

EXISTING CONDITIONS AND FUTURE TRENDS

2040 VERMONT STATEWIDE LONG RANGE TRANSPORTATION
PLAN UPDATE

JUNE 7, 2017 DRAFT

Contents

Background and Context	4
Issues Overview.....	5
Transportation System Overview	7
Highway	7
Bridges.....	7
Intelligent Transportation Systems (ITS).....	8
Park & Rides.....	9
Bicycle & Pedestrian	10
Public Transit.....	11
Intercity Bus Service	11
Railroads.....	12
Freight Rail	12
Passenger Rail	13
Aviation	14
2016 Statewide Transportation Public Opinion Survey	15
General Travel Characteristics	15
Satisfaction with Transportation Programs & Infrastructure	16
Importance of Transportation Issues & Services.....	17
Alternative Fuel Vehicles	18
Technology.....	19
State & National Policy Review	21
Executive Order #01-17	21
Government Accountability Committee Quality of Life Outcomes	21
MAP-21 & the FAST Act	21
Water Quality	23
2016 Vermont Comprehensive Energy Plan (CEP).....	23
Health in All Policies.....	23
Complete Streets	24
Federal Automated Vehicles Policy.....	24
Technological Change.....	25
Current Transportation Technology	25
Future Trends	26
Connected & Automated Vehicle Technology	26

Workforce Ramifications	28
Energy & Climate Change.....	29
Climate Change & System Resilience.....	30
Programs & Projects	31
Population & Demographics.....	32
Population	32
Population Age Profile.....	32
Employment.....	33
Economic Development.....	35
2020 Comprehensive Economic Development Strategy	36
Better Connections Grant Program.....	36
Funding and Finance	37
Funding Sources	37
Federal Funds	37
State Funds	38
Land Use.....	41
VTrans Activities Related to Land Use	42
Act 250	42
VTrans Corridor planning process.....	42
Vermont State Design Standards	43
Title 18 § 1111 Permit Process.....	43
Act 145 Transportation Impact Fees	44
Coordination with Partner State Agencies.....	44
State Designation Programs	44
VTrans System Plans and Policies	45
Vermont Highway System Policy Plan, 2004.....	45
Vermont Airport System and Policy Plan, 2007	45
Public Transit Policy Plan, 2012	45
Pedestrian and Bicycle Policy Plan, 2008.....	46
Vermont State Rail Plan, 2016	46
Strategic Highway Safety Plan, 2017	47
Vermont Freight Plan, 2015.....	47
Vermont Transportation Asset Management Plan (TAMP), 2018.....	48
Vermont Intelligent Transportation Systems (ITS) Architecture, 2017.....	49

Figure 1 - Use Frequency of Transportation Options and Services.....	15
Figure 2 - Satisfaction with Transportation Programs and Infrastructure.....	16
Figure 3 - Importance of Transportation Issues & Services	17
Figure 4 - Likelihood of Alternative Fuel Vehicle Purchase	18
Figure 5 - Internet Access.....	19
Figure 6 - Bus, Rail, and Air Schedule Information	19
Figure 7 - Real-time Traffic Information.....	20
Figure 8 - Connected Vehicle Technologies	27
Figure 9 - VT Energy Consumption by Sector (2016 VT CEP).....	29
Figure 10 - State Population, 1900-2015.....	32
Figure 11 - 2015 & 2040 Population Age Profiles	33
Figure 12 - Statewide Employment Trend, 1995-2040	34
Figure 13 - VTrans Budget by Major Funding, SFY2016	37
Figure 14 - Transportation State Revenue Sources, Consensus Revenue Forecast, January 2016 ..	38
Figure 15 - Vermont Gasoline Consumption by State Fiscal Year (Gallons)	39
Figure 16 - Vehicle Miles Traveled in Vermont, 2000-2014.....	39
Map 1 - Vermont's State Highway Network.....	7
Map 2 - Vermont's Park & Ride Facilities	9
Map 3 - VTrans Bicycle Corridor Planning (Example).....	10
Map 4 - Regional Public Transportation Services	11
Map 5 - Vermont's Rail System	12
Map 6 - Vermont Passenger Rail Routes.....	13
Map 7 - Vermont's Public Use Airports	14

Background and Context

Vermont's Long Range Transportation Plan (LRTP) is a framework to guide transportation decision-making and investments over the next 20 years. All Vermonters have a stake in the transportation system's continued development. Over the course of the next year, the Vermont Agency of Transportation (VTrans) will be developing the 2040 LRTP.

Our transportation system may look very different through the course of the next 20 years. The growth of new technologies such as connected and autonomous vehicle systems, demographic changes in the form of an aging population, and ongoing changes to the state's primarily services-based economy likely require us to think differently about how we plan, build, and manage our transportation system and investments. While maintaining our highways and bridges, public transit, railways, and airports will continue to be major focus areas moving forward, we are likely to focus more on the operational part of our transportation system, such as information systems, signals, and automated message boards and other technology solutions.

As part of our LRTP outreach efforts, VTrans produced this Existing Conditions and Future Trends Report and a Statewide Public Opinion Survey to gauge satisfaction levels with the condition of infrastructure, the various modes of transportation, and maintenance activities. These reports provide a wealth of information on different aspects of Vermont's transportation system. We welcome and encourage all Vermonters to provide their thoughts and insights on the data and observations presented in these reports, as well ideas on where transportation policy and investments should focus over the next 20 years.

Please email your comments to Dave Pelletier at dave.pelletier@vermont.gov.

You can follow the development of the plan at vtrans.vermont.gov/planning/long-range-plan.

Issues Overview

Travel Behavior – According to the 2016 Statewide Transportation Public Opinion Survey, Vermonters travel primarily by automobile - 91% reported they drive a personal vehicle frequently (multiple times per week or month), and 88% of workers reported driving alone or carpooling as their primary mode of transportation to work. Walking is also a popular means of transport, with 45% responding they walk frequently, followed by biking (14%) and public transit (8%).

Customer Satisfaction – The 2016 Statewide Transportation Public Opinion Survey indicated a high level of satisfaction with winter highway maintenance (69% very satisfied or satisfied), traveler information (62%), DMV services (61%) and the physical conditions of Vermont's highways (61%). The largest sources of dissatisfaction were the availability of bicycle infrastructure such as bike lanes or sufficient road shoulders (42% dissatisfied or very dissatisfied), the availability of sidewalks (31%), and Amtrak service in the State (30%).

Population – If current trends and conditions continue, Vermont's population will grow from 626,000 to almost 654,000 by 2040 representing a 4.4% increase overall. By 2040, ½ of the population in the State will be 45 years or older; 26% of the population will be over 65 years of age.

Funding – Vermont derives about 55% of its \$616 million annual transportation budget from federal sources. The majority of those federal funds are from fuel taxes via the Federal Highway Trust Fund. Most of the remainder of Vermont's annual transportation budget (38%) is comprised primarily of State gas and diesel tax revenues, purchase & use taxes, and motor vehicle fees. Federal and State gas and diesel fuel taxes are becoming less effective due to slowing growth in overall vehicle miles traveled (VMT) and increases in vehicle fuel efficiency. The latter trend will likely continue as hybrid and electric technologies continue to evolve.

Energy & Environment – Transportation is the largest end use of energy (37%) and the largest generator (45%) of greenhouse gases in Vermont. Managing and mitigating highway stormwater runoff is a major priority for the state as it addresses phosphorous pollution levels in its water bodies, which contributes to blue-green algae problems. The VT Department of Environmental Conservation (DEC) estimates the cost to address erosion on local roads at approximately \$10 million per year.

Alternative Fuel Vehicles – When asked of the likelihood of an alternative-fuel vehicle for their next personal vehicle purchase, 56% of respondents in the 2016 Statewide Transportation Public Opinion Survey said they were likely to purchase a hybrid-electric vehicle (e.g. Prius). A further 41% would consider a plug-in hybrid electric vehicle, such as a Chevrolet Volt, and 31% would consider some type of fully electric vehicle.

Transportation & Land Use – Development of relatively inexpensive and easily built-upon suburban and rural land leads to increased traffic; this in turn leads to the need for further investment and increased highway maintenance expense. Conversely, maintaining Vermont's historic settlement patterns of compact centers surrounded by rural countryside leads to walkable, public transit-friendly environments that require less automobile use.

Freight – Proportionally, highways carry most of Vermont's freight - approximately 83% by weight and 88% by value. Rail accounts for 16% by weight and 11% by value, and air-cargo accounts for less than 1% by both measures. Burlington International Airport, E.F. Knapp Airport (Barre-Montpelier) and Rutland Regional Airport provide regularly scheduled cargo service. Much of the rail

infrastructure in Vermont is weight restricted and limited to carrying loads that are significantly less than the present national standard rail carload weight of 286,000 pounds.

Information – According to the 2016 Statewide Transportation Public Opinion Survey, 65% of Vermonters obtain bus, rail, and air travel information through the internet. However, many Vermonters still rely on radio (45%) and television (36%) for “real-time” or current highway travel conditions.

Vehicle Automation & Connectivity – Advances in vehicle technology and associated highway infrastructure have the potential to provide great gains in highway safety, mobility, and convenience. It is also likely to have significant impacts on the insurance industry, licensing and regulation, and enforcement of motor vehicle laws.

VTrans Workforce – The transportation system is increasingly reliant on communications technology and data-management to address safety, capacity, and mobility challenges. The composition of the workforce and the skills and talents needed to maintain and operate the transportation system is changing.

Highway Safety – Vermont experienced 64 highway fatalities in 2016. Prior to this year, the state had experience a 26% decrease in major crashes between 2004 and 2015. Vermont continues to struggle with the same issues and experiences the same trends as other states across the nation. The four most prevalent of these are speed, impaired driving, distracted driving and occupant protection. In 2016 fatal highway crashes where a seat belt was available, 48% of drivers or passengers were not wearing a seat belt.

Transportation System Overview

Highway

Vermont's highway network is the backbone of the State's transportation system, accounting for the highest use among all transportation modes in the movement of people and goods. The network contains 14,171 miles of public roadways, of which 3,103 miles (22%) are on the state-owned highway system, with the rest owned and managed by Vermont cities and towns. Of the state-owned highway system, 772 miles consists of federally designated National Highway System (NHS). The NHS system includes all Interstate Highways and major regional highways, such as US 7, US 4, VT 9, and VT 103. Map 1 illustrates the State Highway System, including Class 1 Town Highways.

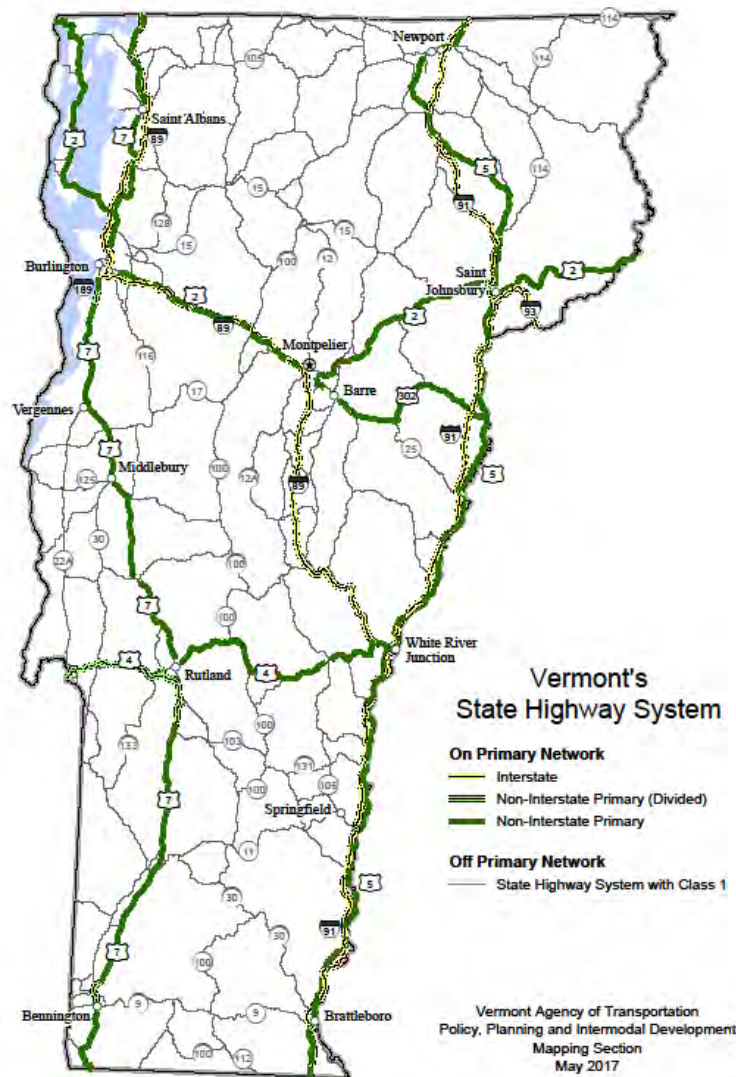
State and town highways in Vermont are classified by type as follows:

- **State Highways** – These are highways maintained exclusively by the Agency of Transportation.
- **Class 1 Town Highways** – These are town-maintained highways which form the extension of a state highway route and which carry a state highway route number.
- **Class 2 Town Highways** – These are town-maintained highways selected as the most important highways in each town (in addition to Class 1 highways).
- **Class 3 Town Highways** – These are other town-maintained highways negotiable under normal conditions all seasons of the year by a standard manufactured passenger car.

Bridges

Bridges are a significant component of Vermont's highway system. VTrans is required to inspect all bridges with a span greater than 20 feet (considered "long structures") on all interstate, state and

Map 1 - Vermont's State Highway Network



town highways¹. The current inventory of bridges totals just over 4,000. That includes 520 interstate bridges, 1,834 bridges on state highways, and 1,640 town highway long structures. All of these bridges are eligible for federal funding of some type.

Intelligent Transportation Systems (ITS)

The majority of Vermont's most significant existing Intelligent Transportation Systems (ITS) components are part of the highway system. These include variable message signs, Road Weather Information Systems (RWIS), advanced traffic signal technologies, and advanced traffic management systems (ATMS). Current advances in ITS technologies are fast-paced and many of the opportunities for improving the transportation system lie in this area. See the "Technological Change" section of this document for more on the subject of technology and the future of transportation.

¹ VTrans does not maintain an inventory of short town highway bridges.

Park & Rides

The VTrans Park & Ride Program has evolved organically over the years, from what can be characterized as a demand-and-response effort to a more sophisticated program involving numerous Agency sections and external Agency partners. VTrans operates 30 state-owned lots and has assisted in the development of over 62 municipal lots.

The majority of the state-owned lots are located in the I-89, I-91, and US 7 corridors. Municipal lots serve local needs, often filling in the gaps off the main interstate and state route corridors²

The 30 state-owned lots provide 1,525 parking spaces at which commuters can park a car and either share a ride with a carpool or vanpool, or, in many cases, board one of the numerous public transit system bus routes. VTrans maintains an interactive web page of [Park & Ride facilities](#) for commuters to reference when making travel plans. Map 2 illustrates the state and municipal park and ride lots throughout Vermont.

Map 2 - Vermont's Park & Ride Facilities



² Statewide Park-and-Ride Facilities Plan, December 2015

Bicycle & Pedestrian

Bicycling and walking in Vermont are not only popular recreational activities, but are a means of transportation for many. The 2016 Statewide Transportation Public Opinion Survey found that walking is the next most frequently used mode of transportation after the automobile, with 45% reporting they walk multiple times per week or month. In the same survey, 42% of respondents indicated dissatisfaction with the current level of bicycling facilities, including on-road shoulders and separated paths, and 37% of respondents saw room to improve sidewalks and pedestrian infrastructure.

The primary goal of the VTrans Bicycle and Pedestrian Program is to provide safe and convenient facilities for those Vermonters who desire alternative transportation. To this end, VTrans administers a bicycle and pedestrian grant program and provides Federal Transportation Alternatives grant funding to municipalities and other qualified not-for-profits for the establishment of bicycling and pedestrian infrastructure.

VTrans is currently developing an On-Road Bicycle Plan in support of enhancing on-road bicycle improvements on State roadways. The VTrans On-Road Bicycle Plan is a planning effort to categorize the state roads into high, moderate, and low-use corridors based on current and potential bicycle use. The Plan will assist VTrans in understanding where to focus limited resources toward bicycle improvements and will allow better integration into Agency projects and activities. Map 3 is a corridor priority map for the state developed as part of this process.

VTrans also owns approximately 140 miles of rail-trails statewide. These corridors serve as separated bicycle travel corridors and are a great recreational resource generating economic and physical activity in village centers.

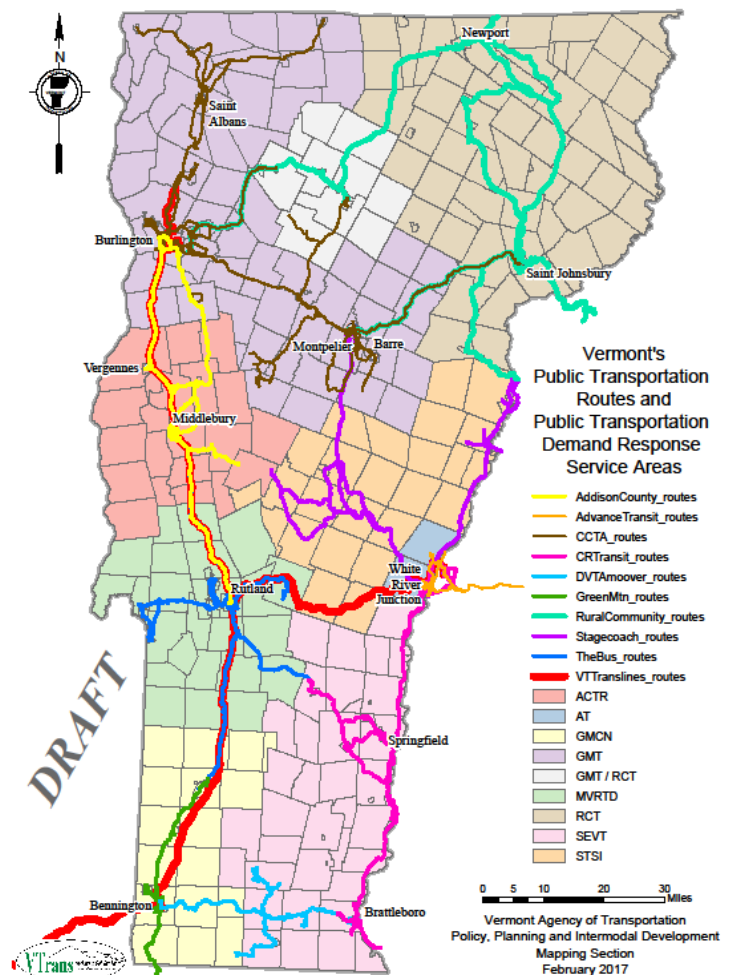
Map 3 - VTrans Bicycle Corridor Planning (Example)



Public Transit

Vermont has seven regional [public transportation providers](#) serving community needs such as individual mobility (including Medicaid transportation), access to employment, and economic development—including tourism. Due to the predominantly rural nature and low-density development of Vermont, most transit providers offer a mixture of fixed and flexible routes and demand responsive services covering the range of mobility needs. Some providers, located near ski resorts, also run seasonal services that support the state's tourism industry. Commuter services have proven particularly popular in recent years, with the Montpelier LINK operating between Burlington and Montpelier accounting for over 130,000 boardings in State Fiscal Year 2016. Vermont's regional transit ridership reached an all-time high in 2015 at just over 5 million trips, with roughly half of those taking place in the greater Chittenden County region and the other half occurring throughout the rest of the state. Ridership dipped slightly in 2016 to 4.7 million trips statewide. This trend is consistent with public transit throughout the United States. Map 4 illustrates Vermont's regional public transit provider areas and routes.

Map 4 - Regional Public Transportation Services



Intercity Bus Service

Vermont has experienced growth in intercity bus service connections in recent years. In addition to ongoing services provided by Greyhound, Megabus, and Yankee Trails, VTrans implemented two new intercity routes with Vermont Translines in 2014, establishing connections between Burlington and Albany, NY and/or Rutland and White River Junction. All intercity routes connect to national bus networks. All intercity service and routes can be found at the Go Vermont website or by calling 1-800-685-RIDE.

Results of the 2016 Statewide Transportation Public Opinion Survey indicated that 30% of Vermonters use public transit with some frequency. Also of note from the survey, 28% of respondents reported that improvements to transit or other alternate modes could get them to drive their personal automobiles less.

Railroads

Vermont's rail network encompasses approximately 578 miles of active rail lines. All of these lines are used for freight service with two routes also being used for intercity passenger service. The State of Vermont owns 305 miles of the active rail network. Map 5 illustrates the regional freight network.

Freight Rail

Freight rail service in Vermont is provided by short line and regional railroads. In other parts of the nation, Class I railroads (carriers with revenues in excess of \$467 million) serve as the railroad equivalent of the Interstate highway network, carrying freight between regional markets. By contrast, short line and regional railroads serve a gathering role, providing a "last mile" connection to shippers on relatively light density rail lines. In Vermont, similar to most other New England states, short line and regional railroads make up the rail network. As such, most freight is handled by multiple railroads between origin and destination.

Genesee & Wyoming, Inc. and the Vermont Rail System each provide freight rail service throughout the state. Genesee & Wyoming, Inc. owns two railroads that pass through Vermont:

- New England Central Railroad;
- St. Lawrence & Atlantic Railroad.

The Vermont Rail System provides freight service on each of the State-owned rail lines under the following subsidiary railroads:

- Vermont Railway;
- Green Mountain Railroad;
- Washington County Railroad.

Map 5 - Vermont's Rail System



These rail lines are leased to the Vermont Rail System, such that the State is responsible for capital improvements on the lines, as well as maintaining some of the rail bridges, while the operator is responsible for ongoing maintenance and freight operations.

Passenger Rail³

Passenger rail service in Vermont is provided by the National Passenger Railroad Corporation (Amtrak) through the *Vermont* and *Ethan Allen Express* services. Map 6 shows Vermont's passenger rail routes.

The *Ethan Allen Express* provides daily service between New York City, Albany, Schenectady, Saratoga Springs and Rutland, serving stations in Castleton and Rutland.

The *Vermont* operates daily service between Washington, D.C., New York, New Haven, Springfield and St. Albans on a daytime schedule totaling 13 hours and 45 minutes between endpoints, serving nine passenger stations in the state.

Map 6 - Vermont Passenger Rail Routes



Both the *Ethan Allen Express* and *Vermont* services are subsidized through cooperative agreements between Vermont and other states. The *Vermont* is supported by Vermont, Massachusetts, and Connecticut, while the *Ethan Allen Express* is supported by Vermont and New York State. The Vermont portion of the subsidies for the two services is about \$8.1 million per year, which Vermont pays to Amtrak for providing the services. In 2016, the *Ethan Allen Express* carried 50,717 passengers and the *Vermont* carried 89,318. The restoration of passenger rail service to Montreal and expansion of the *Ethan Allen Express* to Burlington are among the top rail priorities for the State.

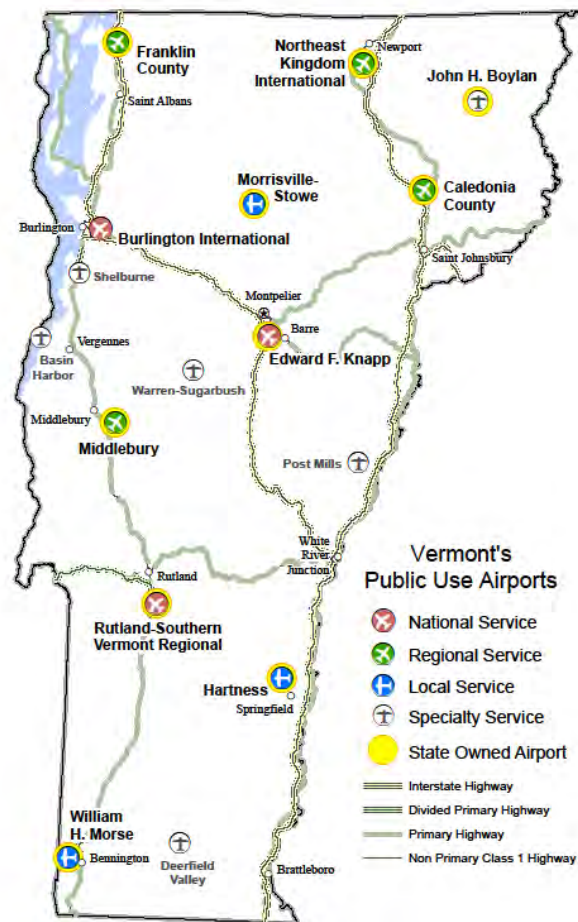
³ Map sourced from [Vermont State Rail Plan](#), October 2015

Aviation

Vermont's public use airport system consists of 16 airports of varying sizes and attributes. There are 10 airports owned by the state, five owned privately, and one municipally owned (Burlington International).

Thirteen of the 16 airports are part of the FAA's National Plan of Integrated Airport Systems (NPIAS), which identifies airports that are significant to the national air transportation system. Burlington International, Rutland State, and Edward F. Knapp in Berlin have commercial service. The others are general aviation airports. Knapp and Rutland contribute significantly to Vermont's freight movement system, with 1.5 million pounds of freight moving through Rutland in 2016 and 545,000 pounds passing through Knapp⁴. Burlington International Airport is the state's most active facility with respect to passenger service; there were 604,576 enplanements in 2016⁵. Map 7 shows Vermont's system of public use airports.

Map 7 - Vermont's Public Use Airports



⁴ 2017 VTrans Fact Book and Annual Report

⁵ VTrans Aviation Program, Jason Owen, May 12, 2017

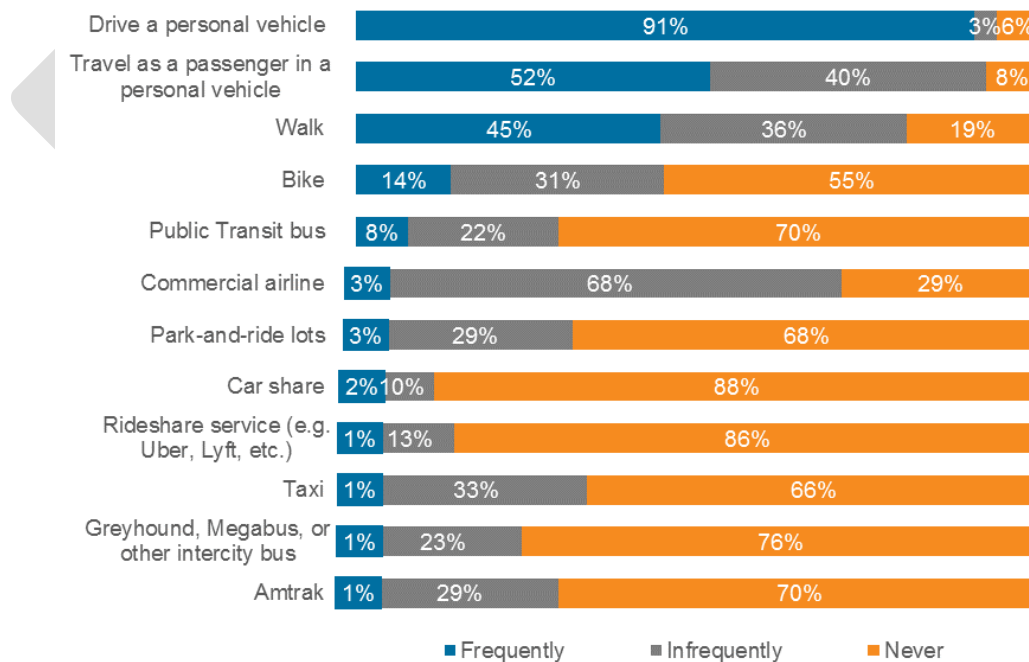
2016 Statewide Transportation Public Opinion Survey

VTrans conducted a statewide transportation public opinion survey in 2016 in anticipation of the update of the LRTP. VTrans conducted similar statewide surveys in 2006 and 2000 to inform the 2009 and 2002 versions of the LRTP. The full survey report is available at <http://vtrans.vermont.gov/docs>. A summary of key findings is as follows:

General Travel Characteristics

- Automobiles are the primary mode of transportation for most Vermonters, with 80% reporting that they drive a personal vehicle frequently (multiple times per week), and 88% of workers reporting driving alone or carpooling as their primary mode of transportation to work. Walking is the next most frequently used mode of transportation with 45% reporting they walk multiple times per week or month. Bicycling and public transit follow.
- The average total distance traveled by car on the most recent weekday was 58.5 miles and median distance was 30 miles.
- Respondents who commute to work reported living an average of 16.6 miles from work with a median distance of 10 miles. This is a slight increase from 15.7 miles 2006 and 15 miles in 2000.
- When asked what might encourage them to drive their vehicle less in Vermont, 30% reported that nothing could do so. However, 28% reported that improvements to transit or other alternate modes could get them to drive less. Note in 2006, 37% responded that nothing could encourage them to drive less.

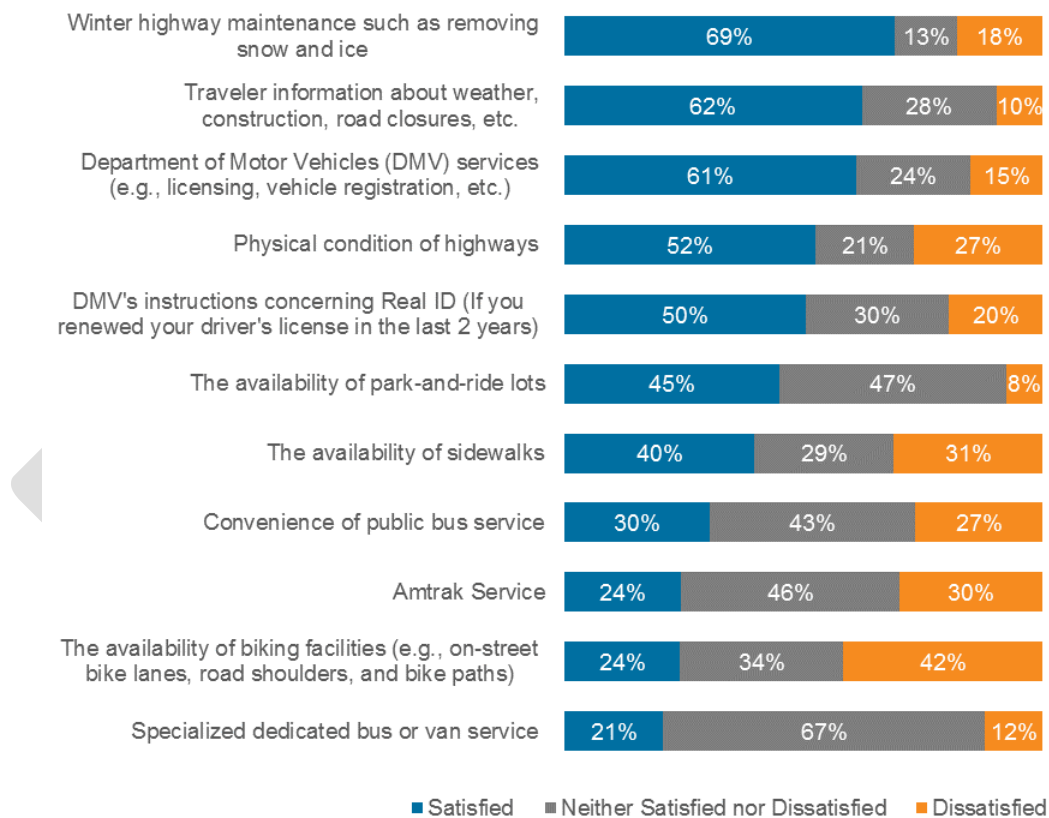
Figure 1 - Use Frequency of Transportation Options and Services



Satisfaction with Transportation Programs & Infrastructure

- A majority of respondents are satisfied with winter highway maintenance (69% very satisfied or satisfied), traveler information (62% very satisfied or satisfied), DMV services (61% very satisfied or satisfied) and the physical conditions of Vermont's highways (61% very satisfied or satisfied).
- The largest sources of dissatisfaction are the availability of bike lanes (42% dissatisfied or very dissatisfied), the availability of sidewalks (31% dissatisfied or very dissatisfied), and Amtrak service in the State (30% dissatisfied or very dissatisfied),).
- Respondents do not perceive traffic congestion in Vermont to have a significant impact on their overall quality of life, with 93% reporting no negative effect or a slight/moderate negative effect on their quality of life.

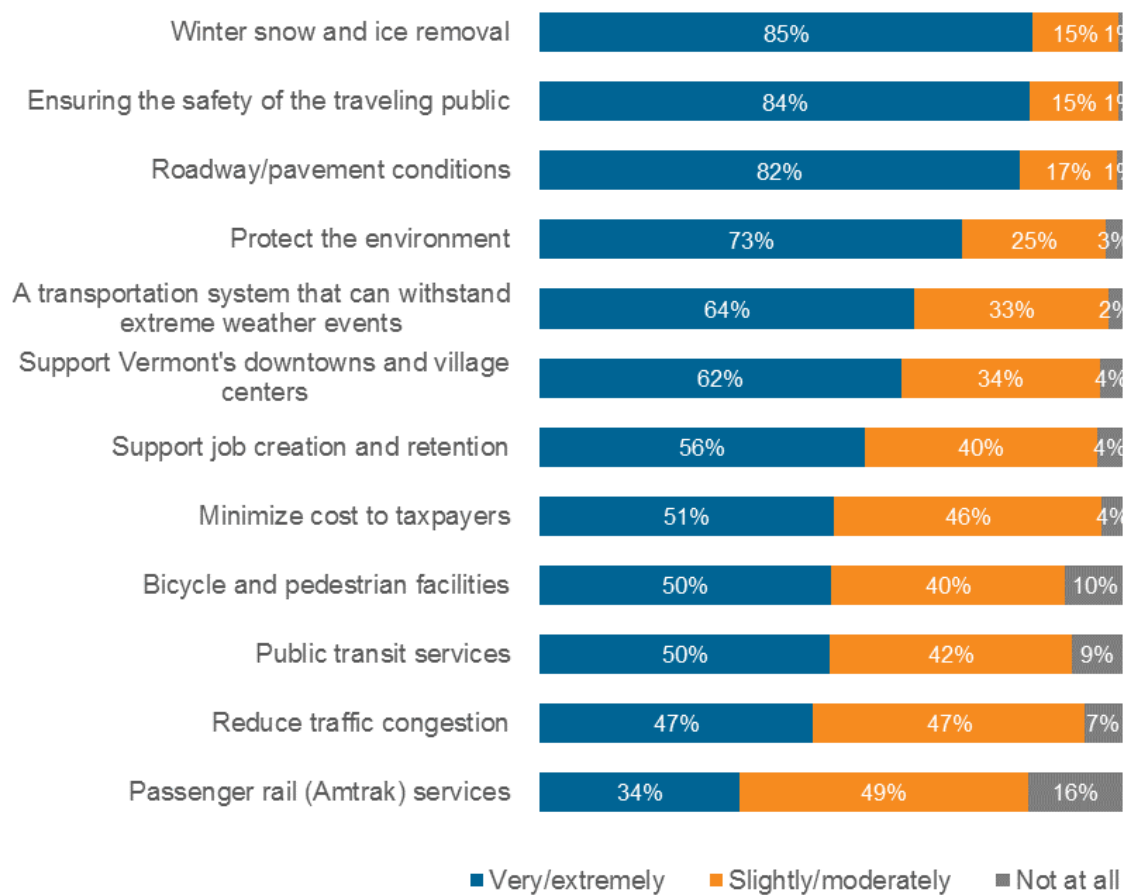
Figure 2 - Satisfaction with Transportation Programs and Infrastructure



Importance of Transportation Issues & Services

- Of those listed, the most important transportation services and issues were winter snow and ice removal (85% selected extremely or very important), ensuring the safety of the traveling public (84% selected extremely or very important) and roadway and pavement conditions (82% selected extremely or very important).
- Next most important was protecting the environment with 73% selecting extremely or very important, system resiliency to extreme weather events (64% selected extremely or very important) and supporting Vermont's downtowns and village centers with 62% of respondents citing these issues as extremely or very important.

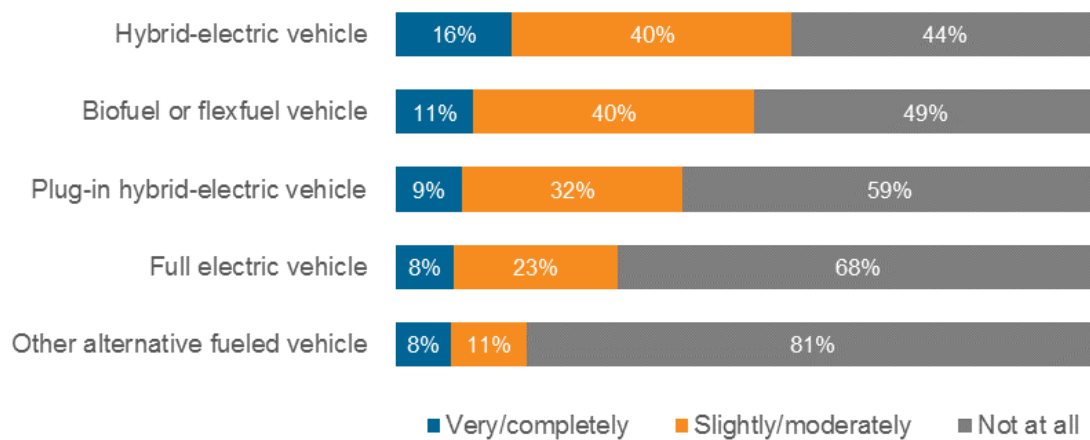
Figure 3 - Importance of Transportation Issues & Services



Alternative Fuel Vehicles

- When asked of the likelihood of an alternative-fuel vehicle for their next personal vehicle purchase, 56% said they were likely to purchase a hybrid-electric vehicle (e.g. Prius). A further 41% would consider a plug-in hybrid electric vehicle, such as a Chevrolet Volt, and 31% would consider some type of fully electric vehicle.
- The greatest obstacles to purchasing a hybrid-electric or fully electric vehicle are price, with 71% citing this as an obstacle, followed by lack of availability of charging stations (51%) and vehicle range limitations (45%) as dissuading factors.

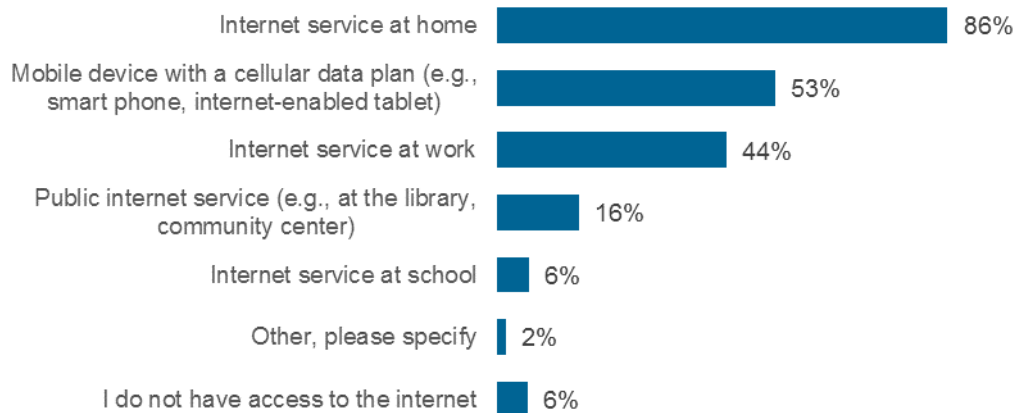
Figure 4 - Likelihood of Alternative Fuel Vehicle Purchase



Technology

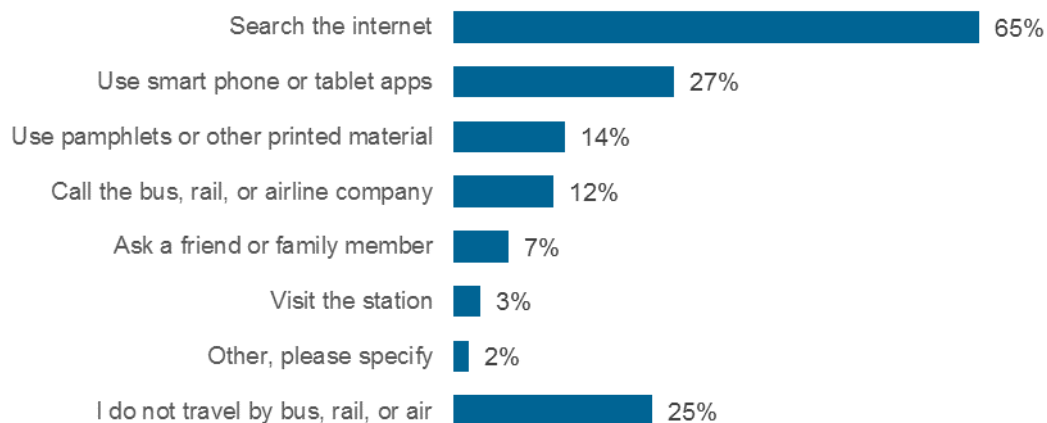
- A majority of respondents (86%) reported having internet service at home, while about 6% of respondents reported having no internet access at any location.

Figure 5 - Internet Access



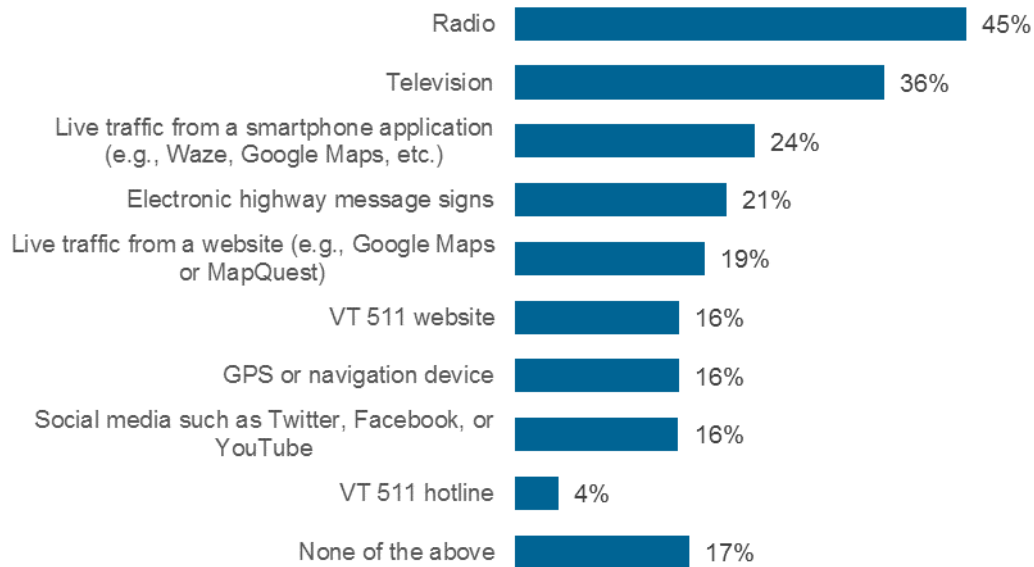
- Vermonters are increasingly obtaining information for bus, rail, and air travel services on the internet (65%), while 14% rely on pamphlets or printed materials, and 12% call the transportation provider on the phone.

Figure 6 - Bus, Rail, and Air Schedule Information



- In contrast to route and schedule information, more respondents get real-time traffic information from traditional media sources such as radio (45%) and television (36%) than mobile devices or the internet.

Figure 7 - Real-time Traffic Information



State & National Policy Review

The following state and national policy summary describes some of the more significant policies, laws, and program initiatives closely related to the transportation system. The 2040 LRTP should support the Governor's strategic goals, population outcomes established by the Vermont Legislature, and the national performance goals in the federal transportation law MAP-21/Fast Act.

Executive Order #01-17

Governor Phil Scott issued Executive Order No. 01-17 that directs all State Agencies to utilize their powers, duties and programs to establish the following cornerstones as strategic and operational goals:

1. Growing the Economy
2. Making Vermont an affordable place to live, work and do business; and
3. Protecting vulnerable Vermonters

Government Accountability Committee Quality of Life Outcomes

In 2014, the Vermont Legislature created the Government Accountability Committee which is authorized to recommend mechanisms for State government to be more forward-thinking, strategic, and responsive to the long term needs of Vermonters (2 VSA § 970). To track progress, the following Vermont population level quality of life outcomes were established (3 V.S.A. § 2311):

1. Vermont has a prosperous economy
2. Vermonters are healthy
3. Vermont's environment is clean and sustainable
4. Vermont's communities are safe and supportive Vermont is a safe place to live.
5. Vermont's families are safe, nurturing, stable, and supported
6. Vermont's children and young people achieve their potential
7. Vermont's elders and people with disabilities and people with mental conditions live with dignity and independence in settings they prefer
8. Vermonters with disabilities live with dignity and in settings they prefer.
9. Vermont has open, effective, and inclusive government
10. Vermont's State infrastructure meets the needs of Vermonters, the economy, and the environment

MAP-21 & the FAST Act

The Governor's strategic goals and population outcomes established by the VT Legislature are consistent and mutually supportive. Both are also consistent with the national transportation performance goals in the two most recent federal transportation acts: Moving Ahead for Progress in the 21st Century (MAP-21) and the Fixing America's Surface Transportation (FAST) Act:

- **Safety:** To achieve a significant reduction in traffic fatalities and serious injuries on all public roads
- **Infrastructure condition:** To maintain the highway infrastructure asset system in a state of good repair
- **Congestion reduction:** To achieve a significant reduction in congestion on the National Highway System
- **System reliability:** To improve the efficiency of the surface transportation system

- **Freight movement and economic vitality:** To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
- **Environmental sustainability:** To enhance the performance of the transportation system while protecting and enhancing the natural environment
- **Reduced project delivery delays:** To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices

VTrans is required to provide certain performance measures that demonstrate progress toward the Legislature's population outcomes and will be expected to provide measures related to the Governor's strategic goals. Similarly, MAP-21/Fast Act requires a performance management approach and reporting of specific measures related to the national goals. The FAST Act requires the Statewide LRTP to include description of performance measures and targets as well as a system performance report.

The passage of the FAST Act also resulted in the addition of two planning goals to the previous eight guiding the statewide and non-metropolitan planning process. Specifically, Title 23, Part §450.206, Subpart B – Statewide and Nonmetropolitan Planning and Programming states that:

“(a) Each State shall carry out a continuing, cooperative, and comprehensive statewide transportation planning process that provides for consideration and implementation of projects, strategies, and services that will address the following factors:

- (1) Support the economic vitality of the United States, the States, metropolitan areas, and nonmetropolitan areas, especially by enabling global competitiveness, productivity, and efficiency;
- (2) Increase the safety of the transportation system for motorized and non-motorized users;
- (3) Increase the security of the transportation system for motorized and non-motorized users;
- (4) Increase accessibility and mobility of people and freight;
- (5) Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;
- (6) Enhance the integration and connectivity of the transportation system, across and between modes throughout the State, for people and freight;
- (7) Promote efficient system management and operation;
- (8) Emphasize the preservation of the existing transportation system;
- (9) ****NEW**** Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation; and
- (10) ****NEW**** Enhance travel and tourism.

Water Quality

The Lake Champlain TMDL, or Total Maximum Daily Load, places a cap on the maximum amount of phosphorus from point and non-point sources, which include state and local roads, that is allowed to flow into the Lake Champlain while still meeting Vermont's water quality standards. Phosphorus concentrations currently exceed the water quality standards established in the TMDL for most segments of Lake Champlain. To support implementation of the policies and actions necessary to satisfy the Lake Champlain TMDL, the Vermont Legislature enacted Act 64 in 2015 creating the [Vermont Clean Water Initiative](#). Phosphorus loading to Lake Champlain is dominated by “nonpoint sources,” which are generated by runoff and erosion across the landscape, as opposed to “point sources” such as wastewater and certain stormwater discharges that are conveyed by a pipe or other discrete conveyance and are more closely regulated⁶.

Because stormwater runoff from state and local roadways contributes to the non-point sources of phosphorus, VTrans has the following roles and responsibilities to address water quality and Act 64:

- Act 64 requires municipalities to acquire and comply with a Municipal Roads General Permit by 2018. To assist municipalities with the planning and capital investments required for compliance, VTrans is providing state transportation funds through the Better Roads Grant Program and federal funds through the Transportation Alternatives Program.
- Technical assistance to municipalities through existing and new VTrans programs and efforts.
- VTrans is actively preparing for a new stormwater general permit referred to as TS4. The TS4, a draft of which is due out in 2017, will require the agency to address run-off from the state roadway network on a system wide basis as well as for facilities such as VTrans' District Garages.
- Constant collaboration with the Vermont Department of Environmental Conservation (DEC).

The need is enormous and these water quality initiatives will require resources throughout and beyond the life of the 2040 Long Range Transportation Plan. The DEC estimates the cost to address erosion on local roads at approximately \$10 million per year.

2016 Vermont Comprehensive Energy Plan (CEP)

The CEP is required by 30 V.S.A. § 202b and the Vermont Electric Energy Plan is required by 30 V.S.A. § 202. The overarching goal is to set the state on a path to obtain 90% of its total energy from renewable sources by 2050.

The CEP also includes interim transportation goals to reduce transportation energy consumption by 20% and power 10% of transportation energy from renewable sources by 2025. Vermont's transportation sector is currently fueled 94% by petroleum.

See the “Energy” section of this document for an overview of the [Comprehensive Energy Plan](#) CEP goals and strategies.

Health in All Policies

The Health in all Policies (HiAP) initiative acknowledges that health impacts and outcomes result from virtually all decisions and policies throughout state government. Created by executive order #7-

⁶ [Vermont Lake Champlain Phosphorus TMDL Phase 1 Implementation Plan, September 15, 2016](#)

15 in 2015, “Health in All Policies is a collaborative approach to improving the health of all people by incorporating health considerations into decision making of cross-sectors and policy areas.”⁷ Transportation is no exception, and many of the programs managed by VTrans have either direct or indirect health impacts. [VT Health in All Policies](#).

Complete Streets

During the 2011 legislative session, the Complete Streets Bill (Act 34) was passed to "ensure that the needs of all users of Vermont's transportation system - including motorists, bicyclists, public transportation users, and pedestrians of all ages and abilities - are considered in all state and municipally managed transportation projects and project phases." The language in the bill excludes unpaved highways. The full [Complete Streets Guidance](#)⁸ is available on the VTrans publications webpage.

The bill requires the Agency to make available to the public a list of all state and municipal projects that incorporated complete streets principles, including a project description and its location. The bill also requires the Agency to make available to the public a list of all state and municipal projects that did not incorporate complete streets principles with an identification of which exemption was applied. Exemptions are allowed where use of the transportation facility by pedestrians, bicyclists or other users is prohibited by law; where the cost of incorporating complete streets principles is disproportionate to the need or probable use; and/or incorporating complete streets principles is outside the scope of a project by its very nature. The Agency will continue to educate and assist municipalities and partners with meeting the requirements of the Complete Streets bill.

Federal Automated Vehicles Policy

The US DOT, through the National Highway Transportation Safety Administration, released guidance in 2016 on the subject of vehicle automation. This guidance was an explicit acknowledgement of the magnitude and breadth of the impact of vehicle automation technology, as well as an outline of the challenges of adapting our transportation system to these innovations. Benefits these technologies bring include the potential for dramatically increased highway safety. According to the NHTSA Federal Automated Vehicles Policy issued in September of 2016, “...the excitement around highly automated vehicles (HAVs) starts with safety. Two numbers exemplify the need. First, 35,092 people died on U.S. roadways in 2015 alone. Second, 94 percent of crashes can be tied to a human choice or error. An important promise of HAVs is to address and mitigate that overwhelming majority of crashes.”⁹ In addition to safety, vehicle automation presents opportunities to increase mobility for those people with disabilities, aging populations, or those who can’t afford the cost of car ownership or simply choose not to own a car.

⁷ <http://www.healthvermont.gov/about/vision/health-all-policies>

⁸ <http://vtrans.vermont.gov/sites/aot/files/highway/documents/publications>

⁹ Federal Automated Vehicles Policy: Accelerating the Next Revolution in Roadway Safety, USDOT-NHTSA September 2016. <https://www.transportation.gov/AV>

Technological Change

Technological change is always taking place, but the pace at which new technologies are developing and having an impact on the transportation network is currently very rapid. Advancements in mobile and information technology allow us to collect, interpret, and deploy data at unprecedented rates and quantities, allowing us to manage our transportation systems in ways previously not possible.

At the same time, socioeconomic and demographic trends indicate that society is responding to evolving technology and the possibilities it presents. Services like Uber and Lyft, based on technological platforms typically accessed by mobile devices, reflect a change of mindset toward mobility rather than car ownership.

VTrans incorporates required infrastructure and protocol into the transportation system through its Vermont ITS (Intelligent Transportation System) Architecture document. This document should serve as the central inventory for all VTrans ITS efforts, and should be shared throughout the Agency and with other partner state agencies to ensure coordinated, effective development and rollout of technologies affecting the transportation network.

Current Transportation Technology

Evolving technology that VTrans is incorporating into the transportation system include the following examples:¹⁰

ATMS (Advanced Transportation Management System)

Part of an overall Intelligent Transportation System strategy, ATMS collects data on weather, incidents, congestion and more, and provides information to travelers via variable message signs, mobile platforms, and other means of digital communication. This system is in the early stages of deployment, and is limited by the lack of reliable high-bandwidth communications infrastructure along Vermont's interstate highway corridors.

Managing Assets for the Transportation System (MATS)

Through a tri-state effort with New Hampshire and Maine, VTrans is working to establish, populate and utilize MATS (Managing Assets for the Transportation System), with the primary goal of improving operations efficiency. This system will provide centralized operations information such as location of snowplows, rate of material application, routes of vehicles, and infrastructure inventory. Some of the elements are functional now, and further development is planned as more data is linked to this system. The tri-state partnership has proven to be invaluable, allowing three small states to share information and provide consistency in data across state borders.

Smart work zones

Use of technology, including real time counts, queue detectors, transponders integrated into traffic cones or variable message signs, provides an opportunity to bring the concept of Smart Work Zones to major construction projects. VTrans has only begun this initiative with a few projects, but greater efficiency and traveler benefits could be realized.

¹⁰ Vermont ITS Architecture Update and Strategic Plan, October 2016 DRAFT

Traffic signal operations

VTrans is working to increase connectivity of traffic signal operations to allow centralized management and incorporation of Vehicle to Infrastructure (V2I) technologies. Upgrades and centralization of signal timing management promises opportunities for increased highway capacity and safety.

Variable Message Signs

Variable message signs are much more prevalent along Vermont highways, and have great potential to provide timely information as other smart infrastructure systems come on line. These stations can become a key link in “vehicle-to-infrastructure” communication. A key limitation in their effectiveness is the lack of reliable communication to these devices.

Waze input/crowdsourcing

VTrans’ partnership with WAZE, the most widely used crowd-sourced traveler information mobile software, facilitates two-way communication on road conditions, incidents, and operations. By taking advantage of freely available data and information, travelers are able to make informed travel choices.

Future Trends

Connected & Automated Vehicle Technology

The single most potentially game-changing technology trend currently in transportation is the realm of connected and automated vehicles. While many associate the subject with idealistic visions of the future, the practical promises that “CAV” technologies offer are reduction of crashes, increased highway capacity, and reduced energy consumption.

While fully automated “driverless” vehicles are typically the posterchild for CAV technology, there are many existing lower-level technologies offered by auto manufacturers serving the ultimate goals of CAVs. Examples of this are vehicles with brake-assist, lane-correction, on-board mapping, and so forth. These technologies serve the operator of the vehicles by accessing existing technologies to make travel safer and more efficient. Ultimately, more advanced technologies will enable greater benefits.

Connected vehicles use various communication technologies to connect to the driver, other vehicles on the road (V2V), roadside infrastructure (V2I), as well as the “Cloud,” with the objectives of improving highway safety and efficiency. Some of the primary benefits include:

- reduced crashes
- reduced need for highway infrastructure expansion
- increased reliability and dependability of travel times
- reduced energy consumption

The deployment of CV technologies requires three major components:

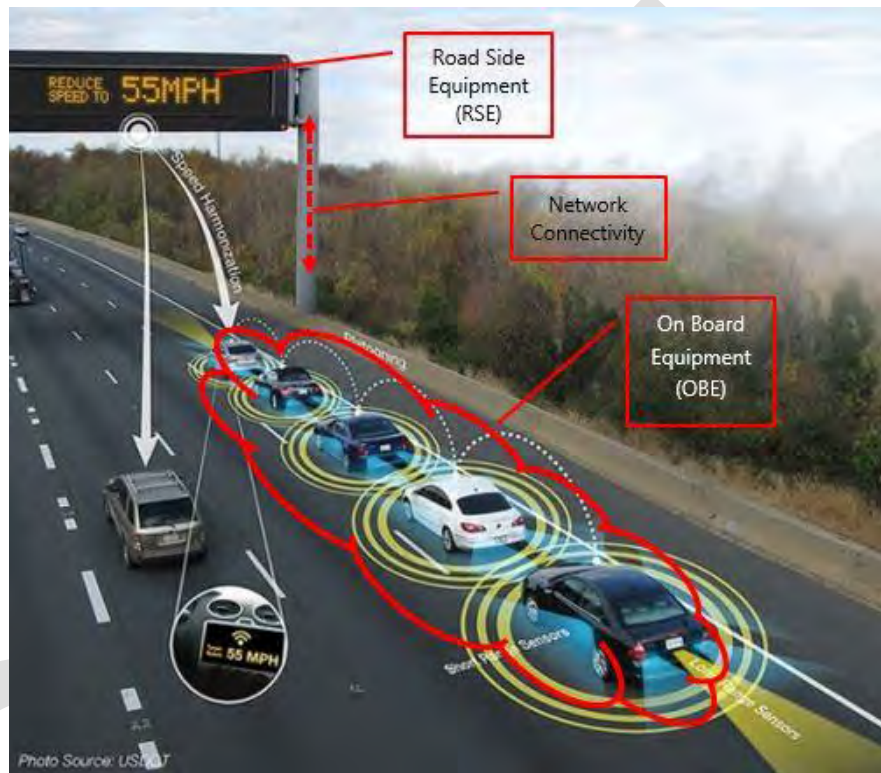
On Board Equipment (OBE) - the components installed in vehicles which may or may not include integration with the various vehicle systems. This equipment includes the wireless communications in the vehicle, including the components necessary for vehicle to vehicle (V2V) communications.

Road Side Equipment (RSE) - the components installed along the roadside, specifically the wireless communications necessary for vehicle to infrastructure (V2I).

Network Subsystem - the backhaul or network necessary to connect roadside devices to one another and to connect roadside devices to the various central processing locations.

VTrans should be adapting and making the infrastructure adjustments and investments to facilitate the incorporation of these technologies.

Figure 8 - Connected Vehicle Technologies



The following infrastructure is critical to take advantage of these burgeoning technologies:

- Communications and information infrastructure along major corridors. This means fiber optic communications infrastructure that will allow the exchange of data needed for these technologies that is robust and not vulnerable during poor weather. Without this, Vermont may not be able to accommodate connected vehicles and vehicle automation features that will be bringing visitors and economic activity.
- These new technologies, including roadside devices and smart infrastructure will produce huge quantities of data. VTrans needs to be equipped with the hardware, software and personnel that can transform this data into be vitally useful information for the efficient management and planning of infrastructure and safe travel for the public.

There is significant potential for benefits in safety, mobility and efficiency that the integration of these technologies can bring. Vermont can realize these benefits with proper planning and wise investment in capital and operations.

Workforce Ramifications

VTrans must understand the implications for workforce development and training as technological advances into operations and infrastructure are incorporated. Technological backgrounds in information technology, computer science, database management and so forth will grow in importance as the transportation system increasingly complex with computer and communications componentry and management systems.

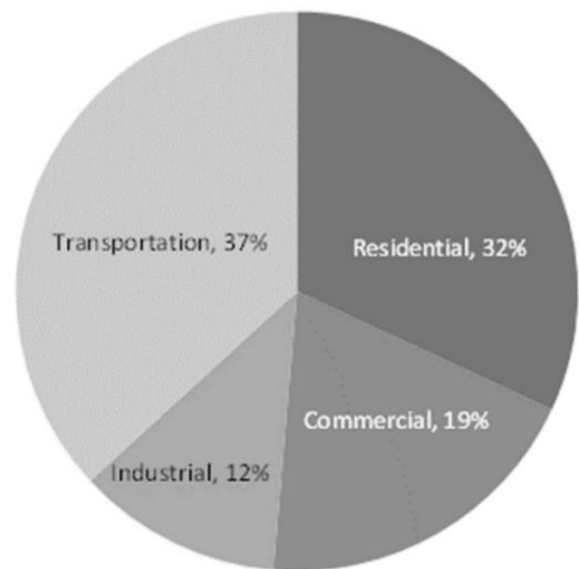
The next generation of VTrans staff will need greater skills with data integration, computer programming, and computer engineering to take advantage of reams of useful information generated by connected vehicles and smart infrastructure. In the past, much of VTrans staff development has focused on recruiting civil engineers and training staff by rotations through the agency.

Implementation of many of the transformational technologies will require staff with expertise in data management, big data analytics, and cyber-security. This will require a shift in emphasis towards recruiting staff with computer science and electrical engineering backgrounds. In addition, as these technologies take root in Vermont, a strong focus on training and development of the agency's existing workforce to adapt to this new era will be important.

Energy & Climate Change

The transportation sector consumes 25% of all the energy used in the United States as of 2014¹¹. This is the single largest end use sector and has major economic and environmental implications as the vast majority of this consumption is through fossil fuels. The transportation sector is also the largest consumer of energy in Vermont, accounting for 37% of the energy used in the state (see Figure 9).¹² Vermont's transportation sector has a significantly higher share of total end use consumption compared to the national level, due to, vehicle miles traveled (VMT) per capita that are above the national average and a relatively low level of commercial and industrial activity, according to the Vermont Transportation Energy Profile. As a result, transportation represents a significant energy-efficiency opportunity for Vermont.

Figure 9 - VT Energy Consumption by Sector (2016 VT CEP)



The State of Vermont's 2016 Comprehensive Energy Plan¹³ (CEP) provides detailed information on current energy consumption, spending and goals, and addresses Vermont's energy future across all end-use sectors, including transportation. The CEP is required by 30 V.S.A. § 202b and the Vermont Electric Energy Plan is required by 30 V.S.A. § 202. Both were adopted January 1, 2016, and updates are required every six years thereafter.

The overarching goal is to set the state on a path to obtain 90% of its total energy from renewable sources by 2050. The CEP also includes interim transportation goals to reduce transportation energy consumption by 20% and power 10% of transportation energy from renewable sources by 2025. Vermont's transportation sector is currently fueled 94% by petroleum.

To transform the transportation sector, the 2016 CEP identifies four primary strategies:

- 1) Efficient Land Use - Vermont's land use goals call for maintaining historical settlement patterns of compact centers surrounded by rural countryside to provide walkable, transit friendly environments that require less automobile use;
- 2) Shift Single Occupant Vehicles - Increase the availability of transportation choices (such as carpooling, public transit, walking, biking) to provide safe and economical options to travel in single occupant vehicles;
- 3) Electrify Light Duty Vehicles - The CEP sets a goal of powering 10% of Vermont vehicles by electricity in 2025. Electric cars are much more efficient than gasoline powered vehicles and

¹¹ US EIA Energy Use for Transportation - http://www.eia.gov/Energyexplained/?page=us_energy_transportation

¹² Vermont Transportation Energy Profile, 2015 -

<http://vtrans.vermont.gov/sites/aot/files/planning/documents/planning/Vermont%20Transportation%20Energy%20Profile%202015.pdf>

¹³ Vermont Comprehensive Energy Plan, 2016 - http://publicservice.vermont.gov/publications-resources/publications/energy_plan/2015_plan

can use power from renewable sources of electricity. This strategy also includes increasing the overall efficiency of fossil fueled light duty vehicles; and

- 4) Heavy Duty Vehicle Efficiency - Increase the efficiency of heavy-duty vehicles and power them with renewable fuels, such as advanced liquid or gaseous biofuels. Expanded fueling infrastructure and increasing fuel availability.

As illustrated in the Comprehensive Energy Plan, Vermont's transportation system is responsible for the largest end-user proportion of energy statewide. There are many factors that contribute to the energy intensity of transportation, and therefore many opportunities to affect a reduction in the overall energy usage. The strategies outlined in the CEP are consistent with VTrans' programs and policies with regard to decreasing the prevalence of single occupant vehicles by providing transportation options such as public transit, carpooling, and non-motorized transportation infrastructure. By providing these options, and working with our partner state agencies to encourage efficient land-use by maintaining historical village settlement patterns, energy use for transportation may be kept in check. According to the 2016 Statewide Transportation Public Opinion survey, these are concepts that resonate with the residents of the state and are likely to into the future. See the "Importance of Transportation Issues and Services" section earlier in this report for more detail.

Climate Change & System Resilience

Climate change has manifested itself in Vermont most obviously in the form of extreme weather events. The impacts of these events on the transportation system are clear. Tropical Storm Irene destroyed miles of roadway at extreme expense to the state and its residents, not to mention the human and emotional toll it exacted on Vermont. The impact of Irene and other such storms has been strong enough that VTrans has made resilience to future disasters a goal in its [Strategic Plan](#).

At the federal level, the Transportation Research Board has made climate adaptation & system resilience a priority and is supporting extensive research. The US DOT and FHWA have been supporting state DOT research and planning activities including development of a vulnerability assessment framework and support for numerous state DOT climate resilience pilot projects. Additionally, recently updated federal transportation planning rules require that states consider and implement planning processes that, "improve resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation."¹⁴

The Vermont Department of Public Safety acknowledges the significance of climate change and system impacts as an issue in the [State Hazard Mitigation Plan](#) (SHMP). According to the SHMP, "the impacts of climate change will affect the severity and frequency of natural hazards and the State of Vermont must be prepared for these impacts."¹⁵

¹⁴ Title 23, Part §450.206, Subpart B – Statewide and Nonmetropolitan Planning and Programming

¹⁵ Vermont Department of Public Safety, State of VT Hazard Mitigation Plan, 2013, p. ES-1

Tropical Storm Irene provided numerous “lessons learned” aimed at making the transportation system and VTrans more resilient and better prepared when disaster strikes in the future. Some of actions that have occurred post-Irene include:

- Bridge and Culvert Inventories and Geomorphic Assessment Integration
- Preliminary Transportation System Vulnerability Assessment
- Developing and Applying Methods and Tools for Transportation System Resilience Planning
- Education and promotion of Town Highway Road and Bridge Standards Adoption
- Incident Command System (ICS) Training
- Hydraulics Manual Update
- Rivers and Roads Training

Programs & Projects

There are a number of existing programs and projects serving Vermont’s need to plan and design, and construct resilient transportation systems. For example, the “ICNet” (Northeast Infrastructure Climate Network) is a regional initiative that seeks to bring climate and engineering academics and state level practitioners together to share expertise and prioritize cross-disciplinary research needs. VTrans is an active participant in this group.

VTrans began an extensive research project in 2015 to develop Methods and Tools for Transportation System Resilience. The project’s intent is to establish easy to understand ways to establish transportation infrastructure’s vulnerability to future flood inundation, erosion and deposition as well as the degree of risk this vulnerability presents to the functioning of the system at the watershed and roadway corridor level.

VTrans also strives for continuous state agency coordination at the executive and staff levels regarding river programs, stormwater and water quality. This includes Lake Champlain TMDL planning and implementation, including stormwater compliance and TS4 and municipal roads permits and municipal codes and standards. The Agency of Natural Resources is a close partner to VTrans in addressing these issues through cooperative program and project development.

To minimize the impact on the transportation system, maintain system integrity, and sustain the security of Vermont’s residents, VTrans will continue to consider system resilience through multiple project, program, and research initiatives. Experience and research indicates it is reasonable to expect the unpredictability and severity of weather events to continue. Minimizing impacts to the transportation system reduces effects on Vermont’s rivers and other natural resources and the statewide and local economies. Disruptions to Vermont’s highway network can be devastating to local businesses, hamper regional travel and emergency response, and negatively affect the state’s vital tourism sector. Investing in programs and projects that mitigate the possible impacts of climate change through system resilience will continue to be a wise investment for Vermont.

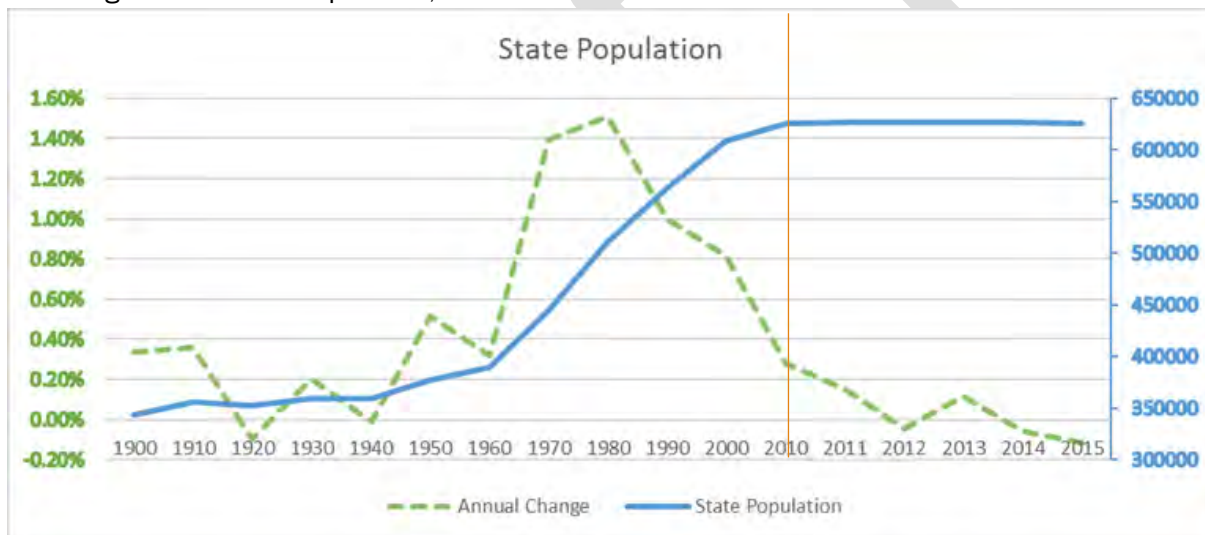
Population & Demographics

Population

According to the U.S. Census Bureau, Vermont had 626,042 residents in 2015. As of 2014, Vermont was the second smallest state by population, second only to Wyoming, and the second oldest population, with a median age of 42.8; only Maine is older with a median age of 44.1. Vermont has the second lowest birthrate in the nation after Rhode Island.

Since 1900, the state population has increased by nearly 300,000 residents, with nearly all that growth occurring between 1960 and 2000. Vermont's growth rate decreased from 1.5% to below 0% between 1980 and 2012. Since 2012, the annual growth rate has hovered around 0% with recent years experiencing negative growth, indicating a falling population. Statewide population forecasts show Vermont reaching 653,458 residents by 2040, representing an annual average of 0.14% increase per year, or annually growing by approximately 885 residents¹⁶.

Figure 10 - State Population, 1900-2015



Source: Demographic & Economic Trends & Forecasts Report, RSG & EPR, 2016

Population Age Profile

The forecasts for statewide population by age brackets indicate the following:

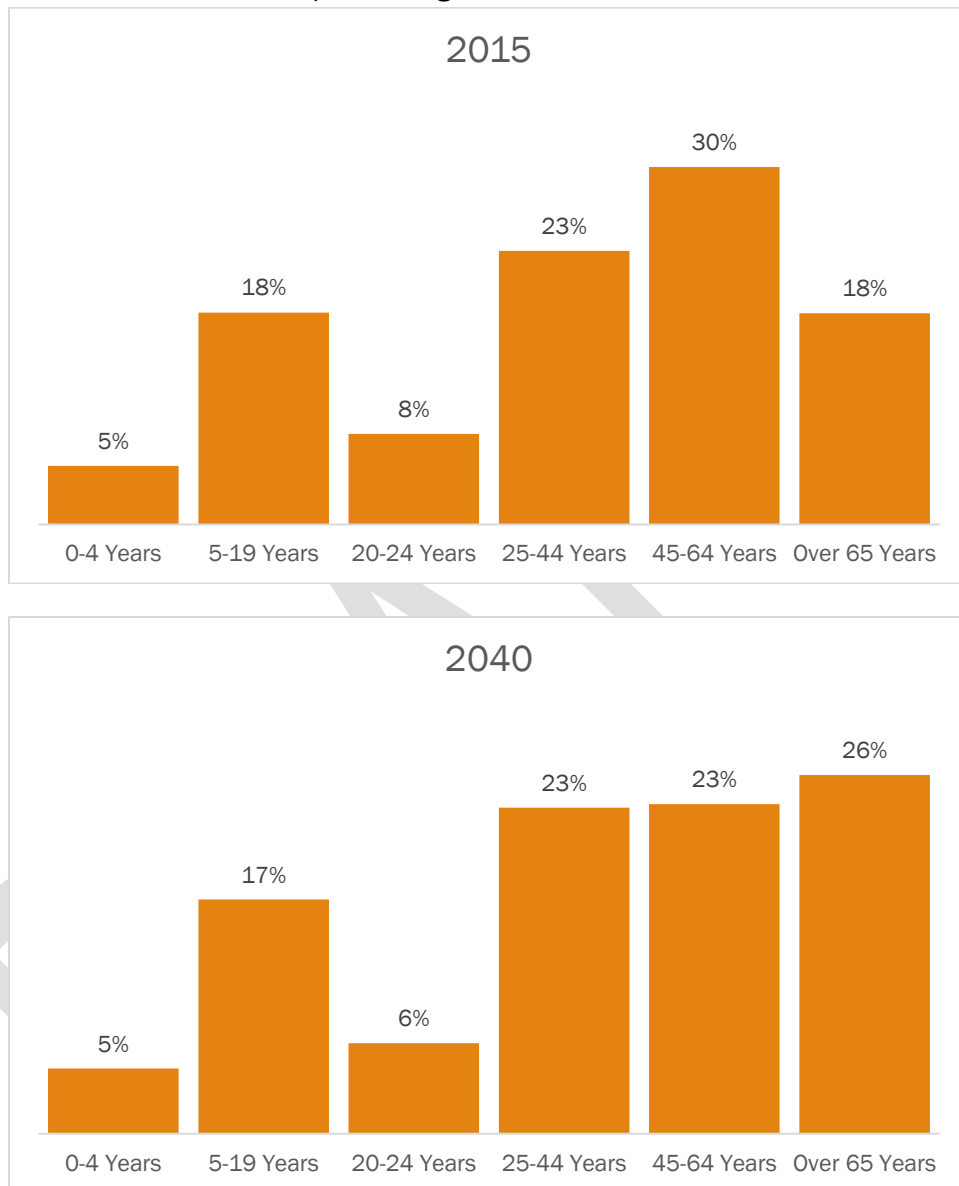
- The proportion of school age residents (ages 5-19) will decline slightly over time
- The proportion of first time home buying population (ages 25-44) will rise slightly over time
- The proportion of the Over 65 age cohort increases significantly by 2040

The pair of graphs below show the relative changes in population cohorts between 2015 and 2040. The increase in the older age cohorts, especially the Over 65 Years group, is evident. With regard to

¹⁶ Demographic & Economic Trends & Forecasts Report, RSG & EPR, 2016

transportation and mobility, the general inference is that more residents will need assistance to maintain mobility as the population ages.

Figure 11 - 2015 & 2040 Population Age Profiles

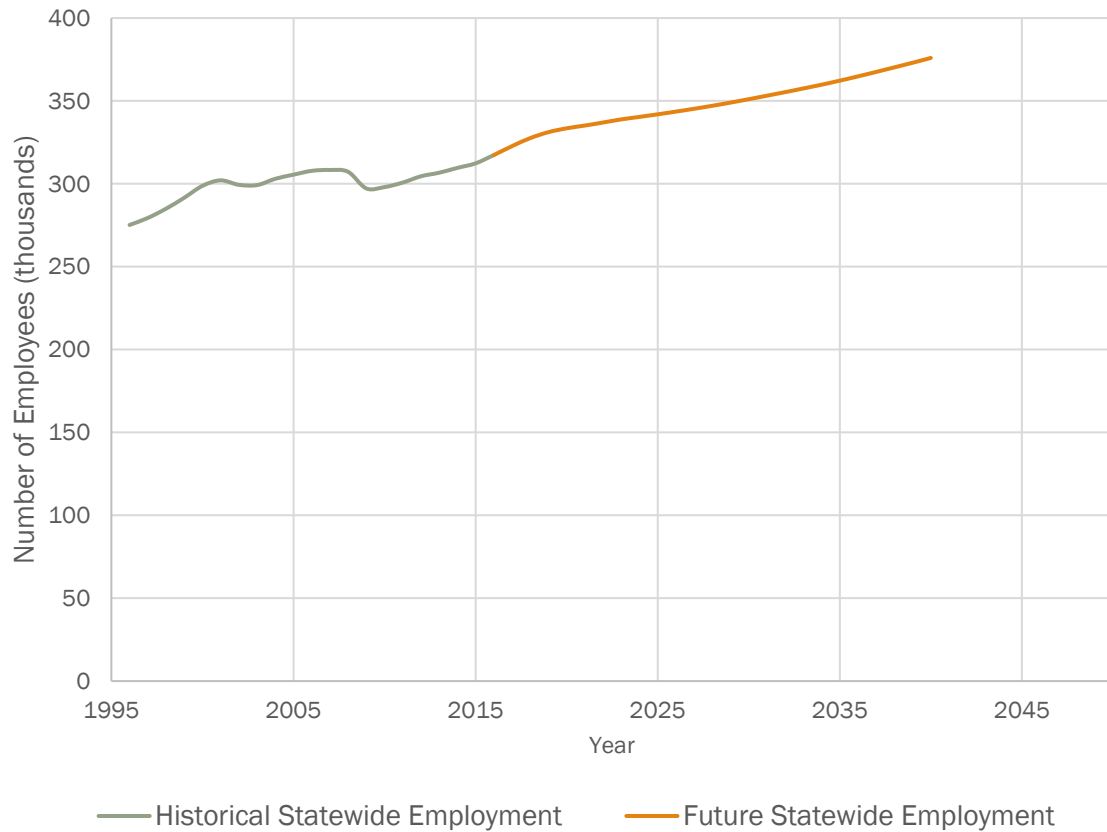


Source: Demographic & Economic Trends & Forecasts Report, RSG & EPR, 2016

Employment

In 2016, the State supported a total of 317,314 non-farm payroll wage and salaried employment positions. This number is forecast to grow to 375,916 by 2040, which is approximately 0.77% annual growth (Figure 12).

Figure 12 - Statewide Employment Trend, 1995-2040



Source: Demographic & Economic Trends & Forecasts Report, RSG & EPR, 2016

Economic Development

Vermont's three major interstate highways run through much of the state, facilitating product movement, distribution access, and workforce commuting. Rail lines crisscross the state and there are 16 airports, including Burlington's International Airport. Highways are the state's most critical transportation asset, providing access and mobility to Vermonters, businesses, and tourists¹⁷.

The transportation network enables shippers to export their products, employees to get to work, and visitors to access the state.

As outlined in the [Vermont 2020 Comprehensive Economic Development Strategy \(CEDS\)](#), the following transportation strengths contribute to the State's economy:

Air

- Facilities at Vermont's 16 airports include multi-carrier passenger aviation, airfreight and a Foreign Trade Zone at the Burlington International Airport (BTV), and smaller private and municipal general aviation terminals and runways.
- Burlington International Airport is currently served by five airlines (Delta, Jet Blue, Porter, United and American Airlines) with direct flights to major hubs such as Chicago, Philadelphia, and the New York and Washington, DC metro areas. Current carrying capacity is approximately 2,500 seats per day.
- Both major commercial parcel carriers, UPS and Federal Express (FedEx), as well as Royal Air Freight, fly into Burlington International Airport (BTV), providing service for much of northern Vermont, with BTV serving as a sub-regional hub for FedEx. Some cargo from FedEx's Memphis "super-hub" arrives by medium-range Boeing 757 aircraft, is distributed to smaller aircraft and flown to destinations such as Portland, ME and Syracuse, NY.
- Rutland–Southern Vermont Regional Airport is served by Cape Air, providing daily round-trip flights to Boston.

Interstate & Transit

- The highway system generally has capacity to accommodate future growth.
- Scenic byways throughout the state attract tourists and reinforce the image of Vermont.
- Public transit providers throughout the state provide alternatives to personal automobile transportation. Bus and train ridership has increased in recent years.
- The VTTrans GoVermont website provides real-time assistance to those seeking carpool and vanpool matching services as well as public transit schedules and bike route information.

Rail

- The Amtrak Vermonter passenger train service runs from St. Albans to NYC and on to DC with 10 stops in Vermont. The Ethan Allan Amtrak service runs from Rutland through Albany, NY and on to New York City's Penn Station.
- There are several rail freight lines operating in Vermont.

¹⁷ Vermont 2020 Comprehensive Economic Development Strategy (CEDS), February 2016

2020 Comprehensive Economic Development Strategy

The transportation focus in the Comprehensive Economic Development Strategy (CEDS), beyond maintenance of the highway system, is primarily on air and rail for passenger and freight transport.

Recommendations emphasize faster, more reliable air, rail and roadway (including bus) connections between Vermont economic centers and major markets of Montreal, Albany, New York, and Boston. The CEDS also recommends facilitating tourism and growth of second home markets by improving access to resort towns via air, rail, and bus. Other general initiatives include redeveloping airports with an orientation toward high value-added products and redeveloping vacant properties connected to the rail network for businesses requiring rail access.

Specific projects called out in the CEDS include the [Burlington Railyard Enterprise Project](#), extending the Ethan Allen Express to Burlington, developing western corridor intercity passenger rail connecting Manchester through to Albany and NYC, and specific improvements at Rutland, Newport, Hartness, and Morrisville-Stowe Airports, as well as a customs facility for Burlington International Airport.

Better Connections Grant Program

The Better Connections Grant Program is a multiagency partnership that aligns state and local investments to increase transportation options, build resilience, and strengthen economic vitality in Vermont communities. The Better Connections Program is an annual planning grant program administered by VTrans in partnership with the Vermont Agency of Commerce and Community Development (ACCD). Municipalities annually compete for approximately \$200,000 in projects funds. A 10% local cash match is required.

Website: <http://vtrans.vermont.gov/planning/projects-programs/better-connections>

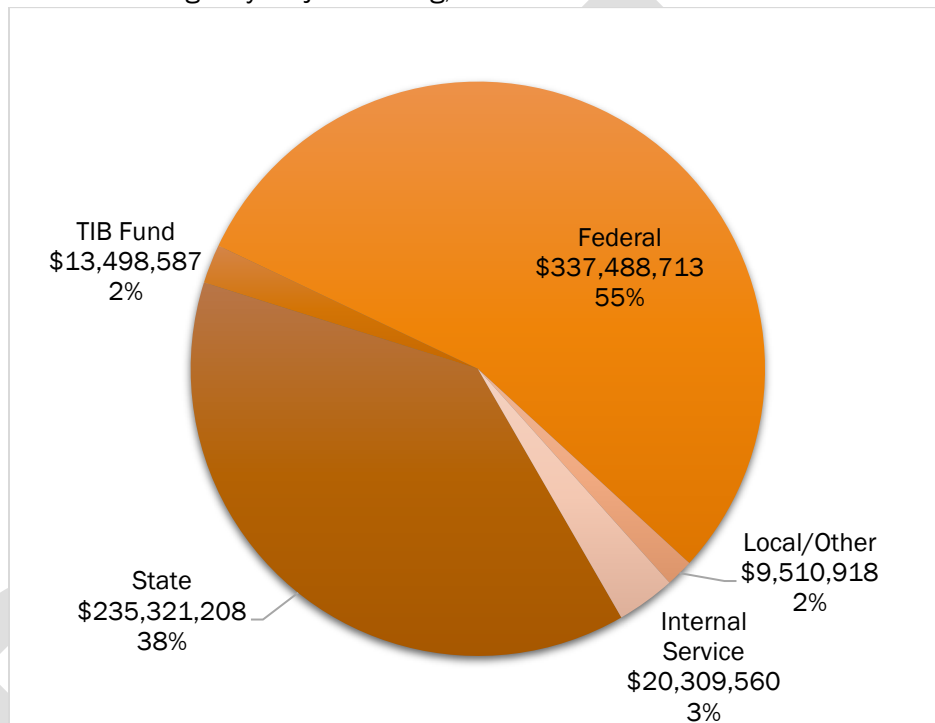
Funding and Finance

Funding Sources

Vermont funds the maintenance and operation of its transportation system through a combination of the following major funding sources:

- Federal transportation funds (primarily FHWA & FTA)
- State fuel taxes (gasoline and diesel taxes, and assessments)
- DMV registration and other fees
- Vehicle purchase and use taxes

Figure 13 - VTrans Budget by Major Funding, SFY2016



Source: VTrans Budget & Fiscal Management Section

Federal Funds

For State Fiscal Year (SFY) 2016, approximately 55% of the state's \$616.1 million transportation budget is derived from federal funding sources. Federal funding risks center on transportation reauthorization and Highway Trust Fund (HTF) revenues. The vast majority of Vermont's \$337,488,713 federal funds are derived from the HTF account.

The current federal surface transportation authorization, Fixing America's Surface Transportation (FAST) Act is a 5-year, \$305 billion authorization that covers highway, transit, and rail programs. The FAST Act does not provide sufficient long-term funding for Vermont's transportation needs. Although funded at slightly higher levels than the previous authorization, funding levels are insufficient to reduce the backlog of VTrans projects or keep up with the inflation associated with capital and operating costs.

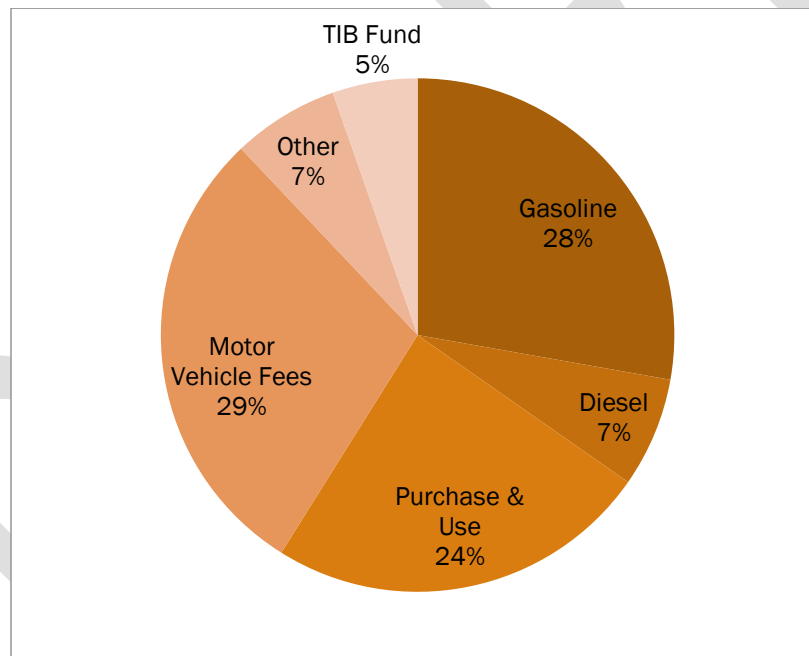
The HTF – which collects taxes on gasoline and diesel sales - is the primary federal mechanism to fund highway and transit programs. Approximately one-quarter of FAST apportionments are based on funding sources other than the HTF. The fund is intended to be self-sustaining. In the past 6 years, however, Congress has approved multi-billion dollar transfers from the General Fund to the HTF to cover shortfalls. The HTF's long-term solvency continues to be threatened by lower than anticipated revenues and the impact of inflation – the federal gasoline tax of 18.4-cents per gallon has not been increased since 1993.

State Funds

State revenues account for the second largest share of transportation revenues. The current SFY 16 budget includes approximately \$235 million state funds, in addition to \$13.5 million in Transportation Infrastructure Bonds (TIB) funds.

State revenues encompass a diverse combination of gas and diesel taxes, purchase and use taxes, motor vehicle fees, and TIB funding. Gas and diesel taxes account for 35% of revenue, followed closely by Department of Motor Vehicle (DMV) fees at 28%, and purchase and use fees (23%).

Figure 14 - Transportation State Revenue Sources, Consensus Revenue Forecast, January 2016



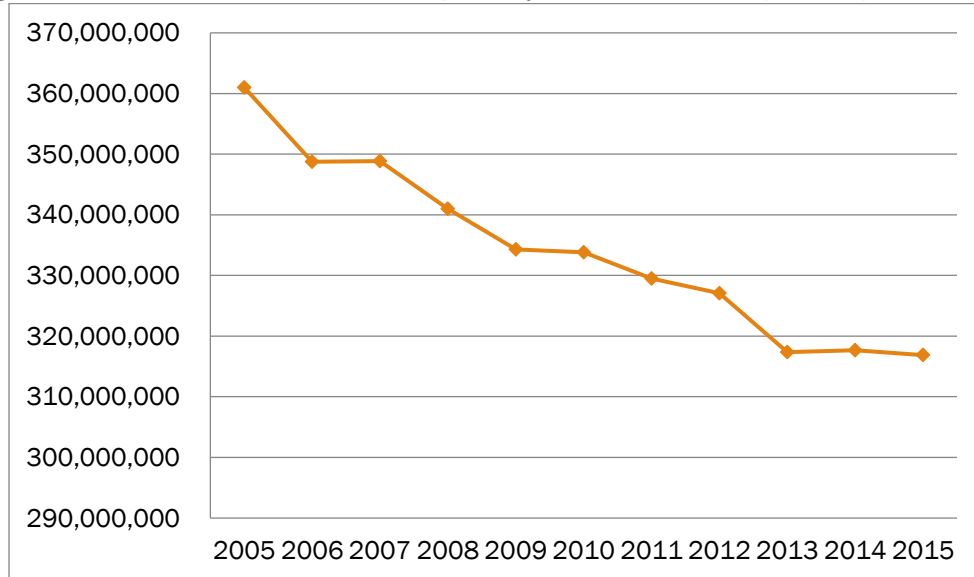
Source: VTrans Budget & Fiscal Management Section

The gasoline tax risks associated with federal funding are also applicable to state funding. Mirroring national trends, Vermont has witnessed a decline in gasoline consumption – an important source of revenue accounting for close to a quarter of state transportation revenues - as residents drive less and shift to more fuel efficient vehicles. Since 2005, gasoline consumption has declined by over 40 million gallons. Gasoline revenue to the Vermont transportation fund declined steadily between 2005 and 2013 as improvements to fuel economy and fewer Vehicles Miles Traveled (VMT) resulted in lower gasoline consumption.

A 2013 change in the Vermont gas tax structure has resulted in gasoline revenues rising slightly. However, revenues have been flat from 2014 to 2015, and will likely not keep pace with inflation

without major increases in consumption. VMT trends do not suggest this will occur through sheer number of miles driven. Throughout the 1990s and early 2000s, VMT in Vermont increased an average of 2% annually, peaking in 2003 at 7.9 billion. Since then, VMT declined by 820 million miles, or 10.2%, posting its largest decline since the 1920s.

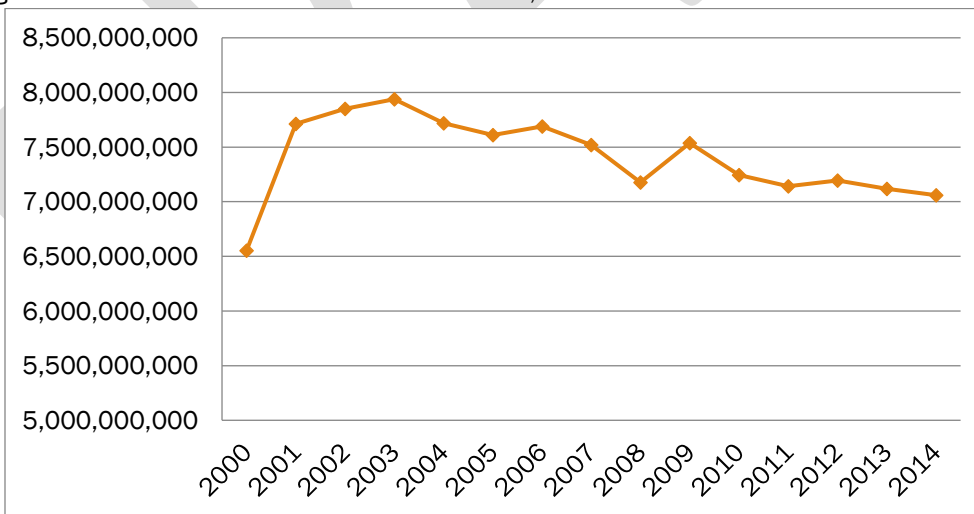
Figure 15 - Vermont Gasoline Consumption by State Fiscal Year (Gallons)



Source: Vermont Joint Fiscal Office – Gasoline & Diesel Revenues Report

<http://www.leg.state.vt.us/jfo/transportation.aspx>

Figure 16 - Vehicle Miles Traveled in Vermont, 2000-2014



Source: VTrans Highway Research Section – Vehicle Miles Traveled, 2003-2014

<http://vtransplanning.vermont.gov/research/highway/publications>

The outlook for transportation funding under the current revenue mechanisms is not particularly positive for the reasons presented above. If trends continue, the gap between system needs and funding generated by the primary revenue sources will widen.

State transportation fund revenues have stabilized somewhat thanks to a 2013 change in the way Vermont assesses fuel taxes, but consumption is still declining, leading to weakened revenue generation.

Federal funding, which comprises over half of the roughly \$616M annual Vermont transportation budget, is probably relatively stable for the next few years thanks to the FAST Act, though federal revenue generation suffers from the same trends of decreasing effectiveness of fuel-consumption based models, including relatively low increases in VMT, and increased vehicle fuel efficiency. Over time, the States may become increasingly responsible for a larger proportion of overall system maintenance and operating funding.

DRAFT

Land Use

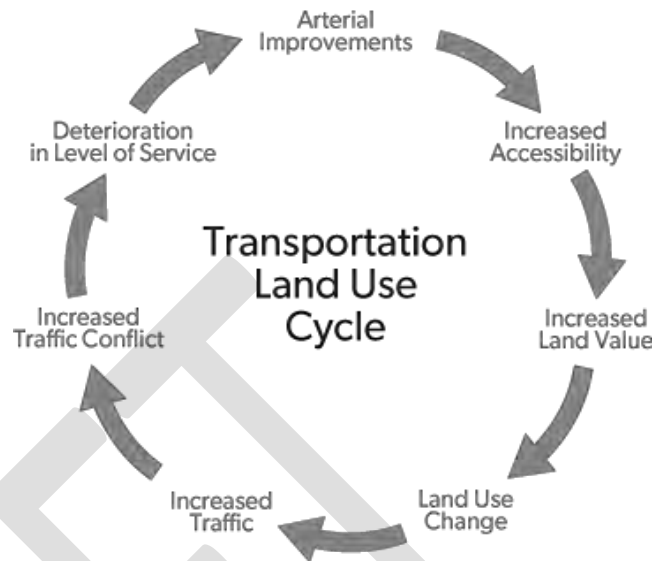
The relationship between transportation and land use is direct, complex, and circular. Investment in transportation systems that prioritize high-speed, long-distance mobility leads to spread out development, dependent on the automobile for access to critical needs. The highly mobile transportation system can drive land use patterns, particularly where people choose to locate their homes and businesses, and employment. This sets a cycle in motion as dispersed land use patterns further increase the demand for transportation.

VTrans recognizes that land use patterns affect transportation choices and transportation options affect land use decisions. By considering land use and access in addition to mobility and safety, VTrans has the opportunity to provide a more effective response to transportation problems and avoid some problems before they arise. VTrans seeks to accomplish this through a corridor planning approach, among other strategies.

Transportation agencies are often in a reactionary position, responding to accessibility needs created by land use decisions outside of their control. The result is typically low-density, dispersed development and higher traffic levels, which lead to increased maintenance and operating costs. A corridor management approach looks beyond the individual asset to the broader corridor context. Good planning and access management practices can mitigate the impacts of development by seeking the proper balance between access and mobility. VTrans employs both of these practices and is currently refining the Corridor Planning process to increase its effectiveness.

In the 1950s, one quarter of Vermont's workforce worked in agriculture, mining, or forestry, and over 10,000 family farms were in operation around the state. The dominant land use patterns of small villages or economic centers, surrounded by rural countryside was in part due to the nature of employment and the state's rudimentary road network. Beginning in the 1960s with the construction of the state's first interstate highway network, Vermont witnessed drastic change to growth and development patterns. Such road network improvements provided easier access to many areas of Vermont.¹⁸

In response to some of the changes resulting from such growth, the Vermont passed historic land use regulations that provide the guidelines to govern growth such as the Vermont State Land Use and Development Bill (Act 250, 1970). This landmark law provides a process for reviewing and managing the environmental, social, and fiscal consequences of major subdivisions and



¹⁸ Vermont Natural Resources Council. *Historic Settlement Patterns*. n.d. <http://vnrc.org/resources/smart-growth-resources/historic-settlement-patterns>. Accessed May 6, 2016.

development. VTrans has a seat at the table when considering the impacts of development through this process, most commonly providing comment on the vehicular traffic impacts of developments.

As identified in the 2016 Comprehensive Energy Plan, Vermont's land use goals call for maintaining historical settlement patterns of compact centers surrounded by rural countryside to provide walkable, transit friendly environments that require less automobile use.

VTrans has a role in influencing efficient land use in a number of ways described in the following section.

VTrans Activities Related to Land Use

Act 250

Vermont's Conservation and Development law, State Land Use and Development Plans (10 VSA 151) (Act 250), passed in 1970, is a state-wide land use planning law that regulates large scale developments using ten criteria related to natural resources, cultural resources, and social effects. Nine District Commissions covering the state review proposed projects and issue permits. The Vermont Land Use Panel, part of the Vermont Natural Resources Board, oversees the activities of the District Commissions and enforces the Act 250 permits through the Act 250 Rules.

The Act 250 Rules set forth the permit process for issuing Act 250 permits. Before granting a permit, the district commission must find that the subdivision or development is consistent with a set of 10 criteria. VTrans is commonly involved in the review of Criteria #5, which reads as follows:

(5) (The project) ...will not cause unreasonable congestion or unsafe conditions with respect to use of the highways, waterways, railways, airports and airways, and other means of transportation existing or proposed.

Additionally, VTrans, the Land Use Panel, and the Vermont State Traffic Committee have a Memorandum of Understanding to coordinate the regulation of certain transportation related projects. The agreement sets forth a policy for the District Commissions to impose Act 250 permit conditions that do not conflict with state highway law, and provides procedures for phased review of VTrans projects.

VTrans Corridor planning process

Corridor Management Plans seek to balance ideas for transportation improvements with anticipated land use and development challenges.

The corridor management planning process is designed to bring together as many interested parties as possible – at a minimum local businesses and governments, transportation service providers, the regional planning agency or agencies, and VTrans –to study transportation needs and land use dynamics in a defined segment of a transportation corridor. The participants identify mutually acceptable transportation and land use strategies for the segment – ideally before problems become critical. Some of these strategies may be pursued immediately; others may need to wait for an appropriate or opportune time. The critical ingredient for success is a shared commitment to take responsibility for seeing that strategies in the plan are implemented. A successful corridor management plan is one that is useful to all participants as a “blueprint” for future actions and decisions.

VTrans developed this approach in collaboration with Vermont's regional planning commissions and the Agency of Commerce and Community Development. In July 2005 the ideas were incorporated into the Vermont Corridor Management Handbook, a technical resource for state, regional and local planners and consultants undertaking these studies.

Vermont State Design Standards

Vermont developed the [Vermont State Standards for Construction, Reconstruction, and Rehabilitation of Roadways and Bridges](#) subsequent to the passage of the landmark 1991 Intermodal Surface Transportation Efficiency Act, and the publication of the 1995 Vermont Statewide Long Range Transportation Plan. The standards were developed with two purposes in mind:

1. To provide clear technical direction to the designers of transportation projects in Vermont.
2. To achieve roadway and bridge designs which provide access, mobility and safety for users, and which are also sensitive to the social and environmental context of Vermont.

As outlined in the Standards, "In Vermont, the public has indicated a strong desire for roadway projects to respond to the natural, scenic, and cultural landscape. To provide optimum consideration of these elements, the natural and human "built environment" features in the vicinity of a specific project should be inventoried and analyzed to guide the roadway design development process. The inventory should include: topographical and physical characteristics; natural resources; recreational uses; potential, existing and future residential uses; historical resources; visual and aesthetic resources; landmarks; and existing and potential land uses."

In this way, VTrans acknowledges land-use and attempts to design and construct project that best fit the existing and planned context of land-use and resources surrounding the transportation facility.

More recently, VTrans revisited the State Design Standards in a cooperative project with the Smart Growth American organization. The resulting report, [Revising the Vermont State Standards: M2D2: Multimodal Development and Delivery](#), identifies specific modifications to the Vermont State Standards, recommends changes to other related VTrans guidelines and policies, and presents an implementation plan and schedule for conducting the revisions. The new revisions will help VTrans keep pace with the state of the practice in highway engineering and better meet and balance the diverse needs of Vermont residents and communities.

Title 18 § 1111 Permit Process

VTrans participates in decisions about land use through the Title 19, § 1111 permit. Prior to performing any work or installing any utility facility within the State highway right-of-way, an "1111" permit is required from the Agency of Transportation. A permit is needed for nearly any activity in or directly affecting the highway right-of-way, including (but not necessarily limited to) creation or modification of a driveway, repaving a portion of a driveway within the right-of-way, placement of structures, placement or grading of earthen material, discharge of water, or nearly anything else that would affect the right-of-way. By administering this permit process, VTrans can affect access management improvements and indirectly influence the use of land adjacent to state highways. This in turn can affect eventual costs borne by the state in terms of eventual highway system improvements.

Act 145 Transportation Impact Fees

Act 145 authorizes the Vermont Secretary of Transportation to create Transportation Improvement Districts (TID) for discrete geographic areas where a transportation impact fee will be assessed to development projects that require either an Act 250 permit or a state highway access permit.¹⁹ The TID boundary and impact fee formula are determined through a transportation infrastructure plan prepared by either VTrans or a Regional Planning Commission in consultation with affected municipalities, landowners and developers. The fee is based on existing projects included in the VTrans Capital Transportation Program, which is approved annually by the Vermont General Assembly. Primarily intended to address localized traffic impacts, Act 145 also benefits further Vermont's goal of compact development surrounded by rural countryside and working lands.

Coordination with Partner State Agencies

VTrans coordinates with partner state agencies and supports various state level initiatives geared at maintaining historic settlement patterns. Through Act 250 and more recently, Growth Center initiatives, traditional neighborhoods, and settlement patterns as articulated by Act 250 Criterion 9L, there has been an evolving and growing emphasis on efficient use of land. These efforts aim to discourage disperse and unfocused development and may strengthen the small urban areas throughout Vermont and increase their proportion of county population over time.²⁰

State Designation Programs

VTrans has partners in state government working to influence and assist in the preservation of traditional village settlement patterns. The Department of Housing and Community Development (DHCD) manages the designation programs for downtowns, village centers, new town centers, growth centers, and neighborhood development areas. According to the DHCD website, "these programs work together to provide incentives, align policies and give communities the technical assistance needed to encourage new development and redevelopment in our compact, designated areas. The program's incentives are for both the public and private sector within the designated area, including tax credits for historic building rehabilitations and code improvements, permitting benefits for new housing, funding for transportation-related public improvements and priority consideration for other state grant programs."²¹

A more detailed review of these five designations is available at the following link:

<http://accd.vermont.gov/sites/accdnew/files/documents/CD/CPR/DHCD-Planning-Manual-Module2.pdf>

¹⁹ <http://www.neite.org/The%20Chronicle/11-2014.pdf>

²⁰ Demographic & Economic Trends & Forecasts Report, RSG, 2016

²¹ <http://accd.vermont.gov/community-development/designation-programs>, accessed May 2, 2017

VTrans System Plans and Policies

The following is an overview of Plans and Policies maintained by VTrans. These plans and the policies included within should reflect the overall direction and priorities of the Agency. Conversely, the content of each plan informs the LRTP planning process by providing a snapshot of existing conditions and future trends likely to occur in each transportation system area, e.g. airport, highway, public transit. In this way the LRTP planning process and system plans continually inform each other.

Vermont Highway System Policy Plan, 2004

The Highway System Policy Plan (HSPP) takes a broad look at current and likely future highway conditions and needs. It provides a high-level, strategic view to guide VTrans in preserving, maintaining and enhancing the highway network. The HSPP responds to a number of key transportation concerns, including:

- Aging Infrastructure
- Limited Resources for Transportation
- Increased Emphasis on Highway Operations and Management
- Recognition of Transportation/Land Use Relationships
- Balancing Quality of Life, Mobility, Environmental, and Economic Development Concerns

Vermont Airport System and Policy Plan, 2007

The Vermont Airport System and Policy Plan includes an inventory of the State's commercial, public and private airports, estimated future passenger demand, and evaluated current performance. The Plan includes a series of goals related primarily to retaining commercial service, expanding passenger service capacity and options, and addressing on-site infrastructure and off-site transportation access needs. An update of the plan is currently underway and scheduled for completion later in 2017.

Public Transit Policy Plan, 2012

The Vermont Public Transit Policy Plan (PTPP) outlines transit policies, goals and strategies to meet current and emerging public transportation challenges, in addition to performance tracking to help guide transit investments. The State's primary public transit goal is to preserve and enhance the level of public transit in Vermont, provided that specific routes and services are well used by the traveling public. A subset of goals for public transit in Vermont is codified in 24 V.S.A. Chapter 126, S.5083 as follows:

"..State policy shall support the maintenance of existing public transit services and creation of new services including, in order of precedence, the following goals:

- Provision for basic mobility for transit-dependent persons
- Access to employment, including creation of demand-response service.
- Congestion mitigation to preserve air quality and sustainability of the highway network.
- Advancement of economic development objectives, including services for workers and visitors that support the travel and tourism industry."

Pedestrian and Bicycle Policy Plan, 2008

The Vermont Pedestrian and Bicycle Policy Plan reports on the status of bicycling and walking in the State of Vermont and provides a vision and direction on how it will proceed into the future. The plan outlines policies, goals, objectives, actions and performance measures as they relate to bicycle and pedestrian facilities and programs. The focus of the plan is to provide direction within VTrans through the following policy:

“At each stage of planning, design, construction, implementation, operations and maintenance activities, VTrans-funded projects and programs shall reasonably include pedestrians and bicyclists. New projects, reconstruction projects and other transportation facility improvements will maintain or where feasible improve existing access and conditions for pedestrians and bicyclists to meet applicable Vermont standards. Education and encouragement programs will incorporate pedestrian and bicycle issues, as appropriate.”

The intent of the overarching policy is to drive goals including the following:

- Cultural Environment - enhance the human scale and livability of Vermont’s communities.
- Economic Vitality - enhance the economic vitality of Vermont by increasing economic development opportunities.
- Health - improve the health of Vermonters and reduce health care costs by making it easier, safer and more convenient for citizens to be more physically active by walking and bicycling on a regular basis.
- Natural Environment - improve air quality, reduce greenhouse gas, and increase energy conservation through increasing the viability of walking and biking as a means of transportation.
- Safety - improve the safety of pedestrian and bicycle travel throughout the entire roadway network

Vermont State Rail Plan, 2016

The Vermont State Rail Plan provides a framework for maintaining and enhancing the state rail system. The State Rail Plan establishes the following priorities:

- Maintain the state’s rail system in a state of good repair
- Expand rail system capacity to accommodate growth objectives
- Expand the use of the rail system
- Provide a rails system that is financially sustainable
- Improve intermodal connectivity
- Improve the rail system to support economic development
- Enhance rail system safety

Specific project priorities include:

- Restoration of passenger rail service to Montreal
- Upgrade all bridges to the 286,000 pounds carload standard
- Extend the Ethan Allen Express from Rutland to Burlington

Strategic Highway Safety Plan, 2017

The [Strategic Highway Safety Plan](#) (SHSP) serves as the framework for reducing fatalities and major crashes on the State's public highways. Through a data-driven process, the SHSP identifies Critical Emphasis Areas (CEAs) and safety needs for the State, and selects for implementation the strategies and countermeasures with the most potential to save lives and prevent injuries. This multi-year comprehensive plan takes a holistic and integrated approach in establishing statewide goals by embracing the use of the four E's of highway safety: Education, Enforcement, Engineering, and Emergency Services. Critical emphasis areas are as following, with specific goals for each included in the full version of the plan:

CEA 1 Improve Infrastructure

1A – Minimize Lane Departure

1B – Improve the Design and Operation of Highway Intersections

CEA 2 Curb Speeding and Aggressive Driving

CEA 3 Increase Use of Occupant Protection

CEA 4 Vulnerable Users & Motorcyclists Safety

4A – Increase Pedestrian Safety

4B – Increase Bicyclist Safety

4C – Increase Motorcyclist Safety

CEA 5 Age Appropriate Solutions

5A – Improve Younger Driver Safety (Under 25)

5B – Improve Older Driver Safety (65 and Over)

CEA 6 Reduce Impaired Driving

CEA 7 Curb Distracted Driving and Keep Drivers Alert

Vermont Freight Plan, 2015

The Vermont Freight Plan describes the existing and projected conditions for movement of freight into, out of, within, and through the state. Truck, rail, and air are the predominant modes of transport. Proportionally, highways carry most of Vermont's freight; approximately 83% by weight and 88% by value. Rail accounts for 16% by weight and 11% by value, and air-cargo accounts for less than 1% by both measures. Each one of these systems plays a vital role in the transport of Vermont freight.

Proportionally, highways carry most of Vermont's freight. Interstate highways I 89 and I 91 span the state and provide high-speed, high-capacity routes for trucks and automobile traffic. They are also the main gateways to Vermont's external markets in New Hampshire, Massachusetts and Quebec.

Vermont's 578-mile rail network, of which 305 miles are State-owned, serves all regions of the State except Lamoille County. With the exception of three miles of track owned and operated by the Canadian National Railway, all railroads in Vermont are classified as regional or local/short line carriers. Much of the rail infrastructure in Vermont is weight restricted and limited to carrying loads that are significantly less than the present national standard rail carload weight of 286,000 pounds.

The Vermont airport network includes 16 airports that are open to public use. Regularly scheduled cargo service is provided at the three National Service Airports: Burlington International, E.F. Knapp (Barre-Montpelier) and Rutland Regional. Intermittent air cargo service is provided at others.

The plan identifies the following physical and operational needs:

- Highway - maintain state of good repair; increase weight limits and geometric improvements to handle modern trucks; impose fewer time-of-day and weather-related operating restrictions; and improve oversize/overweight vehicle permitting.
- Rail - improve service reliability; upgrade the state's network to fully accommodate 286,000 pound railcars; ensure a general state of good repair; and improve access to rail service either directly or through intermodal transfer.
- Water - ensure the continued viability of the Lake Champlain ferry system for freight as well as passenger use.
- Air - preserve and expand air freight capabilities.

Institutional and regulatory needs include:

- Streamline oversize & overweight permitting process; coordinate freight investments with neighboring states; and engage in dialogues with Vermont communities about the importance of freight and the impact of land-use decisions on the viability of existing and new freight-oriented industry.

Finally, a key conclusion of the Freight Plan is that Vermont's freight system is and will remain adequate to the State's needs if the State advances the following three general goals:

- Ensures reliable truck travel times between Vermont and its major regional markets such as Boston, New York City, Albany and Montreal;
- Keeps highway, rail, aviation and water transportation infrastructure in a state of good repair; and
- Maintains viable rail service to ensure competitive truck services and preserves the capacity for future development of mid-length intermodal and trans-load rail services for Vermont.

Vermont Transportation Asset Management Plan (TAMP), 2018

The Transportation Asset Management Plan (TAMP) summarizes how VTrans is delivering the right treatment on the right asset at the right time. It enhances the linkage among the Long Range Transportation Plan, Strategic Plan, and State Transportation Improvement Plan. The 2018 initial TAMP will focus on pavement and bridge assets while noting that work is underway to bring in a range of other transportation assets for a more effective and encompassing approach. It follows new 2017 FHWA regulations and will continue to be refined. FHWA regulations call for submittal of a first initial TAMP by April, 2018; certification by FHWA by July, 2018; and VTrans' first fully compliant TAMP in June, 2019.

The TAMP covers the following subjects:

- Existing performance gaps
- Future performance gaps with a ten-year horizon, addressing both anticipated trends and policy efforts to bend the trends toward goals in the Long Range Plan
- Risk management and how reducing risk improves overall performance of the transportation system
- How VTrans is closing the gaps
- Next steps and potential enhancements

Some of the strategies used in the TAMP to close existing gaps are life cycle cost planning and financial planning techniques such as asset valuation, scenario planning coordinated with the Long Range Plan, and strengthening alignments between data, risk, performance and finances across VTrans' various transportation assets. Improving these alignments will make VTrans more effective in a range of ways including by making it possible to optimize planning of investments.

Vermont Intelligent Transportation Systems (ITS) Architecture, 2017

VTrans is in the process of finalizing an update to the statewide ITS architecture. According to the draft report, the U.S. Department of Transportation defines Intelligent Transportation Systems as “the integration of advanced communication technologies into the transportation technologies and vehicles. Intelligent transportation systems) encompass a broad range of wireless and wire line communications-based information and electronics technologies.”²²

Successful implementation of ITS technology in transportation infrastructure and services results in better services for users and reduces negative externalities to the environment. ITS technologies encompass all transportation modes, from pedestrian activities to freight movement. The goal of implementing ITS technologies is to enhance the mobility and accessibility in a defined region, helping users go where they want to go, when they want to, in an easier manner.

The majority of Vermont's most significant ITS components are part of the highway system. These include variable message signs, Road Weather Information Systems (RWIS), advanced traffic signal technologies, and advanced traffic management systems (ATMS). Advances in ITS technologies are one of the fastest paced, existing areas of transportation currently. Many of the opportunities for the transportation system of the future lie in this area. See the “Technological Change” section of this document for more on the subject of technology and the future of transportation.

²² Definition obtained from the US DOT Intelligent Transportation Systems Joint Program Office.
<http://www.its.dot.gov/faqs.htm>