IV. TRANSPORTATION

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 grow and maintain the system throughout the TRORC region.

The purpose of this element 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:

- A more integrated transportation network with less overall vehicle miles traveled;
- Greater concentration of development in previously built areas;
- Improved infrastructure to accommodate local accessibility to daily needs;
- A transportation system that balances minimal impacts to the natural environment;
- More resilient infrastructure that can withstand climate change;
- Better local/state/federal budgeting for infrastructure needs;
- A pattern and form of land use that is more efficient, affordable, safe and healthy.
- Highway design built around context sensitive solutions, multimodal uses and transparent and open planning, design and project management.

B. Introduction

Most of us don't actually want "transportation", or even "mobility", the word used in transportation circles to generally signify movement along roads. What we want is *access*, access to desired goods and services at an affordable price and a 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 drive. We can carpool if we live near enough 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.

Some businesses only need good Internet, while others use truck traffic to bring in or ship out goods. If they are next to a rail siding, then freight trains may be the way they move goods. Much of our economy is based on tourists, and they nearly all get here by car, but some come on buses, while others use airlines or trains for at least part of their trip. Through hikers of the Appalachian Trail generally just walk here. But business needs are much the same as for households; they need access, not a specific means of transport.

As can be seen above, 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 system. 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, primarily the road network, but it also looks at means of access (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 does access needs get served for those that cannot drive? And, what have our roads done to our streams?

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 least negative impacts, all while trying not to spend more money.

This chapter of the Regional Plan sets forth an eight-year agenda for the development and improvement of the regional transportation system, in all its parts. A *regional* planning effort helps to ensure a consistent, coordinated, and proactive response among all thirty 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. These are general planning factors not typically considered by state and federal transportation agencies.

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

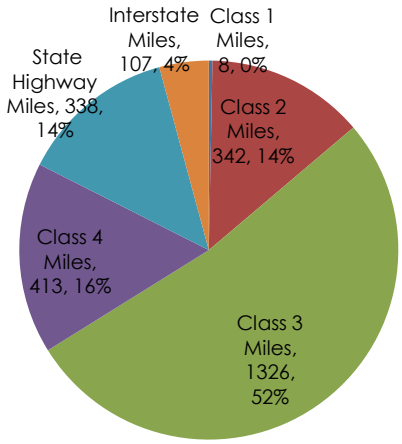
- To provide a wealth of information regarding the condition of the existing transportation system in the Region;
- To provide a means to express the Region's transportation planning concerns and priorities at the State and local levels;
- To guide public investment in transportation infrastructure;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

Taken in its totality, this element is intended to guide TRORC in evaluating public and private recommendations affecting the Region's transportation system and is the foundation for the RPC'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, cheaper, and less destructive to the environment, but we are accustomed to jumping in our cars and driving where we want when we want. To achieve more affordability, less greenhouse gases, better water quality, and improved health while still enjoying access to jobs, goods and services we will need to drive less. This also fits with our demographic needs, since we are rapidly becoming more elderly.

Figure 1: Road Miles in TRORC Region



In 2009, residents of Windsor and Orange Counties travelled more than 1 billion miles, using more than 60 million gallons of gasoline – that's more than 600 gallons and 16,000 miles per person. More than three-quarters of commuters in the region drive to work alone, while just 10% carpool. Five percent of commuters walk, bike, or use public transportation. Just one-third of commuters work and live in the same town, while one-fifth commutes to another town in the same region. 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 continue to expand into rural areas, and commercial development has taken the form of automobile dependent strip development along highways. These choices both limit people's transportation options, and increase their transportation costs. 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 2005, 13 million visitor trips brought more than a billion dollars and supported more than 36,000 jobs in the state. However, we benefit economically from more than just roads: bicycling and walking brought in more than 80 million dollars and supported over 1,400 jobs in 2009.

C. Background and Challenges

REGIONAL TRANSPORTATION SYSTEM: TRENDS & CHALLENGES

The Two Rivers region is exemplified by a series of rural towns that while all distinct in nature, 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 transportation dollars, owing, in part, to the Federal Highway Trust Fund not having sufficient revenues, stymies statewide efforts to maintain and improve roadways and infrastructure. It is no secret that funds for transportation are tight: in 2014 and beyond, the state transportation budget shortfall will be over $200 million per year. 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.
- **Aging Roadways and Infrastructure →** Much 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 health of the economy of the Region. Maintenance of the existing highway infrastructure is prioritized over the construction of new roads. 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, in particular, 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 percentage of the region's population aged 65 or older is 18.4%. This number is set to climb appreciably in coming years, and the region's has to consider the distinct needs of this age bracket when adopting transportation policies. Ensuring that the elder population has safe access to and

within town and village centers as well as regional growth centers is imperative as their mobility likely declines (sentiments that can be echoed for the region's youth population). Well-maintained, well-lit sidewalks, improvements to road signage visibility, and improved regional transit opportunities are a key ways to ensure that elderly residents are afforded a chance to age-in-place.

- **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 further 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. A median income family on average spends as much or more on transportation expenses as it does on housing expenses annually (roughly 27.5% of annual income, or $14,500), as illustrated in the HUD Location Affordability Index.[1]
- **Energy** → As of 2011, transportation is the chief source of greenhouse gas emissions in Vermont.[2] Current transportation trends in the region are heavily skewed toward reliance on fossil fuels. In an effort to achieve statewide energy and emissions goals, it is imperative to improve transit and other multi-modal opportunities to slowly divest ourselves from the use of fossil fuel technologies. Freight and passenger rail, both underutilized statewide, could, for example, receive investments to promote alternative transportation opportunities to residents to decrease this dependence in as much as improving 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 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, yet. But it is important to see these costs in total, and to realize they are huge. Personally, transportation is often the largest cost a family faces after housing. We have tens of thousands of vehicles in the region that easily cost over a billion dollars to buy, and tens of millions to operate every year. Our road network cost us billions to construct, and costs us many millions to maintain every year, most of this 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 1-2 million dollars per year. When floods come, the damage costs are largely to roads and bridges.

Figure 2: Road Miles by Town

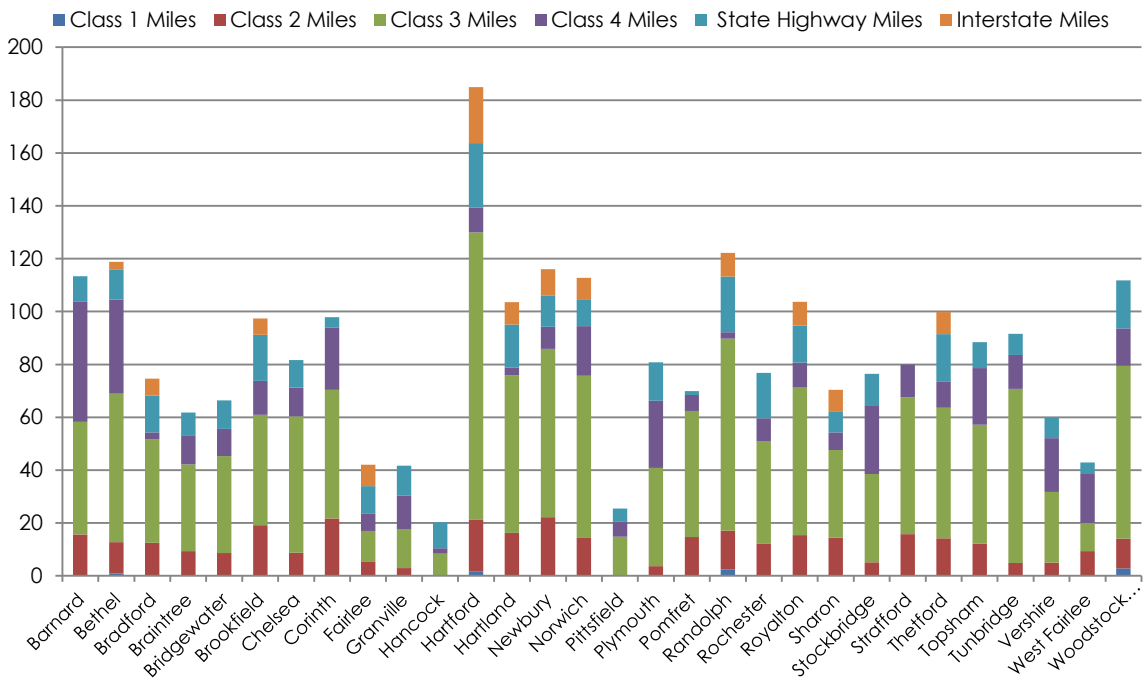
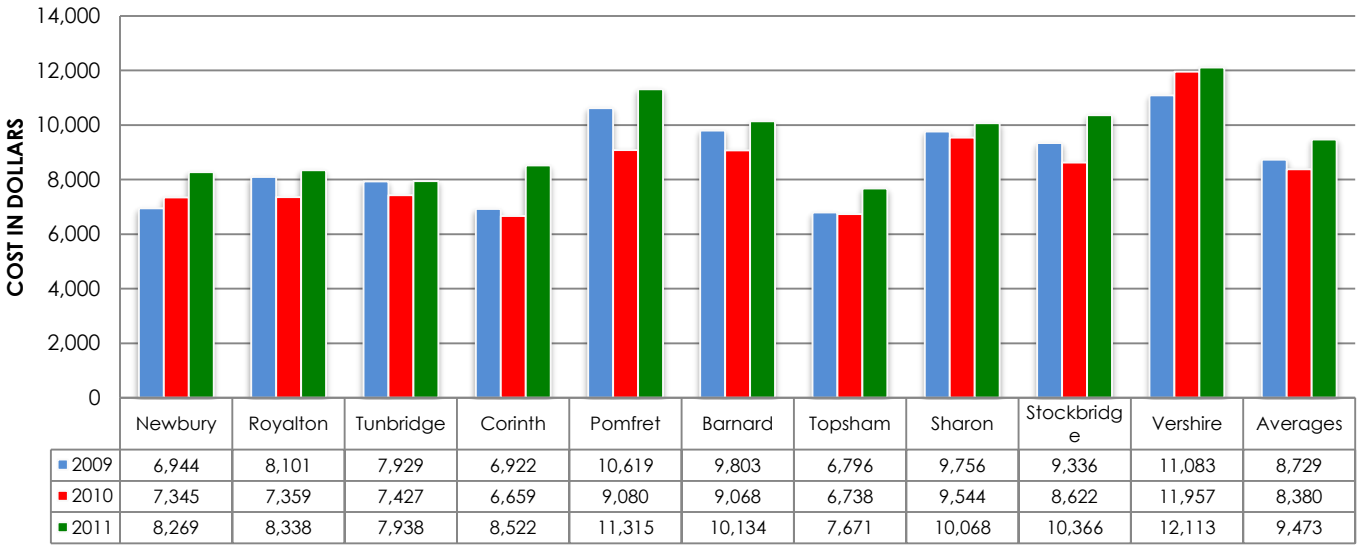


Figure 3: Road Maintenance Costs per Mile



	Newbury	Royalton	Tunbridge	Corinth	Pomfret	Barnard	Topsham	Sharon	Stockbridge	Vershire	Averages
2009	6,944	8,101	7,929	6,922	10,619	9,803	6,796	9,756	9,336	11,083	8,729
2010	7,345	7,359	7,427	6,659	9,080	9,068	6,738	9,544	8,622	11,957	8,380
2011	8,269	8,338	7,938	8,522	11,315	10,134	7,671	10,068	10,366	12,113	9,473

Goal

1. Our transportation system's costs are sustainably funded and include costs to remediate impacts.

Policies

1. Construction design, maintenance initiatives, or policies that help to minimize cost 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 addresses 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 expectation 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, removed or need not to be rebuilt if destroyed.
6. TRORC will work with others to better estimate the full cost of the transportation system.

HOUSING AND TRANSPORTATION

The TRORC region has seen moderate housing sector growth since 2000, despite the economic downturn that began in 2008 and the impacts of Tropical Storm Irene in 2011. The housing market is increasingly costly and tight for residents to live in affordably, particularly for the elder population and those in need of workforce housing (largely those who are in the low- to moderate-income brackets).

As a Region, we need to direct housing growth toward our downtown and village centers, as per our historic settlement patterns. It is imperative that new, rehabilitated, or infill housing opportunities are located near—and supported by—regional transportation opportunities (both roadways and regional public transit opportunities) that provide access to growth centers, where jobs and retail shopping opportunities are most abundant. Furthermore, housing opportunities should be accessible to town and village centers via multi-modal transportation methods. 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.

Cumulative housing and transportation costs are having detrimental impacts on already low incomes throughout the Region. Housing costs that exceed 28% of disposable income are deemed to be unaffordable, according to the HUD Housing Affordability Index[3]. This pushes much of the Region's housing out with the realm of affordability for many residents. However, when viewed in terms of both housing and transportation costs, all towns exceed a cumulative threshold of 45 percent, thereby pushing all towns in the in the Region for which there is data past the cumulative affordability threshold. This data is a clear reflection of the high cost of our car-dependent lifestyles with respect to car ownership, fueling, and maintenances in as much as it is our lack of affordable alternate transportation methods.

Goals

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

Policies

1. 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.
2. Housing developments' location must be seen within a transportation context.
3. 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.
4. 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.
5. Multi-unit housing development proposals alongside roads will include sidewalks, or their proportion cost of such, connecting the development to the main road when sidewalks are present and distances are such that walking is a viable option.
6. 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 urban centers or 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.

D. Access

To move toward a more sustainable future, we need a transportation system that increases transportation options, reduces vehicle miles traveled, and promotes more efficiency. This can only be done with a corresponding change in land use based on our new understanding of land use and transportation connections, by increasing transit funding and services, and building better infrastructure for safe walking and bicycling.

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.

MOBILITY STATUS

A person's ability to effectively use the present transpiration system significantly impacts their access to goods and services, and consequently, their wellbeing. The present transport system in the region is designed around the personal automobile; the inability to own or operate a vehicle

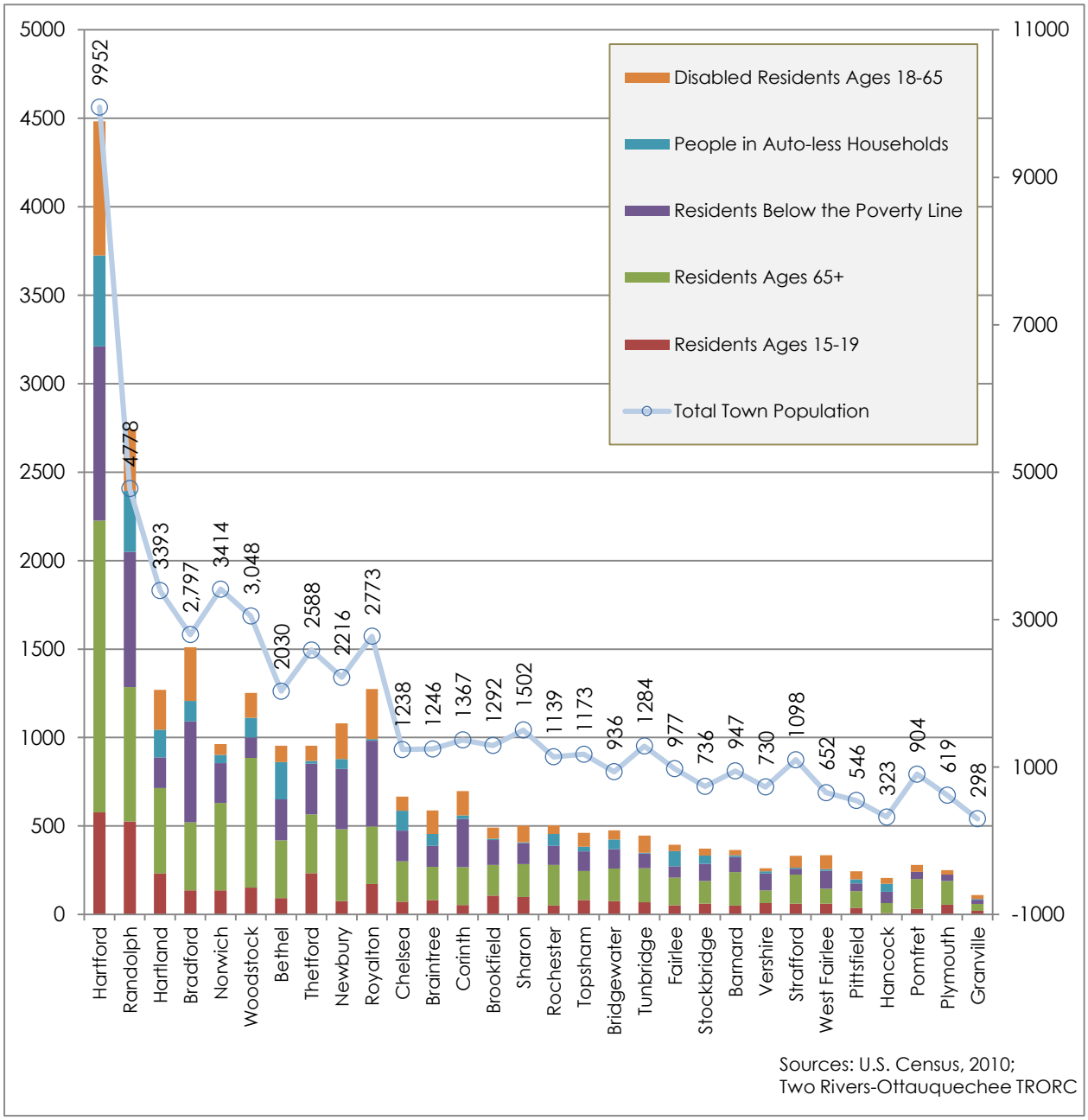
severely limits an individual's mobility and thus, their access to goods and services. Factors which effect mobility in the region include: age, disability status, and access to an automobile. The following population groups represent the residents within the region who are likely to have decreased mobility:

1. Children Ages 15-19 (6.3% of the region's population)
2. Seniors Ages 65+ (16% of the region's population)
3. Disabled Residents Ages 18-65 (6.6% of the region's population)
4. Auto-less Households (3.9% of the region's population)
5. Residents at or below the Poverty Line (10.8% of the region's population)

Because of their decreased ability to use a private vehicle to connect to goods and services, these populations are more dependent on alternative forms of transportation such as public transit and ridesharing. By examining the prevalence of transit dependent populations within each town the town's transit needs becomes apparent.

As illustrated by Figure 4, the number of transit dependent residents correlates strongly with the total population of the town with the region's most populous towns, Hartford and Randolph, displaying the highest numbers of transit dependent residents. For the majority of towns, age is the single largest factor of transit dependency among their population. In other towns, residents below the poverty line are the main factor over resident age as the leading cause of transit dependency in towns such as Randolph, Royalton and Bradford.

Figure 4: Transit Dependent Population per Town



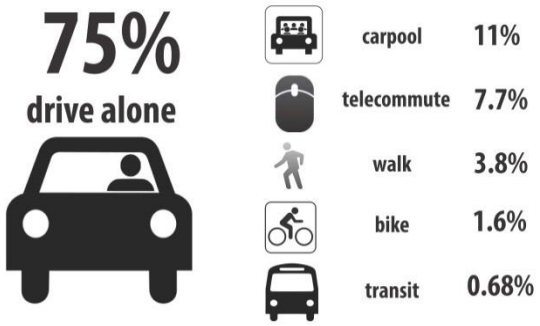
Although Figure 4 indicates that overall population size can be used as a determinant of a town's transit needs, it is also important to acknowledge that towns vary in the proportions of their populations which are transit dependent. By breaking transit dependency within a town down by percentage of the population, rather than by total population, the picture of relative transit needs of the towns shifts dramatically. Smaller towns in the region, such as Hancock, Bridgewater, and Pittsfield rank low in transit need based on their population size, however they have some of the highest proportions of their populations displaying transit dependency. For instance, 65% of Hancock's population is potentially transit dependent. In contrast Norwich, because of its population size, is ranked higher in need, but has a much lower proportion (29%) of its

population exhibiting potential transit dependency. Despite offering relatively low numbers of potential transit riders, smaller towns still exhibit high need for public transit which 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 across the region.

Transit

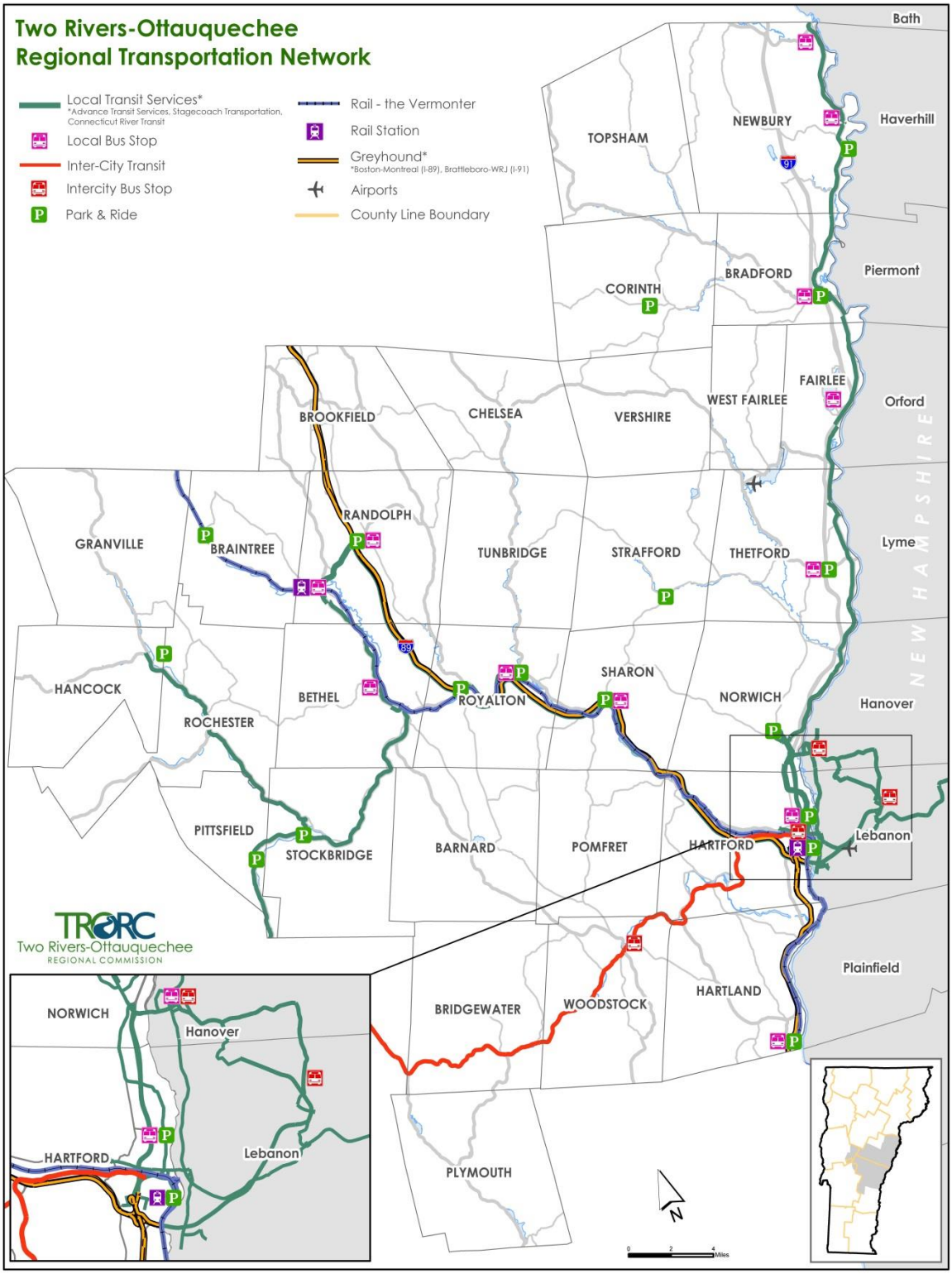
The mobility status assessment demonstrates the vital role which public transit plays within the region's transportation system. However, the rural character of the region presents challenges for a traditional public transport system. Long distances between homes and employment centers strain commuter bus routes, while high transport dependence 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 transport because of its relative inconvenience. Figure 5 shows that a significant portion of commuters are still relying on driving alone to get to work. Currently, public transit provides less than 1% of the overall population with transport to work. Despite this adherence to single occupancy automobile travel, the Vermont Agency of Health and Human Services and Vermont Agency of Transportation have extensively studied public transportation usage and all projections indicate demand for these services are continuing to increase.

Figure 5: Mode of Travel to Work[1]



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. Elderly and disabled transportation services give alternatives to people who wish to live independently but who are less able to drive themselves. The following map (Figure 6) illustrates the transit network across the region.

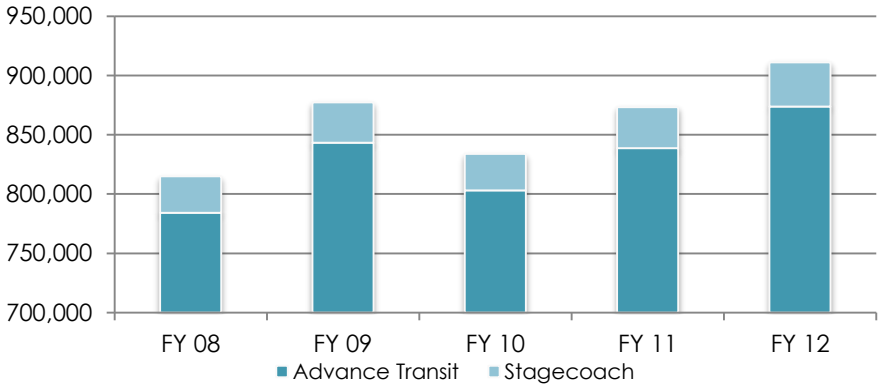
Figure 6: Regional Transportation Network



Public Transportation

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 of Vermont to provide public transportation services within the TRORC region.

Figure 7: Public Transportation Ridership Numbers



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 from Randolph 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 US Route 14 corridor to South Royalton. Advance Transit operates five fixed service routes in the Upper Valley cores 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 US 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. Within the Randolph area, Stagecoach operates the Randolph Village Maxi Taxi which extends out into Braintree and provides local on demand transport. A similar service village circulator service is being proposed for Bradford village.

Intercity Transit Services

Private sector inter-city bus transportation is provided by Greyhound. As of 2010, all of Greyhound's Vermont bus service is based out of its White River Junction hub. The Greyhound route in the Region operates several daily round-trip runs between Boston, MA to Montreal, QC with a stop in White River Junction. This route has stops in Vermont in Montpelier and at Burlington Airport. 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. Supplementing these bus services, Amtrak offers intercity commuter rail transportation with two stops in the

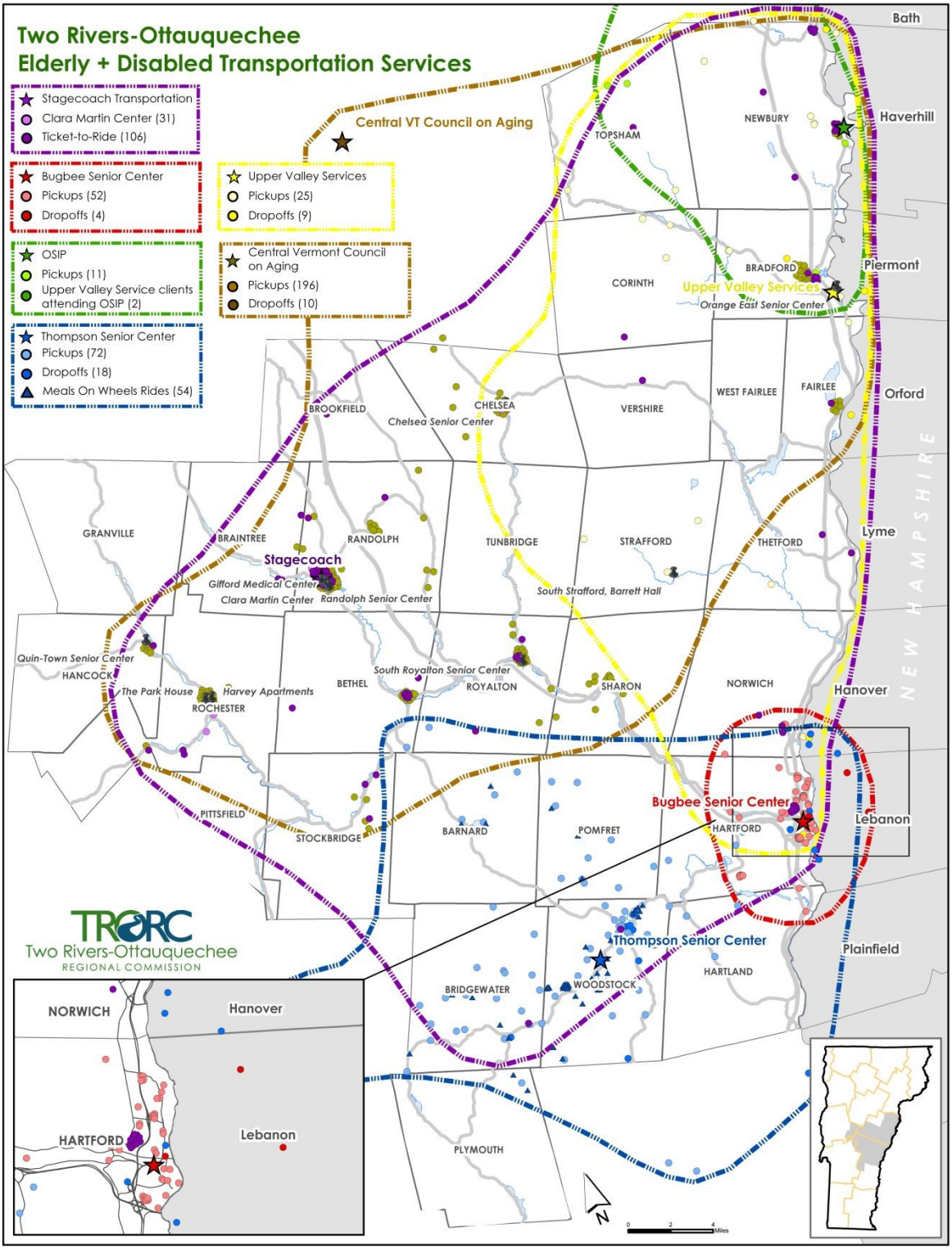
region, White River Junction and Randolph. For more information on rail transport see Section 4.6.

Elderly and Disabled Transportation

Elderly and disabled transportation services are a unique asset to the transportation system and one that operates almost invisibly to most citizens. These services, whether provided by Medicaid or Elderly and Disabled funding programs, offer transportation to eligible individuals for accessing medical appointments, senior meal sites, adult day programs, and commercial service and shopping centers. The regional senior centers and adult day programs coordinate elderly and disabled transportation for their clients both through Stagecoach and through their own network of vehicles and volunteer drivers. The map below (Figure 8) illustrates the coverage areas of elderly and disabled transportation providers in the region. Although it appears the region has redundancy in service areas, there remain 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. 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, 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 to focus the allocation of monies to each transit provider on elderly and disabled populations in each region, distance traveled to facilities served and the volunteer program shared. The Ticket-to-Ride program at Stagecoach subsidizes senior and disabled rides allowing individuals to contribute only 20% of the cost of the ride for a limited number of rides a year. While the core funding comes from state and federal programs, the region is unique in that it extends program's resources by using volunteer drivers (i.e., trips provided by individuals using their own cars). The federal and state transportation programs are chronically under-funded and have become increasingly regulated by the respective transportation agencies. In an effort to ensure continued transport services for the region's growing elderly population, TRORC can advocate for increased funding and resources to meet present and projected needs. TRORC can also collaborate with the public transportation agencies, investing staff time to address these increasing regulations. The ironic reality has been that state and federal regulatory procedures add an unfunded administrative burden that has reduced public transportation services and curtailed volunteer contributions.

Figure 8: Elderly and Disabled Transportation Services



UNMET NEEDS

Social service provides who work with transit dependent populations including the elderly, disabled, and people living below the poverty line identify 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 services. 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 services, 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

1. Available and diverse public transportation options for the region.
2. Human service public transportation is adequately funded and free of undue burdens.

Policies

1. Support town, human service agencies, and the regional public transportation agencies in providing more public transportation services for a greater percentage of the region.
2. Continue assisting public transportation agencies with planning, marketing, and general coordination.

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 Elderly and Disabled transportation services.
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 elders and persons with disabilities.
5. TRORC will support the start of the Upper Valley US Route 4 commuter bus service.

CARPOOL AND PARK AND RIDES

Carpooling

In a rural, sparsely settled area where a comprehensive public transit system is unwieldy, ride sharing allows people to mitigate the cost and environmental impact of their commute without changing the location of their home. Within the region 11% of commuters share rides to work. Carpooling requires a significant amount of coordination and a slight loss of independence in transportation. Two programs exist in the

region to facilitate pairing people with other interested carpoolers, GoVermont and Upper Valley Rideshare.

Park and Rides

In order to facilitate the connection between single occupancy modes of travel to collective travel either by ridesharing or by the use of public transit, the region contains 18 park and rides. Of these park-and-rides, nine are supported by municipalities and nine are supported by the state. Since 2007, seven new municipal park and rides have been added to the region; while three state lots were expanded (bolded). Collectively, these park and rides have added an additional 337 parking spaces (see Figure 9 of the region's park and rides). Additionally, they facilitate the decrease in miles driven using single occupancy vehicles which has significant environmental and economic 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, keep properties on local tax rolls, combines maintenance needs, and improves the overall likelihood that the park and ride lot will be successful.

Figure 9: Regional Park and Rides

Town	Location	Jurisdiction	Total Spaces	Lighting	Shelter	Bike Rack	Public Transit Service
Braintree	VT12A	Municipal	**14**	Yes	No	No	No
Randolph	I-89, Exit 4	State	**89 (+89)**	Yes	Yes	Yes	Stagecoach
Royalton	VT14/VT110	State	20	No	No	No	Yes
Sharon	I-89, Exit 2	State	24	No	No	Yes	Stagecoach
Strafford	VT132	Municipal	**23**	Yes	No	Yes	No
Hartland	I-91, Exit 9	State	**55 (+15)**	Yes	No	Yes	CRT
Hartford	I-91, Exit 12	State	**40**	Yes	Yes	Yes	Advance Transit
Hartford	South Main St, WRJ	Municipal	30	No	No	No	Advance Transit
Norwich	Turnpike Rd	Municipal	30	Yes	Yes	Yes	Advance Transit
Thetford	I-91, Exit 14	State	25	Yes	No	Yes	Stagecoach
Bradford	I-91, Exit 16	State	**81 (+59)**	Yes	No	Yes	Stagecoach
Hancock	VT100, Town Hall	Municipal	**29**	Yes	No	No	No
Pittsfield	VT100, Town Office	Municipal	**18**	Yes	No	No	No
Bradford	VT25/Chelsea Rd	State	**5**	No	No	No	Yes
Newbury	US5	Municipal	**20**	No	No	No	Yes
Corinth	VT25	Municipal	**25**	Yes	No	No	No
Woodstock	US4	Municipal	**20**	Yes	No	No	Vermont Translines
Stockbridge	VT100/VT107	State	**10**	No	No	No	No
		TOTAL SPACES	**558**				

The Regional Plan supports the provision of new and upgrading of existing park and ride facilities with the following goal:

Goal

1. Reduced single occupancy vehicle dependency.

Policies

1. Increase the number of park and ride lots to better support regional public transportation.
2. Encourage and facilitate coordination between public transportation agencies and Vermont Agency of Transportation in construction of park and ride lots, and give higher priority to those located along interstate interchanges and existing bus routes.

Recommendations

1. State investments in park and ride lot improvements shall be as identified in the East Central Vermont Park and Ride Needs Analysis (Appendix X). **Specifically, the two highest priority Park and Ride sites in the region that currently do not exist but are in high demand include:**

    - Royalton I-89 Exit 3 off VT107 (CMG PARK(27)S)
    - 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-occupancy vehicle trips.
4. Towns should consider shared parking lots with other properties that may become formal or informal park and ride lots.

WALK AND BIKE

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. TRORC should work to ensure that these considerations are made in all state and local transportation improvement projects. The context of each project should be recognized in any recommendations for additional facilities or accommodations. In very rural areas, road shoulders provide a reasonable safe and cost effective facility for pedestrians. 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 to enhance safety, such as traffic calming, are appropriate. In areas with more multimodal 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 to pedestrian travel to and from the rider's final destination.

Pedestrian and Bicycle Facilities

Walking and bicycling infrastructure is an important component of the region's goals for sustainable transportation. 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. The Safe Routes to School program is a national initiative designed to promote walking and bicycling among school children. Improving safety is the primary program emphasis, but there are also other goals of improving physical fitness and mitigating school caused traffic impacts. The region has been supportive of federal and state initiatives that incorporate safe routes programs primarily in schools in or near the larger regional growth areas.

Goal

1. A safe and broad network for pedestrians and bicyclists.

Policies

1. Improve transportation infrastructure and services to facilitate independent travel of adolescents.
2. Update town land use guidance or zoning to meet goals for walking, biking and sustainable transportation.
3. Construction projects shall consider improvements to bicyclists and pedestrians to be central to project's purpose, rather than an "enhancement." Accommodations for pedestrians include not only the sidewalk surface, but amenities to make walking feel safer and more comfortable including trees, plantings, benches and lighting.
4. Improve cycling conditions on State routes by improving pavement conditions.

Recommendations

1. TRORC will work with towns and Vermont Agency of Transportation to institutionalize pedestrian and bicycle accommodations in all of its planning, engineering, and construction related activities – implement "Complete Streets". In addition to the existing local land use regulations, develop 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 of objective measures to gauge the potential for walking and bicycling could be one element 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 the Safe Routes to School program and encourage more schools to participate in the program – especially those schools within densely settled villages or town centers.
6. TRORC will advocate that commercial developments invest in transportation infrastructure and services to increase bicycling, walking or transit, or provide necessary rights-of-way to allow later investment in those facilities.
7. TRORC should provide education and training to large employers the benefits of providing showers and bike lockers for employees that commute by biking.

Telecommute

Telecommuting offers an excellent way to both reduce energy use in transportation and consequent green 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, telecommuting is a sizable portion of the way that people in the region access employment, and increasing the option of telecommuting through greater availability of broadband service would increase the attractiveness of the region to individuals that have jobs that are not location-dependent, as well as provide additional economic benefits.

Goal

1. Telecommuting is 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.

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 options where practical for employees**.**
3. TRORC should provide education to employers on benefits of allowing some telecommuting for employees.

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, D.C. is currently subsidized by the State of Vermont, and has stops in Randolph and White River Junction, traveling on the New England Central Railroad. This rail service is utilized more for tourism purposes as opposed to commuter service, and has benefited from upgrades in recent years that have shaved off ample travel time along the corridor. In the past fiscal year alone (FY13-FY14), ridership throughout the state of Vermont was up 6.8%. While ridership at White River Junction was only up a total of 5%, Randolph saw a pronounced growth rate of 14.6% (total growth of 6.1% for the region's stations altogether). All told between 2011 and 2014, total ridership for White River Junction increased by 15.2% and Randolph by 21.3% (total growth of 13.8% region-wide).

Figure 10: Boardings & Alightings on the Amtrak "Vermonter" Line by Fiscal Year

	2014[4]	2013[5]	2012[6]	2011[7]
White River Junction	16,257	15,480	15,125	14,109
Randolph	2,302	2,009	2,004	1,897
Total for Vermont	***107,688***	***100,829***	***96,974***	***91,942***

At one time, almost every town in the region was serviced by rail links, be it for personal or commercial use. While access to passenger trains has decreased with respect to the number of functioning passenger rail stations, there has been an upward trend in rail ridership in recent years, as noted in Figure 10. 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. However, one passenger rail route that is currently under study involves expanding the existing "Vermonter" rail services from Boston all the way to Montreal Central Station in Quebec, Canada. The Northern New England Intercity Rail Initiative (NNEIRI) is a tri-state transportation study being undertaken by Vermont Agency of Transportation and the Massachusetts and Connecticut Departments of Transportation. NNEIRI looks at increasing frequency and higher speeds along two separate, major rail corridors. The "Vermonter" line, if extended beyond Vermont to Montreal, would cover a 470 mile corridor. The study will evaluate potential ridership, environmental impacts, and create development plans along both corridors, covering six different rail line owners.[8]

Freight Transportation

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 TRORC region, with designated stops at twelve towns and villages in the river valley: White River Junction, Wilder, Norwich, Kendall, Thetford, Northboro, Ely, Fairlee, Bradford, Hooker, Newbury, and Wells Rivers.[9] Additionally, the towns of White River Junction and Bradford have industrial parks on-site, and the White River Junction station also serves as an interchange point for the Vermont Rail System freight trains.

There are challenges for rail freight to compete with other transport modes, namely tractor trailers. It can serve as a more efficient, economical, and environmentally friendly means of transportation for goods compared with other modes (notably trucks and planes). Increases in rail freight service can only occur so 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 can work with towns to consider land use and transportation investment policies that would make rail based industries a viable commercial activity. TRORC has had long standing 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.

The State of Vermont has a total of 10 railway companies operating throughout the state, some of which lease rights to the tracks directly from the state.[10] The Vermont Rail System, which operates in the TRORC region, conveyed over 24,000 carloads of freight in 2013 alone.[11] With this much traffic on the rail lines, it is likely that a significant share of the goods transported are actually hazardous materials. This presents a very real threat to health and safety in the event that there is a derailment or other spill, as it occurred north of Vermont in the Lac-Mégantic, Quebec following a crude oil railway crash in July 2013 that killed at least 50 people and damaged swathes 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. 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 bounds, be it within a Hazard Mitigation Plan, Emergency Operations Plan or otherwise.

Goal

1. Increase rail (passenger and freight) services in the region.

Policies

1. Improve existing rail infrastructure to broaden rail services by working with Vermont Agency of Transportation to prioritize service lines.
2. Expand business opportunities for rail/truck connections and tourist travel.

Recommendations

1. TRORC will support the implementation of the Northern New England Rail Initiative final recommendations for a Boston to Montreal high speed rail service.
2. TRORC will support improved rail service along I-91 corridor.

DRIVE

Current State of Transportation Network

As the major transportation infrastructure in the region, the population depends on and expects safe and good condition roads to get to where they need to in the region. Looking at Average Annual Daily Traffic (AADT) volumes on State highways (Figure 11), Interstates 89 and 91

carry the bulk of traffic in the region with an AADT of 10,000+ vehicles a day, followed by US Route 4 and US Route 5 with 5,000 to 10,000 vehicles a day. The region rarely encounters traffic congestion even during peak hours.

The pavement conditions of the State highways (Figure 12) in the region indicate that roughly 40% of the conditions are Poor and Very Poor. There has been a concerted effort from Vermont Agency of Transportation to actively address poor pavement conditions although there remains greater demand over available funds to implement all projects. US Route 5, VT Route 12, VT Route 14 and VT Route 100 remain in Very Poor condition.

After obtaining adequate roadway funding, improving safety is the single greatest transportation issue for the region. TRORC is collaborating with Vermont Agency of Transportation and their Strategic Highway Safety Program whose mission is to reduce crashes resulting in injury and death. TRORC works with Vermont Agency of Transportation on an annual High Risk Rural Roads program that assesses crash data in a five year period and identifies high crash locations and corridors that would be recommended for low cost roadway improvements. Summarizing the latest crash data received from 2009-2015 (998 records) are some interesting trends in the region:

- The highest incidences of crashes are in the Town of Hartford (34%) with the second highest in the Town of Norwich (8%).
- Over 68% of crashes result in property damage only while fatalities make up 1%.
- 54% of crashes occur on a straight road alignment.
- 52% of crashes occur when the weather condition is clear.
- 56% of total crashes involve only a single vehicle.
- 20% of crashes are a result from driving too fast for conditions.

Figure 13 shows a map displaying the crash locations in the region. See Appendix X for more detailed crash summaries.

Goal

1. Reduced crashes resulting in injury and death.

Policies

1. Promote local traffic calming projects for town roads that are located within regional growth areas and/or have speeding related safety concerns.
2. Advocate state transportation agencies more actively apply pavement center line markings on state-controlled and Class 2 roadways. Support fog line markings for all Class 1 and 2 paved roads.
3. Promote integration of rumble strips in State highway projects where appropriate.

Recommendations

1. Continue to conduct road safety audit projects through Vermont Agency of Transportation High Risk Rural Roads program. Focus safety audits 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.
2. Continue speed studies as requested by Towns.
3. Work with towns to develop road standards that promote traffic calming in private development.
4. Continue collaborating with Vermont Agency of Transportation on paving projects and district leveling prioritization.

Scenic Byways and Routes

The National Scenic Byways Program (Byways) is a program available to communities that desire to proactively formalize corridors by scenic and heritage qualities. The Byways program was established under federal transportation legislation in 1991 and has been reauthorized under subsequent transportation bills. There are currently three Byways in the region; the Connecticut River Scenic Byway, the Crossroad of Vermont (Route 4) Byway, and the Scenic Route 100 Byway. In addition, one Vermont Scenic Road has been 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. The Vermont Byways designation seeks to promote the scenic and historical nature of the road and the towns it passes through, but does not restrict development in the corridor. See Appendix X Special Road Designations.

Figure 11: Average Daily Traffic Volume on Major Highways

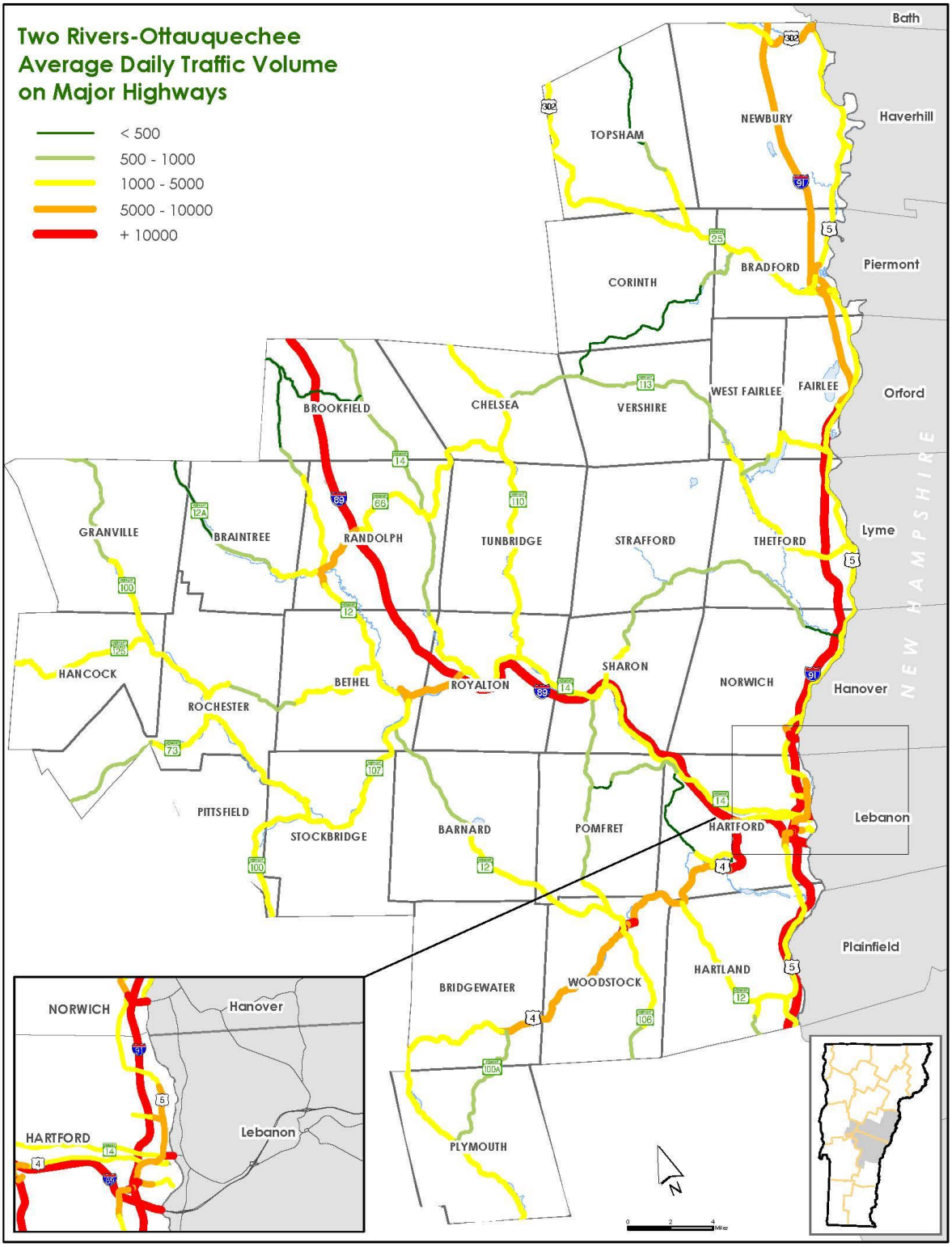


Figure 12: Interstate and State Highway Pavement Conditions

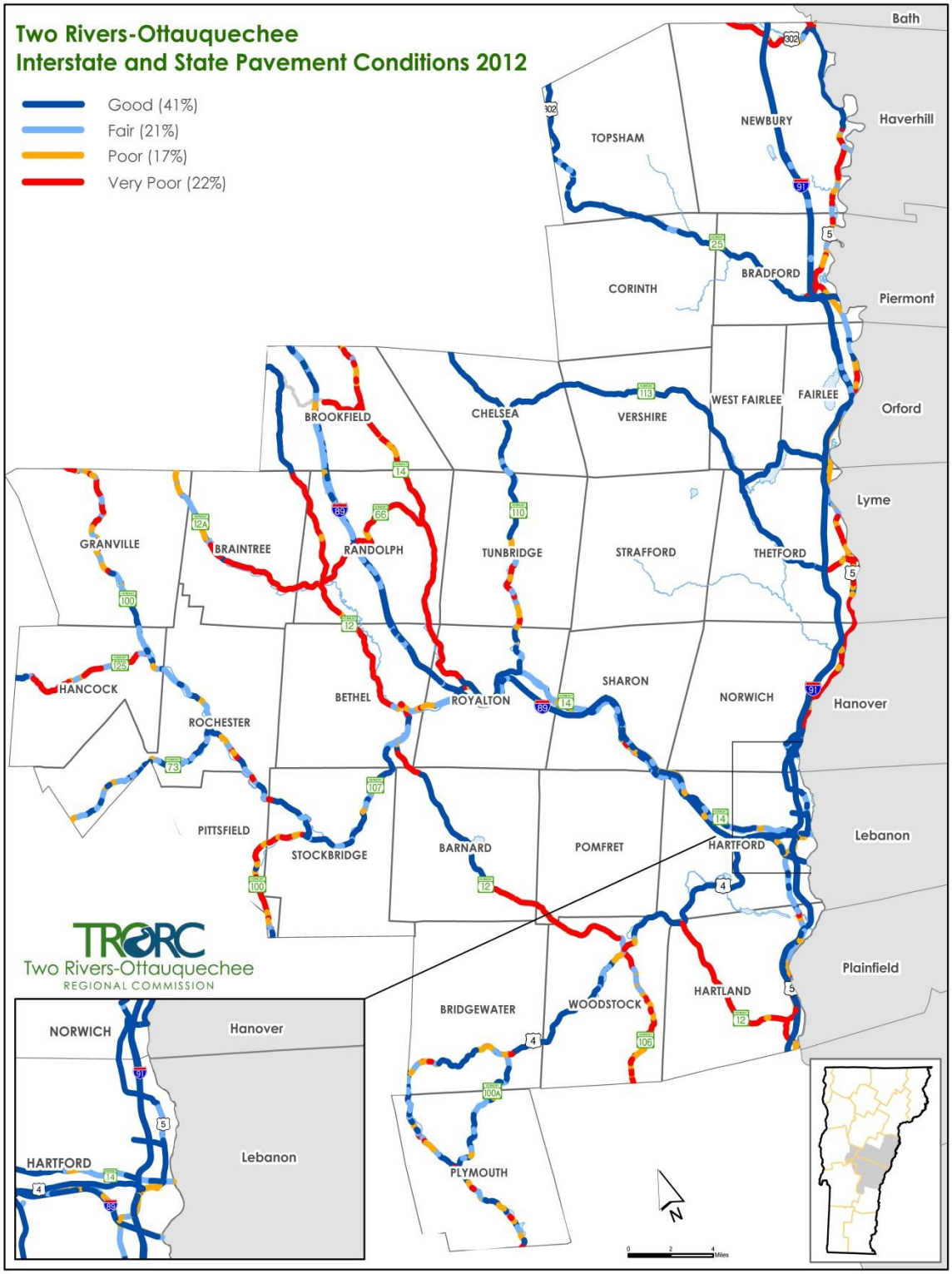
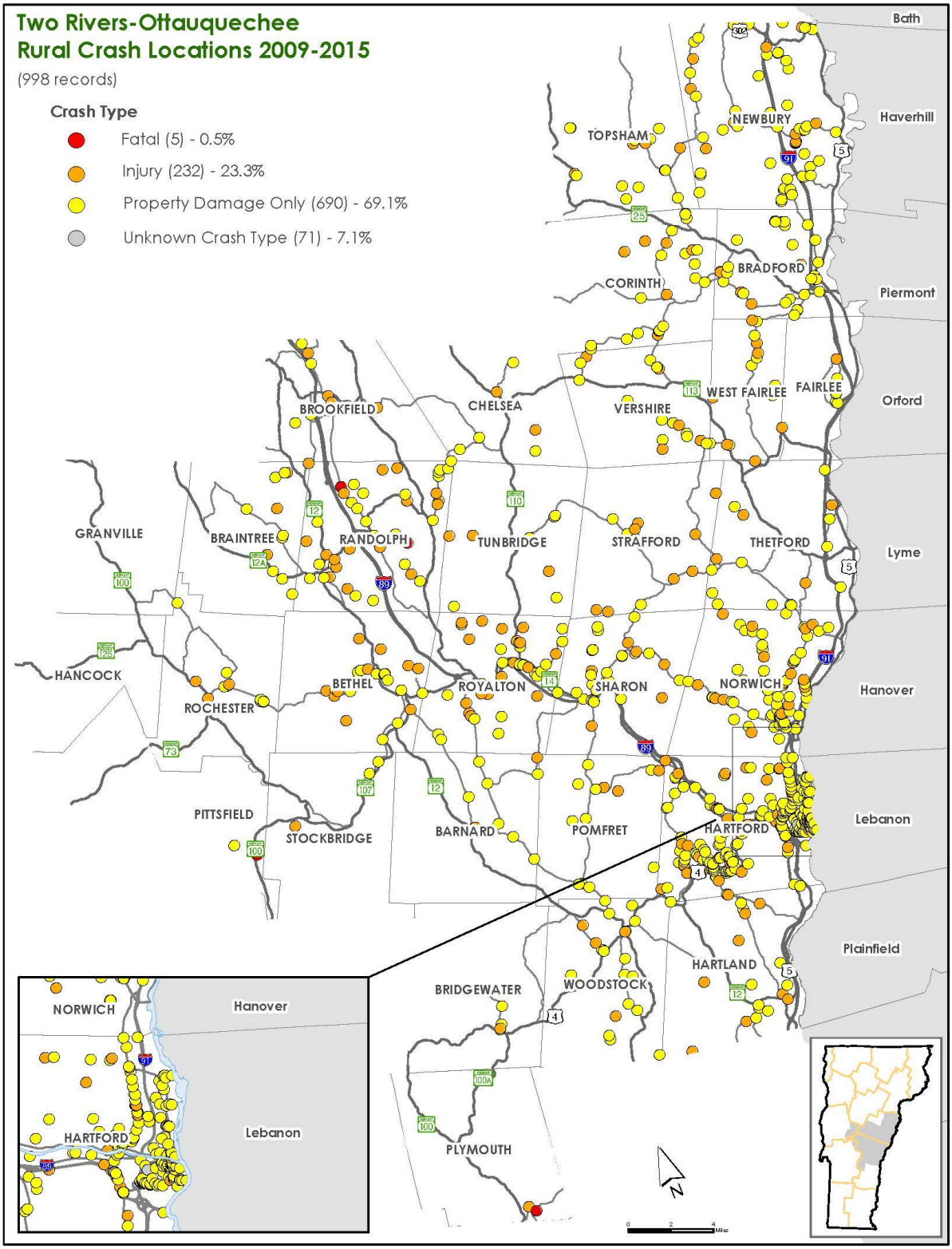
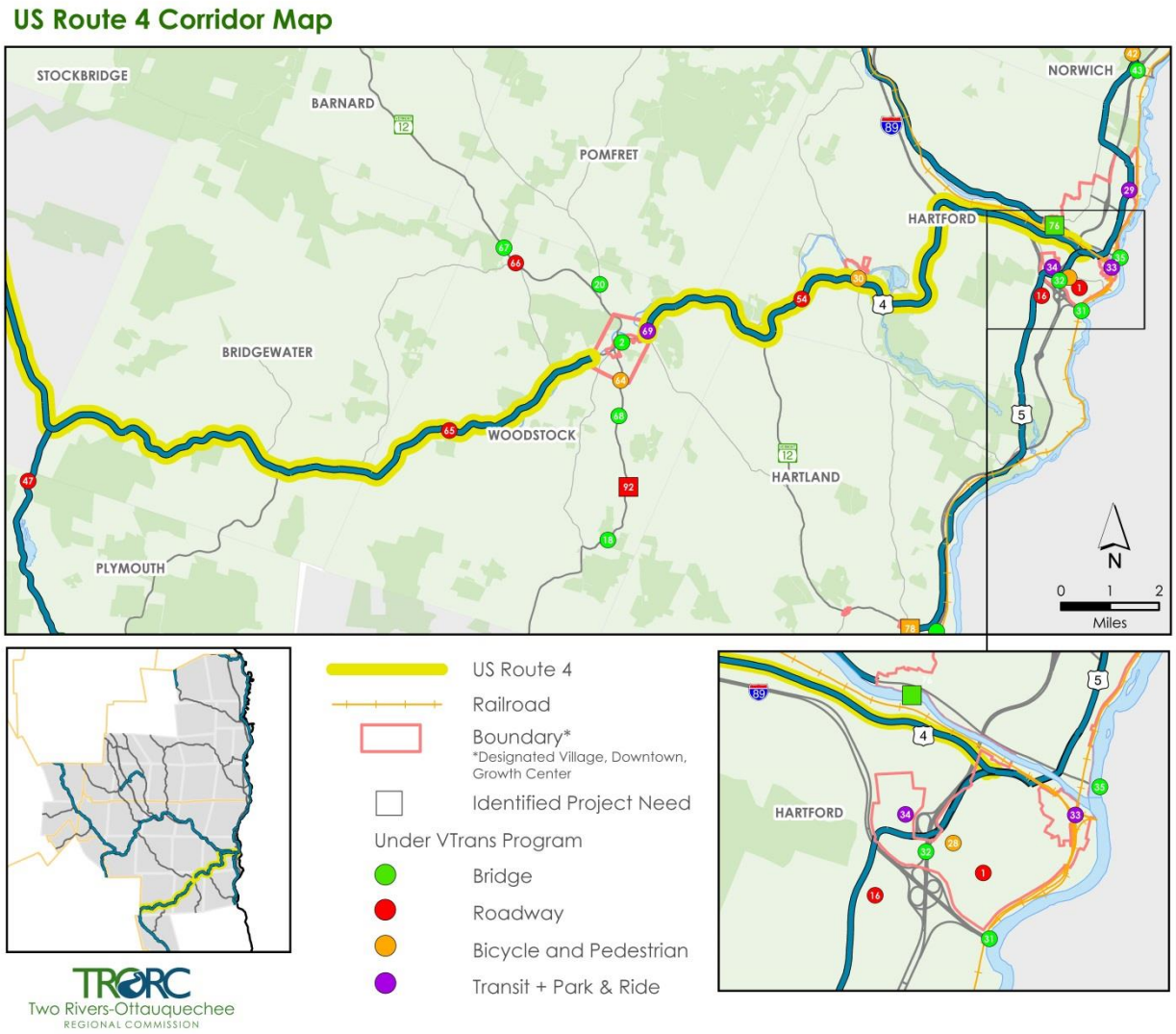


Figure 13: Rural Crash Locations



Transportation Corridors

US Route 4



From a statewide perspective, US Route 4 is one of only three east-west routes across Vermont and carries the highest volumes of the three (VT Route 9 and US Route 2). In this region the primarily two lane rural road parallels the Ottauquechee River along the old railroad alignment and winds through many sensitive natural landscapes and a number of vibrant community centers. US Route 4 is on the national highway system and Vermont's tractor truck network so mobility and safety issues are a top priority. US Route 4 is also Main Street for a number of villages and hamlets. The road is a gateway into Vermont, a tourism destination for experiencing the region's rural landscapes. Many residents' quality of life and the vitality of commercial businesses greatly depend on preserving this unique road and surrounding landscape. US Route 4 faces difficult challenges of preserving mobility, safety, and traveling efficiency while continuing to support community life and commercial activities. There are no other parallel roads or alternative travel options available and the topographical and environmental

constraints would restrict all reasonably feasible roadway expansion projects. As traffic increases and land development intensifies, the region will be forced to accommodate that growth with little or no further transportation capacity improvements.

The US Route 4 corridor has a number of scheduled transportation projects in the Vermont Agency of Transportation's multi-year capital program. They are:

ID	Town	Program	Description
2	Woodstock	Town Highway Bridge	BR51/US4 replacement
30	Hartford	Bike & Ped Facilities	Quechee study
35	Hartford-Lebanon	State Highway Bridge	US4 replacement
69	Woodstock	Park & Ride	US4 lot creation
65	Woodstock	Roadway	US4 improvements from T.S. Irene damage

In 2008, the Hartford US Route 4 Corridor Management Plan (Appendix X) was developed by TRORC, the Town of Hartford and the Vermont Agency of Transportation that assessed existing and projected future transportation and land use conditions. The Plan resulted with a set of transportation and land use recommendations which the region has adopted for planning guidance. In 2009, the US Route 4 West Corridor Management Plan (Appendix X) was developed as a follow up project to the 2008 Hartford Corridor Plan and did a similar assessment from Hartland to Bridgewater. This Plan built on the Hartford Corridor Plan by defining Access Management Zones and offered recommendations for access management.

US Route 5

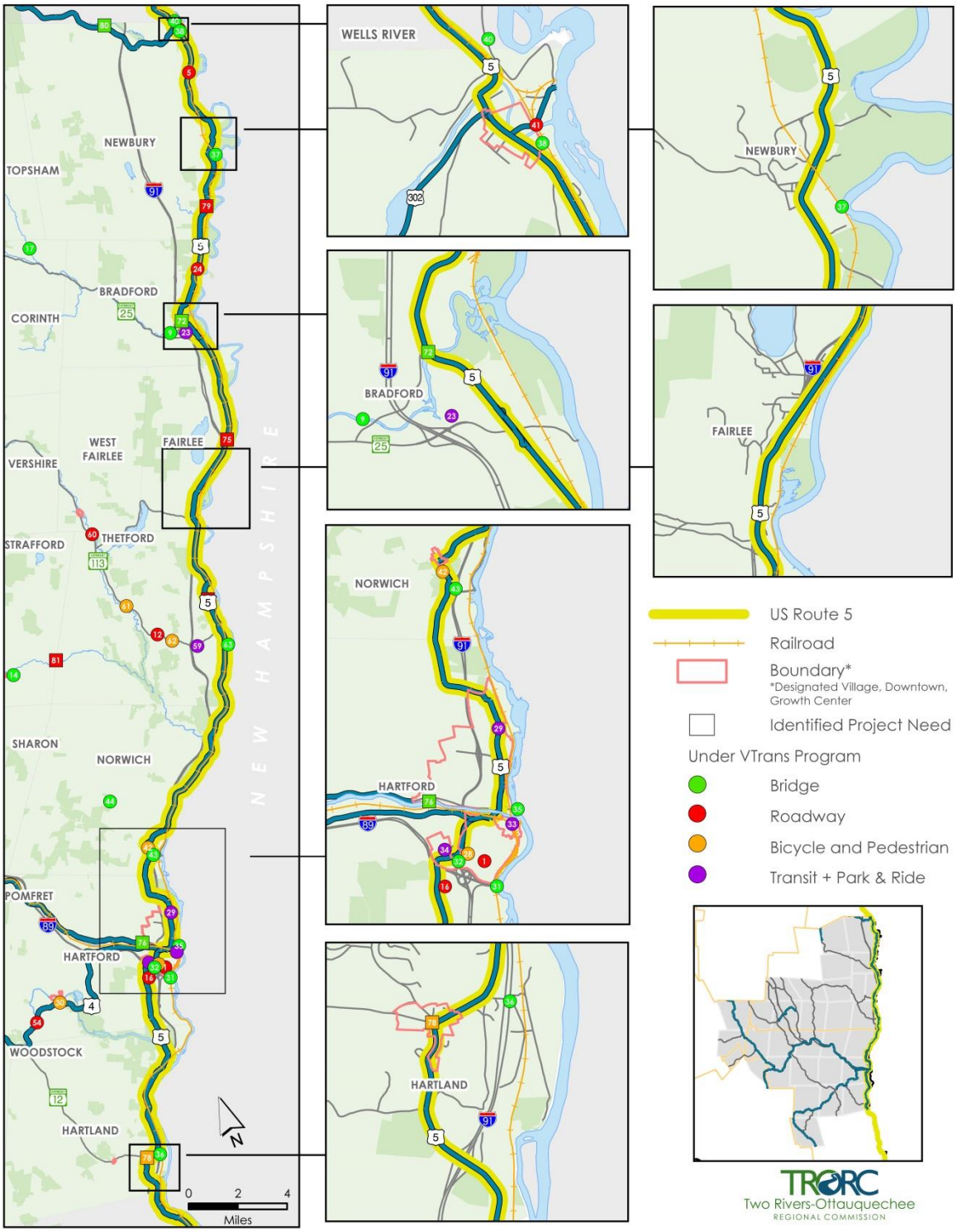
US Route 5 is one of two north-south arterials in the region that runs adjacent to the Connecticut River. US Route 5 is a two lane rural road that parallels the river and offers many scenic landscapes and a number of vibrant village and town centers. US Route 5 has become part of the bi-state Scenic Byway and as such is recognized for its "*unique historic, cultural, environmental, agricultural and railroading traditions and resources" (Connecticut River Scenic Byway - www.ctrivertravel.net)*. While US Route 5 is not included on Vermont's tractor truck network, many logging and other commercial trucks utilize this road to avoid interstate imposed weight restrictions. US Route 5 serves as a Main Street for a significant number of town centers, villages, and hamlets. The region and the greater bi-state tourist industry rely heavily on US Route 5.

Over the last 5 years, TRORC has evaluated tractor truck traffic along US Route 5 which has averaged 5-8% of the overall traffic volumes. The majority of activity is trucking wood products northbound and these vehicles traditionally carry heavier loads than other forms of trucking. Speed limits have also been monitored within the villages and town centers. In those instances, speeds are shown to average 5-15 mph above posted speed limits although more active enforcement in Hartford, Norwich, Fairlee, Bradford, and Newbury has shown to reduce speeds in those areas.

The Upper Connecticut River is a nationally renowned destination for bicyclists with US Route 5 and NH Route 10 providing excellent bicycling loops. US Route 5 is a combination of gently rolling hills and flat terrain that challenges but does not overtax a bicyclist. No official counts

have been conducted along US Route 5, but it is readily observed that the highest bicycling activity in the region occurs on these roads. The most popular routes are the Norwich – Thetford and Thetford – Fairlee sections of US Route 5 and NH Route 10.

US Route 5 Corridor Map

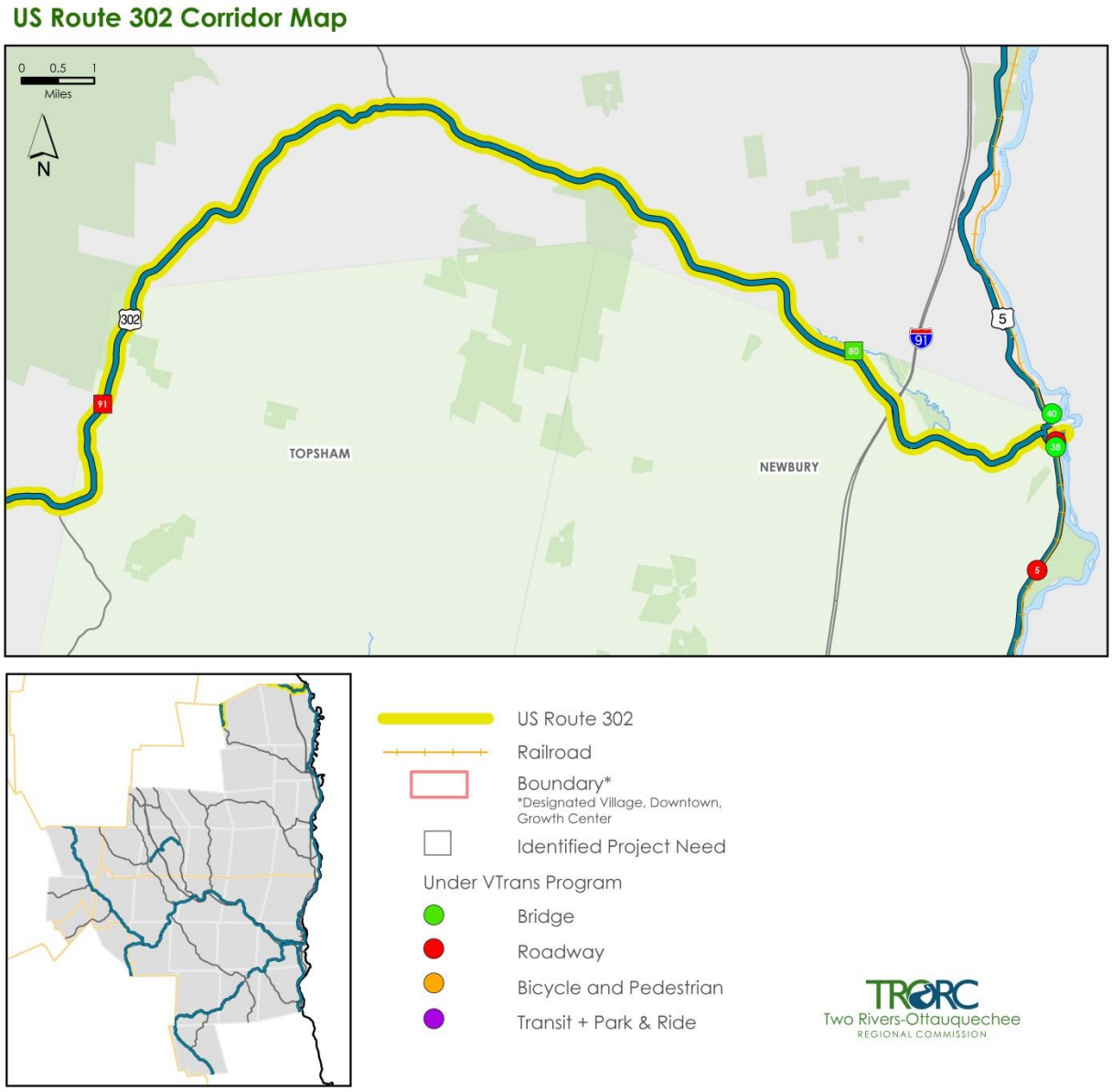


Transportation

The US Route 5 corridor has a number of scheduled transportation projects in the Vermont Agency of Transportation's multi-year capital program. They are:

ID	Town	Program	Location
1	Hartford	Traffic Safety	US 5/Sykes Ave.
5	Newbury-Ryegate	Paving	US5/Bradford line
16	Hartford	Traffic Safety	US5/I-91 SB ramp
28	Hartford	Bike & Ped Facilities	Sykes Mtn Ave
29	Hartford	Transit	green route expansion
32	Hartford	State Highway Bridge	I-91 twin bridges over US5
34	Hartford	Park & Ride	I-89/I-91
36	Hartland	State Highway Bridge	I-91 over US5 BR37
39	Newbury	Park & Ride	lot creation off US5
40	Newbury	State Highway Bridge	US5/BR106 deck replacement
41	Newbury	Roadway	US 302 Alignment
42	Norwich	Bike & Ped Facilities	sidewalk along Church St
43	Norwich	State Highway Bridge	BR48S I-91 over VT10A
72	Bradford	State Highway Bridge	US5/BR rehabilitation
76	Hartland	Bike & Ped Facilities	Three Corners
77	Newbury	State Highway Bridge	resurfacing 4.8 miles of US5
87	Thetford	Roadway	resurfacing 3 miles of US5

US Route 302

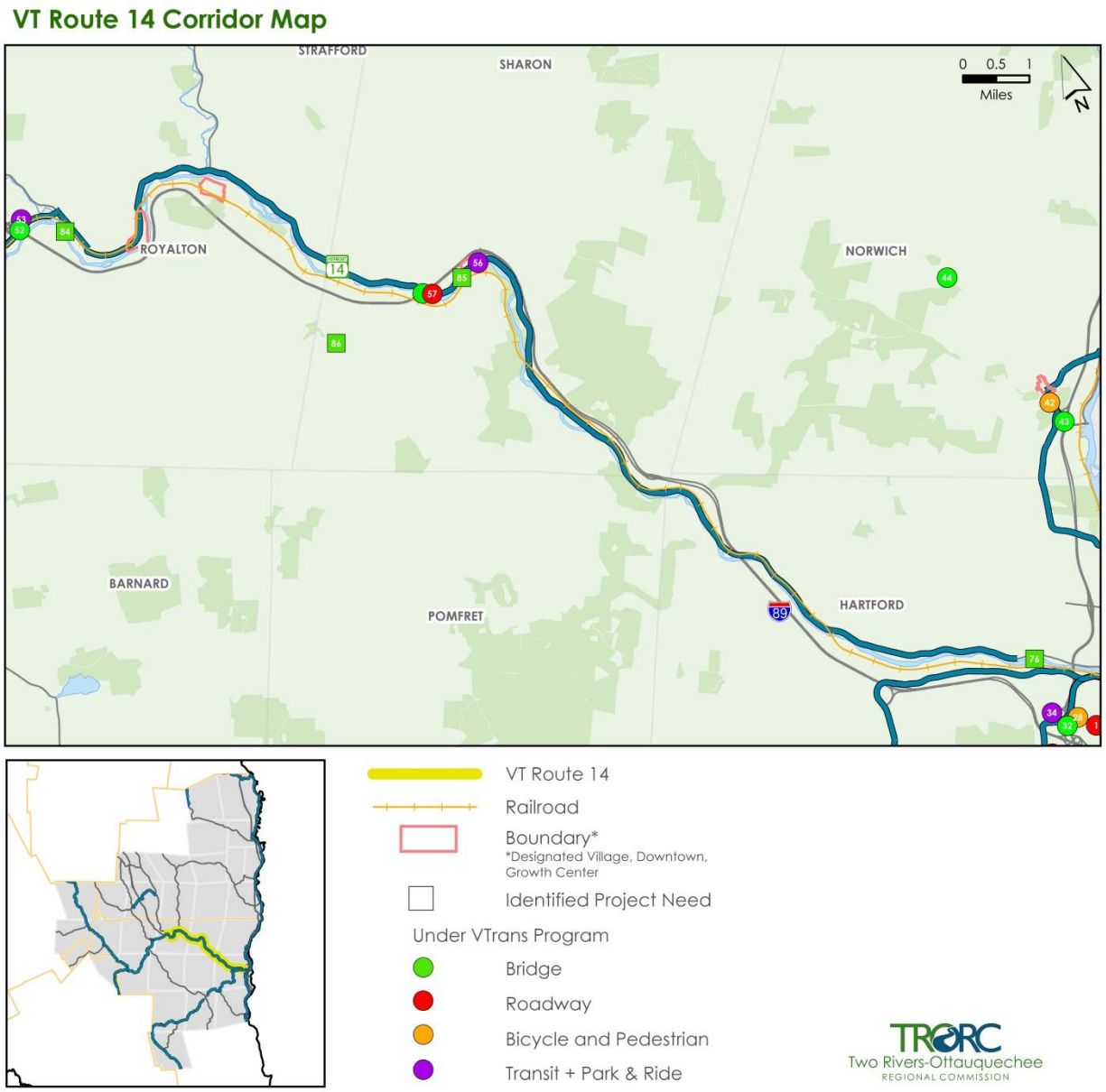


US Route 302 is a major east-west travel corridor connecting the northern New England region from Portland, ME to Montpelier, VT. US Route 302 was originally part of the old New England interstate system that pre-dates the Eisenhower era national highway system. Of the approximately 170 mile highway there are only 8 miles that fall within the region in the towns of Newbury (5 miles) and Topsham (3 miles). US Route 302 is part of the Vermont's tractor truck network which means that this roadway receives a greater priority for transportation project investments. Within our region, US Route 302 crosses Interstate 91 at the Exit 17 interchange. Despite all the strategic advantages to the TRORC and greater North New England region, it is still a two lane road that offers scenic views of rural landscapes and the Wells and Connecticut Rivers.

The US Route 302 corridor has two transportation projects in the Vermont Agency of Transportation's multi-year capital program which are:

ID	Town	Program	Location
41	Newbury	Roadway	US302 realignment
88	Topsham	District Leveling	resurfacing 3.4 miles of US302

VT Route 14



Within the TRORC region, VT Route 14 passes through a variety of landscapes, ranging from more developed growth centers in Randolph (a town center) and White River Junction (a regional center) to more rural and agricultural areas, as seen in Royalton Village and Sharon

(village settlements). There has been a great deal of growth throughout the VT Route 14 corridor over the past forty years, in large part due to the proximity of the interstate highways (both I-89 and I-91). The route's corridor has been—and remains—a prime location for residential housing settlements due to highway access that easily links the area with designated centers. Additionally, the towns of Sharon and Royalton have seen an increase in housing due to demand near Vermont Law School in South Royalton. These drivers for growth are projected to continue, and there is also interest in business growth along the corridor. Current and anticipated growth places strain on the entirety of VT Route 14 and its supporting infrastructure. During Tropical Storm Irene, much of the roadway was washed out and portions were destroyed by the White River and its Second Branch breaching their banks.

According to the 2010 traffic flow map produce by the Agency of Transportation, the annual average daily traffic county for the entirety of VT Route 14 in the TRORC region was 50 to 400 vehicles. The highway is paved throughout, and there are portions of the road equipped with shoulders and pull-off areas. The posted speed limits on the road ranges from 35 to 45 miles per hour, and varies depending on whether the road is passing through town and village centers or areas that are less developed.

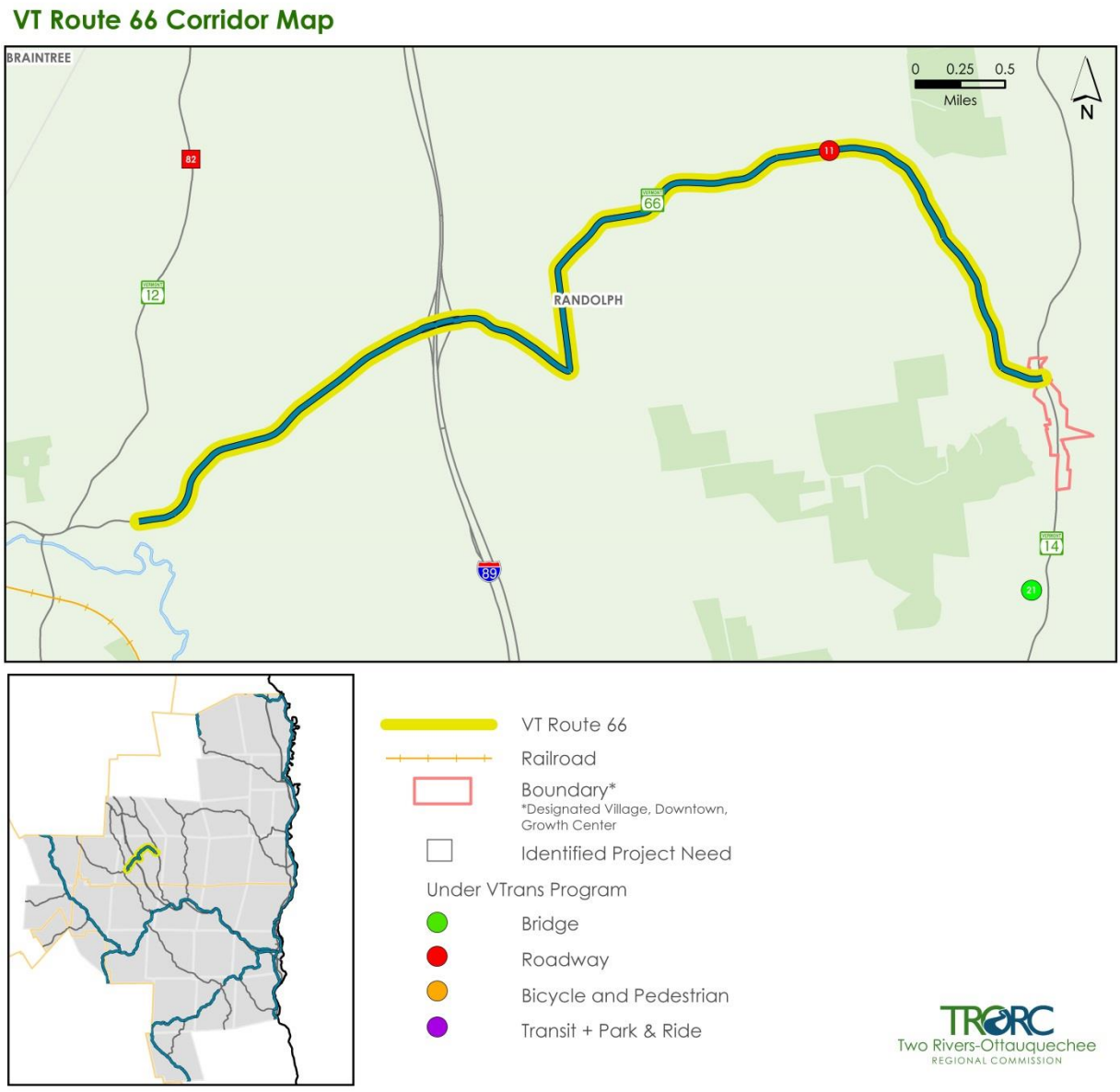
The VT Route 14 corridor has two transportation projects in the Vermont Agency of Transportation's multi-year capital program which are:

ID	Town	Program	Location
56	Sharon	Park and Rides	scoping expansion of existing lot
57	Sharon	Roadway	roadway improvements on VT14
80	Royalton	District Leveling	resurfacing 6.7 miles of VT14

VT Route 66

VT Route 66 is a short 7.6 mile state roadway entirely within the Town of Randolph. It is a two lane rural road accessing Interstate 89 and is the primary gateway to East Randolph, Randolph Center, Randolph Village, and adjacent towns. VT Route 66 is the geographic center of the State of Vermont and connects the Vermont Technical College to the interstate.

The average traffic volume in 2006 are estimated at 4,500 vehicle trips per day, but these numbers can double under full build out scenarios described in the Randolph Exit 4 studies completed in the 1990s. The road has been evaluated by transportation engineers as being in poor condition with an average sufficiency rating of 59. Most of VT Route 66 is posted at 50 mph despite having numerous geometric and sight distance deficiencies. As a rural low traffic volume road, the alignment challenges do not create any real safety or mobility concerns. With the increased development, however, those balances can be negatively altered. As seen in other regions, it is possible that development can impair traffic operations and/or restrict the full build-out potential of a roadway. The challenge is to preserve mobility and safety while continuing to support and encourage a land use development pattern that is supported by this Regional Plan and the Randolph Town Plan. The additional challenge will be to implement transportation enhancements that protect the 'scenic vistas' that are also well supported in the Regional Plan and Town Plan.



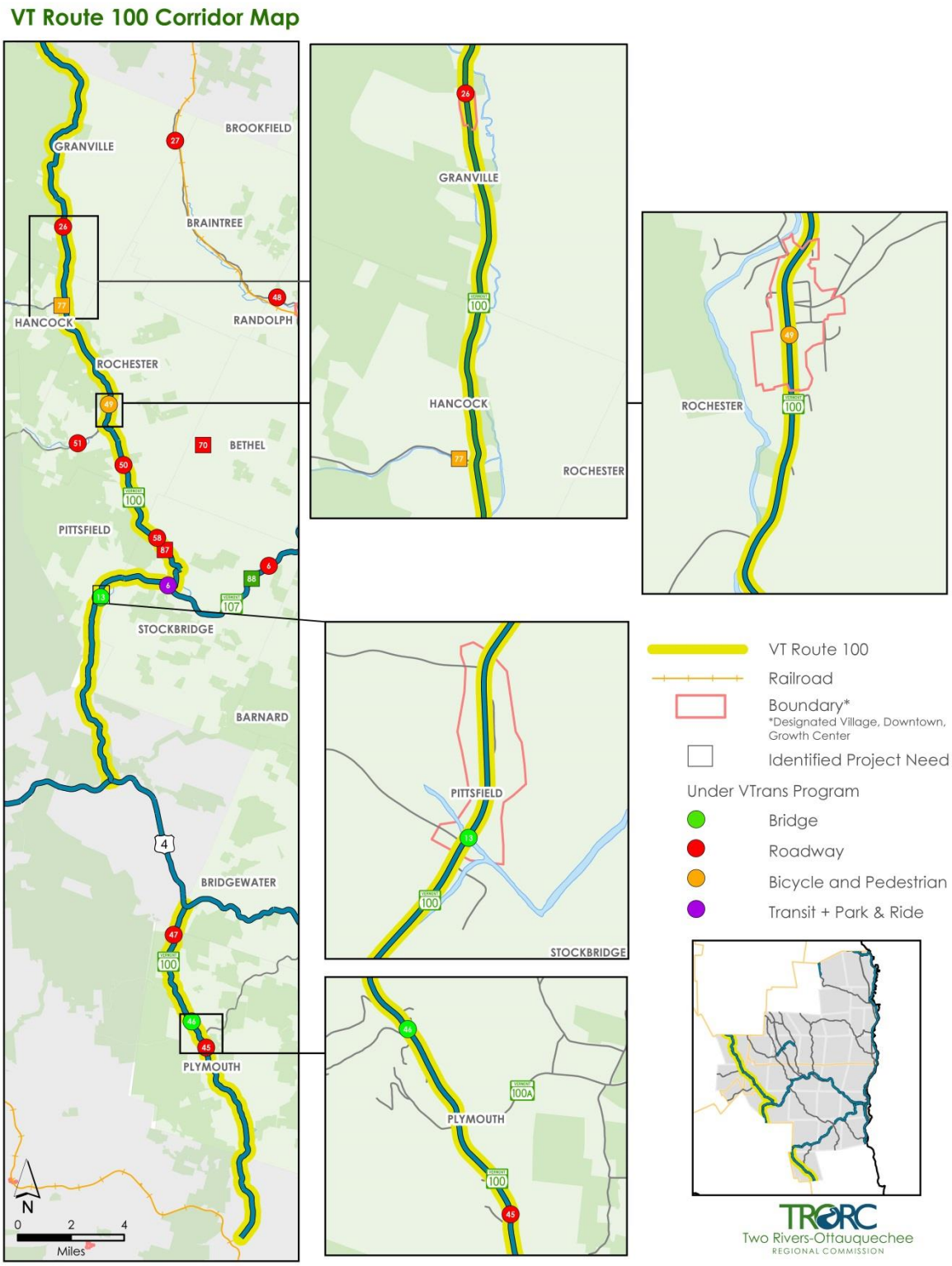
VT Route 66 has one scheduled transportation project in the Vermont Agency of Transportation's multi-year capital program which is:

ID	Town	Program	Location
11	Randolph	Paving	resurfacing VT66/VT12 to VT14

VT Route 100

VT Route 100 is Vermont's primary north-south highway with a 41.3 mile segment traversing the TRORC region. VT Route 100 is a scenic, two lane rural road that connects Plymouth and Bridgewater, exits the region, and then continues through the Quintown region, as the primary access for Stockbridge, Pittsfield, Rochester, Hancock, and Granville. VT Route 100 is most

notable for its scenic panoramas of rural farming and pasture lands and uninterrupted views of rivers, meadows, and mountains. VT Route 100 supports a number of transportation users as a major ski highway, travel route for tourism destinations north and south, local access, and as its own destination for traveling visitors.



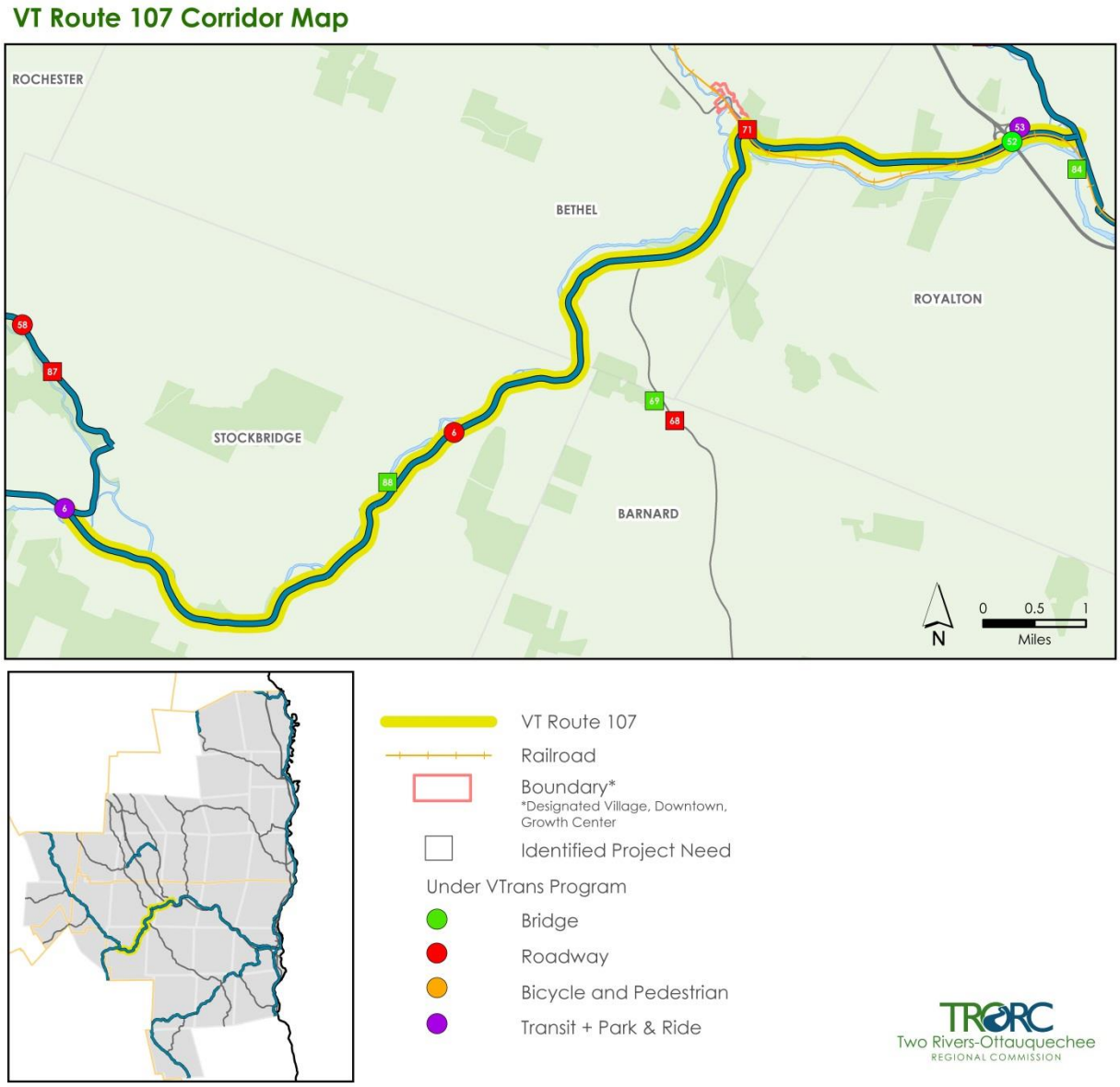
There are relatively low traffic volumes throughout the corridor and rarely any observed traffic congestion. Road conditions are rated as 'fair' by transportation engineers (65 sufficiency rating). In 2006, the road had an estimated traffic volume of 2,300 vehicle trips per day which is

below the total traffic carrying capacities. Tractor truck traffic volumes along VT Route 100 fluctuate from 5-11% of the overall traffic volumes. There is a great diversity of truck traffic volumes and activities. Trucks carrying lumber and a multitude of consumer products can be seen going north and south. Posted travel speeds varied from 25-35 mph within settlement areas to 40-50 mph along the peripheries of town. Speed limit data have not been collected along any section of VT Route 100.

VT Route 100 has several scheduled transportation project in the Vermont Agency of Transportation's multi-year capital program which are:

ID	Town	Program	Location
13	Pittsfield	State Highway Bridges	VT100/BR126 rehabilitation
26	Granville	Roadway	VT100 improvements from T.S. Irene damage
45	Plymouth	Roadway	VT100 improvements from T.S. Irene damage
46	Plymouth	State Highway Bridges	VT100/BR115 rehabilitation
47	Plymouth-Bridgewater	Roadway	scoping of VT100 improvements from T.S. Irene damage
49	Rochester	Bike Ped	sidewalk study VT100
50	Rochester	Roadway	VT100 improvements from T.S. Irene damage
58	Stockbridge-Rochester	Roadway	VT100 improvements from T.S. Irene damage
84	Stockbridge	District Leveling	resurfacing 4 miles of VT100

VT Route 107



A master plan for the Exit 3 interchange was completed in 2000 and its results are reported in the land use section of this Regional Plan. There are a number of transportation and land use factors that strongly support additional development. VT Route 107 has already seen considerable development in recent years and these favorable attributes promise an additional intensifying of land uses. Ensuring that development is not permitted until the infrastructure is in place is essential. A particularly unique asset in Royalton and Bethel, the road runs parallel to the NECR line and with the interstate connections can readily support rail based development. The greatest regional challenge will be preserving traffic capacities while allowing development opportunities consistent with the land use policies of Town and Regional Plans.

In Tropical Storm Irene, sections of VT Route 107 between Stockbridge and Bethel were completely destroyed. It was the last State road repaired and was reopened by the end of December 2011.

The average traffic volumes in 2006 were estimated at 4,300 vehicle trips per day. Road conditions are rated as 'fair' by transportation engineers (65 sufficiency rating) and this is one of the better constructed state highways in the region. Unlike most state highways, a significant portion of VT Route 107 has smooth traveling surfaces, adequate road shoulders, and sufficient sight distances. Posted travel speeds along VT Route 107 are 50 mph throughout the corridor with the exception of a 25 mph posting in the Bethel Village and a 35 mph for Stockbridge Central School. In the few instances where travel speeds where recorded, motorists typically exceeded the posting by 5-10 mph. This is a particular concern within the villages and in areas where intersecting local roads have minimal sight distances. Tractor truck traffic represents 5-10% percent of the overall traffic volumes. VT Route 107 was not identified on the state's primary truck network, although the high truck traffic volumes absent the local destinations suggest truckers continue to use the road as an alternative east-west facility. The challenge will be to better monitor trucking activity and to be more vigorous in enforcing trucking weights and safety laws. Finally transportation professionals utilize the VT Route 107 / VT Route 100 corridors to accommodate truck traffic rerouting plans for US Route 4 construction projects.

VT Route 107 has several scheduled transportation project in the Vermont Agency of Transportation's multi-year capital program which are:

ID	Town	Program	Location
6	Stockbridge-Bethel	Paving	resurfacing VT107/VT100 to VT12
6	Stockbridge	Park and Rides	creation of lot VT107/VT100
52	Royalton	Interstate Bridge	rehab/replace BR26N+S on I-89
53	Royalton	Park and Rides	facility location scoping VT107/I-89
85	Stockbridge	Town Highway Bridges	replacement of Bridge 35 on Bridge St

Goal

1. Reduced crashes resulting in injury and death in the State.

Policies

1. Promote local traffic calming projects for town roads that are located within regional growth areas and/or have speeding related safety concerns.
2. Work with towns to develop road standards that promote traffic calming in private development.
3. Promote integration of rumble strips in State highway projects where appropriate.

Recommendations

1. TRORC will continue to work with towns to conduct road safety audit projects through Vermont Agency of Transportation.
2. TRORC will work with towns to promote traffic calming.

3. TRORC will work with towns and Vermont Agency of Transportation to identify poor pavement conditions for improvement.
4. TRORC will offer town support as needed as liaisons for Vermont Agency of Transportation projects.

Other Priorities and Project Needs

A full listing of regional priority projects and identified potential project needs are found in Appendix X. **Projects 1 – 19** are the prioritized projects in the region and are programmed under the Vermont Agency of Transportation capital plan. **Projects 20 – 65** are projects that are under the Vermont Agency of Transportation but have not been prioritized regionally as these project scopes have not been defined. **Projects 66 to 90** are identified regional transportation project needs but are currently not under the Vermont Agency of Transportation program.

E. Land Use and Transportation

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 that 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 1960's when Interstates 89 and 91 were completed that Vermont was truly auto-accessible. Despite the benefits of fast moving transport via the interstates, the interstate highway had unexpected impacts on communities in the TRORC region. Towns like Sharon and Fairlee had their communities bisected by the highway, creating a distinct separation between their villages and the rest of the community.

Settlement patterns in the TRORC region generally reflect the patterns that state statute land use goals identify as the ideal – densely populated villages and urban centers surrounded by open countryside. With the exception of a few communities, most of the thirty towns in the TRORC region have minimal amount of strip development or sprawl, primarily because these towns lack the population and direct interstate access that is necessary to make the types of businesses that favor sprawl viable.

But, after education costs, transportation represents the largest portion of a municipality's budget. Therefore, it is essential to recognize the connection between land use patterns and the local and regional transportation system. Unplanned development can force communities to invest in roads in locations that increase costs to the communities. Likewise, strip development and sprawl can negatively impact the economic health of our region's villages and community centers. Settlement patterns and transportation systems must be encouraged to develop in a manner that is harmonious, not in conflict with each other.

Current Land Use and Transportation

The TRORC 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, most of our communities have extensive road networks of their own, with each community averaging roughly 85 miles of roads.

The majority of communities in the TRORC region are not net generators of freight traffic. Instead, the primary source of traffic generated by towns is automobile traffic. Only a handful of TRORC's towns can be considered employment centers, as such much of the traffic generated by any given community involves residents driving to and from work. This pattern is, of course, common for much of Vermont, but as residents move into "bedroom communities," the burden on the transportation system grows.

Much of Vermont's appeal to new homeowners is the ability to buy a house in the country; this is reflected in our current settlement pattern. While many communities have small villages, the bulk of the development in our towns is located outside of these areas on rural roads, which increases the need for roads and road improvements. In response, many communities have instituted policies which restrict the development of new public roads. However, it is not uncommon for residents on a private road to 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.

Only 20 communities in TRORC's 30-town region have some form of land use regulations. While all of these towns control rural density to some extent, many of them do so in a manner that still allows a substantial amount of development outside villages and away from major transportation corridors.

Future Land Use and Transportation

To ensure a future where the transportation system is safe, efficient and economically sustainable, the region and municipalities will need to increase efforts to encourage higher density development, particularly residential development, within villages and community centers. At the same time, commercial development that requires trucking, should be located adjacent to major roads, rather than in rural areas to reduce the need for additional investments in infrastructure and to reduce the potential for vehicle and multi-modal conflicts.

The Regional Plan has a land use element that outlines the type, location, density and intensity of development throughout the region through the use of Land Use Areas (see Chapter III: Land Use). Because the type, location, density and intensity of development can directly or indirectly impact the Region's transportation system, this chapter outlines policies for each land use area relating specifically to transportation.

Transportation in Regional Growth Areas and Town Centers

The Land Use chapter differentiates Regional Growth Areas into seven different types of area[12], the purpose of which is to identify locates that should accommodate higher density mixed-use growth while avoiding sprawl. Transportation systems within these Regional Growth Areas

should focus on traffic safety, pedestrian travel and parking. These areas are most appropriate for transportation infrastructure investments that are designed to enhance and protect the character of downtowns and villages.

Generalized Locations	**Bethel, Bradford, Chelsea, Fairlee, Norwich, Randolph, Rochester, South Royalton, Wells River, White River Junction, Wilder and Woodstock**
Primary Roadways	"Main Streets" in towns include a mix of state and U.S. highways as well as Class 1 roadways, including portions of U.S. Routes 4 and 5, VT Routes 14, 100, 107, 66, 12, 110, 113, 25.
Traffic volume of Primary Roadways	• Typically moderate to high traffic volumes (ranging from 3,000 to well over 10,000 AADT). • Relatively high truck volumes, and higher likelihood of peak rush-hour traffic congestion. • Ski traffic congestion often likely along the Route 4 corridor in proximity to the Killington ski area (greatest impacts to Hartford, Woodstock, and Bridgewater)
Desired Future Land Use Characteristics	• Larger settlement areas typically follow a historic settlement pattern with a range of municipal/government institutions (such as town offices and halls, medical complexes, schools, emergency services, libraries, etc.). • All locations listed above, bar Fairlee and Wells River (Newbury), have both municipal sewer and water infrastructure. Ideally, all would, and would be home to a variety of land uses, including residential, commercial, and civic with multi-story, mixed use buildings. • Major growth or investments must be channeled into or adjacent to existing or planned settlement centers and to areas where adequate public facilities and services are available. • Existing or planned investments in infrastructure including a circulation system that is conducive to pedestrian/non-vehicular traffic and supports the use of public transit are encouraged.
Desired Attributes for "Main Streets"	• Typical urban transportation facilities that accommodate commuters, tourists, industry, commerce, pedestrians, bicyclists, and public transit providers. • Pedestrian-oriented streetscapes with wide sidewalks, on-street parking, bicycle lanes, bus stops.
	• Capable of supporting higher traffic volumes. • Support non-motorized travel while providing safe and reliable links to outside markets and resources. • Maintain or achieve desired Regional or Town Center character.

	• Narrow travel lanes to encourage slower driving and improve safety for pedestrians. • Low design speeds (20-30mph). • Intermodal connections encouraged (i.e. bicycle parking, bus stops). • Flexible roadway standards in order to maintain historic and cultural integrity. • Prioritize on-street parking, off-street parking located to the rear of the building. • Pedestrian friendly environment with wide sidewalks, crosswalks, and few curb cuts. • Buildings built close to the sidewalk/street. • Provide bicycle lanes.
Access Management	• Access Category 2 (Wilder State Highway, Hartford), Category 3 (Route 4, 100), Category 4 • Additional curb cuts not encouraged
Other Streets	The above articulates the generalized desirable conditions for the major roads within the future land use areas. Because each community is different, the standards will need to be applied as appropriate for each area. The other streets in these areas should aspire to a lesser degree of these same standards as appropriate for the functional classification of each roadway and the surrounding land area that is serves. For example, smaller residential streets located in these areas will have similar desired characteristics to the Village Settlement category.

Goals

1. A transportation system that maintains and enhances the character of our villages and downtowns.
2. Accessible and diverse public transportation options for the region.

Policies

1. Development that generates a substantial amount of truck traffic is only appropriate within Regional Growth Areas if it does not put an undue burden on traffic safety or the character of the Area.
2. Transportation infrastructure investments within Regional Growth Areas should be designed to enhance circulation for vehicles as well as pedestrian traffic. Development which negatively impacts pedestrian travel is not appropriate in these areas.
3. Whenever possible, development of municipal parking facilities in Regional Growth Areas is encouraged.
4. Expand opportunities for pedestrian and other forms of multi-modal transportation within our villages and downtowns.

Recommendations

1. TRORC shall assist interested communities with studies and planning designed to improve pedestrian and multi-modal networks in Regional Growth Areas.

2. TRORC shall support efforts to develop municipal parking facilities in Regional Growth Areas.

Transportation in Village Settlement Areas

Generalized Locations	**Barnard, Bridgewater, East Randolph, East Thetford, East Topsham, Granville, Hancock, Hartford Village, Hartland Four Corners, Hartland Three Corners, Newbury, North Hartland, Pittsfield, Plymouth Union (Plymouth), Pond Village (Brookfield), Post Mills (Thetford), Quechee, Randolph Center, Royalton Village, Sharon, South Woodstock, Stockbridge, Taftsville, Thetford Center, Tunbridge, Tyson (Plymouth), West Fairlee, and West Woodstock**
Primary Roadways	Major streets are mostly state highways, some town roads
Traffic volume of Primary Roadways	• Low to moderate traffic volumes (typically under 5,000 AADT) • Relatively high truck volumes • Ski traffic congestion often likely along the Route 4 corridor in proximity to the Killington ski area (greatest impacts to Hartford, Woodstock, and Bridgewater)
Desired Future Land Use Characteristics	• Housing densities should be less than those in Town Centers, but higher than those of the areas surrounding village settlements. • Density permitted must be supported by existing public water and sewer or, in the absence of these, the soils present. • Shops, services, tourist businesses, lodging, public facilities, and business/industrial enterprises that fit within the context of the area are encouraged. • Growth should be directed toward and coordinated with existing structures and not place undue burdens on existing services, facilities, and systems (including transportation).
Desired Attributes for "Main Streets"	• Typical village transportation facilities that accommodate a mix of users, including cars, trucks, pedestrians, bicyclists, and public transit providers. • Pedestrian-oriented streetscapes with wide sidewalks, on-street parking, bicycle lanes, bus stops. Where sidewalks are not feasible, widened roadway shoulders can accommodate pedestrians and bicyclists.
	• Capable of supporting moderate traffic volumes. • Support non-motorized travel while providing safe and reliable links to outside markets and resources. • Maintain or achieve desired village character. • Limited financial resources for infrastructure (i.e. public water and sewer systems, sidewalks).

	• Narrow travel lanes to encourage slower driving and improve safety for pedestrians. • Low design speeds (25-35mph). • Modify roadway standards to maintain historic and cultural integrity. • Prioritize on-street parking, off-street parking located to the rear or side of the building. • Pedestrian friendly environment with sidewalks in pedestrian-traveled areas. • Buildings built close to the street with short driveways. • Widen shoulders for on-street parking or bicycle lanes.
Access Management	• Access Category 4 • Some curb cuts acceptable
Other Streets	The above articulates the generalized desirable conditions for the major roads within the future land use areas. Because each community is different, the standards will need to be refined as appropriate for each area. The other streets in these areas should aspire to a lesser degree of these same standards as appropriate for the function classification of each roadway and the surrounding land area that is serves. For example, smaller residential streets located in these areas will have similar desired characteristics to the Hamlet Areas category.

Goals

1. A transportation system that maintains and enhances the character of our villages.
2. Accessible and diverse public transportation options for the region.

Policies

1. New development shall not unduly burden village area transportation systems.
2. Expand opportunities for pedestrian and other forms of multi-modal transportation within our villages that emphasize safety and promote health

Recommendations

1. TRORC shall support efforts to promote complete streets projects in village and downtown centers that improve access and walkability and support connectivity with transit opportunities.
2. TRORC shall support efforts to develop and improve park and ride lots in village areas.

Transportation in Hamlet Areas

Generalized Locations	**Bridgewater Center, Bridgewater Corners, Corinth, East Barnard, East Bethel, East Braintree, East Brookfield, East Corinth, East Granville, Gaysville (Stockbridge), North Pomfret, North Thetford, North Tunbridge, South Pomfret, South Strafford, Strafford, Thetford Hill, Vershire, Vershire Center, Waits River (Topsham), West Braintree, West Bridgewater, West Brookfield, West Hartford, West Newbury, West Topsham, and areas immediately adjoining such areas.**
Primary Roadways	Major streets are mostly town and state highways.
Traffic volume of Primary Roadways	• Low to moderate traffic volumes (typically under 4,000 AADT) • Relatively high truck volumes
Desired Future Land Use Characteristics	• The density of development in Hamlet Areas reflects the existing settlement patterns, physical land capability, and the availability of utilities for expansion. • Hamlets should primarily support single and two-family housing in rural areas and mixed dwelling types in more developed areas, along with business enterprises that fit within the context of the immediate area. • Major traffic thoroughfares through Hamlet Areas should be planned or enhanced with traffic calming elements.
Desired Attributes for "Main Streets"	• Typical village transportation facilities that accommodate a mix of users, including cars, trucks, pedestrians, bicyclists, and public transit providers. • Pedestrian-oriented streetscapes with wide sidewalks, on-street parking, bicycle lanes, bus stops-- all where appropriate. Where sidewalks are not feasible, widened roadway shoulders can accommodate pedestrians and bicyclists.
	• Capable of supporting moderate traffic volumes. • Support non-motorized travel while providing safe and reliable links to outside markets and resources. • Maintain or achieve desired hamlet character. • Limited financial resources for infrastructure (i.e. public water and sewer systems, sidewalks).
	• Narrow travel lanes to encourage slower driving and improve safety for pedestrians. • Low design speeds (25mph). • Modify roadway standards to maintain historic and cultural integrity. • Interconnected street network, avoiding cul-de-sacs. • Prioritize on-street parking (where appropriate), off-street parking located to the rear or side of the building. • Pedestrian friendly environment with sidewalks in pedestrian-traveled areas. • Buildings built close to the street with short driveways. • Widen shoulders for on-street parking or bicycle lanes.
Access Management	• Access Category 4 • Some curb cuts acceptable

Other Streets	The above articulates the generalized desirable conditions for the major roads within the future land use areas. Because each community is different, the standards will need to be refined as appropriate for each area. The other streets in these areas should aspire to a lesser degree of these same standards as appropriate for the function classification of each roadway and the surrounding land area that is serves. For example, smaller, more sparsely developed areas will have similar desired characteristics to the Rural Areas category.

Goals

1. A transportation system that maintains and enhances the character of our hamlet areas.
2. Accessible and diverse public transportation options for the region.

Policies

1. Major traffic thoroughfares through Hamlet Areas should be planned or enhanced with traffic calming elements.
2. Expand opportunities for pedestrian and other forms of multi-modal transportation within our hamlets that emphasize safety and promote health.

Recommendations

1. TRORC shall support development projects in hamlet areas that encourage traditional hamlet design and promote access and walkability.

Transportation in Rural Areas

Rural areas make up the majority of the Region's landscape. These areas are generally residential in nature, with some small-scale businesses, agriculture, forestry and recreational activities. Transportation systems within rural areas should focus on traffic safety, protecting rural character and allowing for multi-modal transportation. Growth in these areas should have a minimal impact on the existing transportation system.

Generalized Locations	**Rural Areas consist primarily of a mixed pattern of land uses, including residential, small-scale businesses, outdoor recreational, agricultural, forestry, and natural resource uses.**
Primary Roadways	Most main arteries are local state or town roads, which may or may not be paved.
Traffic volume of Primary Roadways	• Low traffic volumes (typically ranging from 500-3,000 AADT, often higher on state roadways) • Low to high truck volumes (typically higher on paved versus unpaved roadways)

Desired Future Land Use Characteristics	• Protect the character of rural areas and their natural resources by avoiding sprawling development, and incompatible land uses. • Rural Areas consist primarily of a mixed pattern of land uses, including residential, small-scale businesses, outdoor recreational, agricultural, forestry, and natural resource uses. • Development within these areas has been largely dependent on site limitations, including soil composition, slope, and elevation, and ease of access to community services. • Rural lands should be developed only in areas where potential for agriculture, forestry or mineral extraction is relatively low. • New land development and subdivision should be planned and sited to promote the continued use of agricultural and forestry land for their intended purposes.
Desired Attributes for "Main Streets"	• Maintain rural, scenic two-lane roads. • Generally modestly widened shoulders can accommodate bicyclists and more occasional pedestrian activity.
	• Capable of supporting moderate traffic volumes/facilitating mobility on paved/larger roads. • Minimize impacts on natural resources. • Accommodate working landscape activities.
	• Maintain rural character. • Variable design speeds (40-50 mph) on paved/major roads, and moderate (35 mph/un-posted) on unpaved/minor roads. • Widened shoulders for cyclists on paved/major roads. • Avoid steep new roads and driveways over 12% average grades. • Avoid long new roads or driveways • Minimum width for safety to allow towing cars to pass at low speeds and shared roadway that accommodates horses, bicyclists, and pedestrians on unpaved/minor roads. • Avoid long, dead-end roads that serve only a few houses on unpaved/minor roads. • New roads (public or private) to be built to adopted town road standards.
Access Management	• Access Categories 3 and 4 • Curb cuts encouraged along more minor roadways to ensure safe access between properties, but minimized along state highways to prioritize mobility
Other Streets	The above articulates the generalized desirable conditions for the major roads within the future land use areas. Because each community is different, the standards will need to be refined as appropriate for each area.

Goals

1. A transportation system that maintains and enhances the character of our rural areas.
2. Accessible and diverse public transportation options for the region.

Policies

1. 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 enough to maintain traffic safety and rural character.

2. High density development, including residential subdivisions or multi-family housing developments, is not appropriate for rural areas if it results in an increase in the roadway Level of Service (LOS) of D or worse. If the impact is LOS C or better, a traffic study may be required.
3. Transportation improvements in Rural Areas should not focus on expanding or adding additional roads. Instead improvements should focus on improving existing infrastructure for safety and flood resiliency.
4. Transportation improvements which result in the fragmentation of wildlife habitat and farmland are not appropriate in Rural Areas.

Recommendations

1. TRORC will encourage communities to develop land use regulations that promote reduced density in rural areas consistent with state planning law.
2. TRORC will seek out new ways its municipalities can approach issues of density in rural areas.

Transportation in Conservation & Resource Areas

Generalized Locations	**Natural areas in need of special protection because of their fragile nature, irreplaceable value, and unique and important ecological functions. These areas consist of the following sub-groups:** **1. land in excess of 2,500 feet elevation;** **2. steep slopes - those in excess of 25% gradient;** **3. soils which are predominantly wet or shallow;** **4. wetlands classified by the State of Vermont or U.S. Army Corp of Engineers;** **5. floodplains and areas immediate to lakes, ponds or streams; and** **6. land identified as containing critical wildlife habitats and threatened or endangered species.**
Primary Roadways	Most main arteries are state or town roads, which may or may not be paved. Often Class 2 or 3 town roadways and private roads in some instances.
Traffic volume of Primary Roadways	• Typically low traffic volumes (ranging from 500-3,000 AADT, often higher on state roadways) • Low to high truck volumes (typically higher on paved versus unpaved roadways)

Desired Future Land Use Characteristics	• Protect the character of rural areas and their natural resources by avoiding sprawling development, and incompatible land uses. • Permanent uses such as dwellings and other similar uses are discouraged. • Large scale or large tract land developments or subdivision are not supported in areas where steep slopes, wet, or shallow soils are predominant, unless it can be demonstrated that such developments or subdivisions will not be unduly detrimental to the environment. Where this can be adequately proven, density of settlement should be relatively low. Passive outdoor recreational, forestry, agricultural, and low density residential uses are examples of the preferred uses for critical areas, subject to overcoming site limitations. • Developments, and their associated stormwater discharges, that are adjacent to wetlands should be planned so they do not cause undue disturbance to wetland areas. • No structural development should be located within the limits of a floodway except projects involving health, safety, or transportation. • Development outside of existing or planned regional growth areas, should not be located immediately adjacent to watercourses, lakes, ponds or shorelines.
Desired Attributes for "Main Streets"	• Maintain rural, scenic two-lane roads. • Generally modestly widened shoulders can accommodate bicyclists and more occasional pedestrian activity.
	• Capable of supporting moderate traffic volumes/facilitating mobility on paved/larger roads. • Minimize impacts on natural resources. • Accommodate working landscape activities.
	• Maintain rural character. • Variable design speeds (40-50 mph) on paved/major roads, and moderate (35 mph/un-posted) on unpaved/minor roads. • Widened shoulders for cyclists on paved/major roads. • Avoid steep new roads and driveways over 12% average grades. • Avoid long new roads or driveways. • Minimum width for safety to allow towing cars to pass at low speeds and shared roadway that accommodates horses, bicyclists, and pedestrians on unpaved/minor roads. • Avoid long, dead-end roads that serve only a few houses on unpaved/minor roads. • New roads (public or private) to be built to adopted town road standards.
Access Management	• Access Categories 3 and 4 • Curb cuts encouraged along more minor roadways to ensure safe access between properties, but minimized along state highways to prioritize mobility
Other Streets	The above articulates the generalized desirable conditions for the major roads within the future land use areas. Because each community is different, the standards will need to be refined as appropriate for each area.

Goals

1. Transportation development activities avoid adverse impacts to biodiversity and ecosystem function while minimizing greenhouse gas emissions and water pollution.
2. Built infrastructure and roadways support the function and health of wildlife habitats and landscapes.
3. Roadway extensions avoid encroaching conservation and resource areas.

Policies

1. Where permitted, transportation development must be planned to minimize reduction of the resource value of forest and farmlands by furthering reasonable population densities, use of cluster development, and new community planning designed to economize on the costs of roads, utilities, and land usage.
2. Structural developments within the floodway shall be considered where there is a benefit to health, safety, or transportation.
3. Expansion of existing transportation systems shall be minimized and future projects shall be designed in a manner that avoids fragmentation of large forest tracts to maintain natural and animal habitats between two or more land developments or subdivision.

Recommendation

1. TRORC shall encourage agricultural and silvicultural businesses to use best management practices that minimize damage to roadways, land, and waterways.

Transportation in Interchange Areas

While interstate interchange areas are often magnets for development due to their high traffic volumes and easy access to the interstate highways, these areas can 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. Any commercial land uses at Interchange Areas shall, therefore, be restricted to visitor/traveler services only as appropriate uses. However, because many of the uses associated with serving travelers is also associated with the creation of sprawl or strip development, development in these areas must be strictly controlled. Transportation systems within Interchange Areas should focus on traffic and pedestrian safety, public transportation and access management.

There are thirteen Interchange Areas located in the TRORC region. The Land Use chapter recognizes that each Interchange Area is unique. Four of the region's Interchange Areas are located within Regional Growth Areas (as defined by this Plan) and are treated accordingly. The remaining seven areas are located outside of the denser mixed-use environment of a Regional Growth Area. Within these areas, it is particularly important to acknowledge the relationship between transportation and land use. Please refer to the Land Use chapter p. 45 to specific land use characteristics per Interchange Area.

Generalized Locations	**Areas in close proximity to its thirteen interchange on Interstates 89 and 91 are prime areas for certain types of development due principally to their ease of public access and favorable site conditions. In this region, this includes the towns of Bradford, Fairlee, Hartford, Hartland, Newbury, Norwich, Sharon, Randolph, Royalton and Thetford.**
Primary Roadways	"Main Streets" in towns include a mix of state and U.S. highways as well as Class 1 roadways, including portions of US Routes 4 and 5, VT Routes 12, 14, 25, 66, 107, 113, 132.
Traffic volume of Primary Roadways	• Typically moderate to high traffic volumes (ranging from 3,000 to well over 5,000 AADT) • Relatively high truck volumes • Ski traffic congestion often likely along the Route 4 interchange area in Hartford en route to the Killington ski area
Desired Future Land Use Characteristics	• Reserve land at specific Interchange Areas for the development of services for the traveling public and transport of goods, not for the development of high traffic-generating commercial activities that are unrelated to services for the traveling public or trucking industry, or institutional uses such as governmental offices or post offices. Interchange Area development should not be promoted to the detriment of regional growth areas or the public investments made therein. • Land use activities and public or quasi-public investments planned for Interchange Areas, that have the effect of eroding the socio-economic vitality of downtowns, are incompatible with this Plan. • Appropriate uses include highway-oriented lodging and service facilities, trucking terminals, truck-dependent manufacturing, and park-and-ride commuter lots. • Appreciate the 'gateway' function of many interchanges in both transportation facility and land use design, as the immediate off-ramp area is the first impression that travelers have of parts of the region. Special attention should be paid to signage, landscaping, and building design that promotes the uniqueness of Vermont, not generic or formulaic design, and that draws visitors into villages and downtowns.
Desired Attributes for "Main Streets"	• Providing adequate access for cars and trucks is the primary consideration along with adequate wayfinding information for highway access and services • All other attributes dependent on classification of access roadways, character of surrounding location (e.g., rural, village, hamlet, town) and applicable access management criteria set by Vermont Agency of Transportation
Access Management	• Access Category 2 for all ramps and access roads to the interstate system • Opposing roadway traffic movements should be separated by physical constraints (ex: grade separation or a median separator) along with junctions with heavy intersecting traffic volumes

Goal

1. Uses appropriate to the unique circumstances of each interchange area are built in a manner that protects public safety and discourages strip development and sprawl.

Policies

1. 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 Regional Centers, consistent with more detailed use descriptions in the Land Use chapter.
2. Public and Private transportation infrastructure investments in these areas are not appropriate if they encourage development that will have the effect of eroding the socio-economic vitality of Regional Centers.
3. Development within this area 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.
4. Development that creates land use patterns associated with strip development and sprawl are not consistent with this Plan.
5. The development of public park and ride facilities in Interchange Areas shall be encouraged.

Recommendations

1. TRORC will continue to review and participate in Act 250 permit proceedings.
2. TRORC will continue to work with Towns to have town plans consistent with regional and state policy.
3. TRORC will update the Transportation Land Use (Interchange Area) section of this chapter to coincide with any future changes in the Land Use chapter update.

F. Impacts

While the region's transportation system provides many benefits, it has also created negative impacts to flooding, wildlife, stormwater, air and livability. By recognizing and working to minimize these impacts, the transportation system can be improved in both function and lessened in impact.

FLOODING
Building Resiliency: Lessons from Tropical Storm Irene

In August 2011, Tropical Storm Irene impacted 90% of the towns in the TRORC region, some more than others. With bridges washed out, roads gone, homes taken down stream, 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. Some hazard mitigation techniques have included upsizing culverts and lengthening bridges based on stream hydraulic studies; as well as improved bank stabilization. Planning, not only the next federally declared disaster but also for any upcoming extreme weather event, will include continued coordination between the towns, TRORC, 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. TRORC can pursue funding

opportunities to advance the planning and construction of projects that preserve or enhance water quality. Replacing deficient culverts and bridges carries the greatest potential for addressing water quality – designing appropriately scaled structures that can handle flood events, 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 Agencies of Natural Resources (ANR) and the Agency of Transportation 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 massive 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. In line with this, many towns have already or may be considering the downgrading or relocation of existing roadways to promote resilience. The sum total of all of these efforts serves to improve public safety in as much as the restoration and protection of our waterways and habitat for the public benefit and overall ecosystem health.

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 climate and causing habitats to shift northward or higher, straining plant and animal communities, as well as increasing flood frequencies that stress aquatic biota. Road salt browns nearby plants. Roads have fragmented forests and fields, creating a path for invasive species, effective barriers to smaller animals, and degrading habitat that requires large continuous 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. Not only do these facilities generate runoff that is not going into the ground, they channel this runoff swiftly away. 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.

Livability

The transportation system can link communities and neighborhoods, enabling us to walk, bike, ride or drive safely to see friends, commute to work, access goods and services, and recreate. It can also inhibit livability through creating noise pollution, safety hazards, visual blight, and barriers to passage. By sizing and designing transportation systems to their adjacent land use context we can reduce conflicts (see tables in section 4.6 of this chapter).

Impacts on Land Use

Development that does not take into consideration its impact on existing or future transportation systems can impact livability, increase potential hazards and degrade the character of our communities and the region's quality of life. It is important to the region that future development and investments in transportation infrastructure occur at a scale and at a pace that maintains or improves the health and safety of our towns.

To ensure that our transportation system is not negatively impacted by development, Act 250 (10 V.S.A. §6086) includes a requirement (Act 250 Criterion 5) that before granting a permit, the proposed development will not cause unreasonable congestion or unsafe conditions with respect to the highways and other transportation systems. In its capacity as a statutory party under Act 250, TRORC regularly analyzes development proposals in relation to Criterion 5.

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 scale that is substantially larger than common within our region can have a substantial impact on existing facilities and infrastructure. Chapter XIV, Implementation, identifies those transportation impacts that trigger the Regional Plan's "substantial regional impact" definition. These impacts include (but are not limited to) the following:

A development that significantly affects existing capacity of regional public facilities by:

- contributing to a reduction in the peak hour Level of Service (LOS) from D to E or from E to F; or
- contributing five percent or more to the peak hour Level of Service (LOS) D on a regionally significant local or State highway in or immediately adjacent to regional growth areas or LOS C on regionally significant local or State highways in rural areas; or
- necessitating substantive capital improvements, such as widening or signalization of regionally significant (Class II) local or State highways.

While these criteria apply to developments within the TRORC region, they may also apply to developments in adjacent regions that are of a scale that they will have impacts on transportation facilities within the TRORC region.

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 Master Plan permit findings as part of the Act 250 process, transportation impact studies must be a required part of the permit application.

Goals

1. A transportation system that respects quality of life and environmental considerations.
2. A transportation system that facilitates a strong regional economy.
3. A transportation infrastructure that is adequately funded, well designed, maintained and constructed.

Policies

1. New road systems should avoid fragmentation of large blocks of land and shall not adversely affect critical wildlife habitat.
2. Major highways should minimize barriers to movement of wildlife, terrestrial or aquatic, especially in important crossing areas, through more wildlife-friendly culverts, bridges, railings and signage designed to avoid collisions.
3. Efforts to reduce total vehicle miles travelled and vehicle emissions are encouraged.
4. Road and vehicle impacts should be ameliorated through context sensitive solutions, signage, safety improvements, improved streetscapes and design that fit the adjacent landscape.
5. Future road and parking development will not adversely affect flooding, and opportunities to reduce flood flows from existing pavement and gravel roads are encouraged.
6. New development shall not significantly degrade the functionality or safety of existing transportation infrastructure and transportation infrastructure must be context sensitive to surrounding development.
7. Large-scale developments that meet this plan's definition of Substantial Regional Impact, whether they are located within the TRORC region or in a neighboring region, shall include transportation impact studies through each phase of development and shall mitigate any impacts identified as part of their permit.
8. New development will not cause unreasonable congestion or unsafe conditions with respect to the highways and other transportation systems.

Recommendations

1. TRORC will work with towns and Vermont Agency of Transportation to achieve context sensitive solutions that enhances historic, scenic, agricultural properties of roadway consistent with public safety through transparent public process and project development.
2. Vermont Agency of Transportation and the Transportation Advisory Committee will work to reduce wildlife crossing collisions through improved signage and wildlife passage facilities.
3. TRORC will work with local highway departments as requested to minimize stormwater runoff and road/river conflicts.

4. Towns should consider parking requirements and minimize the use of impervious surfaces for parking through shared parking, allow reduced parking requirements when supported by data or encourage phased parking development when demand arises.
5. Vermont Agency of Transportation, FEMA, ANR, the Vermont Department of Public Safety and others involved in flood recovery should incorporate wildlife and aquatic passage needs into rebuilt bridges and culverts when feasible.
6. 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 impacts.

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[1] *Location Affordability Index*, < http://www.locationaffordability.info/lai.aspx>, Department of Housing and Urban Development.
[2] Department of Environmental Conservation, Air Quality and Climate Division. *Vermont Greenhouse Gas Emissions Inventory Update1990-2011*. <http://www.anr.state.vt.us/anr/climatechange/Pubs/Vermont%20GHG%20Emissions%20Inventory%20Update%201990-2011_120313.pdf>, 2013.
[3] *Location Affordability Index*, < http://www.locationaffordability.info/lai.aspx>, Department of Housing and Urban Development.
[4] *Amtrak Fact Sheet, Fiscal Year 2014, State of Vermont.* <http://www.amtrak.com/pdf/factsheets/VERMONT14.pdf> Amtrak, 2014.
[5] *Amtrak Fact Sheet, Fiscal Year 2013, State of Vermont.* <http://www.amtrak.com/pdf/factsheets/VERMONT13.pdf> Amtrak, 2013.
[6] *Amtrak Fact Sheet, Fiscal Year 2012, State of Vermont.* <http://www.amtrak.com/pdf/factsheets/VERMONT12.pdf> Amtrak, 2012.
[7] *Amtrak Fact Sheet, Fiscal Year 2011, State of Vermont.* <http://www.amtrak.com/pdf/factsheets/VERMONT11.pdf> Amtrak, 2011.
[8] *Northern New England Intercity Rail Initiative*, <http://www.massdot.state.ma.us/northernnewenglandrail/Home.aspx>, Massachusetts Department of Transportation.
[9] *VRS Route Map & Options*. < http://www.vermontrailway.com/maps/regional_map.html> Vermont Rail System.
[10] Dobbs, Taylor. "*When It Comes to Rail Traffic in Vermont, Hazardous Materials Data is Hard to Get.*" <http://vtdigger.org/2013/07/21/when-it-comes-to-rail-traffic-in-vermont-hazardous-materials-data-is-hard-to-get>. VTDigger.Org. July 21, 2013.
[11] *Id*.
[12] P. 26, Regional Growth Areas