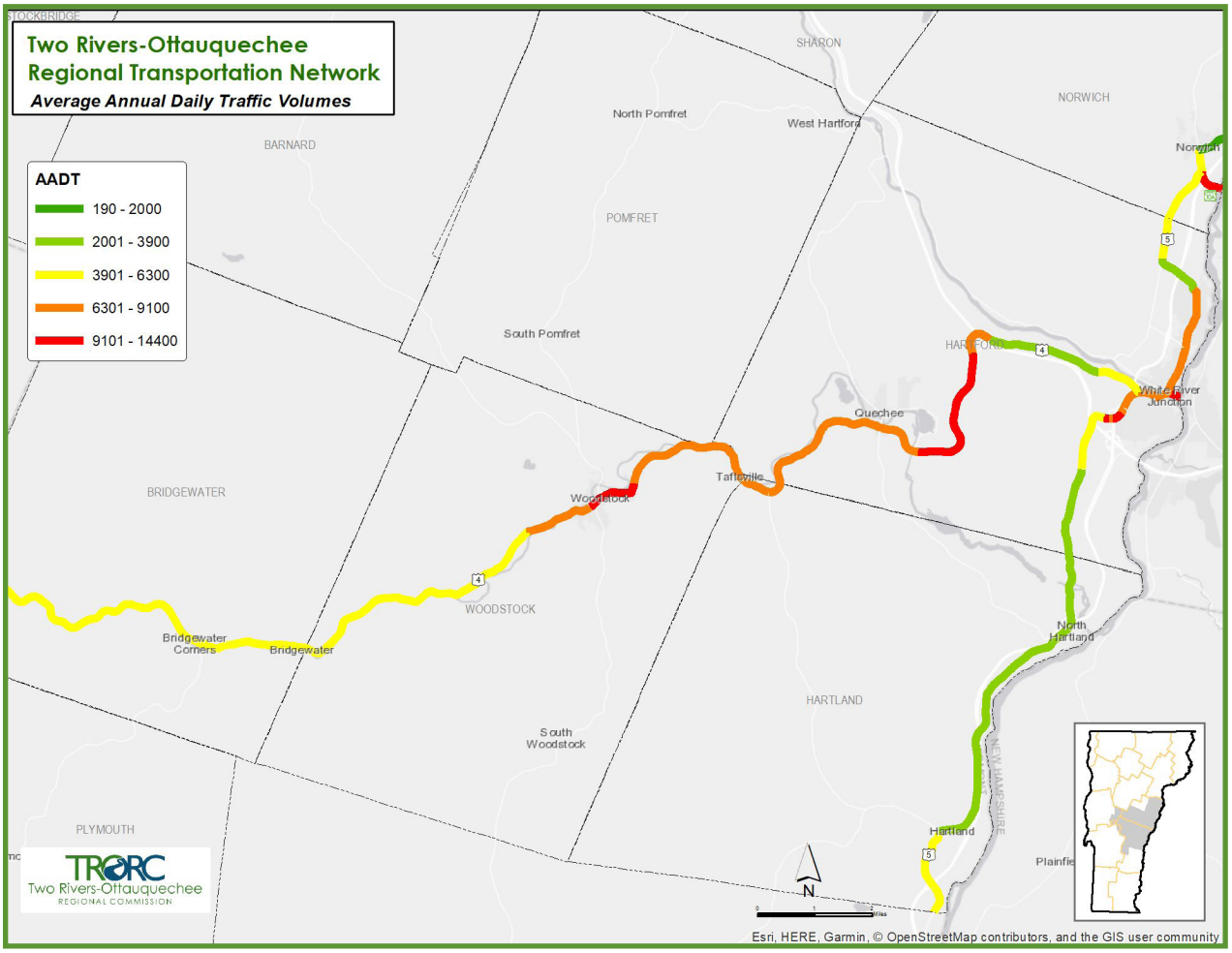
- The highest incidences of crashes are in

Figure 4-4: Regional Road Network



Source: TRORC

Figure 4-5: Average Annual Daily Traffic Volumes (2017) for Areas of Potential Future Congestion



Source: VTrans Traffic Research Unit

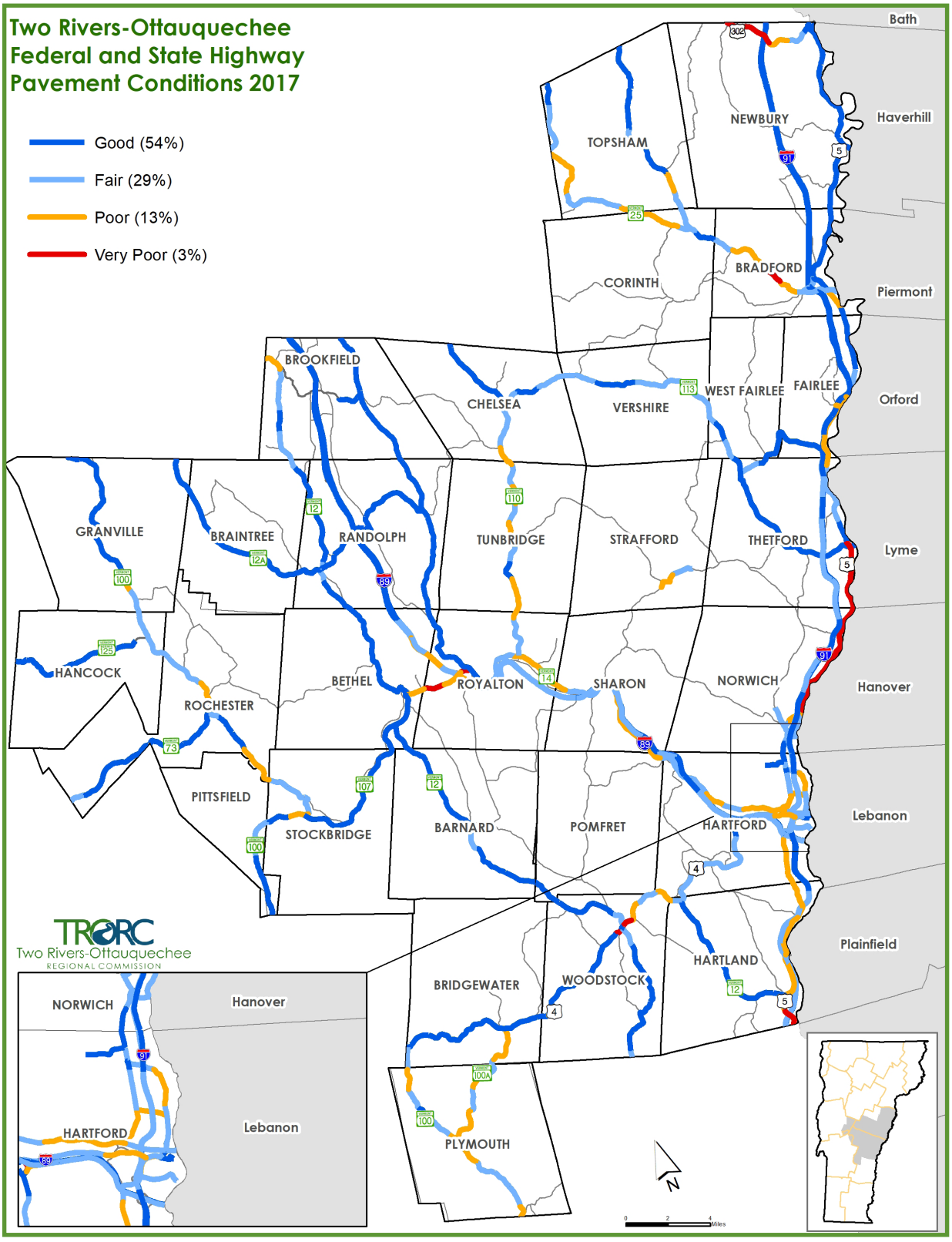
Hartford (26% of the Region's crashes), with the second highest in Randolph (7% of the Region's crashes).

- 53% of crashes result only in property damage, 19% result in injuries, and 0.5% result in fatalities. (By comparison, in the State as a whole, 70% of crashes resulted only in property damage, 17% in injuries, and 0.5% in fatalities.)
- 34% of total crashes involve only a single vehicle.

Scenic Byways and Routes

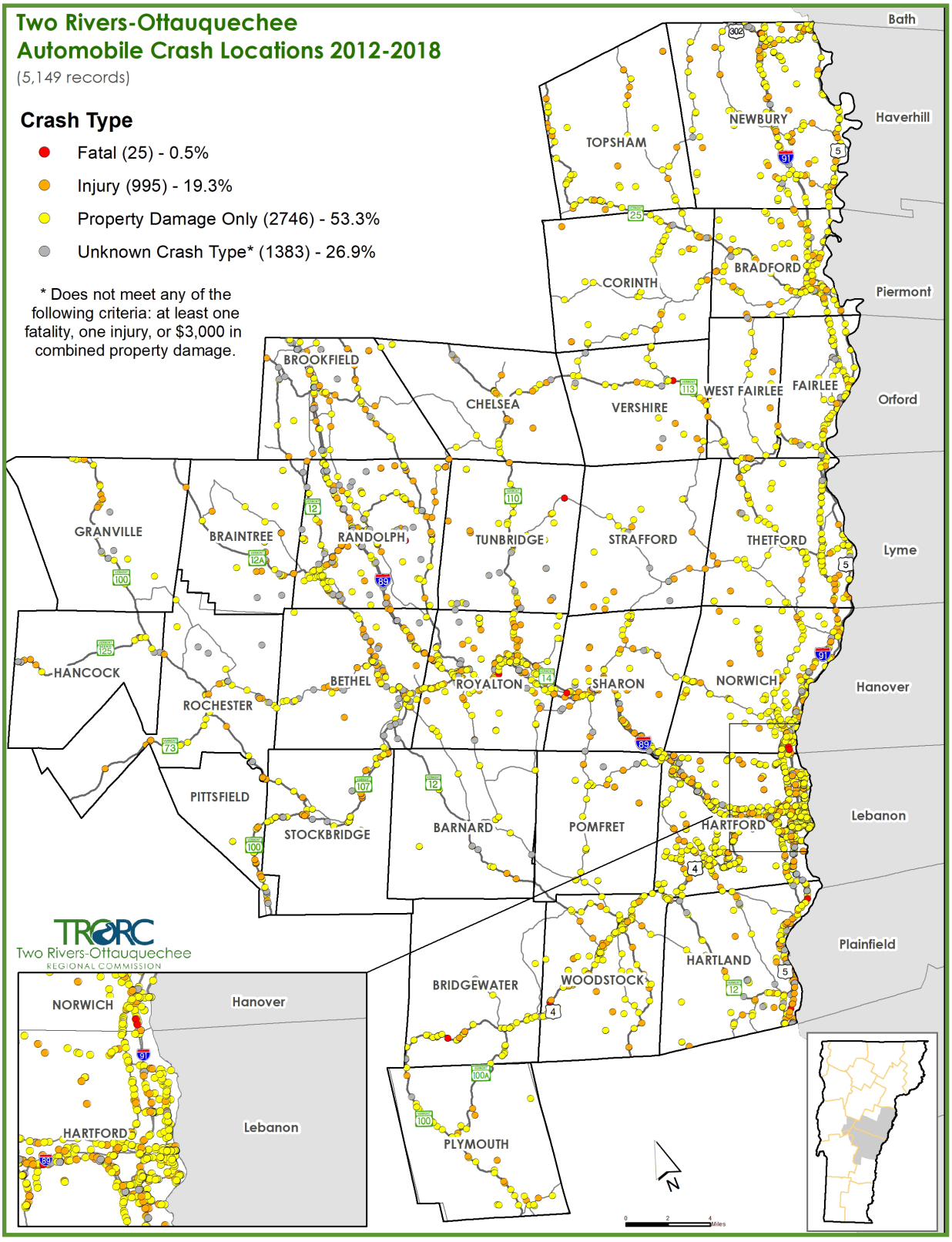
The National Scenic Byways program was established under federal transportation legislation in 1991 to help communities formalize corridors with outstanding scenic and heritage qualities. The Byways designation seeks to promote the scenic and historic nature of the road and the towns it passes through, but it does not restrict development in the corridor. Although the national program is no longer funded, there remain three designated Scenic Byways in the Region: the Connecticut River Scenic Byway, the Crossroad of Vermont (Route 4) Byway, and the Scenic Route 100 Byway. There is also one Vermont Scenic Road designated in the Region, the Route 125 Middlebury Gap Road. The Scenic Road designation places strict development restrictions on the road corridor to preserve the scenic nature of the road.[18] See Appendix B: Regional Special Road Designations.

Figure 4-6: Federal and State Highway Pavement Conditions



Source: TRORC

Figure 4-7: Rural Crash Locations 2012-2018



Source: TRORC

Goals, Policies, and Recommendations: **Driving**

Goals

1. There are reduced crashes resulting in injury and death.
2. Continued mobility on routes between settlement areas.

Policies

1. Continue partnerships with the Vermont Agency of Transportation's promotion of the "Towards Zero Deaths" mission.
2. Promote traffic calming projects for private development and for town and state roads that are located within Regional Growth Areas and/or have speeding related safety concerns.
3. Major traffic thoroughfares through Hamlet Areas should be planned or enhanced with traffic calming elements.
4. State transportation agencies should more actively apply pavement center line markings on state-controlled and Class 2 roadways. Fog line markings should be applied to all Class 1 and Class 2 paved roads.
5. Rumble strips should be integrated in state highway projects where appropriate.

Recommendations

1. TRORC will offer support to towns in capital budgeting for transportation facilities and related equipment.
2. TRORC will continue to work with towns to identify and address road safety risks through the Vermont Agency of Transportation's Systemic Local Roads Safety Program. Focus on roads that have development proposals and/or are expected to support increased development. If the State declares a road or intersection a high accident location, then conduct a road safety audit and advocate for those improvements to be implemented.
3. TRORC will continue conducting speed studies as requested by towns.
4. TRORC will work with towns to promote traffic calming, including development of road standards that promote traffic calming in private development.
5. TRORC will work with towns and Vermont Agency of Transportation to identify poor pavement conditions for improvement. TRORC will continue collaborating with Vermont Agency of Transportation on paving projects and district leveling prioritization.
6. TRORC will offer town support as needed as liaisons for Vermont Agency of Transportation projects.
7. VTrans should take over Route 132 as a state highway.

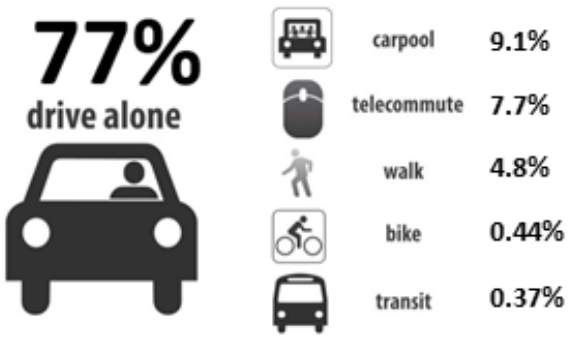
Transit

The mobility status assessment demonstrates the vital role that public transportation plays within the Region's transportation system. However, the rural character of the Region presents challenges for a traditional public transit system. Long distances between homes and employment centers strain commuter bus routes, while high transit dependency in low population density areas presents a uniquely rural challenge to the system. Furthermore, a culture of independence bred by a societal dependence on the private automobile inhibits usage of public transit because of its relative inconvenience. Figure 4-8 shows that a significant portion of commuters are still relying on driving alone to get to work. Currently, public transit provides less than 0.5 percent of the overall population with transport to work. Despite this adherence to single-occupant automobile travel, the Vermont Agency of Health and Human Services and the Vermont

Currently, public transit provides less than 0.5 percent of the overall population with transport to work.

Agency of Transportation have extensively studied public transportation usage and all projections indicate demand for these services will increase. Total ridership for the Region's two primary public transportation providers is displayed in Figure 4-9.[19]

Figure 4-8: Travel to Work Mode, Orange and Windsor Counties



Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

The Region has a number of public transportation services which are increasingly important to its transportation system. Fixed route services to the employment and commercial centers allow residents to work and shop. Transportation services for the elderly and disabled give alternatives to people who wish to live independently but who are less able to drive themselves. Figure 4-10 illustrates the transit network across the Region.

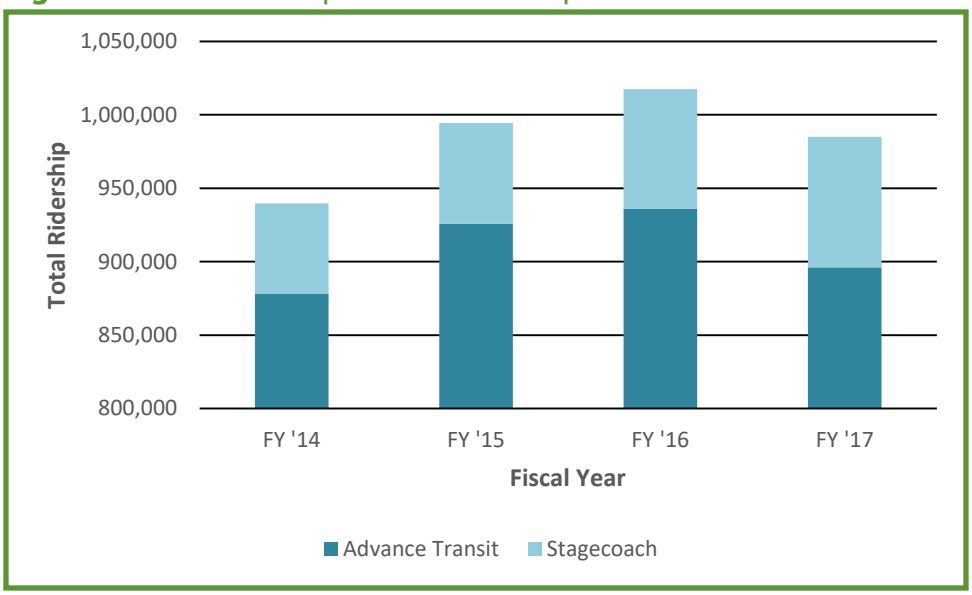
Regional Public Transportation Services

TRORC has consistently supported public transportation through planning, participation on committees, grant writing, and appropriating funds for marketing and planning services. The Region depends on two public transportation providers: Stagecoach Transportation Services and Advance Transit. These two agencies are recognized by the State to provide public transportation services within the Region.

Stagecoach and Advance Transit both operate fixed route commuter buses in the Region. Stagecoach serves three corridors with their fixed routes, connecting passengers to employment. On the I-89 corridor, passengers are connected from Randolph north to Montpelier and south to the Upper Valley. The I-91 corridor routes connect passengers from Wells River south to the Upper Valley. The third commuter route connects passengers from Montpelier and Randolph down the U.S. Route 14 corridor to South Royalton. Advance Transit operates five fixed service routes in the Upper Valley core towns of Hartford and Norwich in Vermont and Hanover, Lebanon, Enfield, and Canaan in New Hampshire. Notably absent is a commuter bus connecting towns along U.S. Route 4 to the Upper Valley.

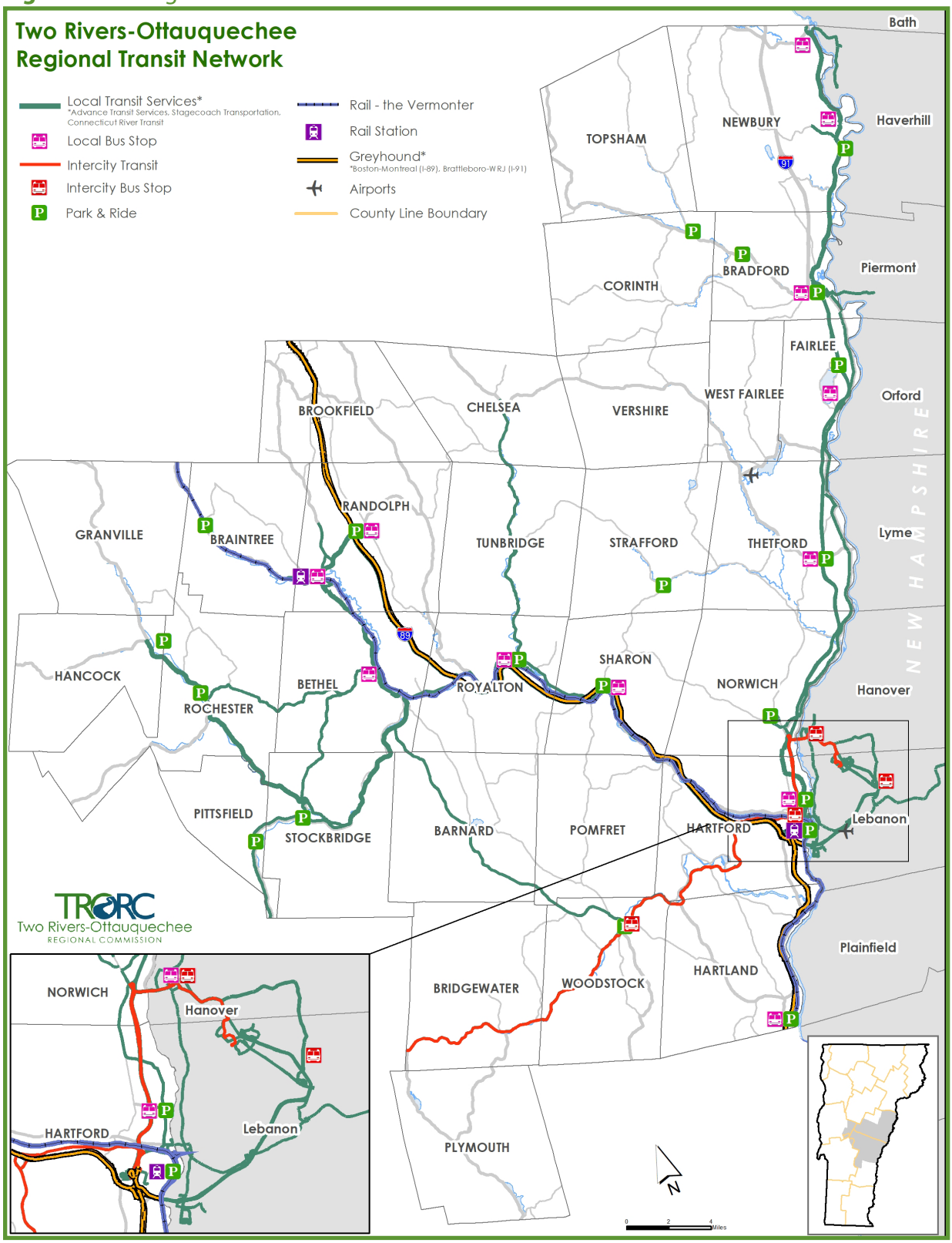
To connect transit-dependent residents with shopping and social centers, Stagecoach offers weekly deviated fixed routes to Lebanon and Randolph, serving the towns of Hancock, Rochester, Stockbridge, and Bethel. Upon passenger request, deviations of up to ¾ mile can

Figure 4-9: Public Transportation Ridership Numbers



Source: Advance Transit, Stagecoach

Figure 4-10: Regional Transit Network



Source: TRORC

be made for pick-ups or drop-offs. Stagecoach also operates weekday transit circulators in the Randolph and Bradford areas.

Intercity Transit Services

Private sector intercity bus transportation is provided by Greyhound, which has a regional service hub in White River Junction. The Greyhound route operates several daily round-trip runs between Boston, MA, and Montreal, QC, with stops in White River Junction, Montpelier, and Burlington. In 2014, Vermont Translines began operation of a route from Rutland to Lebanon, NH. In addition to Greyhound, Dartmouth Coach provides service between Hanover, NH, and Boston, MA, with stops in between at Lebanon and New London, NH. Dartmouth Coach also offers service between Hanover, NH, and New York City. Supplementing these bus services, Amtrak offers intercity commuter rail transportation with two stations in the Region: White River Junction and Randolph. For more information on rail transport, see the Passenger and Freight Rail section.

Transportation for the Elderly and Disabled

Transportation services for the elderly and people with disabilities are a unique asset to the transportation system and one that operates almost invisibly to most citizens. These services, funded by Medicaid and the Federal Transit Administration, offer transportation to eligible individuals for accessing medical appointments, senior meal sites, adult day programs, and commercial service and shopping centers. While medical rides typically are a priority for transportation, transportation to shopping and social interaction are also important factors to the quality of aging in place. Through its Human Service Transportation Coordination Plan, VTrans identifies the service gaps and other transportation challenges that impact the elderly and people with disabilities, and develops coordination strategies to better meet those needs. The Region's senior centers and adult day programs provide transportation for their elderly and disabled clients both through Stagecoach and through their own network of vehicles and volunteer drivers. Figure 4-11 illustrates the coverage areas of transportation providers for the elderly and people with disabilities in the Region. Although it appears the Region has redundancy in service areas, there remains a large percentage of unmet needs and service gaps. The partnering transportation groups continue to collaborate and coordinate services to maximize each provider in addressing service gaps. There may also be opportunities to expand capacity by utilizing school buses that would otherwise be sitting idle. Emerging technologies may be able to support providers' coordination efforts.

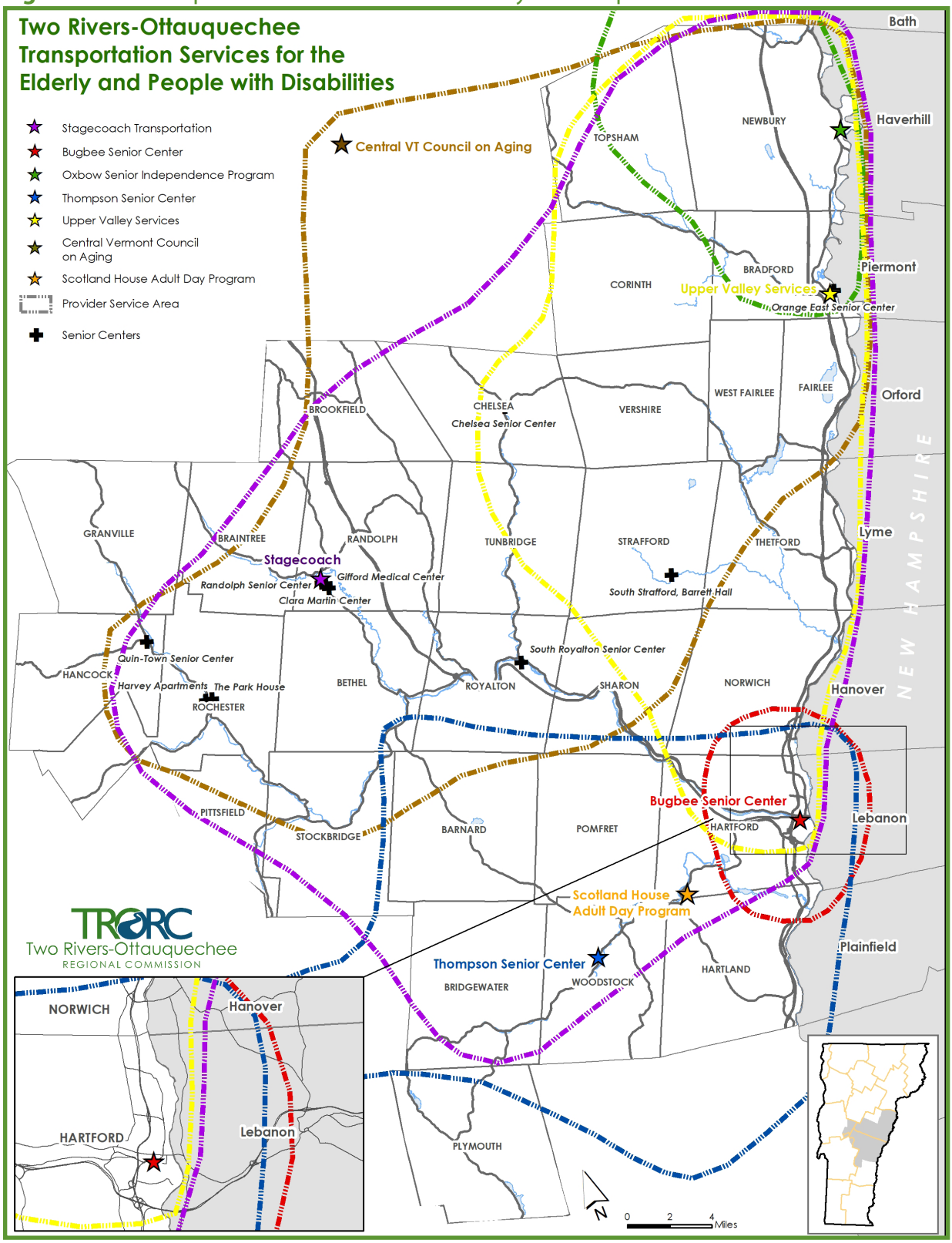
While medical rides typically are priority for transportation, transportation to shopping and social interaction are also important factors to the quality of aging in place.

In 2005, the Vermont Agency of Transportation, in partnership with the Vermont Department of Aging and Independent Living, human services agencies, transit providers, and RPCs, adjusted the Section 5311 funding formula for the allocation of monies to transit providers, focusing on the size of the elderly and disabled populations in each region, the distance traveled to facilities served, and the support of local volunteer programs. The Ticket-to-Ride program at Stagecoach subsidizes rides for seniors and people with disabilities, allowing individuals to contribute only 20 percent of the cost of the ride for a limited number of rides a year. While core funding comes from state and federal programs, the Region is unique in that it extends programs' resources by using volunteer drivers (i.e., trips provided by individuals using their own cars). The federal and state transportation programs are chronically underfunded and have become increasingly regulated by the respective transportation agencies.

Unmet Needs

Social service providers who work with transit-

Figure 4-11: Transportation Services for the Elderly and People with Disabilities



Source: TRORC

dependent populations including the elderly, people with disabilities, and people living below the poverty line have identified two primary unmet public transport needs. The first is the need for extended hours of public transit operation. Currently, buses operate generally between 6AM and 7PM. This schedule does not accommodate people who work evening or night shifts, or seniors who wish to attend social events in the evenings. The second need is for weekend bus service. Buses in the Region generally operate Monday through Friday; this presents a significant challenge for those who work on the weekend. In addition to these unmet needs associated with the existing bus service, there is a need to extend bus service along Route 4 in order to connect communities in the Ottauquechee Valley to the Upper Valley.

Goals, Policies, and Recommendations: **Public Transportation**

Goals

1. Accessible and diverse public transportation options are available and utilized in the Region.
2. Human service public transportation is adequately funded and supported.

Policies

1. More public transportation services should be provided for a greater percentage of the Region, with a particular focus on the needs of transit-dependent populations.
2. Increased accessible para-transit and demand-response transit services (door-to-door or curb-to-curb) for elders and persons with disabilities are strongly encouraged.
3. Continue assisting public transportation agencies with planning, marketing, and general coordination.
4. Opportunities for multi-modal transportation should be expanded within our downtowns, villages, and hamlets, with an emphasis on promoting safety and health.

Recommendations

1. TRORC will advocate for increased funding for more robust transit services that encourage increased ridership.
2. TRORC will support funding increases to meet demand in transportation services for the elderly and people with disabilities.
3. TRORC will advocate for increased capital investments for commuter and human service public transportation.
4. TRORC will continue coordination with agencies in providing transportation services for the elderly and people with disabilities.
5. TRORC will support the development of the Upper Valley U.S. Route 4 commuter bus service.
6. TRORC shall assist interested communities with studies and planning designed to improve multi-modal networks in Regional and Town Centers.
7. TRORC will assist transit providers in assessing unmet transit needs and developing strategies to meet those needs. Strategies could include, but are not limited to, improving coordination between providers to identify and address underutilized capacity of existing services.
8. TRORC will advocate for and support providers in continuing to adopt technologies that help reduce costs, improve efficiency, and enhance service quality.
9. TRORC will support regional efforts to disseminate public information about available transit options.

Carpooling and Park and Rides

Carpooling

In a rural, sparsely settled area where establishing a comprehensive public transit system is not cost effective, ride sharing allows people to mitigate the cost and environmental impact of their commutes without changing the location of their homes. Within the Region, 9.1 percent of commuters share rides to work. Carpooling requires a significant amount of coordination and a slight loss of independence in transportation. The Go! Vermont program managed by VTrans facilitates pairing people with other interested carpoolers.

Park and Rides

In order to facilitate the connection of single-occupant modes of travel to collective travel (either by ridesharing or by the use of public transit), the Region contains 20 park and rides. Of these, eleven are supported by municipalities and nine are supported by the State. Since 2017, two new municipal lots (a total of 34 parking spaces) have been added to the Region (bolded on Table 4-1, which lists the Region's park and rides). Additional facilities will be needed to meet regional demand. TRORC evaluates park and ride capacity and has contributed regional data to statewide needs assessment efforts.

Table 4-1: Regional Park and Rides

Town	Location	Jurisdiction	Total Spaces	Lighting	Shelter	Bike Rack	Public Transit Service
Bradford	I-91, Exit 16	State	**81**	Yes	No	Yes	Stagecoach
Bradford	VT25/Chelsea Rd	State	**5**	No	No	No	No
Braintree	VT12A	Municipal	**14**	Yes	No	No	No
Corinth	VT25	Municipal	**25**	Yes	No	No	No
Fairlee	US5/Train Depot	Municipal	24	Yes	No	No	No
Hancock	VT100, Town Hall	Municipal	29	Yes	No	No	No
Hartford	I-91, Exit 12	State	**40**	Yes	Yes	Yes	Advance Transit
Hartford	South Main St, WRJ	Municipal	**30**	No	No	No	Advance Transit
Hartland	I-91, Exit 9	State	**55**	Yes	No	Yes	CRT
Newbury	US5/Newbury Crossing Rd	Municipal	20	No	No	No	Stagecoach
Norwich	Turnpike Rd	Municipal	30	Yes	Yes	Yes	Advance Transit
Pittsfield	VT100, Town Office	Municipal	18	Yes	No	No	No
Randolph	I-89, Exit 4	State	**89**	Yes	Yes	Yes	Stagecoach
Rochester	VT100	Municipal	**10**	Yes	No	No	Stagecoach
Royalton	VT14/VT110	State	**20**	No	No	No	Stagecoach
Sharon	I-89, Exit 2	State	**24**	No	No	Yes	Stagecoach
Stockbridge	VT100/VT107	State	**10**	Yes	No	No	Stagecoach
Strafford	VT132	Municipal	**23**	Yes	No	Yes	No
Thetford	I-91, Exit 14	State	**25**	Yes	No	Yes	Stagecoach
Woodstock	US4	Municipal	**20**	Yes	No	No	Vermont Translines
TOTAL SPACES			**592**				

Source: Vermont Agency of Transportation

Park and rides facilitate the decrease in miles driven using single-occupant vehicles, which in turn benefits household budgets, reduces fossil fuel use and greenhouse gas emissions, and produces other environmental benefits. In commercial growth areas, park and rides can be combined with rest areas, tourist information centers, restaurants, and other land uses. This increases land use densities, keeps properties on local tax rolls, combines maintenance needs, and improves the overall likelihood that the park and ride lot will be successful. Park and rides can also support the growth of the Region's electric vehicle fleet by providing charging stations; VTrans is working to install charging infrastructure in state-operated lots where practicable.

Goal, Policies, and Recommendations: **Carpooling and Park and Rides**

Goal

1. Single-occupant vehicle dependency is reduced.

Policies

1. The number and size of park and ride lots should be increased to better support regional public transportation.
2. The development of public park and ride facilities in Interchange Areas shall be encouraged.
3. Public transportation agencies and the Vermont Agency of Transportation should coordinate in constructing park and ride lots and give higher priority to those located along interstate interchanges and existing bus routes.

Recommendations

1. The Transportation Advisory Committee (TAC) shall continue to identify park and rides in need of state investments and improvements, including the lot at the Hartford I-89/I-91 interchange (CMG PARK(12)SC).
2. Towns should apply to the Municipal Park and Ride Program and expand the regional park and ride network.
3. TRORC and towns should continue to support public transportation and ride-share programs to reduce the Region's dependency on single-occupant vehicle trips.
4. Towns should consider shared parking lots with other properties that may become formal or informal park and ride lots.
5. TRORC shall support efforts to develop and improve park and ride lots in village areas.
6. TRORC will advocate for more state funding for park and ride lots.
7. TRORC will support efforts to incorporate electric vehicle charging infrastructure into formal park and ride lots and other appropriate locations, as practicable.

Bradford Park and Ride | *Source: TRORC Staff*

Walking and Biking

Complete Streets

Acknowledging the importance of providing people with transportation choices other than the car, the Vermont Legislature passed a "Complete Streets" law in 2011. Vermont's Complete Streets law, Act 34, requires that all users be considered in the planning, design, construction, and maintenance of our roadway system. The context of each state and local transportation improvement project should be recognized in any recommendations for additional facilities or accommodations. In very rural areas, road shoulders provide a reasonably safe and cost effective facility for pedestrians and bicyclists. In more constrained areas where shoulders cannot be provided, shared lanes may be the only realistic option. In these cases, measures to maintain lower speeds and enhance safety, such as traffic calming, are appropriate. In areas with more multi-modal activity, such as downtowns and village centers, there are a range of appropriate accommodations for non-motorized users, including sidewalks of varying widths and designs, bicycle lanes, shared lanes, and bicycle paths. Current or future transit stops should be designed with consideration for pedestrian travel to and from the rider's final destination. "Complete Streets" planning should also make accommodations for small and low-speed vehicles like electric bikes, scooters, and mopeds, which are garnering increased interest as alternative transportation modes that can help reduce single-occupant car trips.

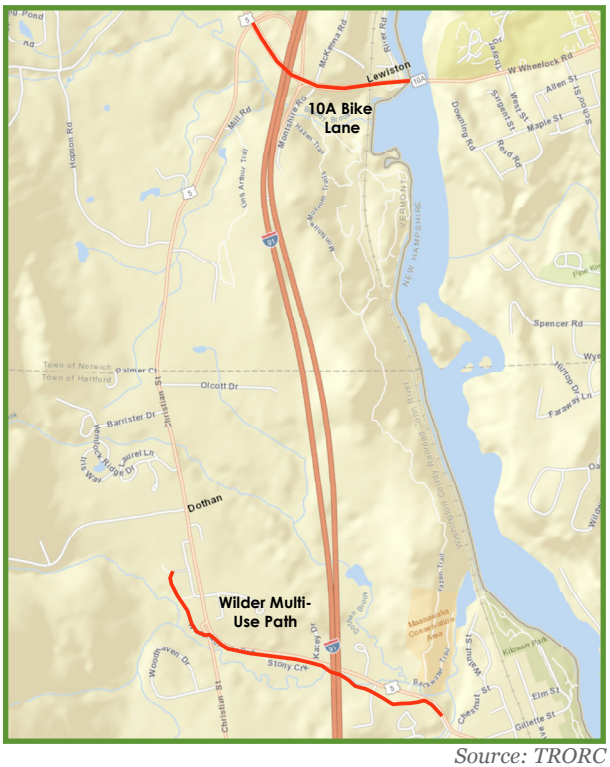
Pedestrian and Bicycle Facilities

Walking and bicycling infrastructure is an important component of the Region's goals for sustainable transportation and economic development. There are three formal bike paths (mapped in Figures 4-12 and 4-13, below) and many informal bike routes in use throughout the Region.

Higher use of these modes will have numerous benefits for the Region, including lower traffic volumes, lower emissions, and improved public health. While Vermont's Complete Streets policy should ensure that transportation improvement projects provide for these modes, there are additional considerations that can further the Region's goals. Land use planning that concentrates growth in areas of existing development, particularly village centers, supports the utility of pedestrian and bicycle infrastructure. The Region has also been supportive of federal and state initiatives that incorporate safe routes programs primarily for schools in or near the larger Regional Growth Areas. Although national Safe Routes to School funding has been curtailed, TRORC continues to support related planning work. Lastly, increasing bicycle and pedestrian travel will require continued community outreach and education.

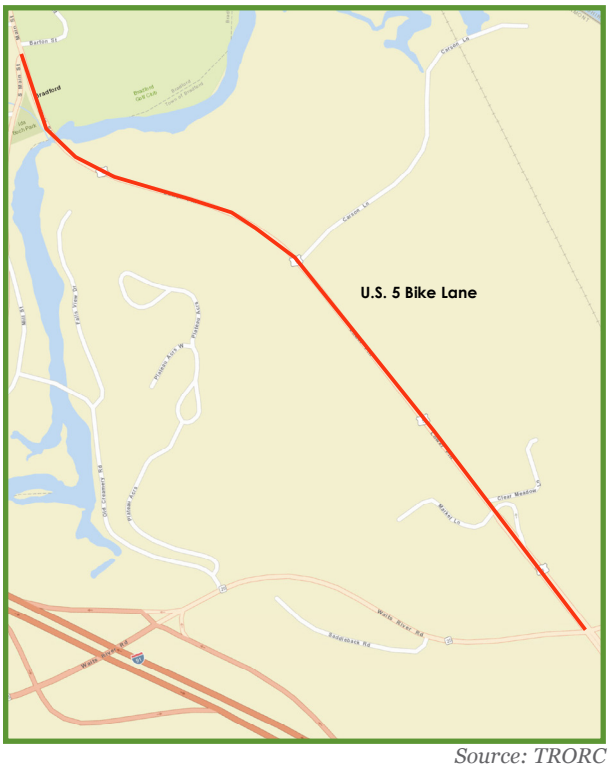
Randolph, VT | *© First Light Studios*

Figure 4-12: Formal Bike Routes in Norwich and Hartford



Source: TRORC

Figure 4-13: Formal Bike Lane in Bradford, U.S. Route 5



Source: TRORC

Goal, Policies, and Recommendations: **Walking and Biking**

Goal

1. The Region has a safe and broad network for pedestrians and bicyclists.

Policies

1. Transportation infrastructure and services should be improved to facilitate independent travel.
2. Town land use plans or zoning should be updated to meet goals for walking, biking, and sustainable transportation.
3. Transportation infrastructure investments within Regional and Town Centers should improve circulation for vehicles and expand opportunities for pedestrian traffic. Development that negatively impacts pedestrian travel is not appropriate in these areas.
4. Construction projects shall consider improvements for bicyclists and pedestrians to be central to the project purpose, rather than an "enhancement." Accommodations for pedestrians include not only the sidewalk surface but also amenities to make walking feel safer and more comfortable, including trees, plantings, benches, and lighting.
5. Opportunities should be expanded for pedestrian transportation within our villages and hamlets, with emphasis on promoting safety and health.
6. Pavement conditions should be improved on state routes in order to improve cycling conditions.

Goal, policies, and recommendations continued on next page

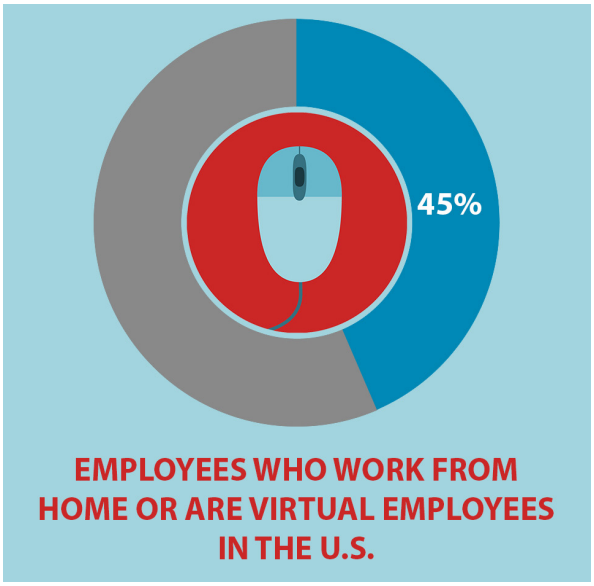
Goal, Policies, and Recommendations: **Walking and Biking**

Recommendations

1. TRORC will work with towns and the Vermont Agency of Transportation to institutionalize pedestrian and bicycle accommodations (including transit connectivity) in all of its planning, engineering, and construction related activities (i.e., implement "Complete Streets"), especially in regional, town, and village centers. In addition to the existing local land use regulations, this work will include development of free-standing Bicycle and Pedestrian Plans for interested towns.
2. TRORC will work with towns to support land use regulations that increase the density and mixed use development pattern that improves walking and bicycling conditions by shortening trips between where people live, work, and recreate.
3. TRORC will cooperate with private and public initiatives that seek to market walking and bicycling in towns and the Region and participate in state and local initiatives that promote bicycling and walking.
4. TRORC will use objective measures to gauge the potential for walking and bicycling to assess priorities for investments in these modes. These measures could include population density, employment density, and block sizes or intersection density.
5. TRORC will continue to support municipal planning for safe routes to school, especially within densely settled villages or town centers.
6. TRORC will advocate that commercial and other development projects invest in transportation infrastructure and services to increase use of alternative modes such as bicycling, walking, or transit, or provide necessary rights-of-way to allow later investment in those facilities.
7. As opportunities arise, TRORC will provide education and training to large employers on the benefits of providing showers and bike lockers for employees who commute by biking.

Telecommuting

Telecommuting offers an excellent way to reduce both energy use in transportation and resultant greenhouse gas emissions, while also encouraging commercial activity in the Region. Telecommuting can provide good job opportunities in more remote communities but also in more urban areas. Currently, 7.7 percent of workers in Orange and Windsor Counties access employment by telecommuting.[20] Strengthening telecommuting through greater availability and speed of broadband and fiber optic service would increase the attractiveness of the Region to individuals who have jobs that are not location-dependent, as well as provide additional economic benefits. Improved Internet networks would also benefit teleconferencing in the Region, which like telecommuting helps to reduce vehicle miles traveled. Teleconferencing may require additional supportive technology depending upon the needs of the participants.



Work from Home Graphic | *Info Source: New Jersey Institute of Technology's Online MBA Program*

Goal, Policies, and Recommendations: **Telecommuting**

Goal

1. Telecommuting and teleconferencing are easily done via widespread fast Internet access.

Policies

1. Broadband Internet service should be available throughout the Region's areas where development is desired.
2. High-speed fiber networks should be available in all village areas of concentrated growth.
3. Employers are encouraged to allow telecommuting and teleconferencing.

Recommendations

1. Towns, the State, telecommunications providers, and TRORC should map existing cellular and broadband services in the Region, identify gaps, and work to provide coverage in those gap areas.
2. Private businesses should support telecommuting and teleconferencing options where practical for employees.
3. As opportunities arise, TRORC will provide education to employers on the benefits of allowing some telecommuting for employees.
4. TRORC will support efforts to develop community-owned fiber optic Internet service.
5. TRORC will support efforts to provide public access to teleconferencing equipment.

Passenger and Freight Rail

Passenger Rail

The rail industry is an important transportation mode for freight and passenger services. The Amtrak "Vermonter" passenger rail service from St. Albans, VT, to Washington, DC, is currently subsidized by the State of Vermont and has stops in Randolph and White River Junction, traveling on the New England Central Railroad (see Figure 4-10). This rail service is utilized more for tourism purposes than commuter service. It has benefited from track upgrades in recent years that have shaved off ample travel time along the corridor and improved fuel efficiency.[21] Between 2011 and 2017, ridership declined 3.9 percent at White River Junction and declined 3.4 percent at Randolph, a total decrease of 3.9 percent for the Region's stations altogether. Statewide, passenger rail ridership increased 2.4 percent between 2011 and 2017. In its 2017 Transportation Energy Profile report, VTrans noted that ridership growth was lagging behind state targets.[22]

At one time, almost every town in the Region was serviced by rail links, be it for personal or commercial use. Regional access to passenger trains has decreased with respect to the number of functioning passenger rail stations, and there has been a decline in ridership in recent years, as noted in Table 4-2. Many residents in the Region would welcome the opportunity to access regional and local passenger train services in areas closer to home, i.e., within their town or an immediately adjoining municipality. Whether such services will be created or added to existing service lines in the future remains to be seen. In 2016, the Northern New England Intercity Rail Initiative (NNEIRI) study recommended the expansion of the existing "Vermonter" passenger rail services to connect Boston and New Haven to Montreal. The proposed daily round-trip service would stop at all existing stations and would require a number of infrastructure improvements in Vermont, including extension of railroad sidings, safety upgrades to at-grade crossings, new trackage and turnouts, and signal improvements. The projected future ridership (inclusive of passengers of the existing "Vermonter" route) from New Haven to Montreal is 343,000 riders per year, and from Boston to Montreal is 103,000 riders per year. Realizing the NNEIRI vision will require additional study as well as planning

coordination by various state agencies and departments in Vermont, Massachusetts, and Connecticut.[23]

Freight Transportation

VTrans has published a detailed map of railroad corridors in the State, including freight.[24] In our Region, the White River Junction station serves as a freight rail interchange point. The Washington County Railroad Company (WACR) line connects from the New England Central Railroad (NECR) at White River Junction north into Newport. This train line runs parallel to the Connecticut River within the TRO Region, with twelve designated stops in the river valley: White River Junction, Wilder, Norwich, Kendall, Thetford, Northboro, Ely, Fairlee, Bradford, Hooker, Newbury, and Wells River.[25] Additionally, the towns of Hartford and Bradford have industrial parks onsite. During times of emergency, VTrans has coordinated with the rail companies to ship needed materials on the Vermonter passenger rail route (described above).

Freight rail competes with other transport modes, namely tractor trailers, although it can serve as a more efficient, economical, and environmentally friendly means of transportation for heavy and bulky goods compared with other modes. Increases in freight rail service can only occur as long as service enhancements are carried out in conjunction with necessary safety improvements. Rail industries can be located within the Region as long as town land use policies are supportive and the necessary transportation road and bridge infrastructure exists. TRORC has had longstanding goals with which to pursue expanding rail service: preserving the existing infrastructure, expanding capacity where needed to accommodate double-stacked rail cars, and continuing the public's purchasing of privately held rail lines.

In 2017, there were 11 railway companies operating throughout Vermont, some of which leased rights to the tracks directly from the State.[26] Trains carried over 3.25 million tons of freight through Vermont in 2016.[27] With this much traffic on the rail lines, it is likely that a significant share of the goods transported are actually hazardous materials.[28] This presents a very real threat to health and safety in the event that there is a derailment or other spill, as occurred north of Vermont in Lac-Mégantic, Quebec, following a crude oil railway crash in July 2013 that killed at least 50 people and damaged swaths of property. Unfortunately, there is no way of knowing with any degree of certainty what materials are traveling through the State via freight, what their route is, and when they are traveling.[29] Towns with active freight lines are aware of this potential hazard issue and are actively working toward efforts to mitigate the effects of such an incident within their town borders, be it within a Hazard Mitigation Plan, an Emergency Management Plan, or otherwise.

Table 4-2: Boardings and Alightings on the Amtrak "Vermonter" Line by Fiscal Year[30]

	2017	2016	2015	2014
White River Junction	13,554	13,988	14,810	16,257
Randolph	1,833	1,940	2,073	2,302
Total for Vermont	**94,157**	**92,422**	**103,128**	**107,688**

Source: Amtrak

Goal, Policies, and Recommendations: **Passenger and Freight Rail**

Goal

1. There are increased rail (passenger and freight) services in the Region.

Policies

1. Support efforts to improve existing rail infrastructure to broaden rail services by working with the Vermont Agency of Transportation to prioritize service lines.
2. Support efforts to expand business opportunities for rail-to-truck connections and tourist travel.

Recommendations

1. TRORC will support the implementation of the Northern New England Intercity Rail Initiative final recommendations for a Boston/New Haven to Montreal passenger rail service.
2. TRORC will support improved rail service along the I-91 corridor.
3. TRORC will work with towns to consider land use and transportation investment policies that make rail-based industries a viable commercial activity.

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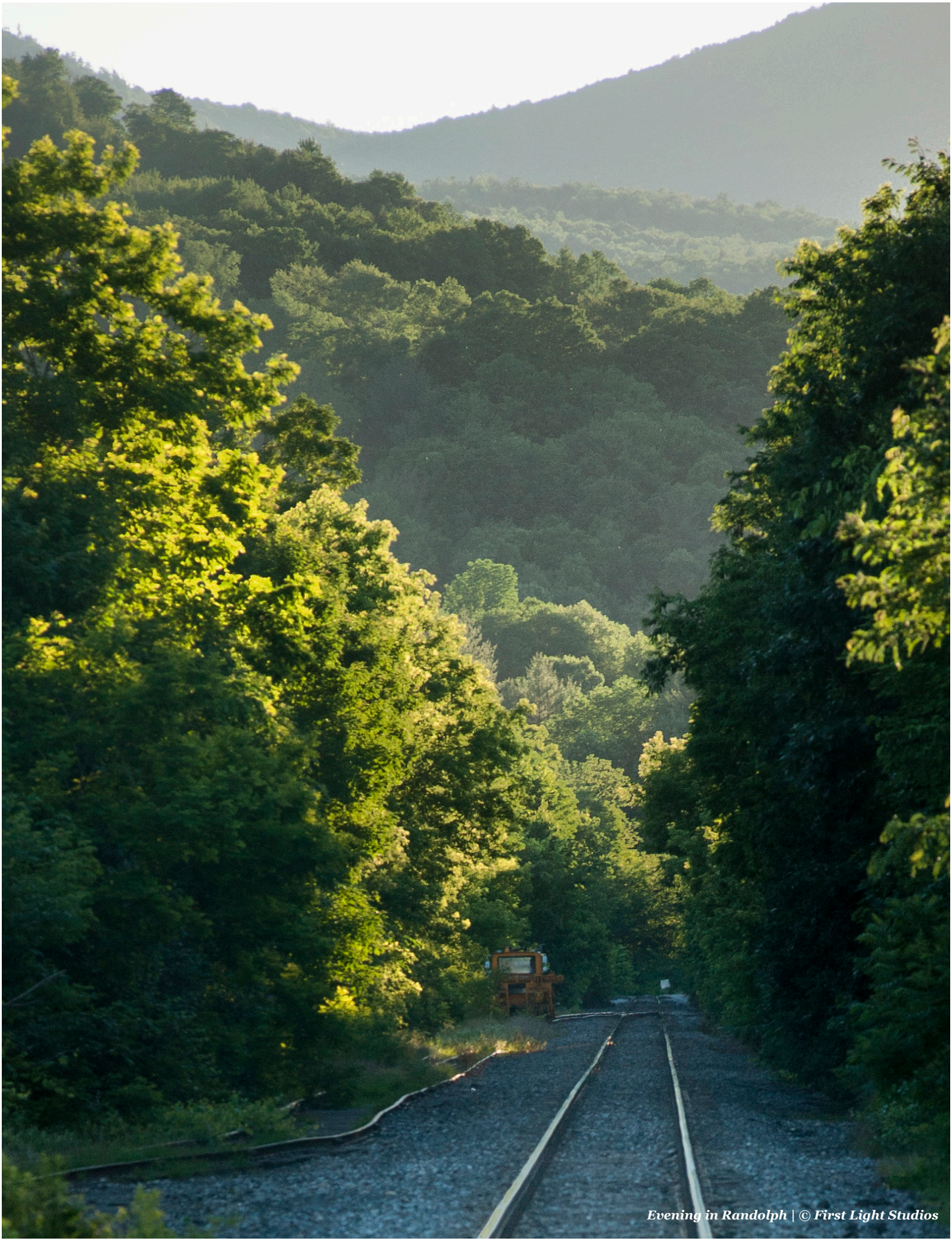

Evening in Randolph | © First Light Studios