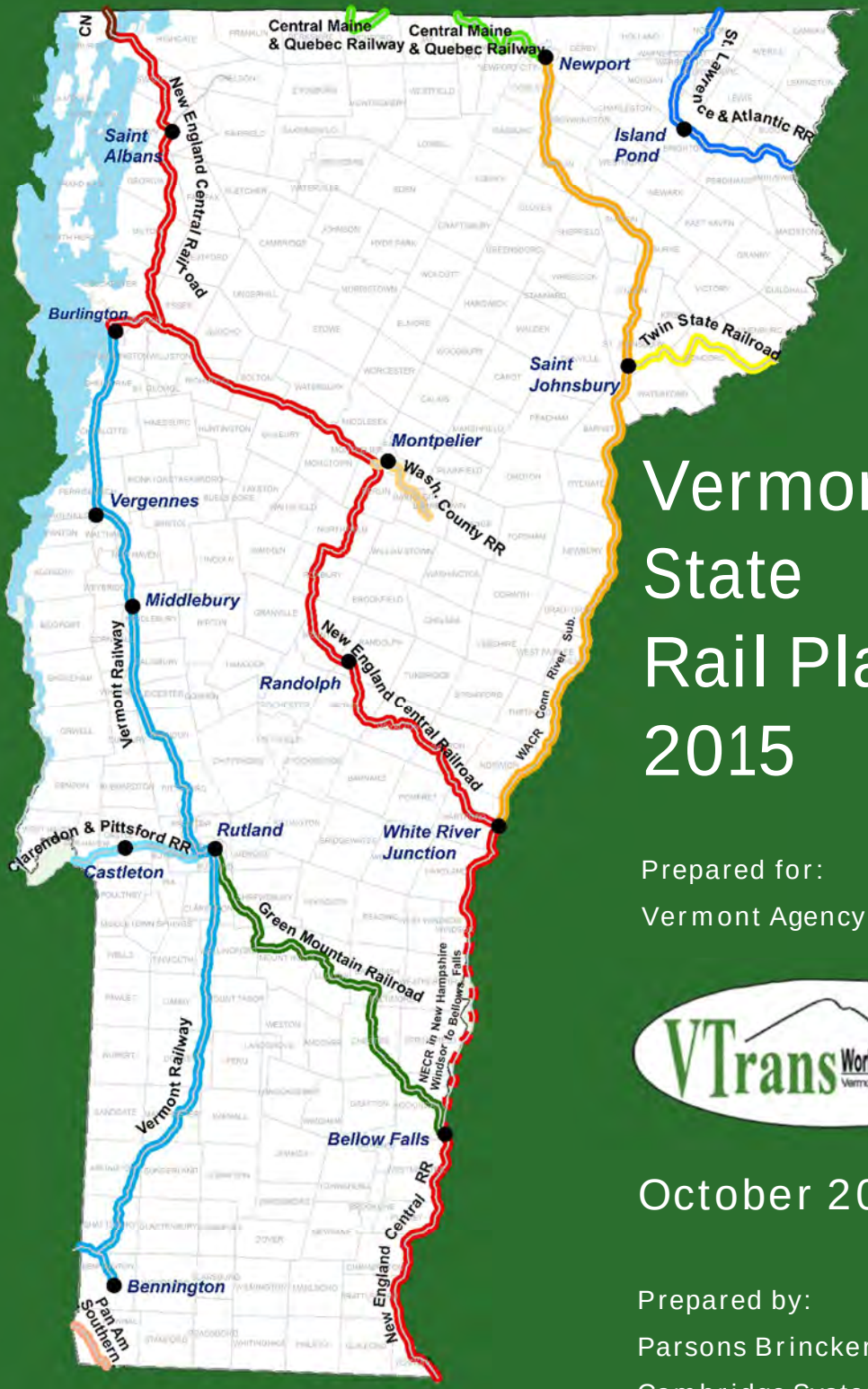


Vermont State Rail Plan 2015

Prepared for:

Vermont Agency of Transportation

VTrans Working to Get You There
Vermont Agency of Transportation

October 2015

Prepared by:

Parsons Brinckerhoff

Cambridge Systematics

Fitzgerald & Halliday, Inc.

Table of Contents

Exhibits

ES.1. Executive Summary

The Vermont State Rail Plan provides a framework for maintaining and enhancing the state rail system. It represents an update to the *State Rail & Policy Plan,* completed in 2006 and has been prepared to conform to the requirements for state rail plans as specified by the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). The format and content of this State Rail Plan adhere to guidance subsequently issued by the FRA in September 2013.

The primary components of the State Rail Plan are:

- Description and inventory of existing rail infrastructure and services in Vermont and their performance;
- Analysis of the usage of the Vermont rail network, both by passengers and freight;
- Assessment of past and future trends that will impact the Vermont rail network;
- Analysis of freight and passenger rail needs for the Vermont rail network;
- Identification of vision, goals, and objectives for the Vermont rail network;
- A proposed capital plan to address the needs of the Vermont rail network.

ES.1.1. Vermont Rail Network

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. Exhibit ES-2 illustrates the regional freight network. The State of Vermont owns 305 miles of the active rail network. The State acquired these lines when their former owners either filed for bankruptcy or announced that they would no longer provide service on these lines, or both. The first rail lines the State purchased were those of the Rutland Railroad after the company filed for bankruptcy and abandonment in 1962. The most recent was the acquisition of trackage now operated by the Washington County Railroad Connecticut River Line in 2003.

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 are the rail network. As such, most freight is handled by multiple railroads between origin and destination.

On approximately 94 percent of the Vermont rail network, freight service is provided by one of two companies, Genesee & Wyoming, Inc. or the Vermont Rail System. Genesee & Wyoming is the nation's largest short line holding company with over 120 (105 in North America) subsidiary railroads, operating over 13,000 miles of track in North America. The company 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.

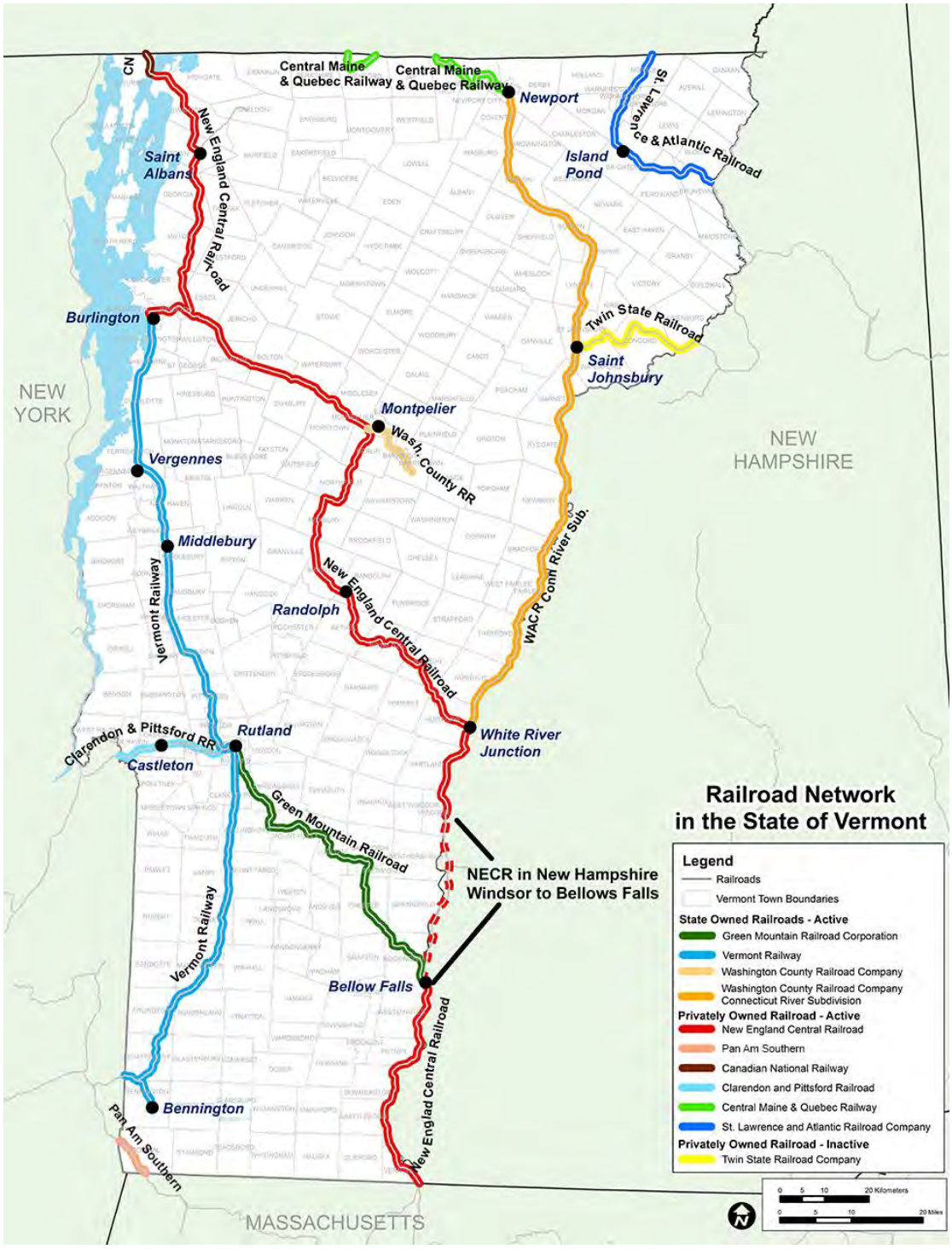
These rail lines are leased to the Vermont Rail System, such that the State is responsible for capital improvements on the lines, as well as maintaining some of the rail bridges, while the operator is responsible for ongoing maintenance and freight operations. In addition to operating state-owned lines, Vermont Rail System also owns and operates the Clarendon & Pittsford Railroad. The Central Maine & Quebec Railway also provides service into northern Vermont, and the Pan Am Railway passes through the southwestern corner of the State. The Central Maine & Quebec Railway was created in 2014 from rail lines formerly owned by the Montreal, Maine & Atlantic Railway, which declared bankruptcy following the Lac Megantic disaster. Exhibit ES-1 provides mileages of rail lines in Vermont, and Exhibit ES-2 provides a map of the Vermont rail network.

Exhibit ES-1: Table of Vermont Active Rail Lines

Rail Line	Ownership	Track Mileage
Pan Am Southern (PAS)	Private	6.3
Canadian National (CN)	Private	3
Clarendon & Pittsford (CLP)	Private	17.9
Connecticut River Division (WACR)	Public – State	102.2
Green Mountain Railroad Corp (GMRC)	Public – State	50
Central Maine & Quebec (CMQ)	Private	24.4
New England Central Railroad (NECR)	Private	190.9
St Lawrence & Atlantic Railroad (SLR)	Private	30.7
Vermont Railway (VTR)	Public – State	139.8
Washington County Railroad (WACR)	Public – State	13.1
	TOTAL ACTIVE MILEAGE	**578.3**
	TOTAL ACTIVE MILEAGE PUBLIC-STATE OWNED	**305.1**

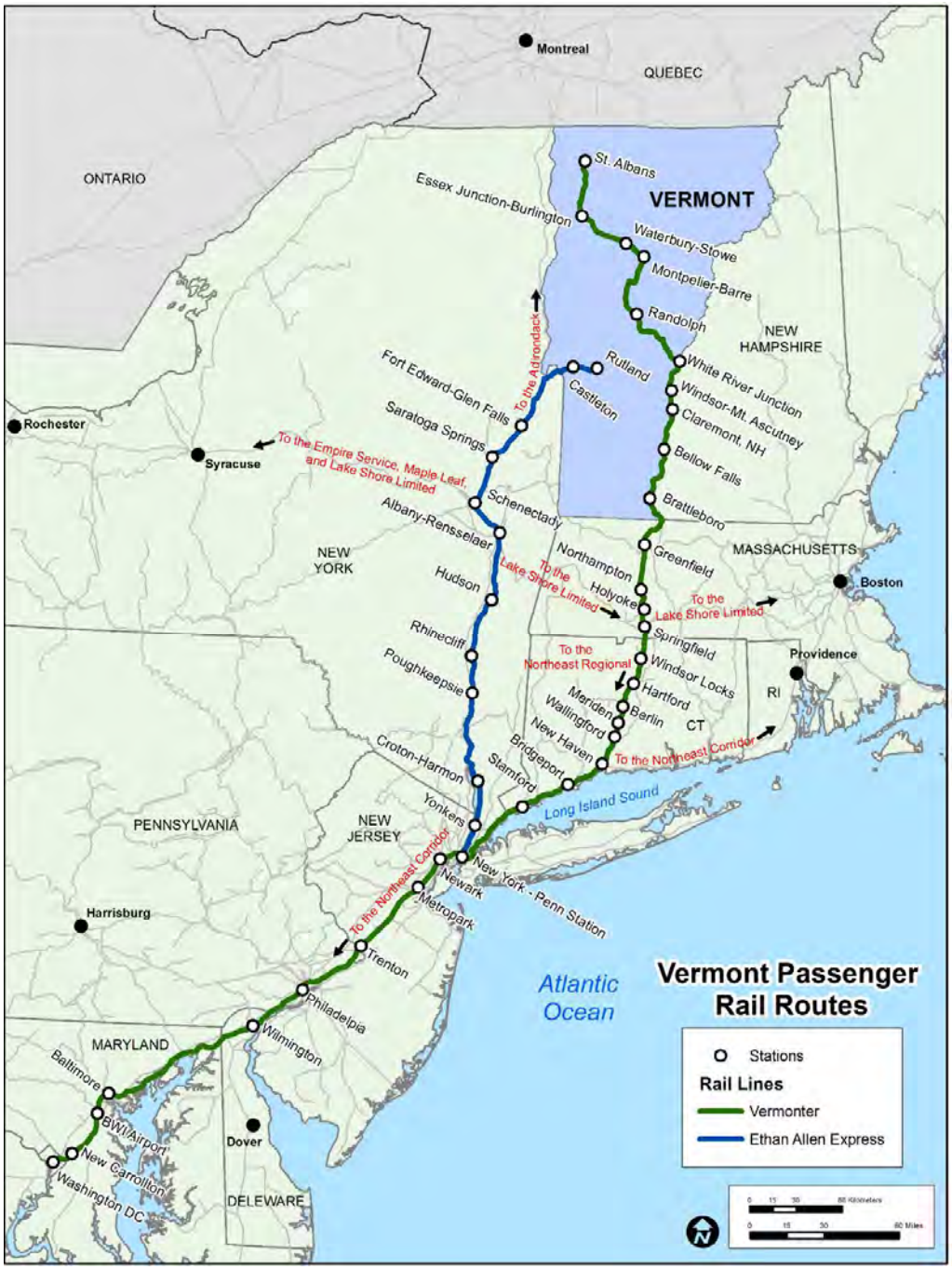
Passenger rail service in Vermont is provided by the National Passenger Railroad Corporation (Amtrak) through the *Vermonter* and *Ethan Allen Express* services. The *Ethan Allen Express* provides daily service between New York City, Albany, Schenectady, Saratoga Springs and Rutland, covering a total route distance of 241 miles. Begun in 1996, the *Ethan Allen Express* operates on a daytime schedule totaling five hours and 30 minutes between endpoints. Fifteen of the train's 241 route miles are in Vermont, and serves Vermont stations in Castleton and Rutland. The *Vermonter* 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, covering a route distance of 467 miles. The *Vermonter* traverses 185 miles of its 611-mile route in Vermont, while serving nine passenger stations in the state. Between 2010 and 2012, substantial improvements were made to the *Vermonter* route in Vermont and New Hampshire. Financed by $50 million in federal High Speed Intercity Passenger Rail (HSIPR) funds and another $20 million by the host railroad NECR, most rail was replaced, and other upgrades were completed that eliminated slow orders and restored speeds up to 59 mph between St. Albans and White River Junction, and 79 mph south of White River Junction and Vernon. Prior to the upgrades, slow orders imposed 38 minutes of delay to the *Vermonter*'s travel time between Brattleboro and St. Albans.

Exhibit ES-2: Vermont Railroad Network



Both the *Ethan Allen Express* and *Vermonter* services are subsidized through cooperative agreements between Vermont and other states. The *Vermonter* 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. Exhibit ES-3 displays the passenger routes that serve Vermont.

Exhibit ES-3: Vermont Passenger Rail Lines



ES.1.2. Usage of the Vermont Rail Network

As in other states, Vermont's freight rail network is primarily used to haul low value, bulky commodities long distances. Some highlights of commodity flows in 2011 for Vermont include:

- Total tons carried were about 6.6 million;
- Most freight, 69 percent, travels through Vermont between other states; 26 percent travels to or from Vermont and other states; while 5 percent travels intrastate;

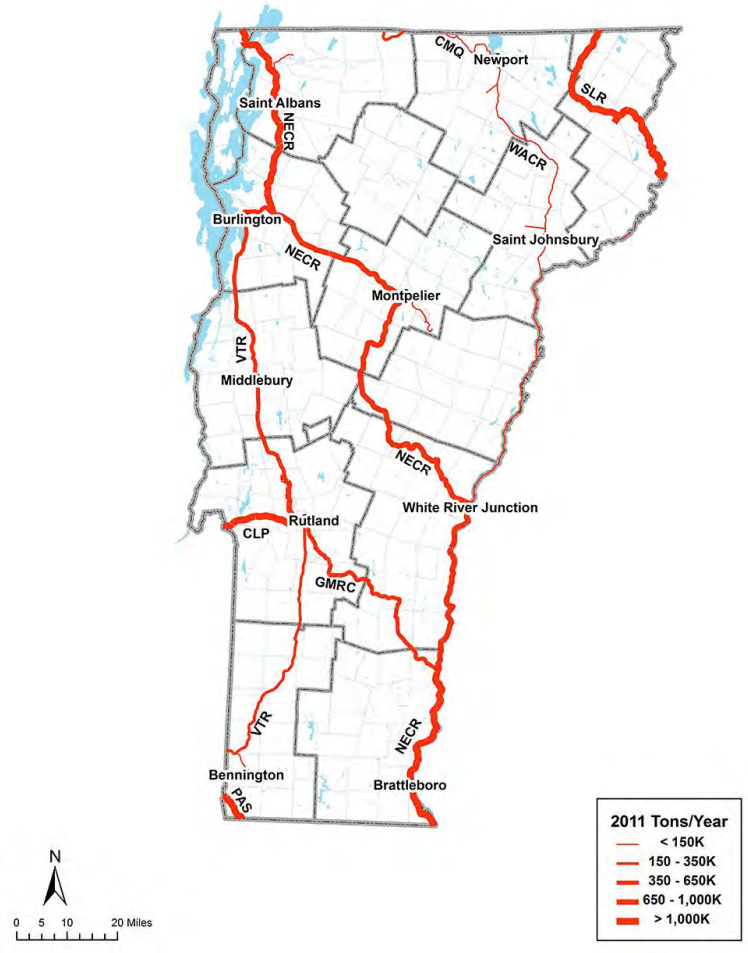
- The Vermont freight network carries a variety of commodities, with Pulp, Paper, and Allied Products; Clay, Concrete, Glass or Stone; Lumber or Wood Products; Chemicals and Allied Products accounting for about 57 percent of the total.
- Volumes shipped on the Vermont rail network have fallen dramatically in recent years, by about 40 percent between 2000 and 2011. Forecasts suggest that freight volumes should climb back slowly over the next 20 years, although Vermont freight volumes are dependent on relatively few shippers, so freight volumes could potentially rebound much sooner.
- New York State, Maine, Canada, and states in the Southeast are Vermont's largest trading partners by tonnage of rail freight.

As shown in Exhibit ES-4, the rail lines of the New England Central Railroad (NECR) and the St. Lawrence & Atlantic Railroads (SLR) are the most heavily used in the State. The Washington County Railroad (WACR) has the lowest freight density of the active freight lines.

Highlights of passenger rail usage in Vermont include:

- In Federal Fiscal Year (FFY) 2013 (ends September 30), 102,952 passengers got onto or off of trains at stations in Vermont, of which the *Vermonter* accounted for 81,926, and the *Ethan Allen Express* accounted for 21,026;
- Passenger rail ridership has increased considerably in recent years, growing by 60 percent from FFY 2004 to FFY 2013;
- Essex Junction is Vermont's busiest train station, followed by White River Junction, Rutland, and Brattleboro. Each station saw over 15,000 passengers getting on and off of trains in FFY 2013;
- New York City is by far the largest origin/destination for riders getting on or off of *Ethan Allen Express* trains in Vermont, accounting for around three quarters of the ridership in FFY 2013. New York is also the largest origin/destination for riders on the *Vermonter*, but other important origins/destinations include stations in Connecticut, Intrastate travel within Vermont, Massachusetts, and major metropolitan areas on the Northeast Corridor like Philadelphia or Washington, DC.

Exhibit ES-4: Freight Density of Vermont Rail Lines



ES.1.3. Vision, Goals, and Objectives

Vermont has adopted the following goals and objectives related to rail transportation:

- Maintain the State's Rail System in a State of Good Repair
  - Maintain all bridges to the 263,000 lbs carload standard
  - Maintain track to appropriate FRA track class
  - Remove slow orders – with priority along passenger rail routes
  - Upgrade rail to continuously welded rail along passenger routes
  - Rehabilitate passenger rail stations
- Expand the Rail System's Capacity to Accommodate Growth Objectives
  - Upgrade all bridges to the 286,000 lbs carload standard
  - Upgrade to 115 lbs rail
  - Eliminate vertical clearance obstacles
  - Install platforms at new passenger stations
- Expand the Rail System's Use
  - Increase the use of rail by shippers and receivers currently using rail.
  - Attract new rail shippers and receivers to locate along rail lines
  - Preserve inactive rail corridors
  - Implement new intercity passenger rail service along western corridor (Burlington, Vergennes, Middlebury, Rutland, Manchester, Bennington) and extend *Vermonter* to Montreal
  - Exceed FRA Intercity Passenger Rail Performance and Service Quality indicators.
  - Increase existing and planned passenger routes to a minimum of FRA Class 4 Track in order to allow operating speeds to 79MPH
- Provide a Rail System that is Financially Sustainable
  - Examine other passenger rail service providers in order to reduce operating subsidies
  - Pursue federal grant opportunities to rehabilitate the rail network.
- Improve Intermodal Connectivity
  - Integrate rail stations with local and intercity bus transportation
- Improve the Rail System to Support Economic Development
  - Coordinate rail and economic development efforts
  - Provide incentives for new and existing businesses to use rail.
  - Support the development of transload facilities.
- Enhance Safety of the Rail System
  - Reduce rail-highway grade crossing collisions
  - Participate in disaster planning with local, state, federal authorities

ES.1.4. Passenger Rail Issues, Needs and Initiatives

ES.1.4.1. Performance and Cost of Current Service

Improvements to the *Vermonter* both in Vermont and other portions of the route have boosted the speed and reliability of the service. Beyond the enhancements within Vermont, the rerouting of the *Vermonter* in Massachusetts is expected to reduce transit times by 25 minutes. The New Haven – Hartford – Springfield project will decrease transit times and increase reliability for the Vermonter route in Connecticut. But performance issues remain. As a requirement of PRIIA, FRA and Amtrak developed a series of performance measures and standards

by which to assess Amtrak services, in terms of financial performance, on-time performance, train delays, and customer satisfaction. The *Ethan Allen Express* and *Vermonter* meet some service standards but not others, with some customer service and on-time performance metrics lagging below the standard. The costs of subsidies have also increased. PRIIA significantly increases the share of costs that states must pay for state-supported Amtrak services. Vermont's subsidies increased by 19 percent between FFY 2013 and FFY 2014 when the new PRIIA cost allocations took effect. FFY 2015 subsidies are expected to be higher, increasing faster than inflation. Vermont will need to work with Amtrak and state partners to investigate solutions to improve service and control costs.

ES.1.4.2. Proposed New Services

Because passenger rail travel is more energy-efficient than highway travel, the *2011 Vermont Comprehensive Energy Plan* established a goal of quadrupling intercity passenger rail ridership by 2030 to 400,000 on and offs at Vermont stations per year. Even with optimistic forecasts for passenger growth, Vermont will not be able to meet this goal with existing services. Therefore, if Vermont is to meet this goal, additional passenger rail services must be introduced. Services included in the Plan are described below.

Extend the Ethan Allen Express to Burlington – The Ethan Allen would be extended from its current terminus in Rutland to serve an additional station in Middlebury and Union Station in downtown Burlington. The rail line between Rutland and Burlington would be improved so passenger trains could reach a maximum of 59 miles per hour. The project would enhance mobility in western Vermont, providing a more direct connection to New York City and points on the Northeast Corridor. Burlington is Vermont's largest metropolitan area and would be served by two Amtrak services, the *Ethan Allen Express* and the current *Vermonter* service at Essex Junction. Necessary upgrades include the upgrading of track, additional passing sidings, improved crossings, new wye tracks, and a new station platform at Middlebury. VTrans has begun improvements on this corridor with an $18.5 million project to improve the line between Rutland and Leicester, and estimates that completing the project would require another $26.4 million. VTrans also projects that the extension would add $1 million to annual *Ethan Allen Express* subsidies.

Extend the Vermonter to Montreal – Before the *Vermonter* service acquired its current name in 1995, it was the *Montrealer*, which was an overnight train to Montreal. This project would restore *Vermonter* service to Montreal but as a day train service. Doing so would enable Vermont's economy to be more closely tied with the large nearby metropolitan area of Montreal. Ridership on the *Vermonter* would significantly increase. In March 2015 the United States Department of Homeland Security and The Government of Canada signed a preclearance agreement which will make new train service agreements easier by setting up an agreed upon process for border crossing, customs, and other cross-border activities.[1] Given that over $90 million has been spent in recent years on the *Vermonter* corridor in Vermont and that the service would share the existing passenger rail corridor with the *Adirondack* through most of the route in Canada, VTrans does not anticipate significant capital costs associated with the extension. However, VTrans estimates that the *Vermonter* subsidy would increase by $2 million, associated primarily with the cost of cross-border operations, and additional expenses incurred in Canada. As a later initiative, Vermont would add a second *Vermonter* frequency, although this would require negotiations, not only with Canadian authorities and Amtrak, but also with other New England states.

Extend Ethan Allen Express from Burlington to Essex Junction – If the *Ethan Allen Express* were to be extended to Burlington, it would be logical that the service be further extended to Essex Junction. This would allow direct connectivity between the *Ethan Allen Express* and the *Vermonter*. It may also have operational benefits for handling *Ethan Allen Express* trains in the Burlington area. The full cost of this passenger rail service is uncertain,

[1] *http://www.dhs.gov/news/2015/03/16/united-states-and-canada-sign-preclearance-agreement*

but an estimate put forward by the New England Central Railroad of bringing the Burlington – Essex Junction rail line to a state of good repair is around $4 million.

Add New Service between Albany, NY and Burlington, VT – A new train would provide daily service between Albany and Burlington via Mechanicville, NY, North Bennington, Manchester, Rutland, and Middlebury. The service would improve mobility and boost the regional economy in southwestern Vermont. Currently, residents have limited public transportation options. The project would better connect southwestern Vermont with Albany, with further rail connections to New York City and points beyond. The project would boost the attractiveness of the region to tourists and visitors. Infrastructure improvements necessary to enable the service in Vermont are estimated to cost about $88 million, including a signal system, track improvements, crossing improvements, bridge improvements, and the cost of new stations. Operating subsidies for the service is estimated at approximately $4 million per year.

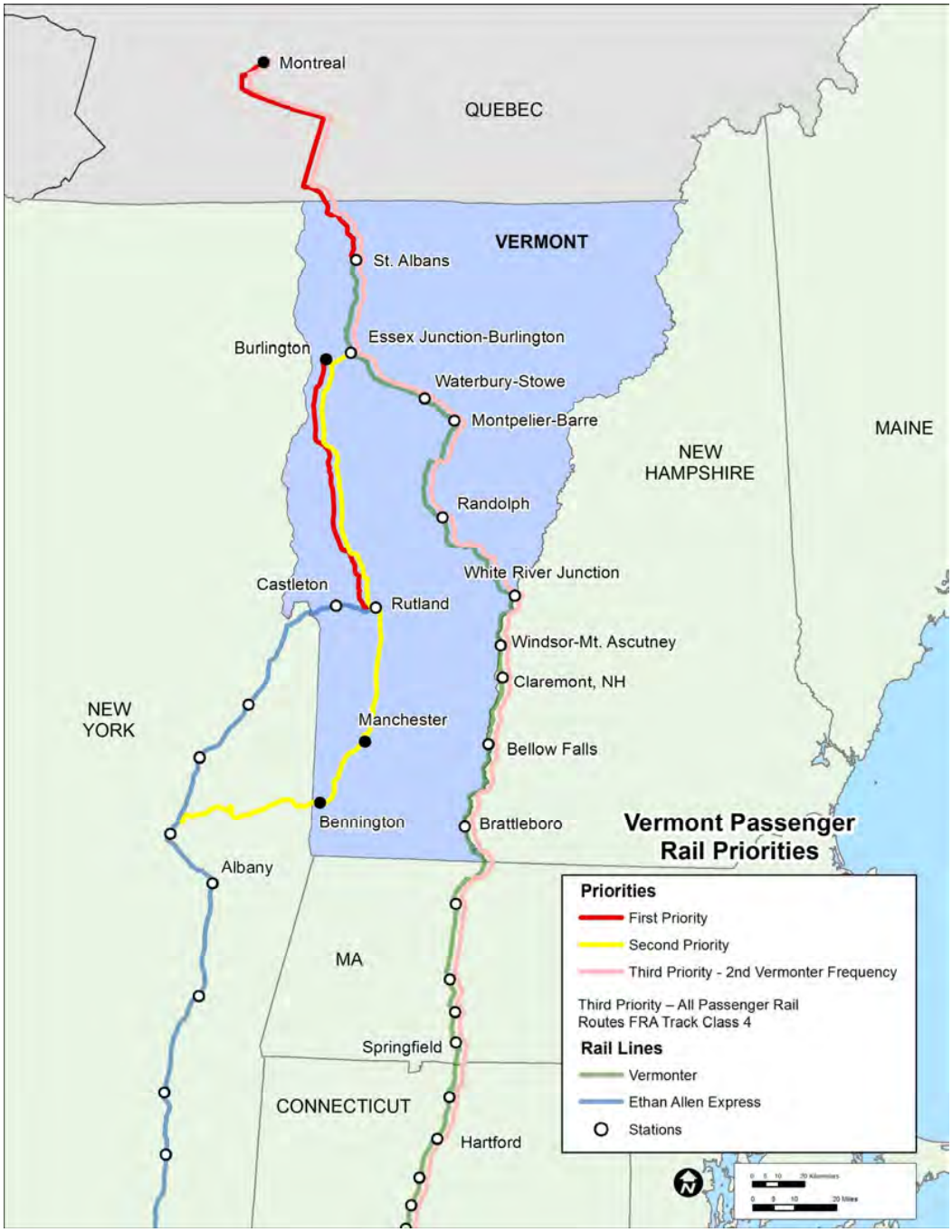
ES.1.4.3. Long-Term Goal: FRA Track Class 4 on All Passenger Rail Routes

The FRA has established minimum track safety standards and maintenance levels for railroad operators, which dictate the minimum track conditions that are allowable for train operations at given operating speeds. VTrans has established the long-term goal of upgrading all rail lines used by passenger trains to FRA Track Class 4 standards, by which the maximum allowable speed for passenger trains is 79 miles per hour. This would enable passenger trains transit times to be competitive with automobile travel, including time for station stops and passenger travel to and from station. A barrier to achieving these train speeds would be the curves on Vermont rail lines, which would limit train speeds on existing right-of-ways, regardless of the condition and maintenance of these lines. Of existing and contemplated passenger rail routes in Vermont, the *Vermonter* route has the most curves and hence the most difficult to upgrade to operations up to 79 miles per hour, while the line between Rutland and Burlington is the straightest and most feasible for upgrading to speeds up to 79 miles per hour. Among the necessary improvements for rail lines to be upgraded to FRA Track Class 4 operations include highway-rail crossing upgrades and Centralized Traffic Control (CTC) dispatching. By CTC, train movements and authority to occupy segments of track are governed by signal indications. From a console, a dispatcher remotely controls signals and powered switches. Upgrading crossings on passenger rail routes and upgrading these routes to CTC dispatching, plus some double tracking to expand capacity on the *Vermonter* route is estimated to collectively cost $255.9 million.

ES.1.4.4. Vermont Passenger Rail Priorities

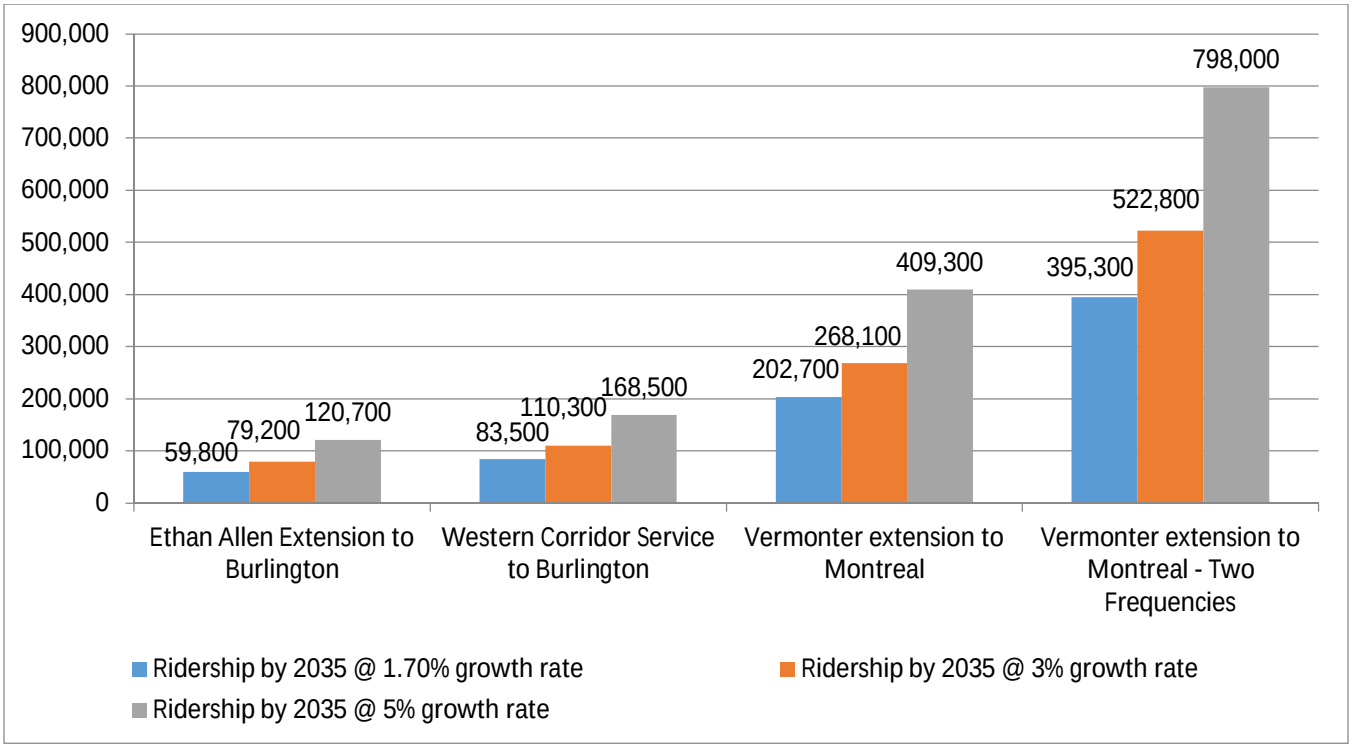
VTrans has established extending the *Ethan Allen Express* to Burlington and the *Vermonter* to Montreal as first priorities. Second priority is to establish the service between Albany and Burlington through North Bennington and Manchester, and further extending the *Ethan Allen Express* from Burlington to Essex Junction. Third priority is to upgrade all passenger routes to FRA Track Class 4 and to add another frequency to the *Vermonter* service. Exhibit ES-5 maps VTrans priorities.

Exhibit ES-5: VTrans Passenger Rail Priorities



Completing the program of improvements in this State Rail Plan is predicted to allow Vermont to achieve the goals set out by the *2011 Vermont Comprehensive Energy Plan.* As shown in Exhibit ES-6, these new services are expected to boost ridership above 400,000.

Exhibit ES-6: Summary of Ridership Impacts of Proposed New Services - 2035



ES.1.5. Freight Rail Issues, Needs and Initiatives

ES.1.5.1. State of Good Repair/Capacity of Rail Lines

Not all of Vermont's track and structures are in a good state of repair, and not all have the capacity to accommodate railcars of industry standard weight.

When the condition of rail lines and bridges falls below the rail lines' FRA Track Class standard, permanent slow orders result. These are posted on bulletins that are distributed to train crews. Trains must travel slower than the speed rating of that rail line. Slow orders restrict train speeds on state-owned rail lines for a number of reasons, but there is a need to improve the conditions of these rail lines to remove these slow orders.

All rail lines in Vermont, except for the New England Central Railroad mainline and the Clarendon & Pittsford Railroad, are only able to accommodate 263,000 pound railcars instead of industry-standard 286,000 pound railcars. This inability places Vermont rail operators at a disadvantage. The cost of shipping in 286,000 pound railcars is estimated to be about six percent less than the cost of shipping in 263,000 pound railcars.[2] Shippers sometimes prefer not to locate on rail lines that cannot accommodate 286,000 pound railcars, and Class I railroads sometimes prefer not to interchange with carriers that cannot accommodate heavier railcars. Vermont Rail System reports that the company is often forced to turn away traffic because railcars that would otherwise be shipped on the company's railroads have been loaded heavier than can be accommodated on state-owned rail

[2] *M.B. Hargrove, Thomas S. Guins, and Carl D. Martland, "Economics of Increased Axle Loads: FAST/HAL Phase II Results," Report No. LA-007, Association of American Railroads, October 1996.*

lines. The problem will only become worse as the industry continues to shift to heavier railcars, thus diluting Vermont's goal of increasing freight rail traffic.

As of early 2015, Vermont is load rating bridges on state-owned rail lines per an FRA requirement. Of the 214 state-owned rail bridges, 125 have been load rated, 40 have not been load rated, and 49 are the responsibility of Vermont Rail System to provide a load rating. Of those that have been load rated, 21 have been found to be deficient and are not load rated to the minimum 263,000 pound interchange standard. Seventy-six are able to accommodate 286,000 pound railcars, while 28 can accommodate the 263,000 pound minimum but not 286,000 pound railcars. Bridges unable to accommodate 286,000 pound railcars can be found on each of Vermont's state-owned rail lines. VTrans estimates that just maintaining and upgrading the superstructures of state-owned bridges will cost about $164 million over the next 20 years. Repair and maintenance on substructures will add another $40 million. Exhibit ES-7 lists estimated bridge costs by rail line.

Exhibit ES-7: VTrans Estimates for Maintaining and Upgrading State-Owned Bridges to 286,000 Pounds

Line	Long Term Cost Estimate
Cost of Bringing Bridge Superstructures to 286K	
VTR Northern Subdivision	$18,473,725
VTR Bennington & Rutland Subdivision	$28,958,565
VTR Hoosick	$5,618,000
GMRC	$46,211,420
WACR Connecticut River Live	$60,112,270
WACR Montpelier & Barre Subdivision	$4,310,000
Total	**$163,683,980**
Repairs to Substructures	**$40,000,000**
Total Superstructures and Substructures (approximate)	**$203,683,980**

In some cases, the condition and characteristics of trackage on Vermont rail lines also limits their ability to accommodate 286,000 pound railcars. Track that has crossties in poor condition, or rail weighs less than 100 pounds per yard that, or tracks are old, of poor quality steel, cannot accommodate heavy railcars. Ideally, rail weight should be 115 pounds per yard or higher to accommodate 286K pound railcars. Some segments of Vermont rail lines have rail weighing 90 pounds per yard, while others have poor quality rail nearly 100 years old or have poor crosstie conditions. Vermont has established a goal of upgrading all rail lines in the State to at least 115 pound rail. Exhibit ES-8 includes estimated costs of upgrading rail lines in Vermont. In most cases, this would involve installing new rail, replacing ties, surfacing, and improving crossings and turnouts.

Exhibit ES-8: Estimated Costs of Track Improvements

Line	Long-Term Cost Estimate
VTR Northern	$12,000,000
VTR B&R	$16,500,000
VTR Hoosick	$4,800,000
GMRC	$18,500,000
WACR CRL	$22,500,000
WACR M&B	$6,500,000
NECR Winooski	$4,000,000
SLR Track and Bridge	$3,300,000
CMQ Ties and Bridge	$1,300,000
Total	**$89,400,000**

ES.1.5.2. Rail Yards, Interchanges, Industrial Access

Beyond bridge and track improvements, railroads in Vermont have put forward a number of projects that are intended to improve operations, add capacity, and enable railroads to better access existing and prospective customers. Projects include:

- Improvements to structures, such as buildings at rail yards or railcar loading facilities;
- Lengthening or adding yard tracks;
- Rehabilitation of yard tracks;
- Construct a spur to access an industrial area;
- Add a new siding to access a customer;
- Rehabilitate existing siding.

Projects are listed in Exhibit ES-9.

Exhibit ES-9: Yard, Interchange, and Industrial Access Projects

Project	Cost
CMQ Newport Yard Projects	$184,000
NECR White River Jct, St. Albans Yard Projects	$4,339,000
NECR/GMRC Interchange Improvements	$4,003,000
NECR St. Albans Roundhouse	$300,000
GMRC Yard Projects	$800,000
VTR Yard Projects	$800,000
WACR Conn River Yard Projects	$700,000
Access to Franklin Industrial Park, former Goodyear Power Plant in Windsor	$260,000
GMRC Sidings	$478,000
WACR Montpelier Branch Sidings	$1,584,000
VTR Sidings and Structures	$1,675,000
WACR Connecticut River Line Sidings	$1,927,000
GMRC Passing Sidings	$1,155,000
VTR Passing Sidings	$2,002,000
WACR Conn River Passing Sidings	$3,344,000

ES.1.5.3. Vertical Clearances

Where possible rail intermodal service is provided with double stack railcars, on which shipping containers are placed one on top of the other. This is more efficient than single stack, since railroads can fit more containers on each railcar and on each train. Hi cube domestic containers are about a foot taller than low cube international containers. Adequate clearance to accommodate two hi cube containers on top of each other is considered unrestricted double stack. While most rail lines in Vermont could accommodate railcars with low cube or mixed containers stacked on each other (Vermont Railways being the exception), few have the clearance to accommodate railcars with two hi cube containers stacked one on top of the other. The New England Central Railroad recently handled an intermodal service between Montreal and Worcester, MA, but the line does not have clearance for unrestricted double stack. The estimated cost of clearing this line to unrestricted double stack is $5.7 million. Because the entire route between Montreal and Worcester, MA, would need to be cleared, removing obstructions within Vermont would need to be part of a larger, $25.8 million initiative to clear the New England Central Railroad and Providence & Worcester Railroad in Vermont, Massachusetts, and Connecticut. VTrans has identified clearing the Clarendon & Pittsford Railroad and Green Mountain Railroad to unrestricted double stack as a second priority, estimated to cost around $10.3 million.

ES.1.6. Safety Issues and Needs

Rail is a relatively safe mode of transportation. Despite high-profile accidents, it is generally much safer to be a passenger on a train than a motorist on the highways. Per ton-mile hauled, freight trains are less likely to be involved in accidents than trucks.

But railroad transportation still has its risks, and if left unabated these risks will increase with increased passenger and freight traffic. One area over which public agencies can have the most control over rail-related risk is highway-rail grade crossings. Between 2004 and 2013 there were 33 accidents at public highway-rail grade crossings in Vermont, of which 10 involved passenger trains and 23 involved freight trains. Two fatalities resulted and 13 injuries from these accidents, while the remainder of accidents were property damage only. Three hundred and eighty-one public highway-rail grade crossings are located in Vermont, of which about 58 percent have train-activated warning devices, while most of the remainder are equipped with only signs or crossbucks to warn motorists.

Vermont like other states receives annual funding to improve safety at crossings from the U.S Federal Highway Administration (FHWA). This funding program requires states to develop a methodology to prioritize crossings for improvement, based in part on an accident prediction model or a hazard index. Vermont's version is the Rail-Highway Crossing Sufficiency Rating. Vermont also has established a long-term goal of installing gates at all existing and planned passenger rail routes.

ES.1.7. Rail Service and Investment Program

Through the course of preparing the Vermont State Rail Plan, $380.3 million in passenger rail needs and $305.3 million in freight rail needs have been identified. Given the prioritization of projects, their phasing would be as shown in Exhibit ES-10.

Exhibit ES-10: Phasing of Vermont Rail Initiatives

2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Ethan Allen Express to Burlington $26.4M																			
				Ethan Allen Express Burlington to Essex Jct $0*															
Vermonter Extension to Montreal $0																			
		Rail Station Upgrades (Statewide) $10M																	
										Enhanced 79 mph *Vermonter* Upgrades $177.3M									
				New Albany-Bennington-Manchester Route $88M															
										Enhanced 79 mph Western Corridor Upgrades $78.6M									
Bridge Upgrades on VTR and GMRC $123.5M																			
										Bridge Upgrades on WACR $80.2M									
Non Passenger Track Upgrades on GMRC, NECR Winooski, SLR, CMQ $27.1M																			
										Non Passenger Track Upgrades on WACR $29M									
Yard Improvements, Economic Dev. Passing Sidings, $19.5M																			
		Burlington Railyard Enterprise $10M																	
NECR Unrestricted Double Stack Clearance $5.7M																			
					GMRC/CLP Double Stack $10.3M														

*Included with freight rail rack upgrades

According to VTrans, the annual available State funding available to cover capital needs is approximately $4 million. Over a 20 year period, this would total $80 million. While appropriations for rail activities by the Vermont legislature are much higher than $4 million per year, most VTrans funding for rail covers operating expenses, such as Amtrak service subsidies and is not available for capital expenditures. Because there is no consistent, dedicated federal funding source for rail transportation in the United States, and most funding for Vermont's capital needs would need to come from federal sources, it is difficult to predict the money that would be available to fund the capital needs identified in this Plan. Since 2002, Vermont has been able to secure on average slightly over $15 million in federal funding per year. If Vermont were to receive this level of funding, plus state funding, total funding available over the 20 year period would be about $380 million. Given that $685.6 million in needs have been identified in this Rail Plan, this would result in a $305.6 million shortfall in needs compared to funding. One possible option for addressing this situation would be to delay the upgrades to Track Class 4 on passenger rail lines to occur after the 20 year period of this State Rail Plan. These improvements account for $255.9 million or 37 percent of the identified needs. Removing the upgrades to FRA Track Class 4 reduces the shortfall to $49.7 million.

Beyond delaying the upgrade of passenger rail lines to FRA Track Class 4 standards, the application of asset management techniques may also help to close the funding gap. By this approach, VTrans would significantly refine its understanding of the condition and likely future costs of state-owned assets. VTrans would work closely

with stakeholders, particularly Vermont Rail System, to understand the required service level for users of the state-owned rail network. VTrans could look for areas where investments provide a level of service that is "good enough" to meet the needs of rail asset users rather than necessarily ideal. As an example, in order to accommodate 286,000 pound railcars, railroad track infrastructure generally must have rail of at least 100 pounds per yard, two-thirds of ties in good condition, and ballast in good condition.[3] While trackage meeting these minimum conditions may not be ideal, it could suffice for railroads to operate 286,000 pound railcars. The same may be the case for railroad bridge upgrades, where the scope of improvements may range from upgraded replacement to good enough to meet users' needs. Transparency is also a key component of good asset management practices, so that stakeholders understand the data and logic used in VTrans decision-making.

[3] *An Estimation of the Investment in Track and Structures Needed to Handle 129,844 kg (286,000 lb.) Rail Cars on Short Line Railroads,* by ZETA-TECH Associates, Inc. for the FRA and American Short Line and Regional Railroad Association.

Chapter 1: The Role of Rail in Statewide Transportation

Vermont's rail system is a vital component of the state's multi-modal transportation system. This State Rail Plan (SRP) provides a framework for maintaining and enhancing the state rail system. It represents an update to the *State Rail & Policy Plan,* completed in 2006 and has been prepared to conform to the requirements for State Rail Plans as specified by the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). The format and content of this State Rail Plan adhere to guidance subsequently issued by the FRA in September 2013.

The United States Congress passed PRIIA for the purpose of improving passenger rail service throughout the U.S. PRIIA requires states to have a Federal Railroad Administration (FRA) approved state rail plan as a condition for qualifying for future federal passenger rail funding. The Vermont SRP has been developed to comply with the requirements of PRIIA, including 12 essential content areas:

- Inventory of existing rail transportation network, rail services and facilities within the state and an analysis of the role of rail transportation within the state's surface transportation system.
- Review of all rail lines within the state, including proposed high-speed rail corridors and significant rail line segments not currently in service in the state.
- A statement of the state's passenger rail service objectives including minimum service levels, for rail transportation routes in the state.
- General analysis of rail's transportation, economic and environmental impacts in the state. This includes congestion mitigation, trade and economic development, air quality, land use, energy use, and community impacts.
- A long-range investment program for current and future freight and passenger rail infrastructure in the state.
- Discussion of public financing issues for rail projects and services in the state, listing current and prospective public capital and operating funding resources, public subsidies, state taxation, and other financial policies relating to rail infrastructure development.
- Identification of rail infrastructure issues within the state that reflects consultation with all relevant stakeholders.
- Review of major freight and passenger intermodal rail connections and facilities and prioritized options to maximize service integration and efficiency between rail and other modes of transportation within the state.
- Review of publicly funded projects that improve rail-related safety and security, including all major projects funded under Section 130 Title 23.
- Performance evaluation of passenger rail services operating in the state, including possible improvements to those services, and a description of strategies to achieve those improvements.
- Compilation of studies and reports on high-speed rail corridor development within the state not included in a previous state rail plan and a plan for funding any recommended development of such corridors in the state.
- Statement that the SRP complies with Title 49 United States Code Section 22102 requirements.

1.1 Multimodal Transportation System Goals

The SRP is being prepared within the context of Vermont's multimodal transportation system goals. These include:

- Provide a safe and resilient transportation system that supports the Vermont economy

- Preserve, maintain and operate the transportation system in a cost effective and environmentally responsible manner
- Provide Vermonters energy efficient travel options
- Cultivate and continually pursue innovation, excellence and quality customer service

Vermont has adopted the following goals related to rail transportation:

- Maintain the State's Rail System in a State of Good Repair
  - Maintain all bridges to the 263,000 lbs carload standard
  - Maintain track to appropriate FRA track class
  - Remove slow orders – with priority along passenger rail routes
  - Upgrade rail to continuously welded rail along passenger routes
  - Rehabilitate passenger rail stations
- Expand the Rail System's Capacity to Accommodate Growth Objectives
  - Upgrade all bridges to the 286,000 lbs carload standard
  - Upgrade to 115 lbs/yard rail
  - Eliminate vertical clearance obstacles
  - Install platforms at new passenger stations
- Expand the Rail System's Use
  - Increase the use of rail by shippers and receivers currently using rail
  - Attract new rail shippers and receivers to locate along rail lines
  - Preserve inactive rail corridors
  - Implement new intercity passenger rail service along western corridor (Burlington, Vergennes, Middlebury, Rutland, Manchester, Bennington) and extend *Vermonter* to Montreal
  - Exceed FRA Intercity Passenger Rail Performance and Service Quality indicators
  - Increase existing and planned passenger routes to a minimum of FRA Class 4 Track in order to allow operating speeds to 79MPH
- Provide a Rail System that is Financially Sustainable
  - Examine other passenger rail service providers in order to reduce operating subsidies
  - Pursue federal grant opportunities to rehabilitate the rail network
- Improve Intermodal Connectivity
  - Integrate rail stations with local and intercity bus transportation
- Improve the Rail System to Support Economic Development
  - Coordinate rail and economic development efforts
  - Provide incentives for new and existing businesses to use rail
  - Support the development of transload facilities
- Enhance Safety of the Rail System
  - Reduce rail-highway grade crossing collisions
  - Participate in disaster planning with local, state, federal authorities

1.2 Rail Transportation's Role within the State's Transportation System

Vermont's rail system is an important component in the state's transportation system, for moving both people and goods. The rail system of Vermont serves to:

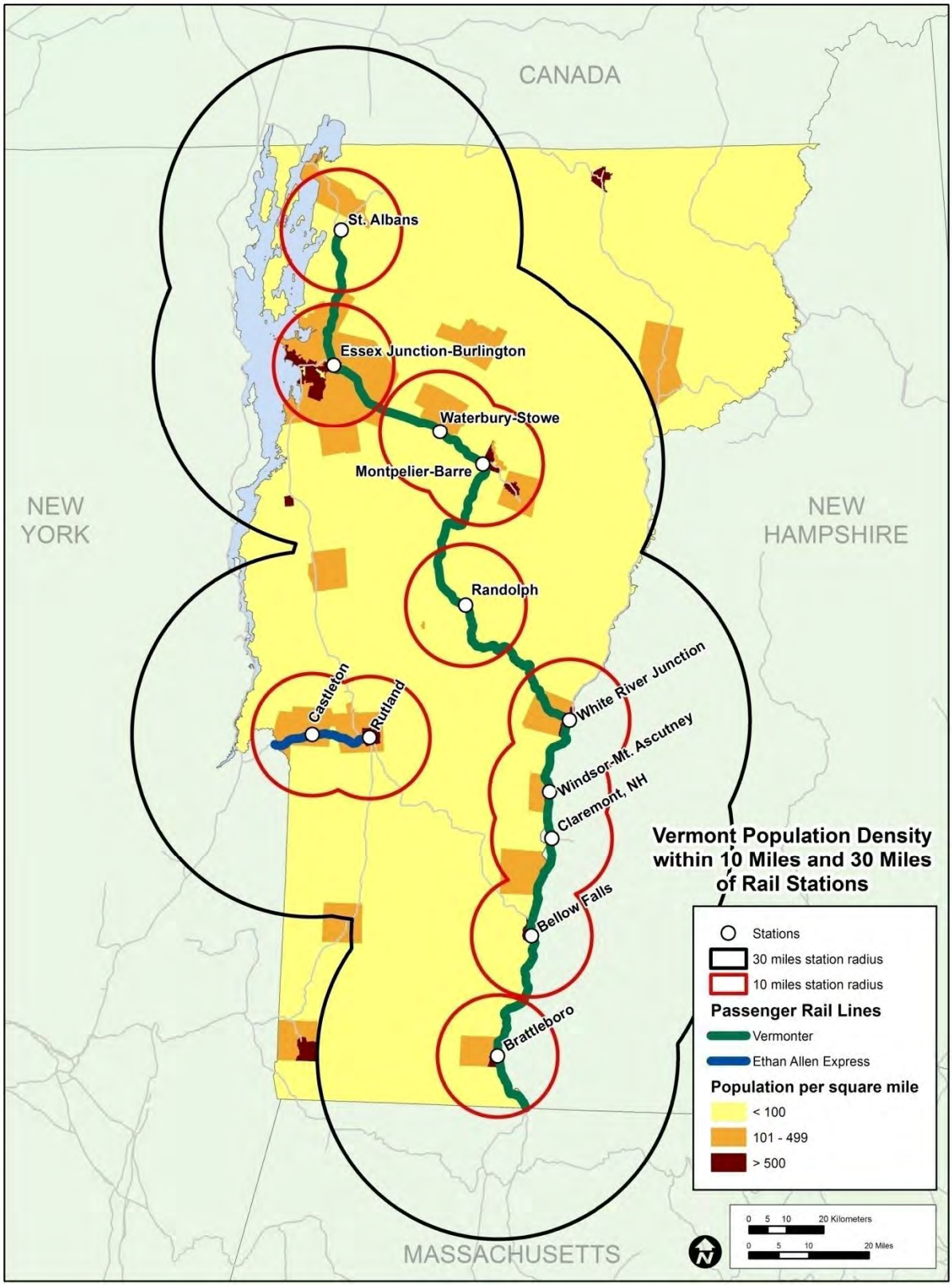
- Foster economic development and benefit local industry;
- Be environmentally friendly; and,
- Integrate with the regional and national transportation system.

While Vermont's rail network is important to the movement of freight, rail has a relatively small modal share when compared to truck freight. On a tonnage basis, rail handles approximately 15 percent of all freight tonnage that touches Vermont, including through traffic, while trucking has a roughly 85 percent market share.[4] For traffic originating and/or terminating in the State, rail's market share is approximately five percent. Market share varies considerably by commodity and distance, with rail having a higher share for traffic moving longer distances. For example, according to the U.S. Federal Highway Administration's (FHWA) Freight Analysis Framework (FAF), 30 percent of shipments (by weight) to or from Vermont over 500 miles in distance are carried by rail. Hence, rail is an important transportation option to those industries that rely on it. Without adequate rail service, the competitiveness of these Vermont industries would be significantly harmed. Furthermore, because rail is used for shipping heavy commodities long distances, rail has an important role in relieving wear and tear on Vermont's highways, and reducing heavy truck vehicle miles traveled. This is particularly the case for through traffic, where the State and its citizens absorb the cost of this wear and tear along with other negative impacts while receiving very little economic benefit.

Rail has a relatively low modal share of passenger travel. According to Amtrak statistics, the Vermonter and the *Ethan Allen Express* carried 102,952 passengers at Vermont stations in 2013. This is compared to approximately 45 million intercity auto person-trips as estimated from the Vermont statewide travel demand model the same year. Intercity passenger rail therefore had a 0.2 percent modal share overall. However, rail provides an important alternative transportation resource for Vermonters. Frequently, rail serves intermediate distance markets that are inconvenient to access by air or by automobile, such as congested metropolitan areas along the Northeast Corridor. Given the number of Amtrak stations and the geographic size of Vermont, most Vermonters do not live far from a train station. Based on data by Census tract from the 2010 U.S. Census, most of the population (90.6 percent) lives within 30 miles from a train station, and more than two-thirds (69.9 percent) can access to a train station within ten miles of their homes (Exhibit 1).

[4] Very rough approximation, indexing 2007 Vermont truck volumes from Vermont Freight Plan to 2011 by U.S. domestic, Canadian trade by truck tonnage from North American Transportation Statistics (http://nats.sct.gob.mx/en/), rail statistics based on Vermont 2007, 2011 STB Waybill Sample as reported by the Association of American Railroads.

Exhibit 1: Vermont Population Density by Census Tract, within ten and 20 Mile Radii of Amtrak Stations

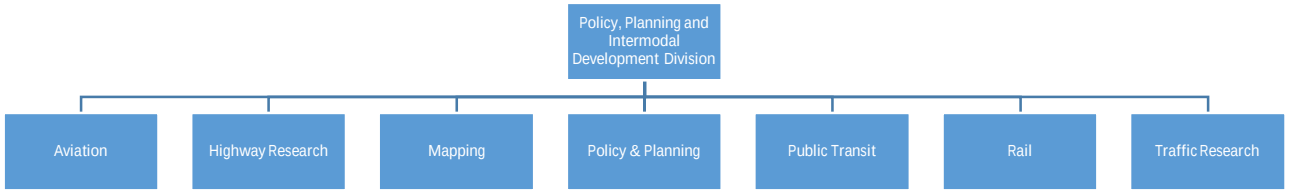


Source: U.S. Census, VTrans, Parsons Brinckerhoff Analysis

1.3 Institutional Governance Structure of State's Rail Programs

Within VTrans' Policy, Planning and Intermodal Development Division, the Rail Program manages state-owned rail assets in Vermont and serves as a steward of the State's rail network. The Rail Program is also responsible for improving highway-rail at-grade crossings, including safety improvements funded under the Railway-Highway Crossing improvements Program, specified by 23 U.S. Code 130. Exhibit 2 displays the organization of the Vermont Agency of Transportation's Policy, Planning and Intermodal Development Division.

Exhibit 2: Organization of Vermont Agency of Transportation Policy, Planning and Intermodal Development Division



The Vermont Rail Council was originally created in 1993 to advise the Governor and the Agency of Transportation on rail issues. Executive Order #13-03 dated August 5, 2003, established the Vermont Rail Advisory Council and designated its membership and duties anew. Membership is drawn from private rail operators, operators on state-owned railroads, freight shippers, environmental and economic development organizations, regional chambers of commerce, regional planning commissions, the House and Senate transportation committees, and travel and recreation organizations. The council meets quarterly.

In addition to VTrans and the Rail Council, a number of state and local agencies have an interest in the performance of the Vermont rail system in carrying out their responsibilities. Vermont's 11 regional planning commissions (RPCs), are tasked with developing regional plans, and coordinating regional activities across member municipalities. Among the planning issues addressed by these organizations is transportation, including rail. The Chittenden County RPC also serves as the Metropolitan Planning Organization (MPO) for Burlington and surrounding areas. MPOs are policy-making organizations that are funded in part by the federal government and are required for urban areas with populations over 50,000. They are required to maintain Long Range Transportation Plans, as well as Transportation Improvement Programs (TIP), which include projects to be funded using federal as well as other sources.

1.4 State's Authority

VTrans was designated the state's rail planning agency by the Vermont legislature in 1973. Subsequent legislation has provided VTrans with the authority to contract with Amtrak and obtain property for the purposes of supporting intercity passenger rail.

Some highlights of legislation passed in recent years include:

- Acquisition of rail lines to support ongoing operation of freight rail service in Vermont along with authorization to enter into agreements with private operators to provide service on these lines.
- Act 18 of 1999-2000, established a policy that rail network improvements should be conducted in a manner that accommodates 315,000 pound railcars.
- Legislation directing VTrans to develop plans for capital upgrades, study the relocation of rail yards in Burlington and Rutland and study upgrading the Bellows Falls tunnel to accommodate double-stack container cars — a project that has been implemented in recent years.

- Various proposals to consider either reactivating the Vermont Transportation Authority or creating a Vermont Rail Authority to manage ownership of the State's rail assets.

PRIIA requires that states designate a "State Rail Transportation Authority" which is responsible for preparing, maintaining, coordinating, and administering the State Rail Plan. PRIIA also requires that states establish a "State Rail Plan Approval Authority" with responsibility for review and approval of the State Rail Plan. In the case of Vermont, VTrans serves both roles.

1.5 Freight and Passenger Rail Services, Initiatives and Plans - Summary

Since the completion of the last rail plan in 2006, Vermont has undertaken a series of transportation planning studies with the goal of better understanding system performance, needs and deficiencies along with opportunities to improve mobility. Brief summaries are provided for the following freight and other modal studies:

- Northern New England Intercity Passenger Rail Study (ongoing)
- New York – Vermont Bi-State Intercity Passenger Rail Study (2014)
- Vermont Freight Plan (2013)
- Vermont Western Corridor Transportation Management Plan (2010)
- Knowledge Corridor – Restore *Vermonter* Springfield to East Northfield, Massachusetts (2010)
- Knowledge Corridor Passenger Rail Feasibility Study (2009)
- Northeast CanAm Connections: Integrating the Economy and Transportation (2009)
- Vermont Long Range Transportation Business Plan (2009)
- Middlebury Rail Spur Final Environmental Impact Statement (2008)
- Boston to Montreal High Speed Rail Planning and Feasibility Study (2013)

1.5.1 Northern New England Intercity Passenger Rail Study (ongoing)

This ongoing study outlines plans to expand higher-speed rail service between cities in Connecticut, Massachusetts, Vermont and Montreal, Canada. The study establishes three main goals: to increase intercity train speeds to optimal levels, to reduce travel time between cities in the corridor and to lessen passenger rail interference with freight. According to the study, high-speed rail expansion is necessary to boost the regional economy, expand travel options and provide a cost-competitive and convenient alternative to car travel.[5]

1.5.2 New York-Vermont Bi-State Intercity Passenger Rail Study (2014)

This 2014 study analyzes alternatives for expanding rail service on existing freight rail lines in east central New York and southwestern Vermont from Albany to Mechanicville, NY; continue to North Bennington, Manchester and Rutland. Rail service expansion is recommended to encourage tourism, improve commercial development and provide more transportation options along the corridor. Based on evaluations of regional mobility, economic development, transportation efficiency and environmental quality, the study recommends the addition of a new train that serve the Mechanicville-North Bennington- Manchester-Rutland route.

1.5.3 Vermont Freight Plan (2013)

An update of the 2001 Freight Study, this study explores current and future freight demands in Vermont, and recommends action strategies to meet freight demands. Demand for freight is projected to rise 40 percent between 2007 and 2035, or 1.35 percent annually. With trucking as the major source of freight in the state, the

[5] *Additional information on the study can be found at http://www.massdot.state.ma.us/northernnewenglandrail/Home.aspx.*

report proposes to ensure trucks transport freight from Vermont to New York City, Boston, Montreal, and other markets in a timely manner. The plan also includes projects to maintain highway infrastructure to handle freight traffic, and sustain competitive and economically viable freight rail service in the State. Performance measures are proposed to evaluate the economic, logistical/operational and infrastructural success of freight systems.

1.5.4 Knowledge Corridor – Restore the Vermonter Springfield to East Northfield, Massachusetts (2010)

This 2010 study investigates the impacts of relocating the *Vermonter* in Massachusetts to operate over a more western route between Springfield-Holyoke-Northampton-Greenfield-East Northfield instead of Springfield-Amherst-East Northfield. The new alignment is anticipated to increase ridership, lower travel time, raise more revenue, enhance system capacity, augment revenue per train and improve passenger rail service along the corridor. Construction would temporarily cause increased vehicular traffic, lower air quality, noise and require utility lines to be relocated, though it is expected to create jobs and boost the regional economy. These improvements are currently underway.

1.5.5 Northeast CanAm Connections: Integrating the Economy and Transportation (2009)

This 2009 study examines transportation options to encourage economic growth in the northern New England States, upstate New York and southeastern Canada. The study recommends short-term policy actions (such as harmonizing trucks and improving economic data coordination between Canada and the U.S.), mid-term planning initiatives (such as embarking on a study to address the feasibility of an east-west highway or rail line connecting the Maritime Provinces to the Quebec and Ontario through the U.S.) and a long-term goal of investing in infrastructural improvement projects (including the east-west highway and/or rail line through the U.S. to and from Canada).

1.5.6 Vermont Western Corridor Transportation Management Plan (2010)

The 2010 plan develops a long-term vision for transportation networks in western Vermont. The plan identifies six key transportation issues: (1) highway congestion and safety concerns, (2) projected growth in trucking, (3) interest in improving public transportation, (4) more interregional transportation connections, (5) rail infrastructure improvements, (6) emphasis on links between transportation, land use, economic vitality and quality of life. To meet future demands, the plan outlines strategies to improve highway, freight, public transportation, economic vitality and quality of life in the corridor.

1.5.7 Knowledge Corridor Passenger Rail Feasibility Study (2009)

This 2009 study explores rail improvements between Springfield and East Northfield, MA that would enhance mobility and lead to greater economic development in the region. The report evaluates three potential improvements:

- Realigned *Vermonter* – shifting the train west to run between Springfield-Holyoke-Northampton-Greenfield-East Northfield instead of Springfield-Amherst-East Northfield.
- Enhanced Intercity Service –addition of three roundtrip trains per day, two to Greenfield, MA and one to White River Junction.
- Commuter Service – Integration of the first two proposals with seven new commuter trains connecting Greenfield, MA directly to the New Haven-Hartford-Springfield line.
- Based on a cost-benefit analysis, the report recommends phasing in rail improvements over time, starting first by realigning the line and then enhancing intercity service. A longer-term goal is to improve commuter rail service.

1.5.8 Vermont Long Range Transportation Business Plan (2009)

The Long Range Transportation Business Plan (LRTBP) set out a comprehensive 25-year plan for the State's multimodal network. The LRTBP identified key challenges facing the State's transportation system: aging infrastructure; changing demographics and economy; land use issues; funding constraints; energy constraints, environmental impacts and climate change; freight movement and trade globalization; and security needs and issues. To address these challenges, the LRTBP established seven policy goals:

- Secure sustainable funding and finance sources;
- Optimize transportation system management and operations;
- Provide a safe and secure transportation system;
- Preserve, manage and operate the state's existing transportation system to provide capacity, safety, flexibility, and reliability in the effective and efficient manner;
- Improve and connect all modes of Vermont's transportation system to provide Vermonters with options;
- Strengthen the economy, protect and enhance the quality of the natural environment, promote energy conservation and improve Vermonter's quality of life; and
- Support and reinforce Vermont's historic settlement pattern of compact village and urban centers separated by rural countryside.

The LRTBP developed and linked funding, planning and management strategies to each of the goals to enable VTrans to manage the State's transportation system in an efficient, innovative and sustainable manner. Many of the strategies address freight, including calls for the state to facilitate safe and efficient movement of freight and passengers, to integrate transportation planning and investments with state and local economic development strategies and plans and to emphasize long-range planning and the development of new strategies and policies.

1.5.9 Middlebury Rail Spur Final Environmental Impact Statement (2008)

This 2008 study examines the potential environmental impacts of building a freight line from Middlebury to the local Omya Quarry. The study finds that building a 3.3-mile rail line would best improve local transportation of material from the quarry to the regional freight rail system. Potential projected negative impacts include minor job losses, small increases in air pollution, more noise and a larger amount of runoff. Positive impacts include a boost to the local economy and reduced truck traffic.

1.5.10 Boston to Montreal High-Speed Rail Planning and Feasibility Study (2003)

This 2003 study explores the conditions requirements for building a high-speed rail line between Boston, MA and Montreal, Canada. The study found that high-speed rail would be well-used and a cost-effective project, as ridership was anticipated to generate enough revenue to justify the costs of upgrading rail infrastructure. However, building and operating this service would entail negotiation and coordination among a wide range of state, provincial, federal and private agencies in both U.S. and Canada to comply with laws, regulation and permitting requirements.

1.6 Accomplishments since the Last Plan

Since the *State Rail & Policy Plan* was released in December 2006, a number of initiatives have improved the effectiveness and condition of the Vermont rail network. Some highlights are below.

1.6.1 Rehabilitation of the New England Central Railroad

One hundred and sixty miles of the New England Central Railroad mainline from the Massachusetts State Line to the Canadian border has been or is in the process of being rehabilitated and upgraded, about 28 percent of the Vermont rail network. Between 2010 and 2012, the section of line from the Vermont/Massachusetts border to St. Albans was upgraded, funded by a $50 million High-Speed Intercity Passenger Rail Program (HISPR) grant and a $20 million match from the New England Central Railroad. More than 141 miles of continuously welded rail were installed, roadbed improvements were made, grade crossings replaced, bridges were improved, and signals were improved. The project has enabled train speeds to increase between St. Albans and White River Junction to up to 59 miles per hour compared to 40 miles per hour before the project. From White River Junction south to Vernon, the track in some places is now rated for train speeds up to 79 miles per hour for passenger trains compared to 55 miles per hour prior to the project. As a result, the *Vermonter*'s travel time in Vermont has been reduced by about 38 minutes. The project also has significant freight implications, since it now allows the New England Central to operate 286,000 pound railcars, an important factor for the competitiveness and costs of the New England Central freight services.

A subsequent project is improving the New England Central line from St. Albans north to the Canadian border. This is funded by an $8 million grant through the TIGER IV Discretionary Grant Program and a $3 million contribution by the railroad. Nineteen miles of new welded rail are being installed, in addition to new ties, ballast, and bridge upgrades. The project will allow the New England Central to increase the weight limit of freight cars from 263,000 pounds to 286,000 pounds. It will permit eventual extension of the *Vermonter* service to Montreal, increasing train speeds from a current 40 miles per hour to a maximum of 59 miles per hour on this segment.

Exhibit 3: Ribbon Cutting of the Vermonter High Speed Rail Project

Source: Kevin Burkholder

1.6.2 Western Corridor Improvements

VTrans continues to advance improvements to the Vermont Railway, which enters Vermont near North Bennington and then roughly parallels Route 7 to Burlington. Improvements to this corridor benefit both freight operations and planned passenger rail service. The State has started work on an $18.5 million project to rehabilitate and upgrade track between Rutland and Leicester. The project is funded in part by a $9 million grant through the TIGER V Discretionary Grant Program, as well as $3 million in State funding. The remainder of the

project is funded by a portion of the $25 million in federal appropriations secured by Senator Jeffords before he retired from the U.S. Senate in 2007. The project will replace jointed rail with continuously welded rail, install new ties and turnouts, replace farm crossings, and surface the line. A major bridge is also being replaced. The upgrades will allow shippers on this segment, including Vermont's largest shipper, Omya, to access the broader North American rail network using 286,000 pound railcars. It also prepares the segment for future passenger rail service, upgrading maximum allowable passenger train speeds from 40 to 59 miles per hour.

1.6.3 Tropical Storm Irene Recovery

In August 2011, Tropical Storm Irene caused extensive damage to the Vermont rail network, with six rail bridges experiencing major structural damage,[6,7] and more than 200 miles of rail in the state-owned rail system were damaged. These damages cost the state an estimated $21.5 million in repairs. The New England Central Railroad also experienced damage with repairs required at 66 locations.[8] As a result, more than half of the state-owned Vermont Railway was shut down for over three weeks.[9] Service on Amtrak's *Vermonter* was suspended for five weeks while track repairs were made.[10] It was only with strenuous efforts by railroad personnel, federal, state and local officials, and contractors that service was restored as quickly as it was. These efforts, including $4.4 million in public funds, not only restored Vermont's rail infrastructure, but in many cases infrastructure was rebuilt to a better standard than it had been previously.

Exhibit 4: Repair of Bridge in White River Junction after Hurricane Irene

Source: Kevin Burkholder

1.6.4 New England Central Railroad Clearance/Bellows Falls Tunnel

The *State Rail & Policy Plan, 2006*, noted that clearance restrictions at Bellows Falls were an impediment to operating double stack intermodal trains on the New England Central Railroad. Double stack intermodal trains have operated through Bellows Falls because of this project that lowered the track approximately two feet in a 275-foot tunnel that runs through downtown Bellows Falls. Work included strengthening and underpinning the

[6] *Vermont Agency of Natural Resources: http://www.anr.state.vt.us/anr/climatechange/irenebythenumbers.html*
[7] *Vermont Railway http://www.vermontrailway.com/news_pages/images/gallery.pdf*
[8] *Vermont Agency of Natural Resources Lessons from Irene: Building resiliency as we rebuild: http://www.anr.state.vt.us/anr/climatechange/Pubs/Irene_Facts.pdf*
[9] *Vermont Railway http://www.vermontrailway.com/news_pages/images/gallery.pdf*
[10] *VTrans http://vtransoperations.vermont.gov/sites/aot_operations/files/documents/connections/AOT-OPS_Tropical_Storm_Irene_Special_Edition2011.pdf*

tunnel, lowering the track, paving and reconstructing a nearby crossing, and relocating a fiber-optic cable. The clearance was completed late 2007 and was funded by $2 million in federal funds and $700,000 in State funds.

Exhibit 5: Excavation of Bellows Falls Tunnel

1.6.5 Accomplishment of Performance Targets Set out by the 2006 Plan

As shown in Exhibit 6 below, many of the targets set out in the *State Rail & Policy Plan, 2006* have been met. Some highlights include the following:

- Vermont targeted a three percent annual increase for passenger rail travel. Instead, ridership increased by 8.5 percent per year;
- One hundred and twenty eight bridges were identified as deficient and not meeting the minimum interchange standard of being able to accommodate 263,000 pound railcars. The target was to increase bridges meeting the minimum standard by three percent per year. Instead, the annual increase was 3.3 percent;
- A target was set to increase safety at three crossings per year. Instead, 6.4 crossings were improved per year.
- A top priority was established to clear constraints that prohibited operations to 19 foot, six inches on the Green Mountain Railroad and the New England Central Railroad. These constraints were cleared.
- A top priority was established to eliminate loading restrictions on the Green Mountain Railroad and the New England Central Railroad. While this target was not met on the Green Mountain Railroad, it was met on the New England Central Railroad.
- A target was set for originating carloads in Vermont to equal at least 10,000, while terminating carloads were targeted to be at least 17,000. While the originating carload target was not met, in 2013, terminating carloads were 23,600, well above the target of 17,000.

Exhibit 6: 2006 Rail Plan Performance Measures, Targets, Current Conditions

Performance Category	Performance Measure	2006 Conditions	Target	Current Conditions
System Effectiveness	Freight rail volumes	9.7 million tons	10 million tons, then 2% annually	6.7 million tons
	Passenger rail trips in VT	57,121 ons and offs at Vermont stations	3% annual increase	9.6% annual increase (100,829 in 2013)
System Condition	Bridge Ratings	Approximately 128 state owned bridges need improvement for 263K cars	Increase annually bridges meeting line requirements by 3%	3.3% annual increase (30 of 128 bridges)
	Number of miles that do not comply with VT Track classification	Current track conditions consistent with track class	Maintain track conditions consistent with track class.	Difficult to quantify
	Average grade crossing ratings	VTrans has priority rating for crossing improvements	Improve 3 or more crossings annually	6.4 annually (45 crossings)
System Initiatives	Number of railcar loading restrictions on priority Routes	1st Priority Routes – 21 restrictions	Eliminate 1st priority restrictions within 5 years	NECR Yes, GMRC No
	Number of clearance constraints in priority Routes	1st Priority Routes - 6 constraints	Eliminate 1st priority constraints within 5 years	NECR Yes, GMRC Yes
	Number of transload facilities that meet operational/business needs	Approximately 12	Support improvements of intermodal and transload facilities	No
	Number of railcars originated & terminated in Vermont	9,420 carloads orig. 16,040 carloads term.	10,000 carloads orig. 17,000 carloads term.	7,500 carloads orig. 23,600 carloads term.

Chapter 2: The State's Rail System

2.1 The State's Existing Rail System: Description and Inventory

2.1.1 Existing Freight, Passenger and Commuter Trains

General Overview of the Rail System

Vermont's rail network encompasses approximately 578 miles of active rail lines, with ownership being split nearly equally between the state and private operators as illustrated in Exhibit 7. All of the lines are used for freight service with two routes also being used for intercity passenger service. Intercity rail passenger service operates on 200 miles in Vermont, serving 12 stations, one of which is located directly over the Vermont border in Claremont, New Hampshire. Vermont's passenger network is illustrated in Exhibit 8 with station amenities and parking facilities detailed in Exhibit 9. Exhibit 10 illustrates the regional freight network. The rail owners and operators are made up almost entirely of short lines and regional railroads.

The intercity passenger rail services are operated by Amtrak, with the State of Vermont contributing to the funding and service planning, in partnership with neighboring states through which the trains operate. The rail corridors are oriented in a north–south alignment, owing primarily to terrain. Connections to larger regional railroads and to the national rail system are available at several locations including Washington, D.C., New York-Penn Station, Albany, NY, Schenectady, NY, New Haven, CT, and Springfield, MA.

No commuter rail service currently operates within Vermont.

Exhibit 7: Vermont Railroad Network

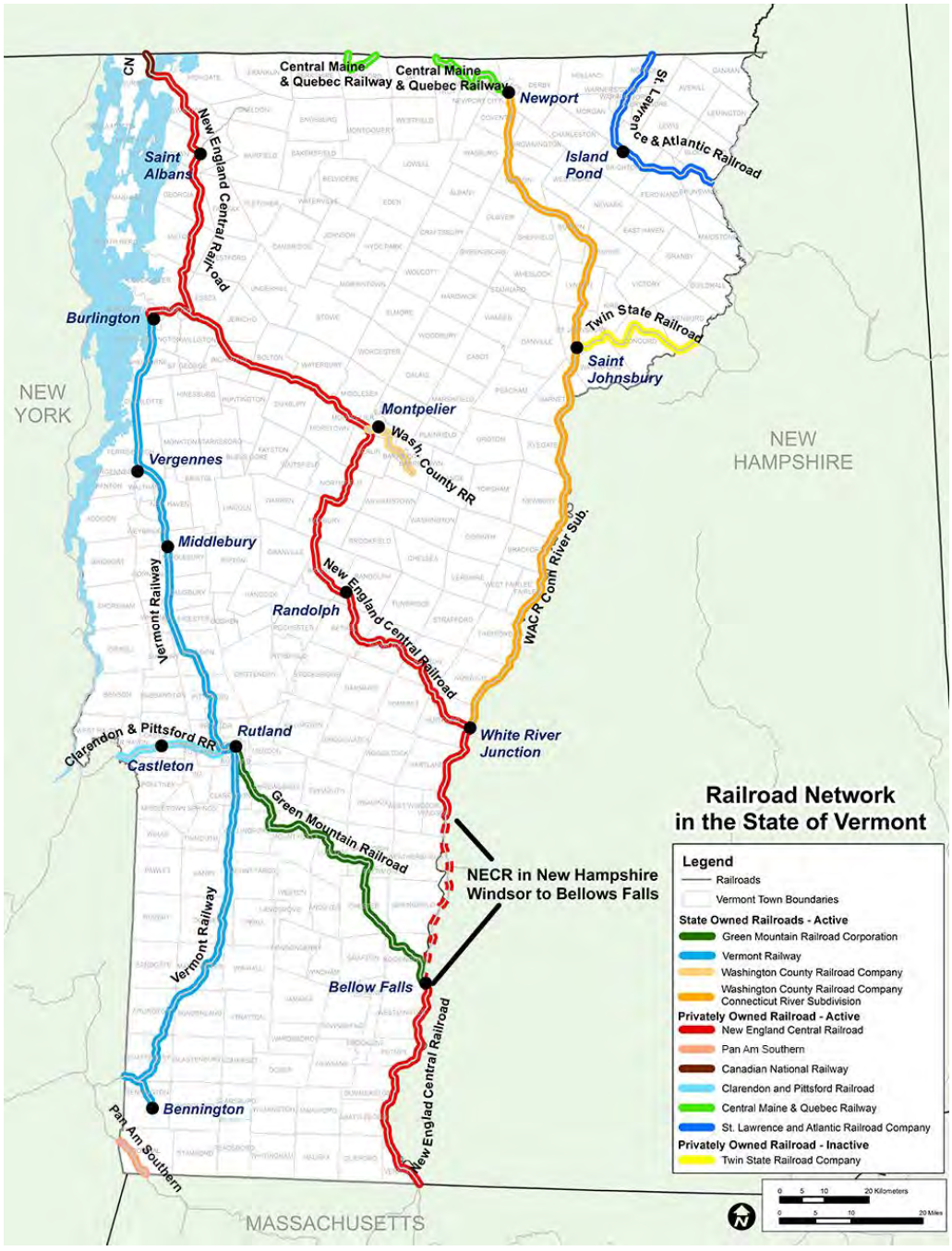


Exhibit 8: Vermont Passenger Rail Lines

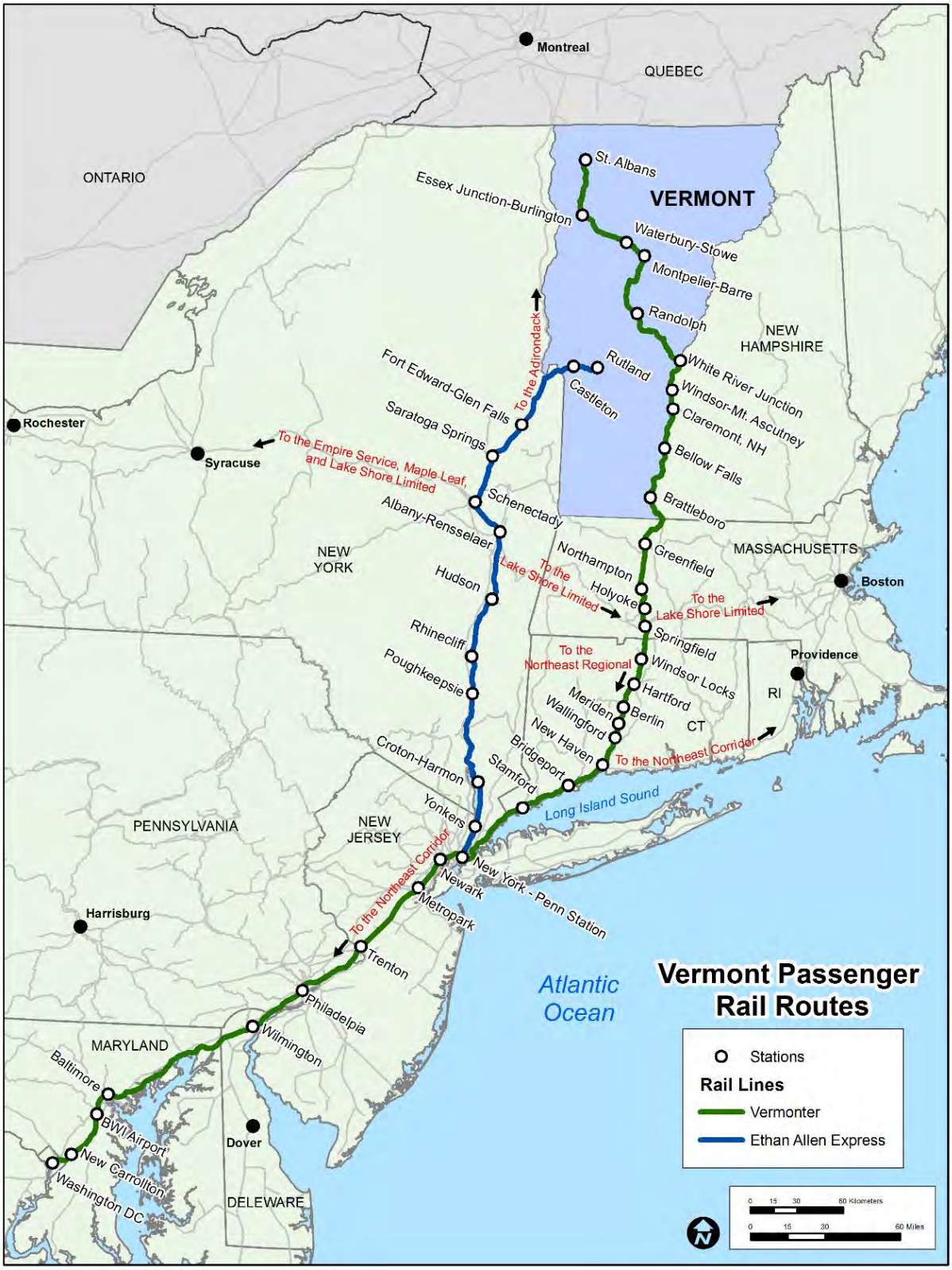


Exhibit 9: Vermont Passenger Stations

Station	Amenities	Parking Facilities
Rutland	Enclosed waiting area Accessible restrooms, water fountains, waiting room, platform	5 Short-term parking spaces 30 Long-term parking spaces ADA spaces available
Castleton	Enclosed waiting area Accessible restrooms, water fountains, waiting room, platform Wheelchair lift	4 Short-term parking spaces 4 Long-term parking spaces ADA spaces available
St. Albans	Enclosed waiting area Restrooms Accessible platform Wheelchair lift	7 Short-term parking spaces 7 Long-term parking spaces No ADA spaces available
Essex Junction-Burlington	Enclosed waiting area Accessible payphones and waiting room Accessible platform Wheelchair lift	5 Short-term parking spaces 3 Long-term parking spaces ADA spaces available
Waterbury-Stowe	Enclosed waiting room Accessible payphones, restrooms, water fountains, waiting room Accessible platform Wheelchair lift	Short-term parking spaces available Long-term parking spaces available ADA spaces available
Montpelier-Barre	Enclosed waiting area Accessible restrooms, payphones, and platform Wheelchair lift	10 Short-term parking spaces Long-term parking spaces available
Randolph	Platform only – accessible Wheelchair lift	Short-term parking spaces available Long-term parking spaces available ADA spaces available
White River Junction	Enclosed waiting room Accessible restrooms, water fountains, waiting room, platform Wheelchair lift	8 Short-term parking spaces 8 Long-term parking spaces ADA spaces available
Windsor, Mt. Ascutney	Platform only Accessible payphones	Short-term parking spaces available Long-term parking spaces available
Claremont, NH	Accessible Platform Wheelchair Lift	10 Short-term parking spaces 5 Long-term parking spaces ADA Spaces Available
Bellow Falls	Enclosed waiting area Lockers Accessible restrooms, water fountains, waiting room, payphones, platform Wheelchair lift and wheelchairs	6 Short-term parking spaces 6 Long-term parking spaces ADA spaces available
Brattleboro	Enclosed waiting area Accessible waiting room, restroom, platform Wheelchair lift and wheelchairs	No parking

Exhibit 10: Regional Freight Network

History of Vermont's Railroads

Vermont is the third largest of the New England states, encompassing 9,616 square miles. The Green Mountain range, an extension of the Appalachian Ridge, divides the state into two watersheds, which also define the state's western and eastern borders - the Lake Champlain / St. Lawrence River watershed on the west and the Connecticut River watershed on the east. These two watersheds have influenced the development of transportation routes

within the state, and the division occasioned by the Green Mountains has made travel between the east and west problematic.

Construction of Vermont's first railroad, the Vermont Central, was completed in 1849 on a 116-mile route, from Windsor along the Connecticut River, and up the White River Valley and the Winooski River Valley to Burlington. Around the same time, construction was completed on the Rutland and Burlington Railroad running from Rutland up the Champlain Valley to Burlington, and from Rutland south to Bennington. An east-west connection was created by construction of a route over the Green Mountains between Rutland and Bellows Falls. Most of Vermont's major rail lines were completed by 1880. By the turn of the 20th century, the state had approximately 1,000 miles of line.

Much of the railroad development in Vermont was fueled by the need to provide transportation within the State and by financiers seeking to develop a land bridge between Atlantic coast ports and the Great Lakes. Many of these visions were not realized, and the resulting shortfalls in revenues hindered further growth and upkeep of many of these lines.

In a process that emulated national trends, the railroad industry in Vermont went through a period of decline in the first part of the 20th century, in part as a response to overbuilding and speculation. In New England, this retrenchment was exacerbated by a decline in the region's manufacturing activity as industries relocated to southern and western regions of the U.S. As part of the national mobilization, the rail industry in Vermont experienced resurgence during World War II. However, in the post war period, the railroad industry's decline resumed, due to the continuing departure of manufacturing activity and increasing reliance on automobiles, trucks, buses and air transportation.

Passenger services were cut, as the Rutland Railroad's Burlington – Rutland – New York corridor saw its last passenger train discontinued in 1953. The State of Vermont lost its last intercity rail passenger services in 1966 when the Boston & Maine Railroad and the Central Vermont Railroad discontinued the daytime *Ambassador*, the overnight *Montrealer* and *Washingtonian* trains operating between Boston, New York, Washington D.C. and Montreal.

The Rutland Railroad's declining fortunes led to bankruptcy and a filing for abandonment in 1962. The State of Vermont then acquired the line and the Vermont Railway became the state's first designated railroad operator in 1964. In 1965, the Green Mountain Railroad Corporation began operating the Rutland-Bellows Falls segment of the former Rutland Railroad. Vermont's rail preservation efforts and subsequent acquisitions have resulted in the state owning approximately half the active rail lines in the state, illustrated in Exhibit 11.

Exhibit 11: Table of Vermont Active Rail Lines

Rail Line	Ownership	Track Mileage
Pan Am Southern (PAS)	Private	6.3
Canadian National (CN)	Private	3
Clarendon & Pittsford (CLP)	Private	17.9
Connecticut River Division (WACR)	Public – State	102.2
Green Mountain Railroad Corp (GMRC)	Public – State	50
Central Maine & Quebec (CMQ)	Private	24.4
New England Central Railroad (NECR)	Private	190.9
St Lawrence & Atlantic Railroad (SLR)	Private	30.7
Vermont Railway (VTR)	Public – State	139.8
Washington County Railroad (WACR)	Public – State	13.1
	TOTAL ACTIVE MILEAGE	**578.3**
	TOTAL ACTIVE MILEAGE PUBLIC-STATE OWNED	**305.1**

During the late 1960s, the railroad industry in the Northeast U.S. arguably reached its lowest point with the financial collapse of the Penn Central Railroad and the continuing fiscal and physical decline of regional railroads throughout the region. The formation of the Consolidated Rail Corporation in 1976, as part of the Railroad Revitalization and Regulatory Reform Act (4R Act), was the federal government's response to the worsening situation, and its resulting rationalization of the railroad network throughout the Northeast slowed and eventually reversed the decline. Vermont benefitted from this stabilization primarily by having connections to railroads in the Northeast and throughout the U.S. preserved and by having improved services from connecting railroads.

One result of Conrail's creation was the reduction of multiple (and hence competitive) possible connections to the national rail system, since for Vermont, nearly all of these connections needed to occur through Conrail at some point. The sale of Conrail to CSX and Norfolk Southern (NS) in June 1999 afforded short line and regional railroads in Vermont and in other New England states the opportunity to pursue alternate connections to the national rail system through both CSX and NS. The issue of having alternative, competitive connections to the North American rail system remains paramount for freight rail planning efforts in Vermont.

The establishment of Conrail did not result in immediate success. Conrail and other major railroads were hampered by extensive government regulations, which impeded railroads' ability to react to market forces and greatly diminished their financial viability. Economic deregulation of the railroad industry by the federal government under the Staggers Act of 1980 allowed railroads to adjust services and rates in response to market conditions. It also facilitated the sale or abandonment of unprofitable routes and trackage. This permitted railroads to regain their footing when competing with other modes. The increased revenues provided railroads with resources needed to finance improvements and expansion of their infrastructure and rolling stock.

The creation of Amtrak in 1971 was intended to remove the burden of money-losing passenger train services from the railroads while preserving a national passenger rail network. Vermont regained passenger rail service in 1972, when the overnight *Montrealer* between Washington D.C. and Montreal via White River Junction was restored.

As regulatory changes set into motion the ability of the large Class I railroads to rationalize their networks by selling off unprofitable routes, the number of new locally focused railroad companies has grown. A great number have taken marginal operations and turned neglected rail lines into self-sustaining prosperous operations, to the benefit of the local communities.

This process has continued to evolve with the acquisition of short lines by larger holding companies. The trend has been for clusters of short lines and regional railroads to realize economies of scale by acquisition and management by holding companies. The purchase of the St. Lawrence & Atlantic Railroad by Genesee & Wyoming and the acquisition of the New England Central Railroad by RailAmerica were illustrative of this trend. More recently, further consolidation has taken place with larger holding companies purchasing the assets of smaller ones. Thus, RailAmerica, including the New England Central Railroad, was absorbed by the Genesee & Wyoming in 2012.

Vermont is among a small group of states in which Class I railroads have a minimal or non-existent presence. Canadian National, a Class I railroad, operates into northeastern Vermont for approximately three miles to an interchanges with the New England Central Railroad. A comparison, provided in the *2006 Vermont State Rail Plan*, shows that in 1964, Canadian Pacific Railway, Canadian National/Central Vermont, Delaware & Hudson Railway and the Boston & Maine Railroad were all identified as Class I railroads serving Vermont. The previously noted regulatory changes and rationalization of the national railroad network have been the major reasons for these changes in ownership and track class.

Vermont's short lines and regional railroads have also been consolidating. In 1997, the Vermont Railway (VTR), the Green Mountain Railroad Corporation (GMRC) and the Clarendon and Pittsford Railroad Company (CLP) came under the corporate umbrella of the Vermont Rail System (VRS). In 1999, the Vermont Rail System took over operations of the Washington County Railroad, which operates a 14-mile state-owned line from Montpelier Junction to Barre. In 2002, the Vermont Rail System added the New York, Portland & Ogdensburg Railway Company Inc. to its family of railroads. Similarly, the NECR has gone through several owners since its spin-off from Canadian National in 1995. First as a subsidiary of the RailTex, then starting in 1999 as part of RailAmerica, and, as noted previously, as part of Genesee & Wyoming, Inc. since 2012.

Inactive or Abandoned Lines

In 1994, the Lamoille Valley Railroad ceased operations. Several years of declining rail traffic culminated in the line being rail banked and converted to interim use as a rail trail.

Until 1999, the Twin State Railroad operated over a route connecting St. Johnsbury with Whitefield, NH that was once part of the former Maine Central's Mountain Division between Portland, ME and St. Johnsbury. Embargoed and out of service, the estate of Clyde Forbes continues to hold operating rights leased from its owner, Pan Am Southern. The legal status of these rights is unclear, and little effort has been made by the parties involved to resolve the issue following Mr. Forbes passing in 2011.

Freight Service

Pan Am Southern (PAS) is a subsidiary of a holding company, Pan Am Railways, previously known as Guilford Rail System. PAS operations in Vermont include seven miles of former Boston & Maine Railroad main line from Mechanicville, NY to Lowell, MA which transverses the southwest corner of Vermont. This line has recently been upgraded in a joint undertaking between PAS and the Norfolk Southern (NS) railway. Termed the "Patriot Corridor," the PAS/NS partnership is aimed at giving NS a competitive position in New England with respect to its Class I rival CSX. PAS also operates trains via trackage rights on the NECR between East Northfield Mass and White River Junction. In addition to these active operations, PAS's presence in Vermont also extends to the dormant St. Johnsbury to Whitefield route mentioned above.

Canadian National (CN) operates three miles of track in Vermont that connects NECR with its through line to Montreal and other Canadian destinations.

Vermont Rail System (VRS) is comprised of five properties, with a mixture of public and private ownership of the underlying infrastructure, but with private operations by VRS. The components of VRS are as follows:

- Clarendon & Pittsford Railroad (CLP) is a privately owned and operated railroad with a total of 25 miles of which 18 miles are located in Vermont. The CLP operates between Rutland and Whitehall NY acting as a bridge line carrier for shipments to and from Vermont connecting with the Canadian Pacific. At Rutland connections are provide with the Green Mountain railroad and the Vermont Railway. CLP also hosts Amtrak's *Ethan Allen Express* service which presently terminates at Rutland but is envisioned to be extended to Burlington in the future. The CLP also provides a gateway to the national rail network for Vermont's largest rail shipper Omya, Inc. located in Florence. The line has recently been upgraded.
- Connecticut River Subdivision of the WACR is a state-owned section from White River Junction to Newport Yard. It is operated by the Washington County Railroad. It connects with the Central Maine and Quebec Railways (formally the Montreal, Maine & Atlantic) in Newport and the PAS in White River, and the New England Central Railroad at White River Junction.

- Green Mountain Railroad (GMR) is state-owned and privately operated that provides freight service between Rutland and Bellows falls over a 50-mile line. Operations began in 1965. Its primary freight connections are with PAS and NECR at Bellows Falls, Vermont Railway at Rutland, and CSX at Palmer, MA through a haulage arrangement with NECR.
- Vermont Railway (VTR) is a state-owned and privately operated line with a partnership with the State of Vermont dating back to 1964. It operates freight and excursion passenger services along its route. The VTR runs from Burlington to North Bennington where a spur serves Bennington while the main line continues to Hoosick Junction, NY with a connection to PAS. VTR also interchanges with NECR at Burlington, with Canadian Pacific at Whitehall (via the CLP), and with GMRC at Rutland. VTR hosts Amtrak's *Ethan Allen Express* service at Rutland and operates seasonal excursion passenger services. The portion of the line between Rutland and Burlington is the focus of intense efforts aimed at upgrading the track and associated infrastructure to accommodate Amtrak service to Burlington and 286,000-pound freight cars.
- Washington County Railroad (WACR) is a state-owned privately operated railroad extending from Montpelier Junction to Barre. It connects with the NECR at Montpelier Junction. In 2000, the State of Vermont purchased the upper portion of the Guilford Rail System (now PAS) Connecticut River Line between White River Junction and Wells River. The state assigned operation of this line to the Washington County Railroad, as noted above in the description of the Connecticut River Subdivision of the WACR. PAS operates over the southern portions of the Connecticut River Line from White River Junction to East Deerfield, MA. Following bankruptcy of the Bangor and Aroostook Railroad, the State of Vermont purchased the former Canadian Pacific 62-mile line segment between Wells River and Newport with WACR designated as the interim operator.

Exhibit 12: Vermont Rail Systems Train in Bennington

Central Maine and Quebec Railway (formally Montreal, Maine & Atlantic) has 745 miles of track, with 24 miles located in Vermont and associated trackage rights. It operates from the Newport Rail Yard through Troy, VT into Quebec and then back into Vermont to serve Richford. The line then continues back into Quebec and points north. The Central Maine and Quebec Railway was established in 2014 following the bankruptcy of the Montreal, Maine & Atlantic.

New England Central Railroad Company (NECR) is a wholly owned subsidiary of Genesee & Wyoming Inc., a publicly traded short line holding company and as such is part of an expanding international family of 60 railroads.

NECR operates 325 miles from the Canadian border at East Alburg to New London, CT. Major interchange locations are with Canadian National at East Alburg, PAS at White River Junction, GMRC at Bellows Falls, CSX at Palmer, MA; and the Providence & Worcester Railroad at Willimantic and New London, CT. A connection is also made with the Vermont Railway at Burlington via the NECR Winooski Branch. NECR hosts the Amtrak *Vermonter* service from its CSX connection at Palmer, MA to its present terminus at St. Albans. The line is nearing completion (2015) of an upgrade which will accommodate 286,000-pound cars for its entire length in Vermont and which will support higher operating speed limits for passenger trail services.

St. Lawrence & Atlantic (SLR) is a wholly owned subsidiary of Genesee & Wyoming Inc., which operates 165 miles of track in Maine and Vermont. SLR operates 31 miles in Vermont from Norton to North Stratford, NH. It is currently the only rail line in Vermont with the height clearances that are capable of handling high cubic capacity double stack freight rail cars over its entire length. SLR interchanges in Norton with its Canadian affiliate St. Lawrence & Atlantic (Quebec, or SLQ) which provides a connection with the Canadian National at Richmond, QC.

Passenger Service

There are two regularly scheduled passenger rail lines operating in Vermont, the *Vermonter* and the *Ethan Allen Express*. Both of these services are operated by Amtrak, with state support. In addition, the state is also served by several privately-operated seasonal tourist trains.

The *Vermonter* 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, covering a route distance of 467 miles. The *Vermonter* offers connections with the Boston-Chicago Lake Shore Limited in Springfield, MA and Northeast Corridor services in New Haven, CT. Major hubs where other off-corridor connections are available are at New York, Philadelphia and Washington. In 1995, the *Vermonter* replaced a previous service that continued on to Montreal. This service, the *Montrealer,* operated on an overnight schedule that was designed to be attractive to those traveling between the large northeastern cities and Montreal, with Vermont communities served in the middle of the night.

The *Vermonter* traverses 185 miles of its 611-mile route in Vermont, while serving nine passenger stations in the state. The route uses New England Central tracks for its entire journey in Vermont. Cleaning of the trainsets is performed during layover at St. Albans, while maintenance and servicing of trainsets is performed at the southern terminal in Washington, DC. The inability to reverse (or "turn") trains at St. Albans results in the *Vermonter* trainsets having a double-end configuration. The locomotive is at one end of the train and another locomotive or a non-powered control car is at the opposite end of the train. This results in trainsets with a nonstandard configuration compared to Northeast Corridor operating practices.

Between 2010 and 2012, substantial improvements were made to the *Vermonter* route in Vermont and New Hampshire. Financed by $50 million in federal High Speed Intercity Passenger Rail (HSIPR) funds and another $20 million by the host railroad NECR, most rail was replaced, and other upgrades were completed that eliminated slow orders and restored speeds up to 59 mph between St. Albans and White River Junction, and 79 mph south of White River Junction and Vernon. Prior to the upgrades, slow orders imposed 38 minutes of delay to the *Vermonter*'s travel time between Brattleboro and St. Albans. While these improvements were underway, occasional track outages required substitution of rail with motor coach service. In addition, track washouts west of White River Junction caused by Tropical Storm Irene resulted in a complete cessation of service between August 29 and October 1, 2011. Further track improvements are underway in Massachusetts and Connecticut as part of the Knowledge Corridor Passenger Rail Project that will reduce travel time on the *Vermonter* by approximately 90 minutes.

The *Ethan Allen Express* provides daily service between New York City, Albany, Schenectady, Saratoga Springs and Rutland, covering a total route distance of 241 miles. Begun in 1996, the *Ethan Allen Express* operates on a daytime schedule totaling five hours and 30 minutes between endpoints. Fifteen of the train's 241 route miles are in Vermont, where it operates over the privately held Clarendon & Pittsford Railroad into Rutland.

Cleaning of the trainsets is performed during layover at Rutland, while maintenance and servicing of the trainsets is performed at the southern terminal in New York.

In 2010, the *Ethan Allen Express* stop in Fair Haven was substituted with a stop in Castleton, Vermont. Located approximately five miles apart, Fair Haven was simply a platform with a small shelter, while Castleton is a station facility with a heated waiting room and restaurant. Tropical Storm Irene caused far less disruption to the *Ethan Allen Express* than the *Vermonter*, with service being suspended for only three days.

Both the *Vermonter* and the *Ethan Allen Express* are operated using standard Amtrak Northeast Corridor intercity rolling stock, consisting of single level Amfleet coaches and P42 or P32AC-DM diesel locomotives. There are currently no plans to replace or upgrade the equipment used on these trains. The Amfleet equipment dates from the mid-1970's, and is thus approaching 40 years in age. Although replacement of this fleet is not imminent, Amtrak's 2012 fleet strategy plan envisions completing procurement of a new Northeast Regional fleet by 2028. [11]

Overall, Vermont-related traffic on both trains has steadily increased over the past decade, from 57,523 in 2004 to 102,926 in 2013. Of these totals, the *Vermonter*, with its broader service territory in Vermont, accounted for approximately 75 percent of the traffic, while the *Ethan Allen Express* handled the remainder. In FY 2013, Vermont-related *Ethan Allen Express* passengers traveled a typical distance of 218 miles (almost the entire distance to New York City), while the typical *Vermonter* passenger travels 292 miles, roughly the distance between Randolph, Vermont and New York City. Average distance traveled by *Vermonter* passengers has trended down slightly because of growing intra-state traffic, which has increased from 3 percent of passenger volumes in FY 2004 to 12 percent and over 8,000 riders in FY 2013. The three most heavily utilized stations for both inter- and intra-state travel in Vermont are Essex Junction, Brattleboro, and White River Junction, each of which have handled 15,000 or more passengers in recent years.

Exhibit 13: Amtrak Train in St. Albans

[11] *Amtrak Fleet Strategy, Version 3.1,* p. 45.

Vermont's Tourist Trains

Seasonal tourist train operations are conducted from White River Junction and Bellows Falls by the Green Mountain Railroad, a subsidiary of the Vermont Railway. From White River Junction, trains operate along the Connecticut River north to Thetford, a distance of 16 miles. From Bellows Falls, train rides vary in length, going as far west as Rutland. Peak service is offered during the fall foliage season, with up to six trains per week, while during the summer months, 3-4 trains per week are operated. There are also several Christmas trains during the holiday season.

Exhibit 14: Polar Express

2.1.2 Multimodal Connections

With the exception of the Vermont-supported station in Claremont, NH, most Vermont train stations are located in close proximity to local bus routes but are not directly accessible to local or intercity bus lines as shown in Exhibit 15. Rail passengers can connect to local bus routes from eight out of the 12 stations. In contrast, only the Bellow Falls station provides direct access to an intercity bus route, the Greyhound bus line running from Boston to Montreal.[12]

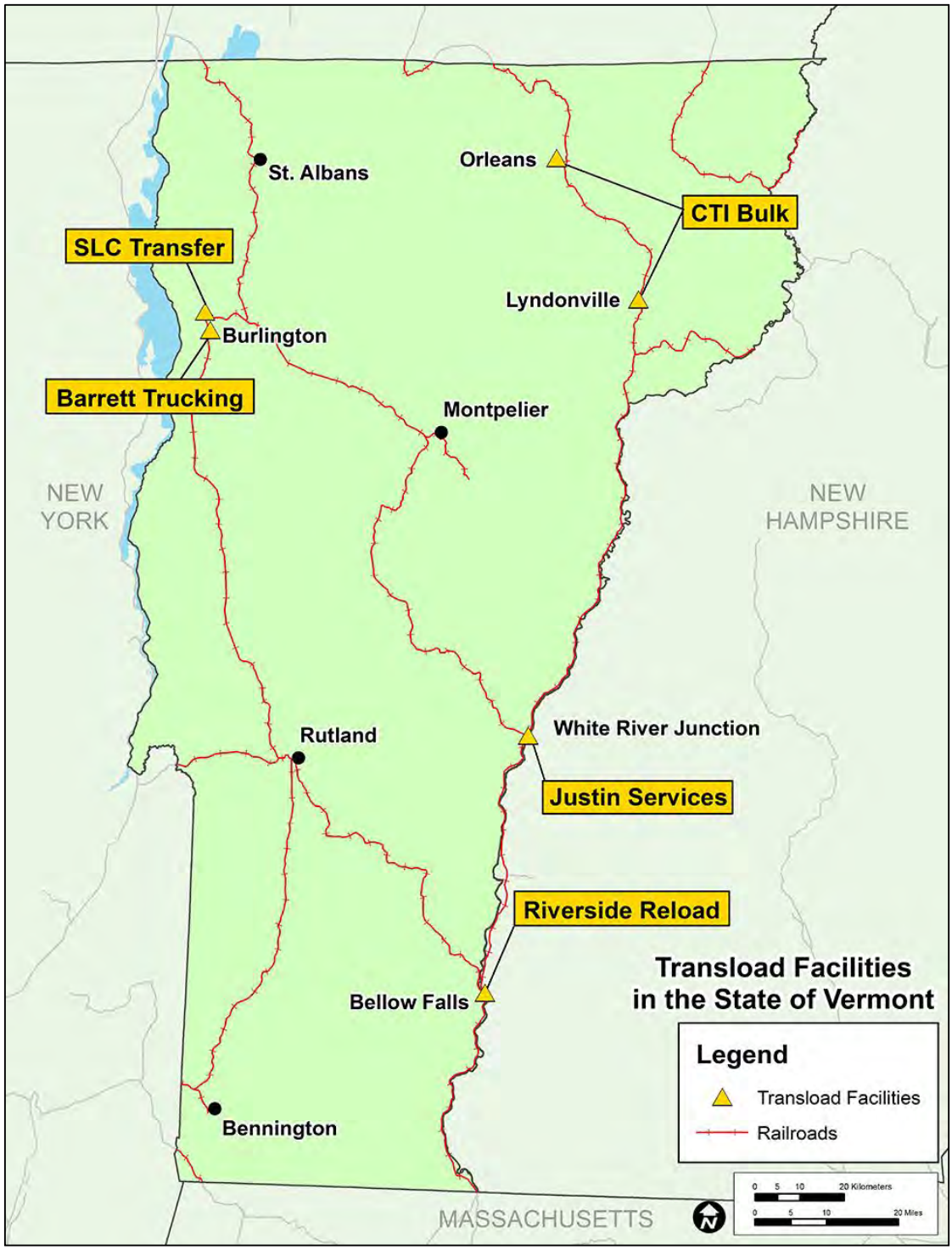
[12] *Vermont Statewide Intercity Bus Study Update. 2013. Prepared for State of Vermont Agency of Vermont.*

Exhibit 15: Table of Vermont Rail-Bus Connections

Bus Connections at Vermont Train Stations			
Station	Bus Connections		Sources
	Local	Intercity	
Rutland	Marble Valley Regional Transit District (North Route)		http://www.thebus.com/
Castleton			
St. Albans	Green Mountain Transit Authority (Routes 109 and 110)		http://gmtaride.org/schedules-and-fares/system-map/
Essex Junction-Burlington	Chittenden County Transit Authority (Route 2), Green Mountain Transit Authority (Routes 1E, 2, 4)		
Waterbury-Stowe	Green Mountain Transit Authority (Waterbury Commuter, Route 100 Commuter)		http://cctaride.org/bus-routes-schedules/system-map/
Montpelier-Barre			
Randolph	Stagecoach Transportation (89er, 89er North, West Lebanon Shopper, Rochester to Randolph)		http://stagecoach-rides.org/
White River Junction	Advance Transit, Connecticut River Transit Authority (Upper Valley Route)		http://www.advancetransit.com/routefinder.htm http://crtransit.org/schedules/Upper_Valley_Routes.pdf
Windsor, Mt. Ascutney			
Claremont, NH	Community Alliance Transportation Service (Claremont Route)		http://www.communityalliance.net/wp-content/uploads/2012/12/2012-Claremont.pdf
Bellow Falls	Connecticut River Transit Authority (Brattleboro-Bellow Falls)	Greyhound	http://crtransit.org/
Brattleboro	Connecticut River Transit Authority (Brattleboro-Bellow Falls)		http://crtransit.org/

Freight multimodal connections facilitate the transfer of goods from one mode to another, in the case of Vermont, between truck and rail. Multimodal transportation allows shippers that are not directly served by the rail network to use rail. Shippers can take advantage of the flexibility of trucking while benefiting from lower transportation costs of using rail for shipping longer distances. For truck/rail multimodal facilities, trucking typically serves a gathering function, whereby truck freight brings cargo to/from a multimodal facility, and rail provides the long-distance transportation. Within the railroad industry, the word "transload" typically refers to truck/rail multimodal facilities that are used to handle non-containerized freight, whether this is bulk (unpackaged cargo such as grain, iron ore, coal, liquids) or break bulk (shipped as a unit or package but not containerized). There are at least five transload facilities within Vermont, as shown in Exhibit 16. Some of these facilities are used for transloading bulk materials, including liquids or solids; others are for transloading dimensional cargoes like steel or lumber; while others provide rail access to warehouse or cross dock facilities.

Exhibit 16: Transload Facilities in Vermont



Another important component of the U.S. freight multimodal system is the intermodal network. Within the freight rail industry, "intermodal" typically refers to the shipments of containers or trailer on flat cars (COFC/TOFC). Intermodal has been of particular interest to public planners in part because it is a relatively high growth area of the rail industry. The American Trucking Associations released a report in July 2014 produced in conjunction with IHS Global Insight, which forecast truck tonnage growing by 1.7 percent per year from 2013 to 2025 and rail's

market share shrinking from 14.5 percent of tonnage in 2013 to 12.8 percent in 2025. However, the same report predicts intermodal rail volumes to grow by 5.5 percent annually through 2019 and 5.1 percent per year through 2025, far surpassing traditional carload rail growth or trucking growth.[13] The other source of interest in intermodal rail is the potential to take trucks off of highways. Typically, the modal tradeoff between using truck and rail consists of lower transportation costs for rail but longer and less reliable transit times. But rail intermodal, particularly for long-distance moves, offers transit times that can be relatively competitive to trucking.

In most parts of the country, rail intermodal networks are owned, marketed and operated by large, Class I railroads. These are the only carriers that have the scale to provide intermodal services between major metropolitan areas. New England is unique in that much of the rail network is operated by smaller Class II and Class III railroads. Therefore, a new business model has emerged by which Class I carriers incorporate New England markets into their intermodal networks by partnering with smaller carriers. Norfolk Southern Corporation has partnered with Pan Am Southern to access Ayer, MA, while the Canadian National Railway until recently accessed Auburn, ME through a partnerships with the St. Lawrence & Atlantic Railroad and has accessed Worcester, MA through partnership with both the New England Central and the Providence and Worcester Railroads. Although no intermodal terminals are located in Vermont, the Norfolk Southern service passes through the state, as have the Canadian National services. Exhibit 17 displays intermodal routes that cross Vermont.

[13] *American Trucking Associations, ATA U.S. Freight Transportation Forecast to 2025.*

Exhibit 17: Freight Intermodal (COFC/TOFC) Routes through Vermont

2.1.3 Intercity Passenger Service Performance Evaluation

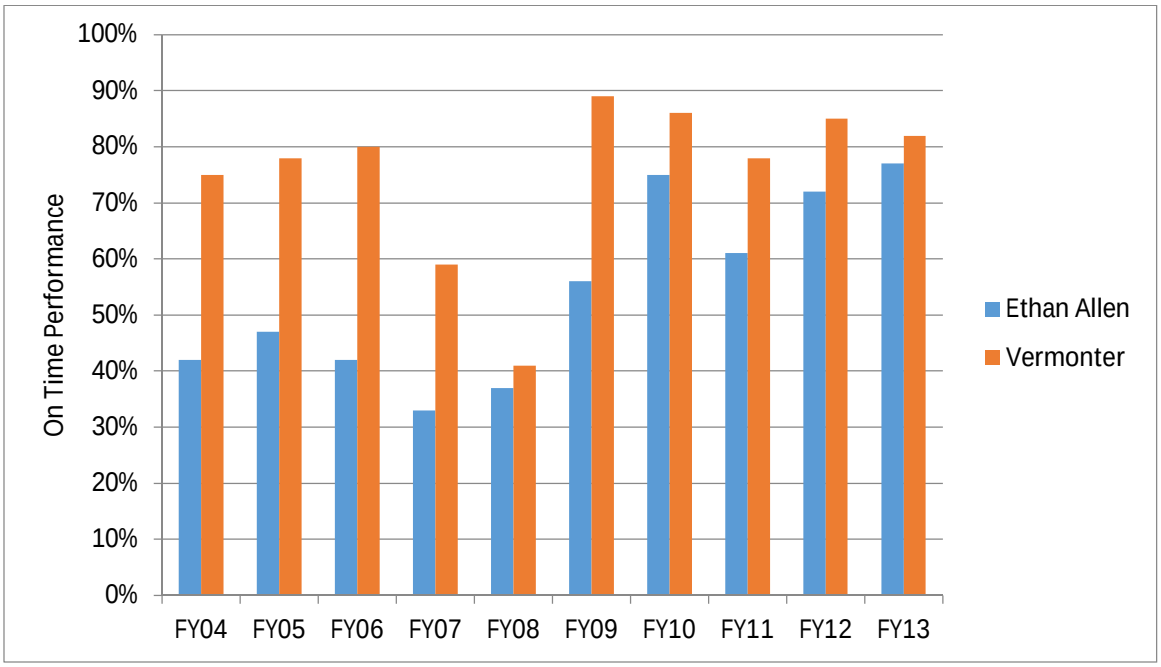
Trends in Service Reliability

A key measure of service performance is reliability, or the degree to which a train operates on-schedule. High reliability has a major impact on both revenues and costs – unreliable service discourages use and raises costs through increased fuel use, personnel, diminished equipment utilization, and, in extreme situations, compensating passengers with refunds, reimbursement for alternative transportation, etc. Amtrak considers a train to be "on-time" if it arrives at the final destination within a threshold that varies based on route length. The on-time threshold for the *Ethan Allen Express* is ten minutes and the threshold for the *Vermonter*, which operates over a route that is more than twice as long, is 30 minutes. The number of trains within the threshold is divided by total trains over a period to calculate the on-time percentage (OTP).

Since FY 2004, OTP was varied considerably on both lines, illustrated in Exhibit 18. Overall, the *Vermonter* has experienced better on-time performance than the *Ethan Allen Express*, although FY 2008 was a low point for both routes. In the late 2000's the two routes experienced significant delays due to track conditions in Vermont, and the *Ethan Allen Express* suffered from significant congestion-related delays in New York. Following completion of track maintenance on the *Vermonter* in 2008, performance on that route improved to 80 percent or better, except in FY 2011 for the reasons noted previously. Performance on the *Ethan Allen Express* has also improved steadily

since FY 2011, in part due to completion of track work between Whitehall, NY and Rutland, and track capacity upgrades on the CP south of Whitehall, NY.

Exhibit 18: On-Time Performance



PRIIA Performance Measures

PRIIA Section 207 requires that Amtrak report certain performance metrics for train routes in order that Amtrak, elected officials, and other policy makers may work together to improve the national passenger rail network.[14] The Section 207 performance metrics for the *Vermonter* are reported in Exhibit 19 while performance measures for the *Ethan Allen Express* are reported in Exhibit 20. These results are the average of the four most recent quarterly reports from FY2013 Q4 through FY2014 Q3. The Section 207 performance metrics are organized into categories: financial, on-time performance, train delays, and customer service. The financial metrics are measured the basis of continuous year-over-year improvement over the prior eight quarters, a rolling metric, while other metrics are measured against standards

The latest information, including current and past Section 207 reports is available from the Federal Railroad Administration Rail Service Metrics and Performance website at https://www.fra.dot.gov/Page/P0532.

[14] The latest information, including current and past Section 207 reports is available from the Federal Railroad Administration Rail Service Metrics and Performance website at https://www.fra.dot.gov/Page/P0532.

Exhibit 19: PRIIA Section 207 Performance Reports for the *Vermonter*

Category	Metric	PRIIA Section 207 Standard	Last Four Quarters Average (2013 Q4-2014 Q3)	Met PRIIA Goals?
Financial	Percentage of operating costs recovered by passenger related revenue (last 8 quarters)	Continuous Improvement	49%	Yes
	Passengers per train mile (last 8 quarters)	Continuous Improvement	134	No
On-Time Performance	Change in effective speed from FY2008 baseline (mph)	>=0	3.5	Yes
	End point on time performance	80%	75%	No
	All stations on time performance	80%	69%	No
Train Delays	Host Responsible Delays – minutes per 10,000 train miles (by each host railroad)	<=900	MNRR*: 1,449	No
			NECR**: 895	Yes
	Amtrak Responsible Delays – minutes per 10,000 train miles for off-NEC corridors	<=325	341	No
	Amtrak Responsible Delays – minutes per 10,000 train miles for the NEC	FY2013: <=475 FY2014: <=425	555	No
Customer Service Indicators	Overall Service	82	78	No
	Amtrak personnel	80	81	Yes
	Information given	80	72	No
	On-board comfort	80	78	No
	On-board cleanliness	80	54	No
	On-board food services	80	55	No

*Metro North Railroad **New England Central Railroad

Over the past eight quarters (4th quarter 2012 – 3rd quarter 2014), 49 percent of the *Vermonter*'s fully allocated costs were recovered through passenger related revenues. On average, these eight quarters represent an improvement over the eight quarters the year prior. There were an average of 134 passengers per train mile, which is a lower load factor than the year before. On average, the fully allocated costs to revenue ratio represented an improvement over the previous years' periods, but the passengers per train did not.

For the on-time-performance metrics, the goal for all services is a change in effective speed that is 0 mph or faster than the 2008 baseline. The *Vermonter* met this goal with an overall change in effective speed of 3.5 miles per hour. For state-supported services, including the *Vermonter*, the goal for end-point on-time performance and all-stations on-time performance is 80 percent. For the *Vermonter* a train is considered "on-time" if it arrives within 30 minutes of its scheduled arrival. Neither the end-point nor the all-station OTP goals were met. Delays are reported for each railroad owner and the *Vermonter* includes two freight railroad hosts, Amtrak owned non-NEC rail territory, and Amtrak-owned Northeast Corridor.

The goal for delays caused by non-Amtrak hosts is less than 900 delay minutes for every 10,000 train miles. The *Vermonter* met its goal for delay on the 61 miles of New England Central Railroad territory but did not meet its

goal on the 318 miles of Metro North Railroad territory where the goal was exceeded with 1,449 minutes of delay for every 10,000 train miles. Amtrak non-NEC territory has a goal of 325 delay minutes per 10,000 train miles. In FY2013 the goal for NEC territory was 475 minutes per 10,000 miles and in FY2014 the goal was reduced to 425 minutes. In the past four quarters average Amtrak-responsible delay did not meet its goal for delay on or off the NEC for the *Vermonter*.

Vermonter customer service metrics are driven by customer satisfaction surveys. The *Vermonter*'s Customer Service standards were met for Amtrak overall, personnel, information given, and comfort. But cleanliness and food service fell short.

Exhibit 20: PRIIA Section 207 Performance Reports for the *Ethan Allen Express*

Category	Metric	PRIIA Section 207 Standard	Last Four Quarters Average (2013 Q4-2014 Q3)	Met PRIIA Goals?
Financial	Percentage of operating costs recovered by passenger related revenue (last 8 quarters)	Continuous Improvement	84%	No
	Passengers per train mile (last 8 quarters)	Continuous Improvement	164	No
On-Time Performance	Change in effective speed from FY2008 baseline (mph)	>=0	2.5	Yes
	End point on time performance	80%	72%	No
	All stations on time performance	80%	81%	Yes
Train Delays	Host Responsible Delays – minutes per 10,000 train miles (by each host railroad)	<=900	CP*: 2,120	No
			Amtrak: 935	No
			MNRR**: 1,362	No
			CLP***: 293	Yes
	Amtrak Responsible Delays – minutes per 10,000 train miles for off-NEC corridors	325	202	Yes
Customer Service Indicators	Overall Service	82	81	No
	Amtrak personnel	80	82	Yes
	Information given	80	71	No
	On-board comfort	80	81	No
	On-board cleanliness	80	61	No
	On-board food services	80	58	No

* Canadian Pacific ** Metro North Railroad ***Clarendon & Pittsford Railroad

According to Amtrak/FRA statistics, the *Ethan Allen Express* covered 84 percent of fully allocated cost through passenger related revenue. Because the percentage of costs covered by revenues had been higher the year before, the standard was not met. The average of 163 passengers per train mile did not represent a consistent improvement over the same statistics one year earlier. The average effective speed improved over the 2008 baseline and thereby met FRA/Amtrak standards. The change in effective speed was 2.5 miles per hour.

For state-supported services, including the *Ethan Allen Express*, the goal for end-point on-time performance and all-stations on-time performance is 80 percent. For the *Ethan Allen Express* a train is considered "on-time" if it arrives within ten minutes of its scheduled arrival. Trains met the goal for all-station on-time performance but not for end-point on-time performance. Delays are reported for each railroad owner and the *Ethan Allen Express* passes over the territory of four host railroads, as well as Amtrak-owned non-NEC rail territory. The goal for delays caused by hosts is less than 900 delay minutes for every 10,000 train miles. The *Ethan Allen Express* met its goal for delay on the 15 miles of Clarendon & Pittsford Railroad territory but did not meet its goal on the 64 miles of Metro-North Railroad territory where the goal was exceeded with 1,362 or the 104 miles of Amtrak host territory with 935 minutes or delay or the 60 miles of CP territory with 2,120 minutes of delay for every 10,000 train miles.

Amtrak non-NEC territory has a goal of 325 delay minutes. In the past four quarters, Amtrak met its goal for delay Amtrak-responsible delays on or off the NEC for the *Ethan Allen Express*.

The *Ethan Allen Express* Customer Service results are similar to those of the *Vermonter* in that customer satisfaction standards are met or close to being met for Amtrak overall, for personnel, information given and comfort but not for cleanliness or food service.

2.1.4 Public Financing of Rail

Vermont's rail program receives state funds through the Vermont Transportation Fund. The Vermont Transportation Fund supports the multimodal activities and investments of the Vermont Agency of Transportation and is supported by revenues from,

- Motor vehicle fees. Primarily fees from the State's Department of Motor Vehicles, including vehicle registration, licenses, permits, and endorsements.
- Purchase and use fees. Primarily a sales tax on vehicle purchases.
- Gasoline and diesel taxes. Tax on fuel purchased in Vermont.
- Other sources, such as title certificates and civil traffic fines, oversize permits, taxes and lease payments by railroads.

Vermont has also established a Transportation Infrastructure Bond fund (TIB), which is supported by an assessment of two percent of the retail price of gasoline. The TIB is used for debt service of previously issued transportation bonds. State transportation funding for the most part does not tie specific transportation programs with specific transportation revenue sources. Each year, rail is considered for funding from the Transportation Fund along with the State's other modal needs.

Between Fiscal Years 2006 and 2014, state appropriations for rail averaged about $10 million. In most years, rail was between four and five percent of the State's transportation budget. During that time, over $4 million per year was spent on subsidies for Amtrak services, between $1 to $2 million per year on maintaining state-owned rail lines, while most of the remainder of the $10 million in average annual appropriations was applied either to capital projects or VTrans staffing.

The rail program also benefits from federal funding. While there is no dedicated federal formula funding for rail, the Federal Railroad Administration administers a number of discretionary grant programs that Vermont has received funding from. Since 2009, the State has received approximately $72 million in federal discretionary grants for rail (Exhibit 21).

Exhibit 21: Federal Discretionary Grants Awarded to Vermont

Program	Year	Railroad	Project Description	Federal	State	Railroad	Total
High Speed & Intercity Passenger Rail	2009	New England Central Railroad	Rehabilitating track between St. Albans and Vernon on *Vermonter* route	$50,000,000	$0	$19,962,000	$69,962,000
High Speed & Intercity Passenger Rail	2010	New England Central Railroad	Continuing rehabilitation of track between St. Albans and Vernon on *Vermonter* route	$2,722,258	$0	$0	$2,722,258
Rail Highway Crossing Hazard Elimination	2011	New England Central Railroad	Installing active protection at 15 unprotected crossings on *Vermonter* route	$2,248,687	$0	$840,284	$3,088,971
TIGER IV	2012	New England Central Railroad	Upgrading track between St. Albans and the Canadian border	$7,912,054	$0	$3,348,022	$11,260,076
TIGER V	2013	Vermont Railway (Western Corridor)	Replacing approximately 9 miles of outdated track	$8,992,007	$2,000,000	$200,000	$11,192,007
Grand Total				**$71,875,006**	**$2,000,000**	**$24,350,306**	**$98,225,312**

Railroads have contributed to funding projects through cash-contributions and in-kind services.

Federal funding and financing options available to rail are described below.

Federal Transportation Funding Programs Relevant to Rail

MAP-21 is the latest transportation program authorized by Congress and became law in 2012. This program continues and refines many of the transportation policies and programs that were created with the landmark ISTEA legislation in 1991. While primarily focused on highway transportation, MAP-21 has significant flexibility in several program components related to highway-rail grade crossings and intermodal facilities that can be used to fund or finance improvements to railroad infrastructure.

Federal Funding of Intercity Passenger Rail

The Passenger Rail Investment and Improvement Act (PRIIA) became law in October 2008. It made sweeping changes to how intercity passenger rail service is funded and operated in the U. S. The Act tasked Amtrak, the U.S. DOT, the FRA, states, and other stakeholders with improving operations, facilities, and services and it reauthorized Amtrak. In addition, PRIIA authorized more than $13 billion in capital funding between 2009 and 2013 for the development of passenger rail service.

State-Supported Rail Passenger Services

PRIIA changed the structure by which passenger rail in the United States is funded. The 1970 Rail Passenger Service Act, which created Amtrak, established a basic system of routes over which Amtrak was required to operate intercity passenger trains. However, under Section 403(b) of the Act, states could request additional service if they covered a portion of the costs. This cost sharing arrangement was revised several times until PRIIA fundamentally altered the relationship between states and intercity passenger rail service. Section 209 of PRIIA required Amtrak, in consultation with the U.S. DOT and states, to develop a uniform methodology for allocating the operating and capital costs to states of providing intercity rail service on Amtrak routes that are either state requested, on designated high-speed rail corridors (outside of the Northeast Corridor), short distance corridors, or routes less than 750 miles. On October 15, 2013, Amtrak announced that it had successfully negotiated contracts with 19 states, including Vermont, thus fulfilling the requirements of PRIIA Section 209. States will pay approximately 85 percent of the operating costs attributed to state-supported routes, as well as capital maintenance costs on Amtrak equipment, and support costs such as for safety and marketing, while Amtrak will pay approximately

15 percent for costs such as centralized dispatching and services. Given the nature of the Amtrak routes in Vermont, VTrans' agreements to fund Amtrak routes were made in conjunction with other states that share those routes, such as Massachusetts, Connecticut, and New York.

Capital Funding

PRIIA also provided substantial federal funding for capital projects aimed at improving intercity passenger rail, with more than $13 billion authorized. The three competitive grant programs established under PRIIA, including the Intercity Passenger Rail Service Corridor Capital Assistance Program, the Intercity Passenger Rail Service Corridor Assistance Program, and Congestion grants were later consolidated into the High-Speed Intercity Passenger Rail Program (HSIPR). Under HSIPR, FRA solicited applications for more than $10 billion in grant funding, much of this appropriated as part of the American Recovery and Reinvestment Act (ARRA). Fiscal year 2010 was the last to include funding for the HSIPR program. No funding for the program was included in the federal 2011, 2012, 2013 or 2014 budgets.

VTrans received two grants under the programs. The first was for $50 million to rehabilitate track on the New England Central RR (NECR) between St. Albans and Vernon. NECR provided approximately $20 million as matching funds for a total project cost just under $70 million.

The second grant of $2.7 million was provided in 2010 to supplement the rehabilitation work on the NECR.

Transportation Investments Generating Economic Recovery grant program (TIGER)

The first round of the Transportation Investment Generating Economic Recovery (TIGER) grant program was included in the American Recovery and Reinvestment Act of 2009. There have since been five additional rounds of TIGER grants. These grants are awarded on a competitive basis for road, rail, transit and port projects that the U.S. DOT believes will have a significant impact on the nation, a metropolitan area, or a region. Projects must have independent utility - ready for their intended use upon completion of project construction. Projects must also be ready for construction within a restricted amount of time. Fiscal year 2014 funds available through the TIGER program were $600 million, while collectively $3.5 billion in funding was made available between FY 2009 and FY 2013 for 270 projects nationwide.

TIGER grants have funded several major rail projects in Vermont. Most recently, VTrans received an $8.9 million TIGER grant in 2013 for the Western Corridor Rail Rehabilitation Project to replace nine miles of old jointed rail with continuously welded rail as well as new surfacing, ballast and ties. This will bring a 20-mile segment of the Vermont Railway to FRA class III status. The total project cost is $18.5 Million, with other federal appropriations comprising approximately $6 million, VTrans contributing $3.2 million in State funds, and the Vermont Railway making an in-kind contribution of $200,000.

In 2012, VTrans received a $7.9 million TIGER grant to fund the "Northern Vermont Freight Rail Project" to upgrade almost 19 miles of track between St. Albans and the Canadian Border. This track upgrade will enable the rail line to accommodate heavier 286,000-pound freight cars, and improve the cross border movement of freight. The total project cost is $11.2 million with the New England Central Railroad contributing approximately $3.3 million.

Section 130 Railroad-Highway Crossings Program

This Federal Highway Administration program provides federal support for projects that improve safety at public railroad/highway grade crossings. States may use funds for installing or upgrading warning devices, eliminating grade crossings through grade separation, or consolidating or closing grade crossings. The federal share of these

funds is 90 percent, while the local or railroad share is ten percent. Funds are allocated to each state by formula. In order for states to receive funds from this program, states must conduct a survey of all public crossings and then prioritize them for improvements, relocation, or separation.

VTrans currently receives approximately $1 million per year for railroad/highway grade crossing improvements through the federal set-aside from the Highway Safety Improvement Program funding.

Surface Transportation Program (STP)

The Surface Transportation Program is a formula program available for improvements of any federal-aid highway, bridge, or transit capital project. Eligible rail improvements include lengthening or increasing the vertical clearance of bridges, eliminating crossings, and improving intermodal connectors. The federal matching share is 80 percent.

Transportation Alternatives Program

MAP-21 created the new Transportation Alternatives Program, which superseded the previous Transportation Enhancement program. It provides funding for specific activities related to surface transportation, of which several are relevant to rail. These include abandoned rail corridor preservation, historic preservation and rehabilitation of historic transportation facilities.

Other Federal Funding Programs Relevant to Rail

U.S. Department of Commerce Economic Development Administration (EDA)

The Economic Development Assistance Programs under the EDA provides grants for projects in economically distressed areas.[15] The program can provide between 50 to 80 percent of the total project cost, depending upon the level of economic distress in the area. The Public Works program is aimed at helping areas to improve physical infrastructure to attract new industry, encourage business expansion, diversify local economies, and generate or retain long-term, private sector jobs and investment. The Economic Adjustment program helps communities that are experiencing economic disruptions such as natural disasters, military base closures, trade related disruptions and major private sector employer restructurings. Examples of rail-related EDA grants include the reconstruction of damaged rail infrastructure, rail spur and access projects. Several areas in northeastern Vermont could qualify for EDA grants. EDA grants are awarded on a competitive basis.

U.S. Environmental Protection Agency, Diesel Emission Reduction Act (DERA) National Funding Assistance Program

DERA funding is available for projects that lower locomotive emissions. These include retrofit technologies, idle-reduction technologies, aerodynamic technologies, and early replacement or repower. In FY 2014, $9 million in eligible funding was available. The extent of federal match depends upon the type of project. There is no requirement that the project be in a nonattainment area for National Ambient Air Quality Standards, but applications are scored higher if the project is in a high priority area.

Federal Financing Programs Relevant to Rail

Railroad Rehabilitation and Improvement Financing Program (RRIF)

The RRIF Program provides direct federal loans and loan guarantees to finance the development of railroad infrastructure. Eligible applicants include railroads, state and local governments, government-sponsored authorities and corporations, joint ventures, and shippers served by one railroad who wish to build a connection to

[15] By federal definition, an area is "economically distressed" if per capita income is 80 percent of less than the national average or unemployment over the past 24 months is 1 percent or greater than the national average.

a competing carrier. Eligible projects include improvements to, rehabilitation, or acquisition of freight and passenger railroad equipment, track and structures, new multimodal facilities, and refinancing of associated debt. Direct loans can provide up to 100 percent of project cost with repayment periods up to 35 years. Interest rates are equal to the U.S. treasury rate, but fees must be paid to defray the cost to the government of making the loan. These include a Credit Risk Premium, which depends upon the level of risk of the loan, and an investigative fee if outside professional services are necessary to issue the loan.

Transportation Infrastructure Finance and Innovation Act (TIFIA)

MAP-21 significantly reforms the application and approval process and increases funding for the Transportation Infrastructure Finance and Innovation Act (TIFIA) program. This program provides credit assistance for large projects up to $50 million or 33.3 percent of a state's annual apportionment of federal-aid funds, whichever is less. Eligible applicants include state and local governments, transit agencies, railroads, special authorities, special districts, and private entities. MAP-21 set a lower eligible project cost for rural infrastructure projects of at least $25 million or 33.3 percent of a state's annual apportionment of federal-aid funds, whichever is less. Approximately $1.0 billion was available in FFY 2014.

TIFIA credit program provides three types of financial assistance.

- Secured direct federal loans. These have a maximum term of 35 years after project completion. Repayment may begin up to five years after project completion.
- Loan guarantees. The federal government guarantees a borrower's repayments to a non-federal lender. Loan repayments to the lender must begin no later than five years after completion of the project.
- Standby line of credit. A federal loan serves as a contingent source of cash to supplement project revenues. Standby financing is available during the first ten years after project completion.

MAP-21 changed the federal share of credit assistance for eligible project costs. A line of credit can be up to 33 percent of project costs, a loan can be up to 49 percent of project costs, and a loan and line of credit combined can be up to 49 percent of project costs. In addition, total federal assistance (grants and loans) to a project receiving a TIFIA loan can be up to 80 percent to total project costs.

Interest rates are equal to treasury rates and are fixed. All projects eligible for Surface Transportation Program (STP) funds are eligible for TIFIA, as well as intercity passenger rail facilities and vehicles, publicly owned freight rail facilities, intermodal freight transfer facilities, access to intermodal freight transfer facilities, and projects located within the boundary of a port terminal under certain conditions. Projects must be included in the state's Transportation Improvement Program. Nationwide, TIFIA loans have helped to finance the establishment of a commuter rail service, in addition to several passenger intermodal projects, of which commuter and intercity rail were components.

Applications are accepted on a rolling basis.

Rural Infrastructure Projects have some special provisions that VTrans may be able to use. Specifically:

- For surface transportation projects not located in a city with a population of more than 250,000.
- 10 Percent of TIFIA funds are "set aside" specifically for rural infrastructure projects.
- Rural Loans are at one-half the Treasury interest rate.

Rail Line Relocation and Improvement Capital Grant Program

The Rail Line Relocation and Improvement Capital Grant Program (RLR) was developed to assist State and local governments in mitigating the adverse effects created by the presence of rail infrastructure. Congress authorized the Rail Line Relocation and Improvement Capital Grant Program in 2005 through the Safe, Accountable, Flexible, Efficient Transportation Act: A Legacy for Users (SAFETEA-LU).

Only states, political subdivisions of states (such as a city or county), and the District of Columbia are eligible for grants under the program. Grants may only be awarded for construction projects that improve the route or structure of a rail line and:

- Are carried out for the purpose of mitigating the adverse effects of rail traffic on safety, motor vehicle traffic flow, community quality of life, or economic development; or
- Involve a lateral or vertical relocation of any portion of the rail line.

Pre-construction activities, such as preliminary engineering, design, and costs associated with project-level compliance with the National Environmental Policy Act (NEPA), are considered part of the overall construction project and are eligible for funding. However, activities such as planning studies and feasibility analyses are not eligible for funding.

Congress provided just over $90 million for the program through FFY 2012, the last year the program was funded. Past program funding has been provided to through both competitive grants as well as Congressional earmarks. While there is no appropriation in this fiscal year, funding could be available in future years.

MassDOT received a $2 Million grant for the Patriot Corridor Double-Stack Clearance Initiative in 2012. This grant will complete preliminary engineering and environmental analysis for the removal of 19 obstructions in two tunnels and 17 roadway, railroad or pedestrian bridges that would prevent a double-stack train from operating between Mechanicville, New York, and Ayer, Massachusetts. Removing the vertical obstructions will improve freight operations and capacity by allowing double-stacked container trains to operate over the line. Approximately six miles of the Patriot Corridor line cuts through the extreme southwest corner of Vermont.

Railroad Rehabilitation and Repair (Disaster Assistance)

Under this program, a state may apply for a grant from the Federal Railroad Administration (FRA) to cover up to 80 percent of the cost of a project to repair and rehabilitate Class II and Class III railroad infrastructure damaged by hurricanes, floods, and natural disasters, provided that the infrastructure is located in a county that has been identified in a Disaster Declaration for Public Assistance issued by the President. Class II and Class III railroad infrastructure eligible for repair and rehabilitation consists of railroad rights-of-way, bridges, signals and other infrastructure that are part of the general railroad system of transportation and primarily used by railroads to move freight traffic. Grants are awarded on a competitive basis and at least 20 percent of the cost of eligible repair and rehabilitation projects must be covered by non-federal sources in the form of cash, equipment, or supplies. Prior to seeking assistance under this Program, grantees must exhaust all other state and federal resources. Federal prevailing wages and health and safety standards (49 USC 24312) applies to grantees receiving funding under this Program. While there was no appropriation in fiscal year 2014, $20 Million has been available in previous years and funding could be available in future years.

Private Activity Bonds

A private activity bond is a bond issued by or on behalf of local or state government for financing the project of a private user. These bonds enjoy the same tax-exempt status as other state and local bonds. Up to $15 billion can

be used for transportation infrastructure, and freight transfer facilities, such as rail-truck facilities, qualify among the types of private activities for which these bonds may be issued. These bonds have recently been issued to finance intermodal developments by CenterPoint in Chicago, IL and Kansas City, MO. In addition, at least one transit project has also issued bonds (Denver) using PAB's. At least 95 percent of the net proceeds of bond issues must be expended within five years of issue date.

Vermont State Infrastructure Bank (SIB)

The Vermont State Infrastructure Bank (SIB) program, operated by the Vermont Economic Development Authority in conjunction with the Vermont Agency of Transportation and the Federal Highway Administration, is available to assist in the construction or reconstruction of highways, roads and bridges, as well as certain facilities related to rail transit. Municipalities, political subdivisions of the state, regional development corporations and private companies that have entered into a contract with a public authority to carry out a qualified project are eligible for SIB funding. All state and federal environmental permits and other approvals are required as a loan condition.

The Vermont SIB loan rates and terms are:

- 3 percent fixed rate for private sector borrowers
- 1 percent fixed rate for municipal-type borrowers
- Equity contribution of between ten - 20 percent.
- Term of up to 30 years, but repayments must begin no later than five years after project completion.

Federal Tax Incentives

Short Line Railroad Tax Credit

The "Section 45G" regulation refers to Section 45G of the Internal Revenue Code. Originally enacted in 2005, the Section 45G provision enabled short line and regional railroads to claim a tax credit of 50 percent for every dollar spent on capital improvements, with a cap of $3,500 per mile of track. This tax credit expired on December 31, 2014. Legislation was introduced during the summer of 2015 to extend the tax credit.

Other Financing and Funding Options

Revenue from Leasing Railroad Rights-of-Way (ROW)

Vermont owns 305 of the 600 active route-miles of railroad in the State and 145 miles of railbanked lines, and the State has an active leasing program. The State collects fees and rents for the use of its rail property. The annual revenue accruing to Vermont from its railroad property leases, including fees and rents for utility crossings as well as rentals from operating railroads, is approximately $1,000,000. VTrans is updating its inventory of State-owned railroad property, and plans to use modern electronic technology and convert existing paper valuation maps into electronic form, in order to more productively manage its rail assets. At present only old, paper maps are available, and these maps have not been updated. In addition, VTrans has begun to identify and resolve instances of illegal encroachments on all State-owned rail lines. VTrans is currently reviewing the fee schedule (regarding utility crossings, or co-linear use of the railroad right of way by a utility or fiber optic line) and updating it to reflect fair market value. Due to changes in real estate costs and the utility/communication industry since the fee schedule was last reassessed, it is believed that there is a potential for a significant increase in revenue in this area.

Leverage State Owned Rail Lines' Annual Lease Payments

The annual revenue received for these lease payments currently goes into the State general fund.

A worthwhile proposal for consideration is the direct use of revenues from property management and operating leases for rail infrastructure improvements, rather than directing these revenues into the State general fund. This would allow a more direct relation between property maintenance and property revenues. Alternatively, rental payments could be used to help secure infrastructure improvement loans (e.g. TIFIA or Vermont SIB). This would benefit the State by allowing more funds to go into upgrading rail lines. The idea is to allow leaseholder railroads to use their lease payments to the State as payments towards a loan for infrastructure improvements. The State general fund would be impacted, but the expenditures from the construction of improvements via a loan would likely provide substantial economic benefits.

Revenue from New Construction Rail Projects

A per rail car surcharge could be implemented to help fund new railroad projects or implement infrastructure improvements. Like a roadway toll, funds from could be collected and placed into a special account to pay for the improvement. Shippers could be required to "guarantee" a base level of usage of the improvement (for example a new siding) in order to ensure the project funding stream is protected. This could be tied into some of the previously mentioned loan programs. A strategy employing this concept should be considered for rail investments in the future.

2.1.3 Safety and Security Programs

Although rail is a relatively safe mode of transportation when compared to highway travel it is not without risks, and VTrans, the state's railroads, and other stakeholders aim to continually reduce the occurrence of fatalities, injuries, as well as property damage only accidents in Vermont. The number of fatalities associated with Vermont's rail system totaled six between 2009 and 2013 compared to none between 2004 and 2008. Of the six fatalities, four occurred at highway-rail grade crossings, while two were trespassers struck by trains on the rail right-of-ways. Five of six fatalities were associated with intercity passenger trains, while one was a freight train. Most injuries associated with rail in Vermont between 2004 and 2013 were within the "other" category, and most of these were associated with railroad employees. Railroads are required to report any employee accident on the FRA safety database.

Exhibit 22: Total Rail Accidents/Incidents in Vermont (2004 - 2013)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fatalities at Highway-Rail Crossings	.	.	.	.	.	2	1	.	1	.
Fatalities from Trespassers on Rail Property	.	.	.	.	.	.	.	.	.	2
Total Fatalities	.	.	.	.	.	2	1	.	1	2
Injuries at Highway-Rail Crossings	2	3	2	.	2	2	2	2	.	2
Other Injuries	17	18	12	23	28	17	13	15	18	19
Total Injuries	19	21	14	23	30	19	15	17	18	18
Total Accidents/Incidents	27	29	18	29	34	28	20	19	20	26

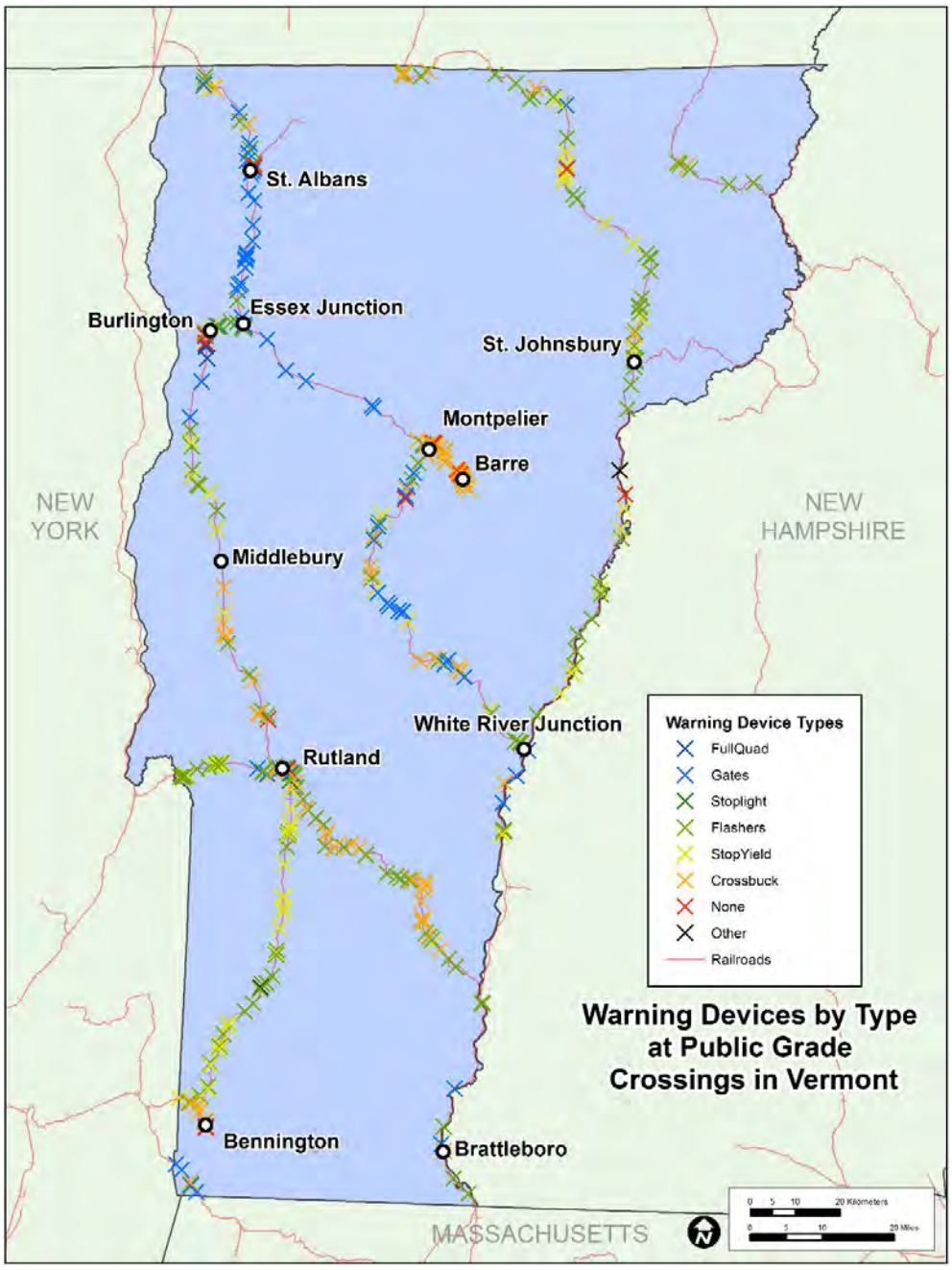
Exhibit 23 illustrates safety features (such as gates or quad gates and flashing lights) at grade crossings in Vermont. According to the FRA, a sizeable percentage of grade crossings (34 percent) have no type of safety features, and only 13 percent of crossings have gates.

Exhibit 23: Vermont Highway-Rail Crossings by Countermeasure

	Count	Percent
Gates	49	13%
Flashing Lights, No Gates	195	52%
No Train-Activated Countermeasures	128	34%
Total	***372***	

Vermont funds crossing improvements through state and federal dollars. The state receives about $1 million per year in federal Section 130 crossings, and also incorporates highway-rail grade crossing components as part of highway projects in they are located within the vicinity of a project area. Over the past seven years, the State has improved 45 crossings. Exhibit 24 displays public highway-rail crossings in the state. As would be expected, the crossings tend to be most frequently located near towns. Many of the crossings are located on existing and proposed passenger rail routes. As Vermont seeks to improve the speeds of passenger rail trains, the state will need to ensure the safety of these crossings.

Exhibit 24: Public at Grade Crossings in Vermont



Federal and State Roles for Safety and Security

The government agency responsible for regulating, monitoring and improving safety on the nation's rail system is the Federal Railroad Administration (FRA). Post September 11, 2001, the Transportation Security Administration (TSA) has also been assigned oversight of some aspects of both passenger and freight rail operations, such as security-sensitive materials.

In 1970, U.S. Congress determined that there was a need to improve the safety of the nation's railroads and enacted the Federal Railroad Safety Act of 1970. The bill gave FRA specific authority over rail safety-related

matters and authorized the FRA to establish safety rules and civil penalties to enforce those rules. The Act fundamentally changed the role of the FRA's safety program, including, providing,

- Broad regulatory authority to address all areas of railroad safety;
- Strong emphasis on national uniformity of safety standards;
- Effective sanctions, including the ability to address emergency situations; and
- State participation in enforcement of national standards.

Regulations include hours of service provisions for employees operating trains, signal systems. Other regulations govern the requirements for testing and monitoring the performance railroad operating crews. These set requirements for training and qualifying supervisors conducting the testing and monitoring programs.

Federal regulations pertaining to railroad safety are described in Title 49 of the Code of Federal Regulations (CFR), Subtitle B, Chapter II. The FRA regulates grade crossing signal system safety in 49 CFR, Part 234. This part prescribes minimum maintenance, inspection, and testing standards for warning systems at highway-rail grade crossings and defines standards for reporting and acting upon system failures. The FRA also requires railroads to conduct periodic inspections of track in a manner stipulated by Track Safety Standards of 49 CFR Part 213. Railroads must use qualified inspectors and maintain records for FRA review. FRA inspectors also perform independent inspections. The same procedure applies to railroad structures such as bridges.

VTrans contributes to safety by undertaking projects to maintain rail infrastructure in a state of good repair, most often focused on track and grade crossing improvements. Project funding includes state funds, federal discretionary grants, as well as federal Section 130 grade crossing funds.

VTrans also participates in Operation Lifesaver, a national rail safety program dedicated to reducing and preventing rail-related accidents by making the public more aware of dangers at highway-rail grade crossings and preventing trespassing on railroad property.

Hazardous Materials

Railroads are required to comply with federal regulations regarding the safe transportation and reporting of hazardous materials. The FRA administers a safety program that oversees the movement of hazardous materials including dangerous goods such as petroleum, chemical, and nuclear products throughout the nation's rail transportation system. FRA's role in the safety program also extends to shipments transported to and from shippers in Canada or Mexico. The FRA also has authority to oversee the movement of shipments marked hazardous so that transportation of these shipments complies with U.S. and international standards even if the shipment does not contain hazardous materials. The FRA's current hazardous materials safety regulatory program includes the following components:

- Hazardous Materials Incident Reduction Program;
- Tank Car Facility Conformity Assessment Program;
- Tank Car Owner Maintenance Program Evaluations;
- Spent Nuclear Fuel and High-Level Nuclear Waste Program;
- Railroad Industrial Hygiene Program;
- Rulemaking, Approvals, and Exemptions;
- Partnerships in Domestic and International Standards-Related Organizations (e.g., AAR, American Society of Mechanical Engineers (ASME), Transportation of Dangerous Goods/Canadian General Standards Board (TDG/CGSB); and

- Education, Safety Assurance, Compliance, and Accident Investigation.

The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 was created to help communities plan for emergencies involving hazardous substances. Developed in response to concerns regarding environmental and safety hazards associated with storage and handling of toxic chemicals, EPCRA requires public and private organizations to develop hazardous chemical emergency plans. EPCRA also requires private industry to report on the storage, use and releases of hazardous chemicals to appropriate government agencies.

EPCRA increases the public's knowledge and access to information on the disposition of chemicals at specific facilities. States and communities can use the information to improve chemical safety and protect public health and the environment. Key provisions of EPCRA include:

- Sections 301 to 303. Emergency Planning - Local governments are required to prepare chemical emergency response plans, reviewed at least annually. State governments are required to oversee and coordinate local planning efforts. Locations where Extremely Hazardous Substances (EHS) are kept in quantities above a threshold are required to participate in emergency plan preparation.
- Section 304. Emergency Notification - Facilities must immediately report accidental releases of EHS chemicals and hazardous substances in quantities greater than corresponding Reportable Quantities (RQs) defined under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to state and local officials. Information about accidental chemical releases must be available to the public.
- Sections 311 and 312. Community Right-to-Know Requirements - Facilities manufacturing, processing, or storing certain hazardous chemicals must make Material Safety Data Sheets (MSDSs) available to state and local officials and local fire departments. MSDSs describe the properties and health effects of these chemicals. Facilities must also report to state and local officials and local fire departments inventories of all on-site chemicals for which MSDSs exist. Information about chemical inventories at facilities and MSDSs must be available to the public.

Long-term storage of rail cars also requires specific reporting requirements to state governments and local fire departments. The State of Vermont HAZMAT Team was created in 1994 to assist all fire departments in Vermont in managing hazardous materials incidents. The Team's authorizing legislation as well as the creation of the HAZMAT Team Chief can be found in Vermont Statutes, 20 V.S.A. § 33.

The Team works with local fire chiefs before, during and after hazardous materials events. HAZMAT Technicians are located across the State and are supported with three HAZMAT response vehicles. HAZMAT response vehicles are augmented by 20 HAZMAT trailers positioned in local fire departments around the State. These trailers contain equipment which may be used for operations level HAZMAT response as well as to perform decontamination. The Vermont HAZMAT Response Team (VHMRT) endeavors to have highly trained and equipped personnel available at any hazardous material event quickly. Hazmat training for municipal officials is offered by the HAZMAT Team, as well as the Vermont Fire Academy.

2.1.6 Economic and Environmental Impacts

Economic Impact of Rail in Vermont

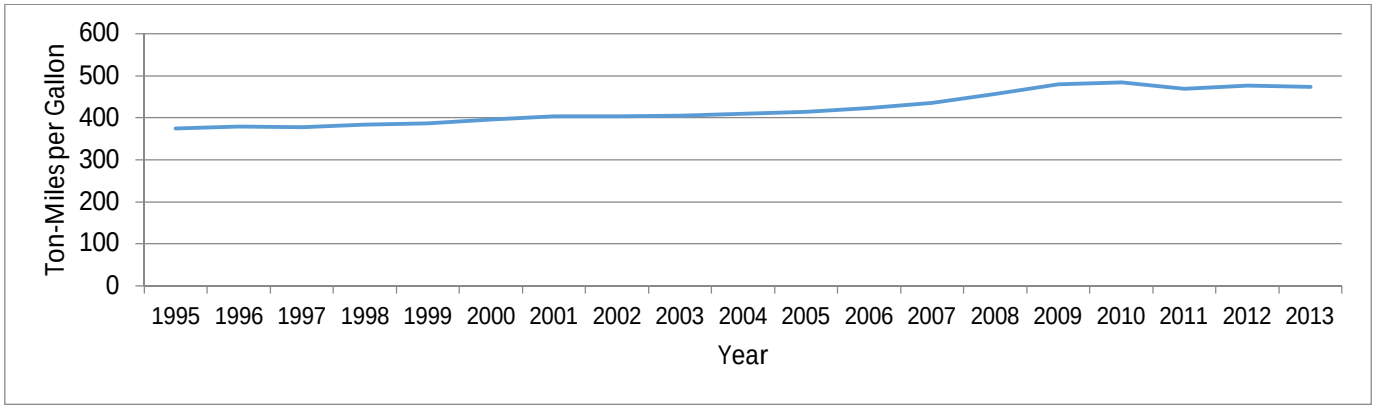
According to the Association of American Railroads (AAR), the railroad industry employed 168 individuals in Vermont in 2011 with average wages and benefits of $84,650. The same year, 750 railroad retirement beneficiaries were located in Vermont, receiving collectively $14 million in retirement benefits. A number of important industries within the state rely on rail. For example, Exhibit 35 below lists freight-intensive industries. Some of these rely on rail, while others do not. Included among those that do rely on rail are manufacturing

operations of food products, nonmetallic minerals, paper, chemicals, wood products, as well as mining. Collectively, these industries employ at least 11,000 people in the state. Efforts to use rail to promote economic development in Vermont are discussed in more detail in Chapter 4.

Energy Impact of Rail in Vermont

Relative to trucking, freight rail is an energy-efficient mode of transportation. A 2009 study for the National Waterways Foundation estimated that rail was more than three times as energy efficient as trucking. Rail can haul a ton of freight 473 miles on a gallon of fuel, whereas truck freight can carry a ton of freight an average of only 150 miles on a single gallon of fuel.[16] Given estimated ton-miles for freight rail in Vermont in 2012 and using the National Waterways Foundation estimates of the relative fuel consumption between truck and rail, the Vermont rail system saved about 2 million gallons of fuel in 2012, compared to the case where this freight would have been hauled by truck. These savings include only the portion of these freight movements within Vermont. Railroads continually improve their fuel efficiency. Average ton-miles per gallon of fuel consumed by the railroad industry improved by more than a quarter between 1995 and 2013, from 375 to 473. This trend is shown in Exhibit 25.

Exhibit 25: Railroad Industry Average Ton-Miles per Gallon of Fuel Consumed

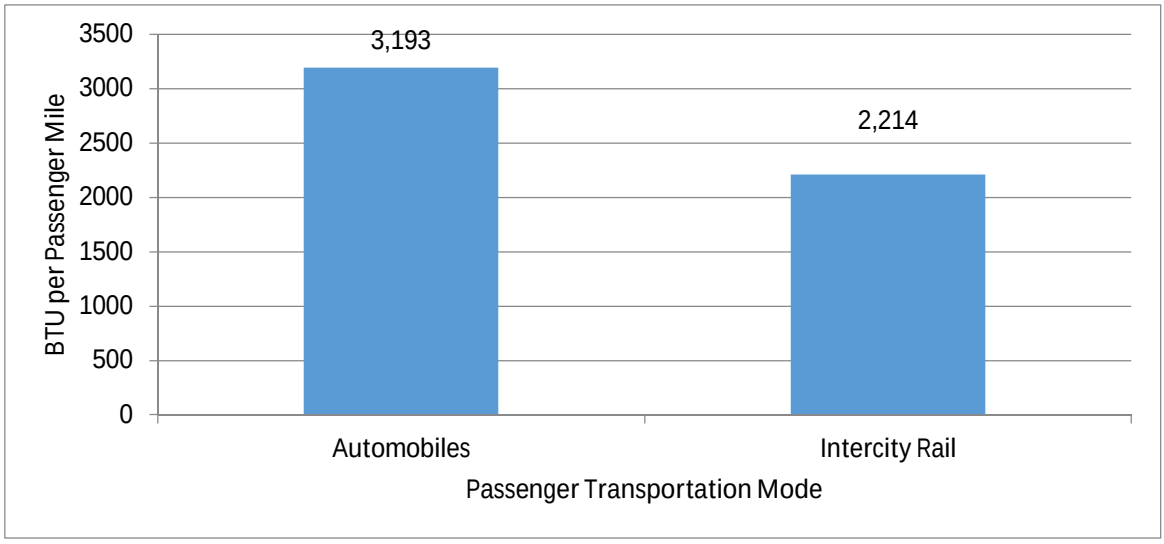


Source: AAR

Passenger rail is also more fuel efficient than highway travel. According to 2012 data gathered by the U.S. Energy Information Administration (EIA), intercity passenger rail consumes about 30 percent less energy per passenger-mile than automobile travel.

[16] *Texas Transportation Institute for the National Waterways Foundation, A Modal Comparison of Domestic Freight Transportation Effects on the General Public 2001 - 2009,February 2012.*

Exhibit 26: 2012 BTUs per Passenger Mile



Source: EIA, Transportation Energy Data Book, 31st Edition

Because rail is more fuel efficient per ton- or passenger-mile, a diversion of freight or passengers from highway transportation to rail would decrease fuel consumption. For example, assuming the 2012 passenger miles as shown in Exhibit 55, the BTU per gallon for rail (assumed to be diesel) and BTU per gallon for highway (assumed to be gasoline), Vermont's passenger rail services saved approximately 275,000 gallons of fuel in 2012.

Environmental Impact of Rail in Vermont

Since rail transportation consumes less fuel than highway transportation (per ton or passenger mile), rail produces fewer greenhouse gases, of which carbon dioxide is the primary component. Assuming that greenhouse gas emissions are proportional to fuel consumption and given the U.S. Energy Information Administration (EIA) estimate that burning diesel fuel produces 22.38 pounds of CO_2 per gallon, the Vermont freight rail network saved about 20,000 metric tons of CO_2 in 2012, solely including the portion of freight movements in Vermont.

Passenger rail similarly produces lower greenhouse gas emissions per passenger mile than automobile travel. Assuming that railroad locomotives emit CO_2 at 22.38 pounds per gallon of diesel consumed, and also per the EIA, burning gasoline produces 19.64 pounds per gallon, Vermont's passenger rail services saved an approximately 2,000 tons of CO_2 in 2012.

Vermont Energy and Emissions Initiative

Through an energy planning process that culminated into the *2011 Comprehensive Energy Plan*, Vermont has laid out a goal to achieve 90 percent renewable energy by 2050. The transportation sector accounts for the single largest energy use sector at 34 percent, and this sector is highly dependent on gasoline and diesel for the vast majority of transportation needs. Transportation also accounts for the largest share of the state's greenhouse gas (GHG) emissions.

Dependence on oil creates economic and environmental challenges. Vermont residents and businesses spend a higher percentage of their income on transportation than the rest of the country. Due to the state's rural character, Vermonters travel further from their homes to employment, services, and shops than many other Americans. In 2010, Vermonters spent $1.1 billion on gasoline and diesel fuel for transportation. Consumption of petroleum results in a tremendous outflow of wealth from the state. Furthermore, this dependence on oil prevents Vermont from reaching environmental goals related to lower GHG emissions.

The two major goals for transportation identified in the Comprehensive Energy Plan include:

- Reduce petroleum consumption through new, more energy efficient vehicle technologies and accelerate the switch to cleaner, less carbon intensive fuels; and
- Reshape the transportation system by providing services, infrastructure, and facilities that allow for more energy efficient movement of people and goods.

Rail contributes to these goals by moving passengers and freight in a more energy-efficient manner than diesel powered trucks. Freight rail is one of the most energy-efficient modes for moving goods. According to the Association of American Railroads, freight railroads can transport a short ton (2,000 lb) approximately 436 miles on a gallon of fuel. Similar efficiencies are found moving passengers by rail.

Recent greenhouse gas modeling undertaken by VTrans has shown that any progress made in emissions reductions by switching to electricity in the light duty sector will be reduced by growth in emissions from the truck/freight sector. Switching more freight to rail must be part of the state's greenhouse gas reduction efforts.

The Comprehensive Energy Plan identifies the following two rail strategies to help in reducing energy use:

- Quadruple passenger rail trips, to 400,000 Vermont-based trips by 2030.
- Double the amount of rail freight tonnage in the state from 2011 levels by 2030.

These strategies can be met by continuing the pattern of capital and operating investments in rail, and by encouraging conducive land use patterns. In terms of freight, Vermont has an abundant amount of rail-oriented land uses, including vacant manufacturing facilities and railroad sidings. These facilities – dating back to the days of heavy industry and resource-extraction sectors – can be repurposed for modern economic activity (specialized manufacturing, transportation & logistics, etc.)

Passenger rail also complements existing land use patterns. Vermont has a longstanding goal of encouraging concentrated mixed-use development in and near downtowns and villages, while protecting natural resources and working landscapes outside of those areas. This traditional land use pattern supports the densities needed for passenger rail to remain a viable mode of transportation.

Resiliency Impact of Rail in Vermont

By adding alternative routes and redundancy to the state's passenger and freight transportation network, rail provides a resiliency benefit in the event that emergency conditions impact the availability of the roadway network for travel, disaster response, or other immediate needs.

Vermont Efforts to Improve Transportation Resiliency

Most recently, tropical storm Irene is a stark reminder of why resiliency planning is important for the people and economy of the future. Affecting Vermont in August 2011, it was the worst natural disaster to hit Vermont in generations - in many places the damage was worse than the historic floods of 1927, long the benchmark against which all storms were compared. Up to 8.5 inches of rain fell in parts of the state and 225 of the State's 251 town suffered infrastructure damage.[17] Six fatalities were reported in Vermont and the total damage to property and infrastructure amounted to $733 million.[18]

[17] *Huffington Post:* http://www.huffingtonpost.com/2013/08/28/hurricane-irene-2-years-later_n_3827088.html
[18] *NY Daily News:* http://www.nydailynews.com/new-york/hurricane-irene-year-storm-cost-15-8-damage-florida-new-york-caribbean-article-1.1145302

The State's transportation infrastructure was especially hard hit: more than 500 miles of state highway and 200 bridges were damaged, with more than 2,000 segments of municipal road damaged along with more than 280 bridges and 960 culverts. The rail network suffered as well: 107 washouts including 50 very large washouts, and six rail bridges had major structural damage.[19,20] In total, more than 200 miles of rail in the state-owned rail system were damaged, and with the bridges cost the state an estimated $21.5 million in repairs. The New England Central Railroad also required repairs at 66 locations.[21] As a result, more than half of the state owned Vermont Railway was shut down for over three weeks.[22] Service on Amtrak's *Vermonter* was suspended for five weeks while track repairs were made.[23]

Exhibit 27: Washed out Vermont Rail Line

Consequently, after Tropical Storm Irene, Vermont advanced a collaborative effort to identify lessons learned, along with a series of preemptive actions and plans to minimize the impacts and costs of similar events in the future. A significant part of these resiliency planning efforts is to integrate improvements to infrastructure to be able to withstand weather events and climate change with the aim of mitigating property loss.

At a statewide scale, efforts such as the Resilient Vermont Project led by the Institute for Sustainable Communities are shaping Vermont as a model of community, economic, and environmental resilience. Working with key stakeholders from state and local governments, businesses and non-profits, the Resilient Vermont Project is

[19] *Vermont Agency of Natural Resources: http://www.anr.state.vt.us/anr/climatechange/irenebythenumbers.html*
[20] *Vermont Railway http://www.vermontrailway.com/news_pages/images/gallery.pdf*
[21] *Vermont Agency of Natural Resources Lessons from Irene: Building resiliency as we rebuild: http://www.anr.state.vt.us/anr/climatechange/Pubs/Irene_Facts.pdf*
[22] *Vermont Railway http://www.vermontrailway.com/news_pages/images/gallery.pdf*
[23] *VTrans http://vtransoperations.vermont.gov/sites/aot_operations/files/documents/connections/AOT-OPS_Tropical_Storm_Irene_Special_Edition2011.pdf*

developing an integrated long-term strategy for resilience – bringing together state, regional and local initiatives; and better equipping the state to prepare for, respond to, and bounce back from future climate impacts and natural disasters.[24]

As part of these efforts, a roadmap to resilience was created, with four key principals:

- Know Our Risks
- Elevate & Integrate Emergency Management
- Align Rules & Investments for Stronger Communities
- Working Together & Learning Together

In support of these efforts, VTrans is working with railroads and state and local officials to implement the following infrastructure-focused recommendations from Resilient Vermont as related to the State's rail network:

- Incorporate best-available climate and risk information into statewide plans to inform priorities and investments
- Support a sustained river corridor mapping program that provides information about flood and erosion risk to inform local, regional and state plans and the identification of hazard mitigation projects
- Participate in a statewide transportation vulnerability assessment that produces a statewide data set and map that shows areas of highest vulnerability and used to guide prioritization of investment.
- Provide guidance and incentives for proactive investment in transportation infrastructure

VTrans is also incorporating resiliency planning in the VTrans Strategic Plan (January 2015)[25] specifically calling out a resiliency-related goal and objective:

- Goal 1: Provide a safe and resilient transportation system that supports the Vermont economy
  - Increase the resilience of the transportation network to floods and other extreme weather and events.

To that end, VTrans is advancing multiple initiatives through the VTrans - Vermont Transportation Resiliency Plan to adapt the state's transportation infrastructure to prepare for future climate change including incorporating adaptive management, policies, and plans into every level of planning, design, operations, and maintenance.[26] VTrans is also expanding programs to gather and monitor data, increase adaptive capacity, and incorporate risk-management into the decision-making process. VTrans resiliency planning involves four considerations throughout this process:

- Vulnerability assessment
- Risk assessment
- Adaptation strategies
- Implementation actions

VTrans has started to develop a vulnerability assessment, identifying roadways in high sensitive river areas and assessing roadway bridges' vulnerability to scour damage. To develop an understanding of the vulnerability of the entire transportation system, it is recommended that rail assets also be included in this vulnerability assessment.

---

[24] Institute for Sustainable Communities, Resilient Vermont: http://resilientvt.org/
[25] VTrans Strategic Plan: http://vtrans.vermont.gov/sites/aot/files/VTransStrategicPlan.pdf
[26] Adapting Vermont's Transportation Infrastructure to the Future Impacts of Climate Change, VTrans, August 13, 2012, http://vtransplanning.vermont.gov/sites/aot_policy/files/documents/planning/Climate%20Change%20Adaptation%20White%20Paper.pdf

Safety Impact of Rail in Vermont

Rail transportation is a relatively safe mode of transportation and imposes fewer risks to the general public relative to trucking. For example, during the years 2006 and 2007, a total of 117 people were killed or injured as a result of crashes involving large trucks in Vermont.[27] According to the FRA safety database, during the same time, only two injuries involving the general public resulted from train operations within the state.

Although rail-related accidents and incidents have declined per statistics shown in Exhibit 22 above, safety remains a concern for the Vermont rail system. Some crossings do not have warning devices, and according to one railroad representative, sight lines at some unsignalled crossings are insufficient, compromising safety. VTrans continues to seek to improve crossings through a mixture of state and federal funding. Trespassing on railroad right-of-ways remains an issue, including trespass by pedestrians and individuals using motorized transport, and at least one rail carrier advocates tougher trespassing laws.

VTrans has expressed interest in updating its methodology for prioritizing crossing improvements. The FHWA requires that states maintain a systematic method for identifying crossings that have the most need for safety and/or operational improvements. According to the FHWA *Railroad-Highway Grade Crossing Handbook,*[28] the prioritization of crossing improvements should be based on:

- The potential reduction in the number and/or severity of collisions.
- The cost of the projects and the resources available.
- The relative hazard of public highway-rail grade crossings based on a hazard index formula.
- On-site inspections of public crossings.
- The potential danger to large numbers of people at public crossings used on a regular basis by passenger trains, school buses, transit buses, pedestrians, bicyclists, or by trains and/ or motor vehicle carrying hazardous materials.
- Other criteria as appropriate in each state.

The identification of which crossings to improve with what improvements is usually a multistep process. States typically develop a short list of crossings to improve based on an accident prediction model or a hazard index. VTrans currently uses a "Rail-Highway Crossing Sufficiency Rating." What factors are included in the hazard index varies by state, but some common considerations are the following.

- Train volumes
- Train speeds
- Average daily vehicle traffic
- Highway characteristics (number of lanes, surface type)
- School-bus frequency and passenger load
- Existing warning devices (passively signed, flashing lights only, or gates)
- Age of existing warning signals, where applicable
- The number of mainline and side tracks in use
- The crossing's 10-year accident history
- Passenger trains on rail line
- Hazardous material shipments over rail line

[27] The Vermont Center for Justice Research, *Vermont Crash Data Resource Book, 2006 and 2007.*
[28] *http://safety.fhwa.dot.gov/xings/com_roaduser/07010/index.htm*

The information used to develop the hazard index is updated annually. The crossings with the highest hazard index are then reviewed by diagnostics teams, frequently involving field inspections. The field inspections allow the team to:

- Verify data on the crossing, such as traffic, train counts, school bus count
- Review sight restrictions
- Assess roadway and railroad grade crossing geometries
- Assess impacts of nearby roadways to the crossing
- Review adjacent crossings to determine if crossings can be closed or consolidated
- Determine if trackage through crossing can be retired.

Usually, a final component of the diagnostic review is to recommend an appropriate treatment of the crossing, such as the appropriate warning device. As many crossings as possible are selected given available funding.

Local input is often an additional factor in selecting grade crossing improvement projects. Some states actively solicit input from local road authorities to identify hazardous crossings. Crossings may have low accident prediction rates but may nevertheless be hazardous, because of geometric characteristics or other unique factors. Some states have developed formal processes for soliciting potential projects from local agencies with standard forms that localities can use to describe existing problems and proposed solutions.

2.2 The State's Existing Rail System: Trends and Forecasts

2.2.1 Demographic and Economic Growth Factors

Freight transportation demand is driven by a state's demographic and industrial structure, especially by those industries most dependent upon freight transportation. As such, the economic future of Vermont and the success of its major industries are intertwined with the capabilities of the state's freight transportation network. The capacity, accessibility, efficiency, and reliability of this transportation system will be a key contributor to economic competitiveness, enabling Vermont's industries to grow. In turn, this growth in freight demand will be determined by the relative success of freight-related industries and general demographic trends.

Gross State Product

Vermont's Gross State Product (GSP), a universal measure of economic size and activity, was $28 billion (2013$) in 2010. Using Moody's Economy.com forecast from November 2013, Vermont's GSP is expected to grow from $28 billion (2013$) in 2010 to $46 billion (2013$) in 2040, an average compound annual growth rate (CAGR) of approximately 1.6 percent (see Exhibit 28).

Over the last 30 years, Vermont's economy grew at an annual rate of approximately 3 percent, but the recent 2013 Economy.com forecast anticipates a future growth rate of about half that of the previous 30 years. Those industries that characterized and carried the state's growth between 1980 and 2010 were concentrated primarily in manufacturing and services, which were among those hardest hit by the recession. While most of Vermont's economic sectors are projected to grow over the next 30 years, some at rates faster than in the past, two sectors - government, and education and health services – are projected to decline.

Exhibit 28: Gross State Product by Major Industry, 1980, 2010, and 2040 (millions of 2013 dollars)

Major Industry	1980	2010	2040	Annual Percent Change (1980-2010)	Annual Percent Change (2010-2040)
Financial Activities	$2,239	$5,522	$7,698	3.1%	1.1%
Retail Trade	$710	$2,403	$6,218	4.2%	3.2%
Manufacturing	$1,120	$3,696	$7,548	4.1%	2.4%
Professional and Business Services	$749	$2,305	$3,811	3.8%	1.7%
Information	$394	$815	$1,535	2.5%	2.1%
Government	$1,672	$3,821	$3,569	2.8%	-0.2%
Wholesale Trade	$357	$1,219	$3,991	4.2%	4.0%
Education and Health Services	$1,428	$3,349	$3,184	2.9%	-0.2%
Transportation and Utilities	$503	$1,218	$2,559	3.0%	2.5%
Leisure and Hospitality	$995	$2,068	$3,334	2.5%	1.6%
Construction	$946	$993	$1,430	0.2%	1.2%
Other Services (except Government)	$140	$175	$292	0.8%	1.7%
Natural Resources and Mining	$39	$36	$40	-0.3%	0.4%
TOTAL Non-Farm	**$11,291**	**$27,620**	**$45,209**	**3.0%**	**1.7%**
TOTAL All Industry	**$11,424**	**$28,009**	**$45,538**	**3.0%**	**1.6%**

Source: Economy.com and Cambridge Systematics, Inc. calculations.

Major Industries

Despite steady growth in Vermont between 1980 and 2010, more moderate growth is anticipated between 2010 and 2040. The structure of the economy in the State is anticipated to change with a focus away from government, education and health services, Vermont's second and third largest economic sectors, to an increased reliance on retail trade, wholesale trade and other services industries. Along with manufacturing the financial services, retail trade, and wholesale trade industries will contribute over half of the total output in Vermont by 2040.

The concentration in Vermont's economic structure did not change substantially from the 2009 Economy.com forecast, with financial services leading the contribution to the state's economy in the future. However, the more significant divergences from the Freight Plan's economic forecast are the projected growth rates by industry. The 2009 forecast anticipated that all industries, with the exception of natural resources and mining, would grow over the next 30 years. In the revised forecast, it is expected that government, and education and health services industries would contract, at approximately 0.2 percent on average (Exhibit 28). The natural resources and mining sector is expected to grow slightly, due to growing demand for stone products and a modest recovery in forest products. This growth is likely beneficial for railroads, given their level of freight intensity, commodity characteristics and trading patterns that favor longer hauls.

Employment

Jobs in Vermont are expected to increase from 306,900 in 2010 to 334,800 jobs in 2040, a growth rate of 0.3 percent annually. This growth rate is not only one quarter the rate of the previous 30 years but also lower than the expected growth rate in the 2009 Economy.com forecast, which is not surprising given the more conservative GSP forecast. Exhibit 29 shows employment by major industry in Vermont in 1980, 2010, and 2040. By 2040, the education and health services sectors are anticipated to have the highest number of employees, with the retail trade and government sectors following closely behind. These three economic sectors are expected to account for slightly over half of all jobs in Vermont. In 1980, the largest sector for employment was manufacturing, which contributed over 20 percent of all jobs statewide, but has declined since. Following this trend, manufacturing, along with transportation and utilities are also expected to see a decline in employment by 2040.

Exhibit 29: Employment by Major Industry, 1980, 2010, and 2040 (thousands)

Major Industry	1980	2010	2040	Annual Percent Change (1980-2010)	Annual Percent Change (2010-2040)
Financial Activities	9	12	14	0.9%	0.5%
Retail Trade	36	56	63	1.5%	0.4%
Manufacturing	45	31	22	-1.2%	-1.1%
Professional and Business Services	8	23	31	3.4%	1.1%
Information	5	5	5	0.3%	0.0%
Government	33	55	57	1.7%	0.1%
Wholesale Trade	7	9	10	1.3%	0.3%
Education and Health Services	28	59	66	2.5%	0.4%
Transportation and Utilities	6	9	8	1.4%	-0.4%
Leisure and Hospitality	13	24	26	2.1%	0.3%
Construction	10	14	21	0.9%	1.5%
Other Services (except Government)	0.3	1	2	3.4%	1.7%
Natural Resources and Mining	1	1	1	-0.5%	0.6%
TOTAL Non-Farm	**200**	**298**	**327**	**1.3%**	**0.3%**
TOTAL All Industry	**215**	**307**	**335**	**1.2%**	**0.3%**

Source: Economy.com and Cambridge Systematics, Inc. calculations.

When compared to economic output expected over the next 30 years, employment growth is much smaller than growth expected in GSP. While growth in employment is slow, when matched to GSP, several industries exhibit increasing growth in GSP suggesting that improvements in productivity are expected. Most notably, the manufacturing, transportation and utilities industries are expected to experience substantial increases in output with decreasing employment between 2010 and 2040. All other industries, with the exception of the government, education, and health services sectors, follow this trend of improvements in GSP growth at much higher rates than employment growth. Exhibit 30 and Exhibit 31 illustrate Vermont's job density.

Exhibit 30: 2013 Vermont Job Density

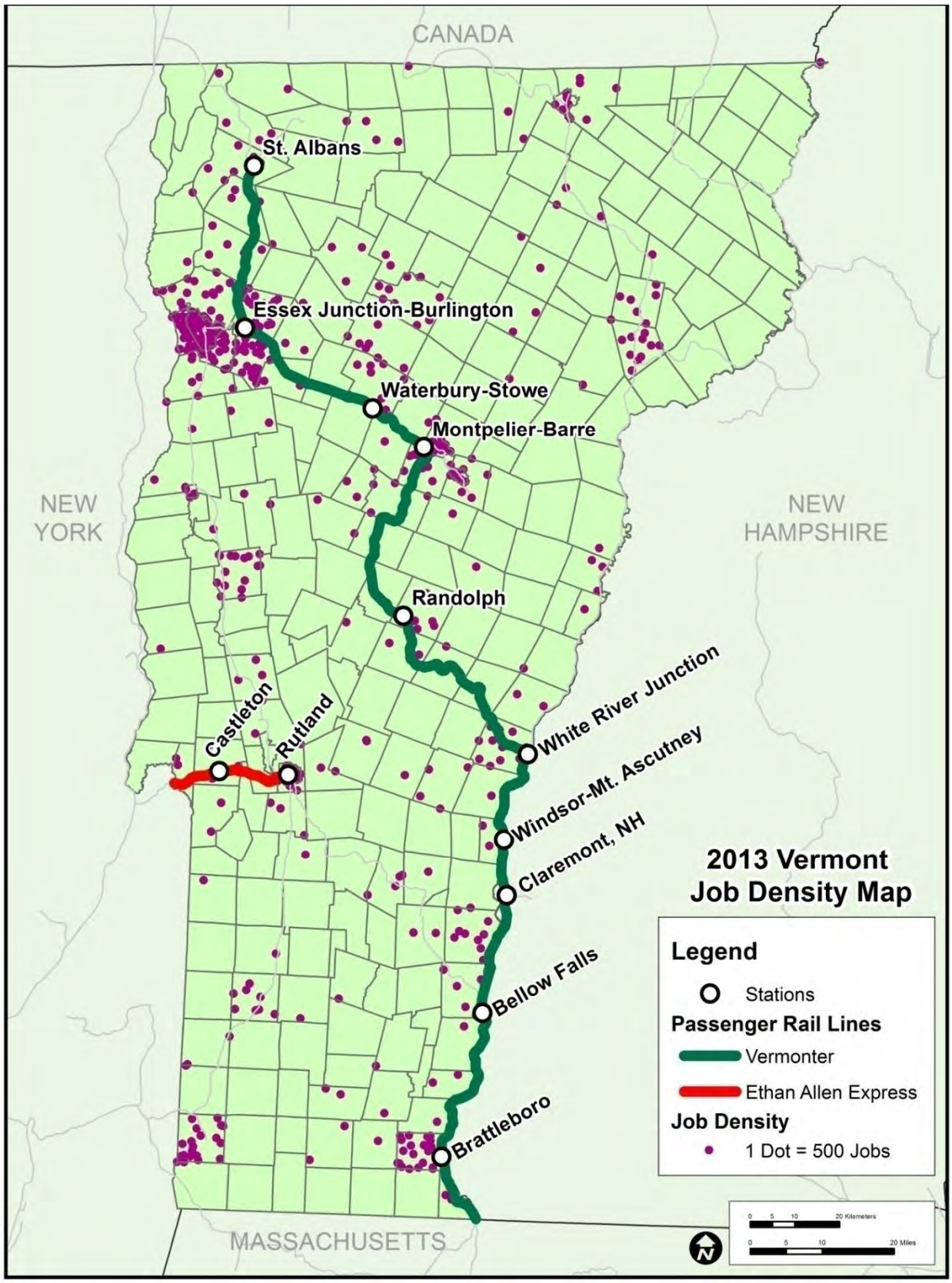
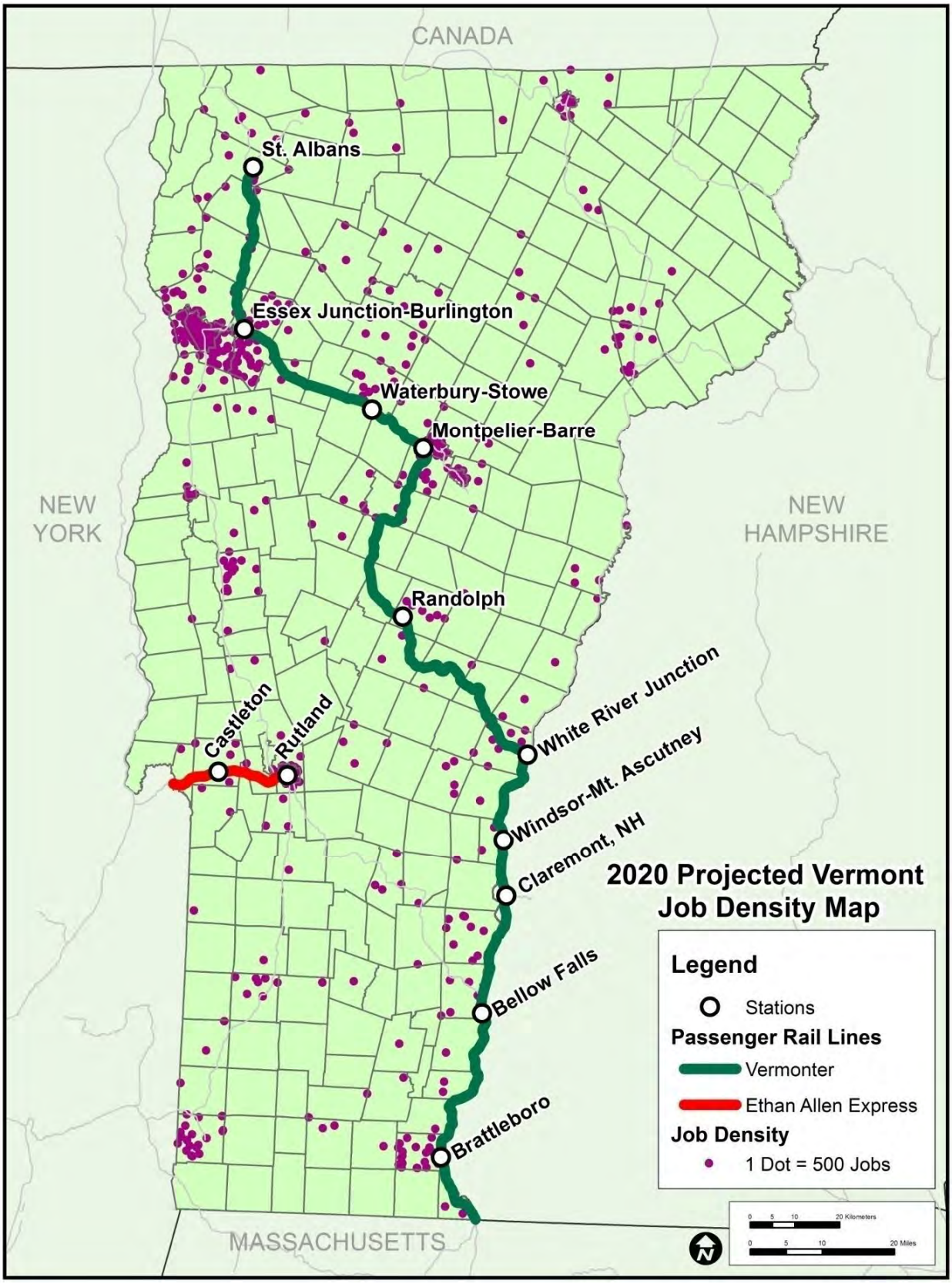


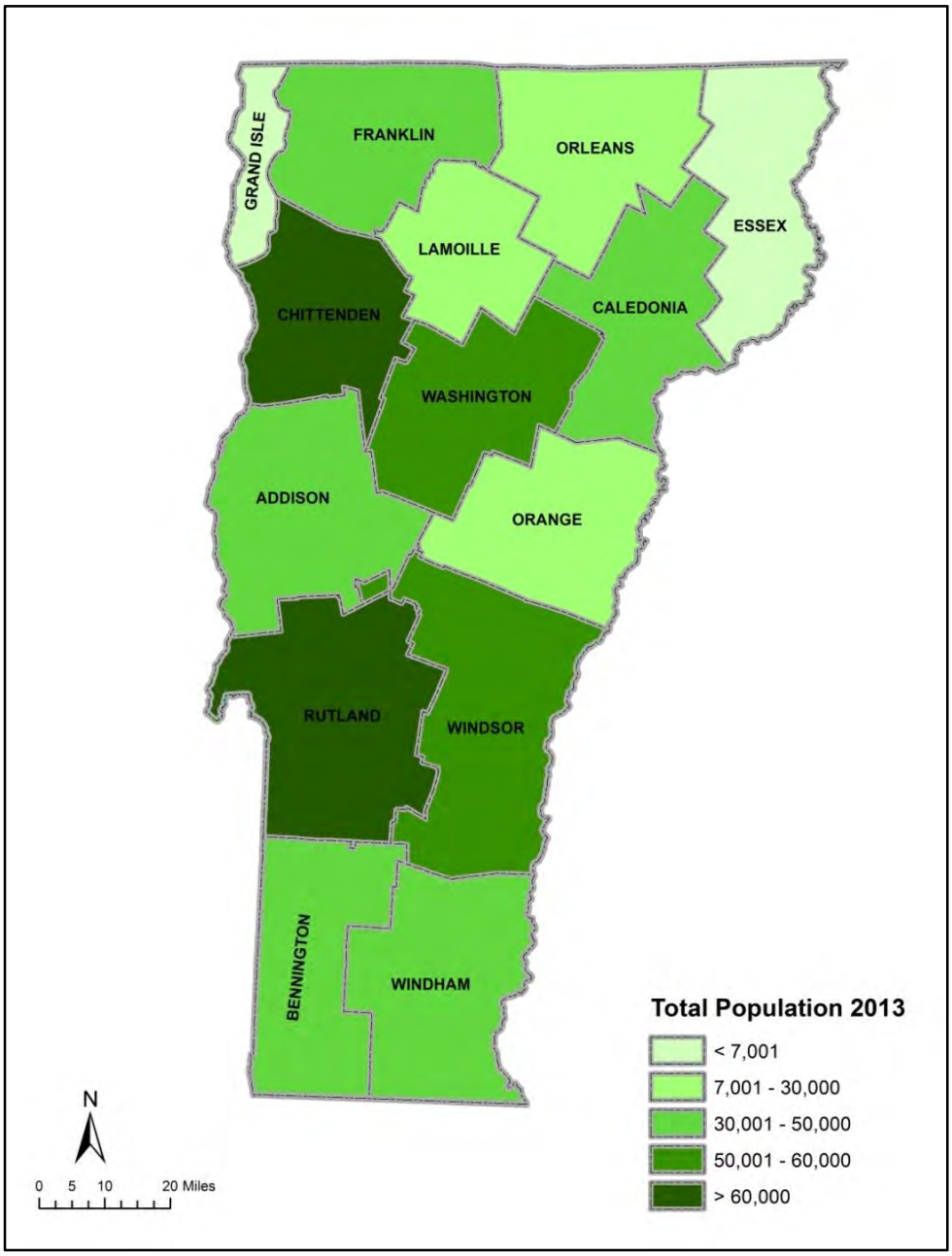
Exhibit 31: 2020 Projected Vermont Job Density



Population

With a population of 626,400, Vermont ranked 49th (Wyoming was 50th) among the 50 states in 2010. Exhibit 32 below shows Vermont's population by county in 2013. Only two counties – Chittenden (home to Burlington) and Rutland – had more than 60,000 residents, with the remaining 12 counties all having fewer residents.

Exhibit 32: Vermont Population by County, 2013



The Vermont Department of Commerce estimates that Vermont's population will experience modest growth through 2030, increasing from 626,000 in in 2010 to 670,000 in 2030. Assuming that the growth rate between 2030 and 2040 is consistent with that forecast for 2010 to 2030, the population as of 2040 would be 694,000. This

is moderately more than was forecast for the Freight Plan, which projected a 10.3 percent population increase to 686,000 by 2039. Exhibit 33 shows population and growth rates for 1980, 2010, 2020, 2030 and 2040.[29]

Exhibit 33: Population, 1980, 2010, 2020, 2030 and 2040 (thousands)

Vermont Population	1980	2010	2020	2030	2040	Annual % Chg (1980-2010)	Annual % Chg (2010-2020)	Annual % Chg (2020-2030)	Annual % Chg (2030-2040)
Total Population	514.4	626.4	643.6	670.1	693.1	0.7%	0.3%	0.4%	0.3%

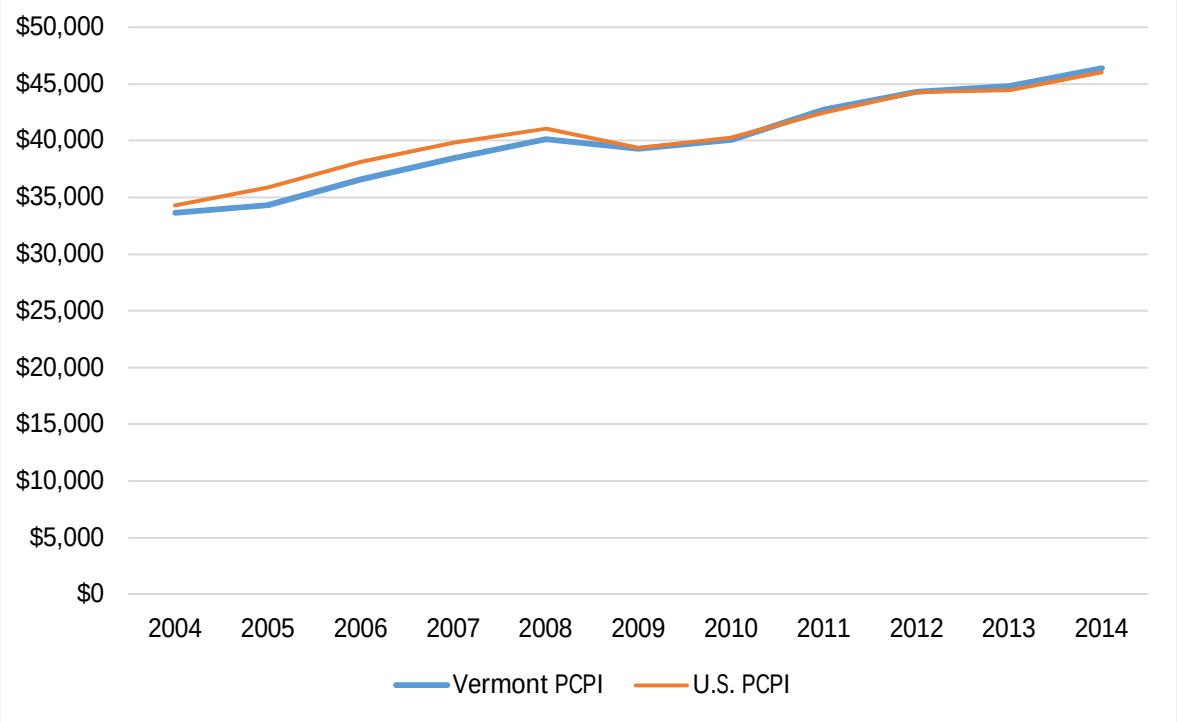
Source: Vermont Department of Commerce and Parsons Brinckerhoff calculations.

Income

In 2014, per capita personal income (PCPI) in Vermont was $46,428. This PCPI ranked 19th in the United States and was 101 percent of the national average, $46,049. The 2014 PCPI reflected an increase of 3.5 percent from 2013. The 2013-2014 national change was 3.6 percent. In 2004, the PCPI of Vermont was $33,652 and ranked 22nd in the United States. The 2004-2014 compound annual growth rate of PCPI was 3.3 percent. The compound annual growth rate for the nation was 3.0 percent. Exhibit 34 displays nationwide and statewide per capita personal income trends over the last decade.

In 2014, total personal income (TPI) in Vermont was $29.1 billion (not adjusted for inflation). This TPI ranked 50th in the United States due to the State's small population. In 2004, the TPI of Vermont was $20.9 billion and ranked 48th in the United States.

Exhibit 34: 2004-2014 per Capita Personal Income



Source: Bureau of Economic Analysis

[29] The Economy.com forecast used to examine activity by economic sector projects a .1 percent decline in population by 2040. This decline is projected to start in the mid-2020s, with the primary causes being increasing mortality rates among aging baby boomers and flat employment, which discourages immigration into the state.

Trends in Freight Intensive Industries

Vermont Gross State Product and Employment Trends in Freight Intensive Industries

The demand for freight transportation is primarily driven by commodity and goods-producing industries such as manufacturing, natural resources, transportation, warehousing/distribution, and utilities. These industries rely on freight transportation to obtain raw materials needed for production of goods used as inputs to other industries or as final goods for consumption. Exhibit 35 presents the GSP of freight intensive industries in 1980, 2010, and 2040, with most falling under the general manufacturing industry.

Exhibit 35: Gross State Product by Freight Intensive Industry, 1980, 2010, and 2040 (million of 2013 dollars)

Freight Intensive Industry	1980	2010	2040	Annual Percent Change (1980-2010)	Annual Percent Change (2010-2040)
Computer and Electronic Products	$56	$1,825	$4,151	12.3%	2.8%
Machinery Manufacturing	$204	$217	$303	0.2%	1.1%
Food Products	$79	$395	$560	5.5%	1.2%
Transport Equipment	$126	$118	$394	-0.2%	4.1%
Miscellaneous Manufacturing	$65	$247	$248	4.6%	0.0%
Plastics and Rubber Products	$40	$83	$163	2.4%	2.3%
Nonmetallic Mineral Products	$54	$98	$230	2.0%	2.9%
Paper Manufacturing	$87	$82	$43	-0.2%	-2.1%
Wood Products	$73	$131	$142	2.0%	0.3%
Chemical Manufacturing	$24	$33	$49	1.0%	1.3%
Furniture and Related Products	$40	$51	$26	0.8%	-2.2%
Mining	$39	$36	$36	-0.3%	0.0%
Forestry and Logging	$133	$389	$329	3.7%	-0.6%
Beverage and Tobacco Products	$4	$32	$38	6.9%	0.5%
Textiles and Leather	$45	$24	$20	-2.0%	-0.6%
Primary Metal Manufacturing	$24	$14	$26	-1.7%	2.0%
TOTAL Freight Intensive	$1,093	$3,774	$6,757	4.2%	2.0%
TOTAL Non-Freight Intensive	$10,331	$24,235	$38,780	2.9%	1.6%
TOTAL All Industry	$11,424	$28,009	$45,538	3.0%	1.6%

Source: Economy.com and Cambridge Systematics, Inc. calculations.

Similar to the findings from the Vermont Freight Plan, the volatility in the freight intensive industries represents an obstacle for freight planning. Rail freight primarily consists of commodities moving distances over 500 miles with lower time sensitivity. Typically, this equates to farm products, fuel, aggregates and sand, nonmetallic minerals, wood, chemicals, coal, scrap metal, and transportation related equipment. Most, if not all, are inputs for various manufacturing industries to produce goods for consumption. Volatility in historical and projected rates of growth are most prevalent in the manufacturing of computer and electronic products, paper products, and machinery. Large swings in growth between the two periods analyzed (1980 to 2010 and 2010 to 2040) impact the ability to forecast long-term demand for raw material inputs for which rail transportation is suitable. Specifically, the paper products and machinery manufacturing industries may present difficulties in planning for demand of the freight rail infrastructure needed for these industries given their substantial cyclicality and variations in projected growth. Although computer and electronics production also demonstrates similar fluctuations in the growth projection, this industry does not have a direct impact on rail demand, as it is largely reliant on truck and air carriage.

Freight intensive industries in Vermont are expected to grow between 2010 and 2040 but at about half the rate of the previous 30 years. Freight intensive industries are expected to grow faster than non-freight intensive industries, mostly services, over the next 30 years.

In contrast to the general output growth anticipated in the freight intensive industries, employment in the same industries is projected to decline, with the exception of three industries: mining, forestry/logging, and the beverage and tobacco products manufacturing. Exhibit 36 provides data on employment trends in the freight intensive industries in 1980, 2010, and 2040 in Vermont. Overall, the projected change in employment between 2010 and 2040 does not vary much from the change in employment between 1980 and 2010, which suggests that the composition of Vermont's manufacturing sector will be similar to that of today. The shifts in some of the manufacturing sub-sectors that would impact rail (e.g. mining, forestry/logging), imply expected growth over the next 30 years.

Exhibit 36: Employment by Freight Intensive Industry, 1980, 2010, and 2040 (thousands)

Freight Intensive Industry	1980	2010	2040	Annual Percent Change (1980-2010)	Annual Percent Change (2010-2040)
Computer and Electronic Products	12	7	5	-1.8%	-1.1%
Machinery Manufacturing	5	3	1	-2.2%	-3.6%
Food Products	2	4	4	2.3%	-0.3%
Transport Equipment	3	2	2	-1.5%	-0.5%
Miscellaneous Manufacturing	1	2	1	2.6%	-2.4%
Plastics and Rubber Products	1	1	1	0.4%	-1.1%
Nonmetallic Mineral Products	2	2	1	-0.9%	-0.6%
Paper Manufacturing	2	1	0.4	-2.5%	-3.0%
Wood Products	3	2	2	-1.8%	-0.6%
Chemical Manufacturing	1	1	1	-0.9%	-0.2%
Furniture and Related Products	1	1	1	1.1%	-0.7%
Mining	1	1	1	-0.2%	0.1%
Forestry and Logging	0.2	0.2	0.2	-1.3%	1.0%
Beverage and Tobacco Products	0.2	0.4	0.4	2.1%	0.2%
Textiles and Leather	2	1	0.2	-4.3%	-2.4%
Primary Metal Manufacturing	1	0.2	0.1	-5.6%	-1.7%
TOTAL Freight Intensive	36	26	19	-1.1%	-1.1%
TOTAL Non-Freight Intensive	**179**	**281**	**316**	**1.7%**	**0.4%**
TOTAL All Industry	**215**	**307**	**335**	**1.3%**	**0.3%**

Source: Economy.com and Cambridge Systematics, Inc. calculations.

Trade and Freight Transportation

The manufacturing industry is expected to see an average growth of two percent annually from 2010 to 2040. Growth in the freight intensive industries, which is expected to be faster than the non-freight intensive industries, will generate need for freight transportation in Vermont.

The Canadian market constitutes about ten percent of trade with Vermont in terms of dollars and 11 percent in freight tonnage.[30] With similar values for the amount of trade with the rest of the world, Canada is Vermont's single largest international trading partner. Given this, Eastern Canada's economy will influence the need for freight transportation in Vermont. Computer and electronic products along with natural resources are among the two major industries in which Canada is a major trading partner.[31] Since computer and electronic products are mainly transported by either truck or air freight, the focus turns to the natural resources and mining industry to understand the future demand for rail freight transportation. Because this trade is primarily concentrated in Eastern Canada, the data in Exhibit 37 present the major economic indicators for that region, which includes Halifax, Moncton, Ottawa-Gatineau, Quebec, and Toronto metropolitan areas.[32] Eastern Canada is expected to grow faster than Vermont by all economic indicators. In Eastern Canada, employment is expected to increase at

[30] *Vermont Freight Plan, Revised 2013*
[31] *Ibid*
[32] *Census metropolitan areas are defined by the Statistics Canada CANSIM II database.*

an annual rate of 1.8 percent, nearly six times faster than in Vermont. GSP growth, however, in Eastern Canada is expected to track more closely with expected Vermont GSP growth.

Exhibit 37: Major Economic Indicators in Eastern Canada, 1990, 2010, and 2040

Economic Indicator		1990*	2010	2040**	Annual Percent Change (1990-2010)	Annual Percent Change (2010-2040)
GSP	Billions 2013 CAD	$245	$407	$747	1.6%	2.0%
Employment	Thousands	3,073	4,307	7,372	1.1%	1.8%
Population	Thousands	-	8,343	13,249	-	1.6%

Source: Economy.com and Cambridge Systematics, Inc. calculations.

* Economy.com data were not available prior to 1990 for the Eastern Canada region and population data were not available prior to 1996.

** Economy.com forecast data for Eastern Canada were only provided to 2023. Thus, an extrapolation from 2024-2040 was calculated using the compound annual growth rate between 1990 and 2023.

As the economy and the population expand in Eastern Canada, a corresponding increase in cross-border trade is likely to occur, if the conditions are conducive for this trade to take place. This includes not only the location of trade corridors, but also the political climate and regulatory and administrative processes that can either facilitate or impede trade.

2.2.2 Vermont's Freight Demand and Growth by Type of Service

An analysis was performed for the rail traffic in the State, including domestic and international flows. The primary source of data for rail freight demand consisted of the Surface Transportation Board's (STB) 2011 Confidential Carload Waybill Sample. Additionally, the latest Federal Highway Administration's Freight Analysis Framework version 3.4 (FAF3.4) data were used as the source for the modal share analysis.

In 2011, Vermont generated about 39 million tons of freight, excluding through traffic[33] of which rail carried approximately five percent of Vermont's freight by tonnage. In 2011, 6.6 million tons of freight moved into, out of, within, or through the Vermont's rail system. Approximately 961,000 tons (14 percent) traveled inbound, 775,000 tons (12 percent) traveled outbound, and 326,000 tons (5 percent) traveled within the state. Through freight comprised a major part of the overall rail freight volume accounting for 4.6 million tons or 69 percent of the total. Through traffic is critical to the continued vitality of rail service in Vermont, and Vermont's strategic geographic position, as one of the gateways to Canada is a key driver of overhead freight.

Vermont's top trading partners for inbound and outbound rail shipments are New York, Canada, Maine, and the South Atlantic region. These trading partners account for 75 percent (1.3 million tons) of total inbound and outbound rail flows by weight.

Current Freight System

Excluding through traffic, Vermont freight volume totaled approximately 39 million tons in 2011. Trucks carried 91 percent of all inbound, outbound and intrastate freight tonnage. Rail carried about five percent of freight on a tonnage basis. Exhibit 38 indicates the estimated tons of freight movement by direction and by mode. These estimates were made using the provisional tonnage from the FHWA's Freight Analysis Framework version 3.4 (FAF3.4), and the 2011 tonnage data on rail demand from the Surface Transportation Board's (STB) Confidential Carload Waybill Sample.

[33] *FHWA's FAF commodity flow data, which was used for this analysis of total freight (across all modes) does not provide through flows.*

Exhibit 38: Freight Movements over All Modes by Direction and by Mode, 2011 Weight (in Thousands of Tons)

Mode	Inbound	%	Outbound	%	Intrastate	%	Total	%
Truck [a]	11,990	90%	7,740	87%	15,383	93%	35,113	91%
Rail [b]	961	7%	775	9%	326	2%	2,062	5%
Multiple Modes & Mail [a]	107	1%	75	1%	5	0%	186	0%
Air [a]	3	0%	2	0%	0	0%	5	0%
Other [a]	338	3%	260	3%	900	5%	1,498	4%
TOTAL	13,339	100%	8,851	100%	16,614	100%	38,864	100%

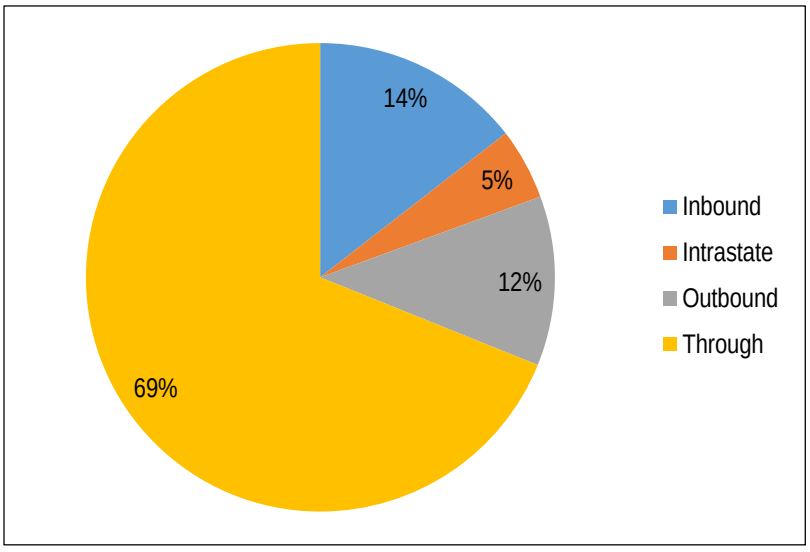
Source: a FHWA FAF3 2011 Provisional estimates
b STB 2011 Confidential Carload Waybill Sample data

Notes: Multiple modes and mail includes shipments by multiple modes and by parcel delivery services, U.S. Postal Service, or couriers. This category is not limited to containerized or trailer-on-flatcar shipments.

Current Freight Rail System Volume

Of the 6.6 million tons carried by the Vermont rail system in 2011, approximately 961 thousand tons (14 percent) traveled inbound, 775 thousand tons (12 percent) traveled outbound, and 326 thousand tons (5 percent) traveled within the State. Through freight accounted for 4.6 million tons or 69 percent of the total. Exhibit 39 charts the rail tonnage of inbound, outbound, intrastate and through freight for 2011.

Exhibit 39: Rail Volume by Direction, 2011 Weight



Rail Directional Analysis

Rail freight flows are assigned a direction according to the following definitions:

- Inbound rail movements originate outside of the state and terminate within the state. Inbound rail freight represents imports to the state. Because consumers and businesses must pay for goods received, inbound freight also is associated with a corresponding outflow of dollars from the region. Outbound rail freight movements originate within the state and terminate outside of the state. Outbound rail freight represents exports from the state and is considered wealth-generating freight because it is associated with an inflow of dollars to the region.
- Intraregional rail freight movements originate and terminate within the state. Intraregional rail moves represent the degree to which the state is trading with itself.
- Through rail freight, movements originate outside of the region, traverse the region, and terminate outside of the region. Through freight moves, while very important for the national and global economy, do not

directly influence the statewide economy to a significant degree; however, the movement of through freight does utilize and affect the state's rail infrastructure as a means to reach its final destination.

Of total rail tonnage carried to, from, within and across Vermont in 2011, 91 percent of tonnage was carried in railcars and nine percent in intermodal containers. In 2011, all of the intermodal containers and trailers traveling through the state were associated with Pan Am Railway's line between Mechanicville, NY and the Boston region that cuts through the far southwestern corner of Vermont.

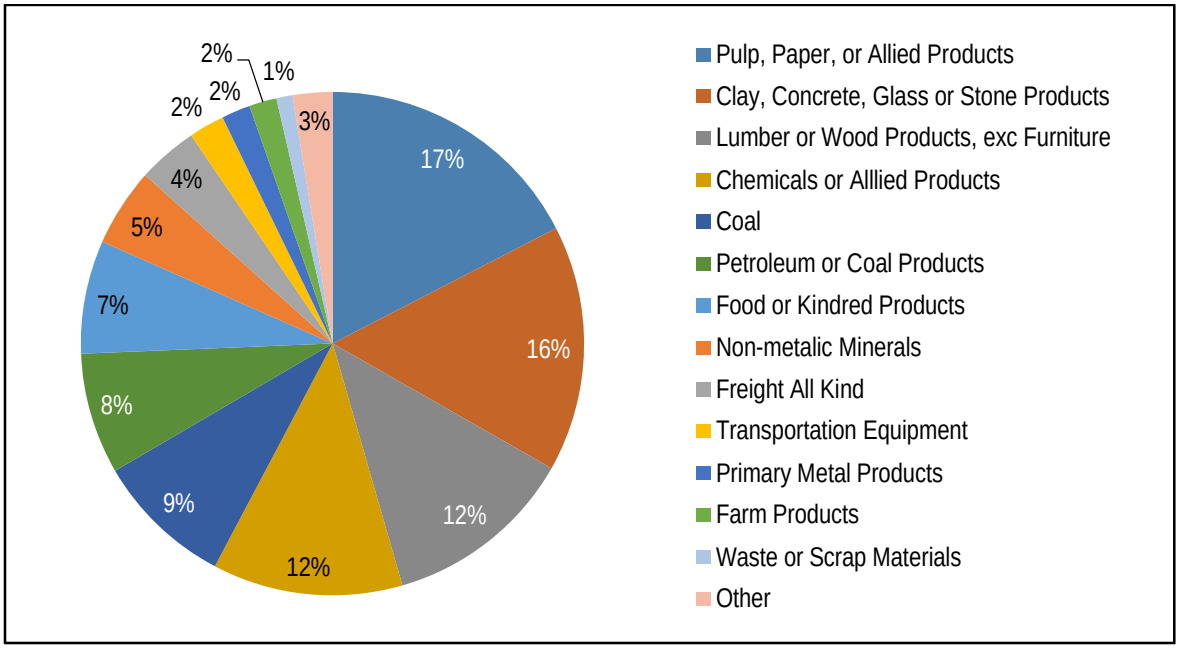
Top Rail Commodities

The top commodities by weight transported into, out of, within and through Vermont by rail in 2011 are shown in Exhibit 40 and Exhibit 41. The largest commodity group in terms of tonnage is pulp, paper or allied products accounting for 17 percent (1.2 million tons) of the tons moved in 2011. Most of these rail shipments are through traffic originating or terminating in Maine or Massachusetts. The next top commodity is clay, concrete, glass or stone products, which make up 16 percent (1 million tons) of the rail tonnage moving in the state. These shipments are most commonly comprised of outbound limestone slurry. Following these are lumber or wood products, and chemicals or allied products, which each make up 12 percent (800 thousand tons) of the total rail tons in 2011. Coal comprises nine percent (600 thousand tons) of the total rail tons on Vermont's rail network in 2011; all of these shipments are through moves. Petroleum or coal products, and food products comprised eight percent and seven percent respectively of the total tons shipped (about 500 thousand tons each). Approximately half of the petroleum or coal products shipments (i.e. gasoline, gas propane, petro oil and fuel oil) are inbound from New York and Canada and the rest are through traffic. Another important inbound commodity is non-metallic minerals (e.g. rock salt) coming from New York and Canada. The remaining top commodities, freight all kinds (that is, miscellaneous mixed shipments usually moving as intermodal shipments), transportation equipment, primary metal products, farm products, waste or scrap materials, and others, accounted for 13 percent or 900 thousand tons in 2011.

Exhibit 40: Top Rail Commodities 2011 Direction (in Thousands of Tons)

STCC2	Commodity	Rail Freight Movements (in thousands of tons)					Percent
		Inbound	Intrastate	Outbound	Through	Total	
26	Pulp, Paper, or Allied Products	8	0	3	1,144	1,155	17%
32	Clay, Concrete, Glass or Stone Products	12	0	766	270	1,048	16%
24	Lumber or Wood Products, exc Furniture	79	282	0	454	815	12%
28	Chemicals or Allied Products	37	0	2	771	810	12%
11	Coal	0	0	0	584	584	9%
29	Petroleum or Coal Products	232	0	0	285	517	8%
20	Food or Kindred Products	227	0	0	254	481	7%
14	Non-metallic Minerals	273	44	0	16	333	5%
46	Freight All Kind	0	0	0	255	255	4%
37	Transportation Equipment	0	0	0	153	153	2%
33	Primary Metal Products	17	0	0	105	122	2%
01	Farm Products	76	0	0	41	117	2%
40	Waste or Scrap Materials	0	0	4	67	71	1%
	Other	0	0	0	168	168	3%
	TOTAL	**961**	**326**	**775**	**4,567**	**6,628**	

Exhibit 41: Top Rail Commodities by Weight, 2011



The mix of commodities for Vermont's outbound rail shipments has been concentrated for some time; in 2002, 95 percent of the outbound rail tonnage was limestone, and the remaining five percent was lumber or wood products, and food products. [34] In 2011, the mix of commodities became even more concentrated, with 99 percent of outbound rail tonnage now consisting of limestone-related products.

The commodity mix for inbound rail shipments is broader. In 2002, the distribution of commodities for inbound rail shipments by weight was comprised of petroleum or coal products (37 percent), non-metallic minerals, glass or stone products (18 percent), food products (16 percent), lumber or wood products (14 percent), farm products (8 percent), and others (6 percent). [35] In 2011, the inbound commodity mix was similar; however, the overall inbound rail tonnage decreased by 33 percent from 2002, from 1.4 million to 961,000 tons.

Top Rail Trading Partners

The "trading partners" (external to Vermont) have been defined as consisting of the states in the New England region, New York, New Jersey, Pennsylvania, the U.S. Census regions and divisions in the rest of the U.S., and the neighboring countries of Canada and Mexico. The trading partners for rail movements into and out of Vermont by weight in 2011 are shown in Exhibit 42. New York, Canada, Maine and the South Atlantic region accounted for 75 percent (1.3 million tons) of total inbound and outbound rail flows by weight.

New York is Vermont's top rail trading partner accounting for 27 percent (480 thousand tons) of total inbound and outbound rail flows by weight in 2011. Vermont's rail trade with New York is all inbound traffic. New York's rail shipments to Vermont include rock salt, petroleum products, and to a lesser extent, food products.

Canada is Vermont's second largest rail trading partner, accounting for 18 percent (300 thousand tons) of total inbound and outbound rail flows by weight in 2011. Sixty-eight percent of the trade between Canada and Vermont is inbound (southbound) and the remaining 32 percent is outbound (northbound). Inbound traffic from Canada

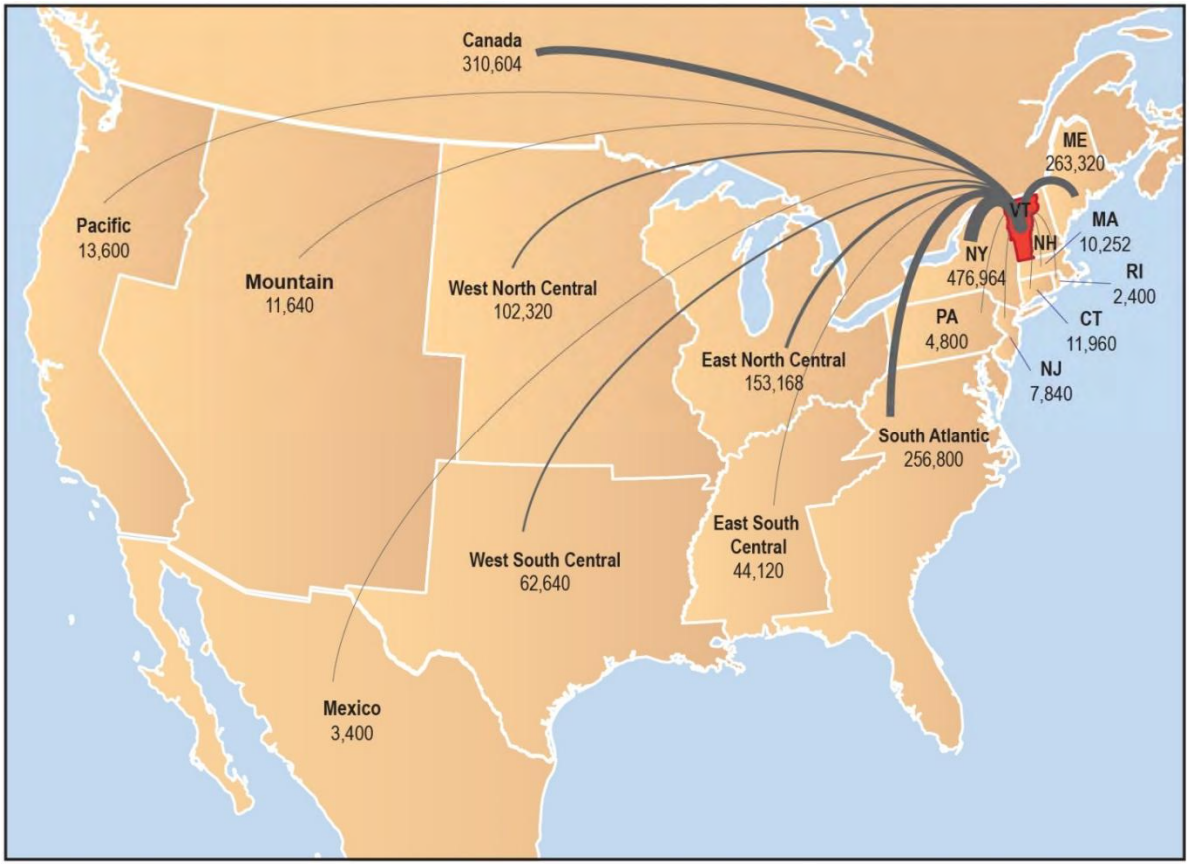
[34] *Vermont Agency of Transportation, VT State Rail & Policy Plan, 2006.*
[35] *Ibid.*

consists of petroleum products, lumber or wood products, farm products, and food products. Outbound traffic to Canada is mostly limestone slurry.

Maine is another top rail-trading partner for Vermont. Rail traffic between Vermont and Maine represented 15 percent (260 thousand tons) of total inbound and outbound rail tonnage in 2011. These rail moves primarily consist of limestone slurry used in the production of paper - and shipped from Vermont to Maine.

Trade with the South Atlantic region represented 15 percent (260 thousand tons) of total inbound and outbound rail tonnage in 2011. About 80 percent of the trade with the South Atlantic is limestone shipped from Vermont to Virginia, Maryland and Georgia. The remaining 20 percent consist of chemicals, plywood, and kaolin shipped from South Carolina and Georgia.

Exhibit 42: Rail Trading Partners, 2011 Weight on Tons



Rail through Traffic

Exhibit 43 illustrates the top origin-destination pairs for the rail through traffic in Vermont. Most of Vermont's rail through freight originates or terminates in Canada, Maine, Massachusetts, and New Hampshire. Traffic flowing between Canada and Maine is largely handled by the St. Lawrence & Atlantic, and the Central Maine & Quebec to a lesser degree. Other through markets are primarily served by Pan Am Southern, and to a lesser degree, the New England Central and Vermont Rail System subsidiaries, Clarendon & Pittsford Railroad and Green Mountain Railroad.

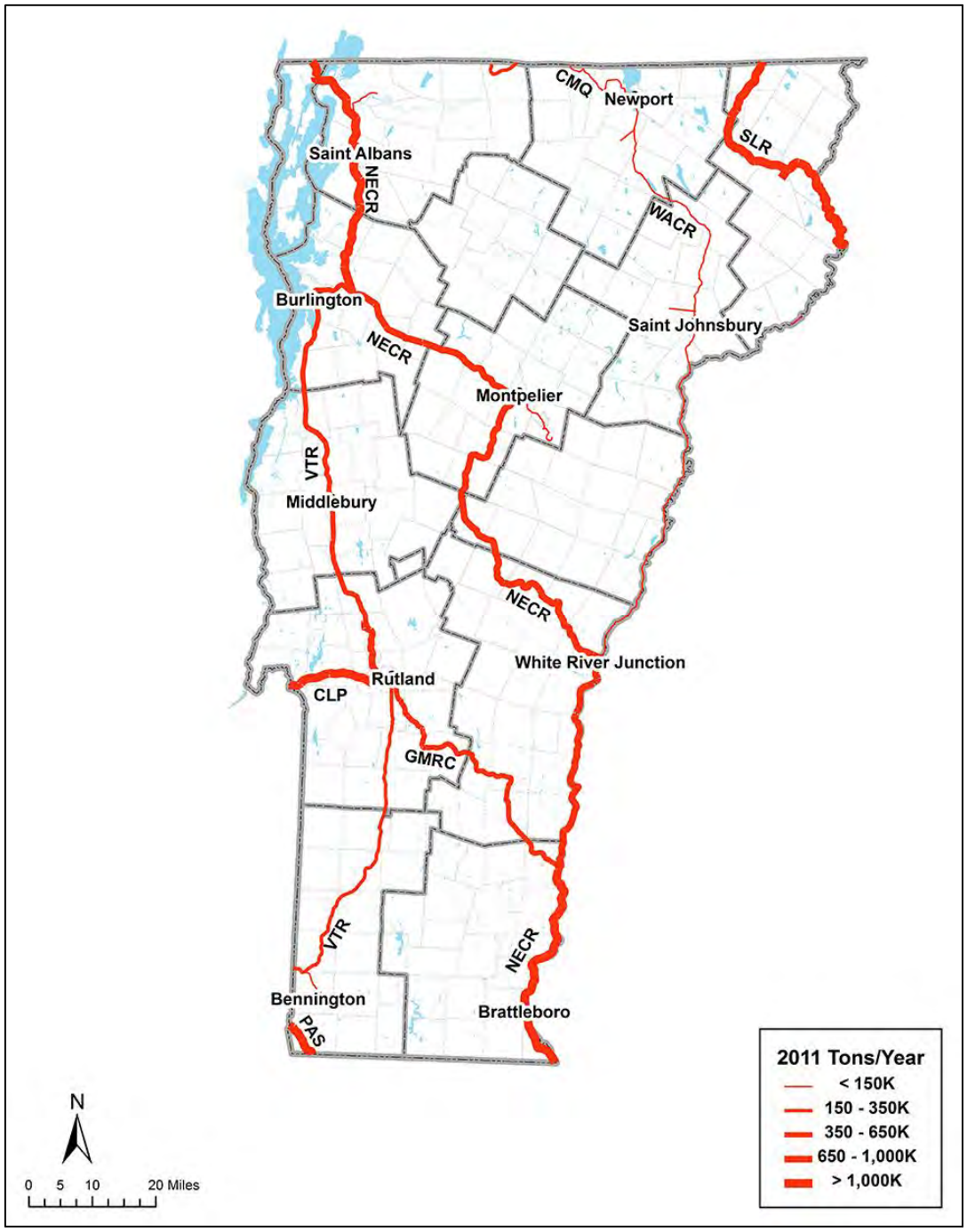
Exhibit 43: Top Rail through Origin-Destination Pairs, 2011 Weight (in Thousands of Tons)

Origin	Destination	Tons 2011 (in 1,000's)	Percent
Canada	Maine	552	12%
Pennsylvania	New Hampshire	495	11%
Canada	Massachusetts	431	9%
East North Central	Massachusetts	377	8%
West North Central	Rhode Island	282	6%
Massachusetts	East North Central	252	6%
Maine	East North Central	211	5%
Canada	New Hampshire	176	4%
Canada	Connecticut	149	3%
South Atlantic	Maine	149	3%
Other		1,493	33%
TOTAL		**4,567**	**100%**

Rail Flows

Exhibit 44 displays the volume of freight tonnage moving over Vermont rail network in 2011. The majority of the rail traffic in Vermont was through traffic (69 percent or 4.6 million tons in 2011). Approximately half of this traffic moved on the 7-mile segment of the Pan Am Southern Railway (PAS) line that traverses the southwest corner of the State, linking the Albany, New York area with eastern Massachusetts, New Hampshire and Maine. The remaining through traffic moved on the St. Lawrence & Atlantic in the northeast corner of the State (1.1 million tons), the New England Central Railroad from Canada via East Alburg traversing all of the State to interchanges in Massachusetts (700 thousand tons), and on the Clarendon & Pittsford Railroad - Green Mountain Railroad Railroad – New England Central Railroad through route (400 thousand tons).

Exhibit 44: 2011 Rail Traffic Flows, in Tons



The Clarendon & Pittsford line between Rutland and Whitehall, NY handled over 1.2 million tons in 2011, consisting of a balanced mix of inbound, outbound and through rail traffic. Over half (520 thousand tons) of the inbound traffic in Vermont entered the state on the Clarendon & Pittsford, interchanging with Vermont Railway in Rutland. East Alburg and the interchange between Canadian National and New England Central came in second at 190 thousand tons and approximately 25 percent of inbound traffic.

Ninety-five percent (738 thousand tons) of outbound traffic originated in Rutland County. Almost half (333 thousand tons) of this traffic exited Vermont on the Clarendon & Pittsford. Another third (260 thousand tons) exited via Bennington and Hoosick Junction, NY on the Vermont Railway. Intra-state traffic constitutes only five percent (326 thousand tons) of the total rail traffic in the State. Most of the intrastate rail traffic (282 thousand tons) moves between Franklin County (Saint Albans) and Chittenden County (Burlington) on the New England Central Railroad.

Future Freight Demand

The FHWA's Freight Analysis Framework version 3.4 (FAF3.4) has been applied to the 2011 edition of the Surface Transportation Board's (STB) Confidential Carload Waybill Sample. The Association of American Railroads (AAR) collects Waybill data annually for the STB from railroads that have moved at least 4,500 carloads each year for each of the previous three years, or which move five percent or more of any state's total rail traffic. The Waybill dataset was utilized to assemble county-to-county base year (2011) tonnage estimates of rail based commodity flows.

The FAF3 provides historical and forecast estimates of tonnage moving between 123 U.S. regions (comprised of major metropolitan areas, state remainders, and 16 entire states) by commodity and mode. The primary basis for FAF3 is a 2007 survey of the shipping behavior of 100,000 U.S. manufacturers and wholesalers (i.e., the Commodity Flow Survey), supplemented by the Journal of Commerce's Port Import Export Reporting System (PIERS), the U.S. Army Corps of Engineers' Waterborne Commerce Database, and for rail, the STB's Carload Waybill Sample Public Use File.

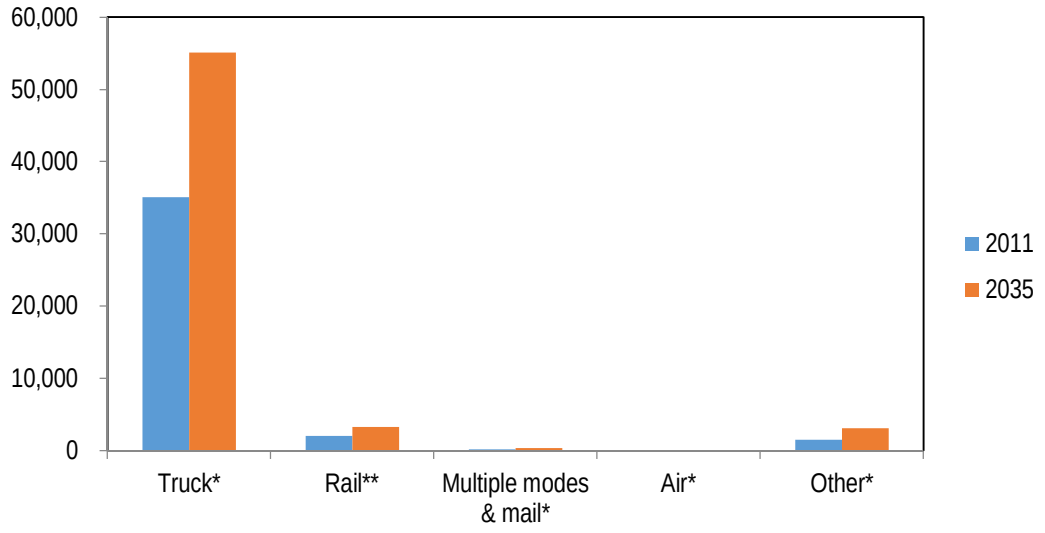
The forecast incorporated into FAF version 3.4, produced by IHS with a base period of Q2 2012, was applied to the 2011 CWS to project 2035 volumes, as well as the intermediate years of 2015, 2020, 2025, and 2030.

Future Freight System Demand

In 2011, 39 million tons of freight moved over Vermont's transportation system, excluding through traffic. Trucks carried 90 percent of all inbound, outbound and intrastate freight tonnage, while rail carried about five percent and air volume was negligible.[36] By 2035, the FAF forecast indicates total volume to amount to 62 million tons, an increase of 59 percent overall. With mode shares remaining unchanged through the forecast period, rail volumes are expected to grow proportionately. Exhibit 45 shows the expected growth in tons by mode between 2011 and 2035.

[36] *Other than trucks moving in ferry service across Lake Champlain, there is no freight moved by water at present.*

Exhibit 45: Future Freight Growth by Mode, 2011 - 2035 Weight (in Thousands of Tons)



Source: * *FHWA FAF3 2011 Provisional estimates and 2035 Forecast;*
** *STB 2011 Confidential Carload Waybill Sample and FHWA FAF 3.4 forecast for 2035 processed by Cambridge Systematics.*

Future Rail Freight Demand

By 2035, total rail freight over Vermont's rail system is projected to increase by 57 percent to 10.4 million tons. Measured in units, in 2011, over 142 thousand railcars moved in, out of, within and through Vermont's rail system, and by 2035 rail units are expected to grow by 69 percent to 241 thousand railcars. The differing growth rates between units and tonnage are a reflection of intermodal shipments growing more rapidly than carload shipments.

Rail Traffic by Direction

Exhibit 46 displays rail freight flows by weight and direction in 2011 and in 2035 while Exhibit 47 graphically displays the proportion of statewide rail tonnage by direction. In 2011, 69 percent of the rail freight flows by weight were through moves that did not originate or terminate within the State. In 2035 through moves are expected to continue to make up the majority of rail volume in Vermont, accounting for 68 percent.

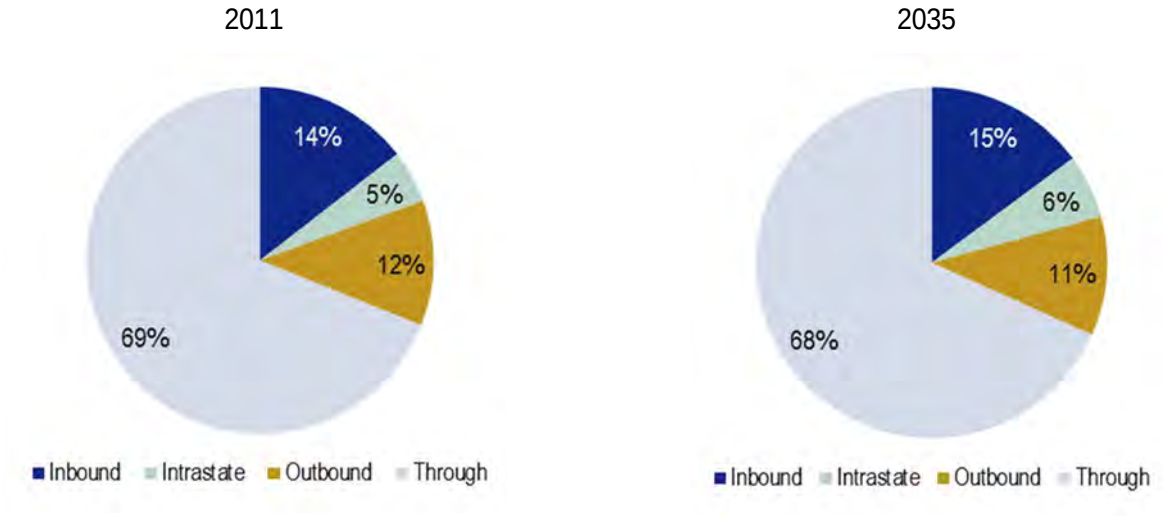
By 2035, intermodal tonnage is expected to double to 1.2 million tons, accounting for 11 percent of the total rail tonnage. The remaining 89 percent consists of carload traffic, which is projected to grow by 50 percent to nine million tons in 2035.

Exhibit 46: Rail Tonnage by Direction, 2011 and 2035 (in Thousands of Tons)

Direction	2011	2035	% Change 2011-2035
Inbound	961	1,542	61%
Intrastate	326	613	88%
Outbound	772	1,140	47%
Through	4,567	7,092	55%
Total	6,628	10,387	57%

Source: STB 2011 Confidential Carload Waybill Sample and FHWA FAF 3.4 forecast for 2035 processed by Cambridge Systematics.

Exhibit 47: Direction of Rail Freight Flows by Weight, 2011 and 2035



Source: STB 2011 Confidential Carload Waybill Sample and FHWA FAF 3.4 2035 forecast processed by Cambridge Systematics.

Top Rail Commodities

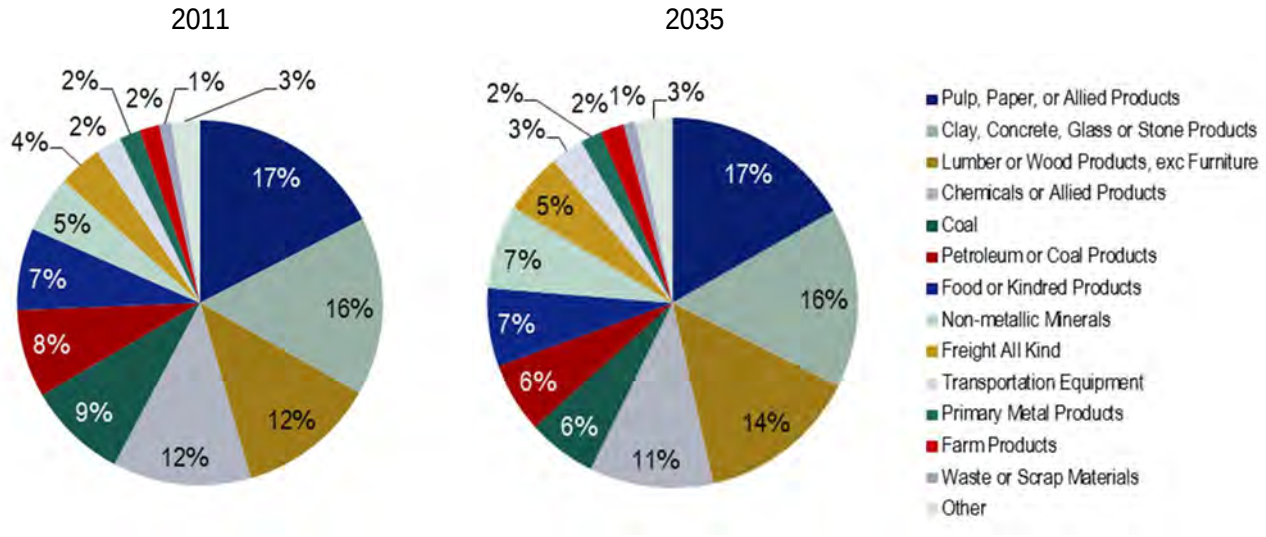
The top four commodities by weight are expected to remain unchanged between 2011 and 2035: pulp, paper or allied products; clay, concrete, glass or stone products (i.e., limestone); lumber or wood products; and chemical products. Combined they account for 58 percent and 57 percent of total commodities by weight in 2011 and in 2035, respectively. Coal and petroleum or coal products comprised nine percent and eight percent respectively of the 2011 tonnage. These commodities are expected to exhibit slow growth over the next twenty-five years, and their shares are expected to decrease to six percent respectively by 2035. The remaining top commodities - food or kindred products; non-metallic minerals; freight-all-kinds (i.e., miscellaneous mixed shipments moving as intermodal shipments); transportation equipment; primary metal products; farm products; and, waste or scrap materials accounted for 23 percent of the total rail tonnage in 2011 and are expected to increase modestly to 27 percent of all rail tonnage by 2035.

Exhibit 48: Rail Commodities, 2011 and 2035 (in Thousands of Tons)

STCC2	Commodity	2011 Tons	2035 Tons	% Change 2011-2035
26	Pulp, Paper, or Allied Products	1,155	1,738	50%
32	Clay, Concrete, Glass or Stone Products	1,048	1,631	56%
24	Lumber or Wood Products, excl. Furniture	815	1,458	79%
28	Chemicals or Allied Products	810	1,124	39%
11	Coal	584	627	7%
29	Petroleum or Coal Products	517	638	23%
20	Food or Kindred Products	481	708	47%
14	Non-metallic Minerals	333	761	129%
46	Freight All Kind	255	551	116%
37	Transportation Equipment	153	299	96%
33	Primary Metal Products	122	191	57%
01	Farm Products	117	217	85%
40	Waste or Scrap Materials	71	108	53%
	Other	168	336	100%
	TOTAL	**6,628**	**10,387**	**57%**

Source: STB 2011 Confidential Carload Waybill Sample and FHWA FAF 3.4 2035 forecast processed by Cambridge Systematics.

Exhibit 49: Distribution of Rail Commodities, 2011 - 2035 Weight



Source: STB 2011 Confidential Carload Waybill Sample and FHWA FAF 3.4 2035 forecast processed by Cambridge Systematics.

Notable differences in share among commodities between tonnage and units occur with freight-all-kinds, transportation equipment, containers, carriers, shipping returned empty, and apparel or other finished textile products. All of these commodities are primarily associated with traffic transiting through Vermont en-route to or from eastern Massachusetts.

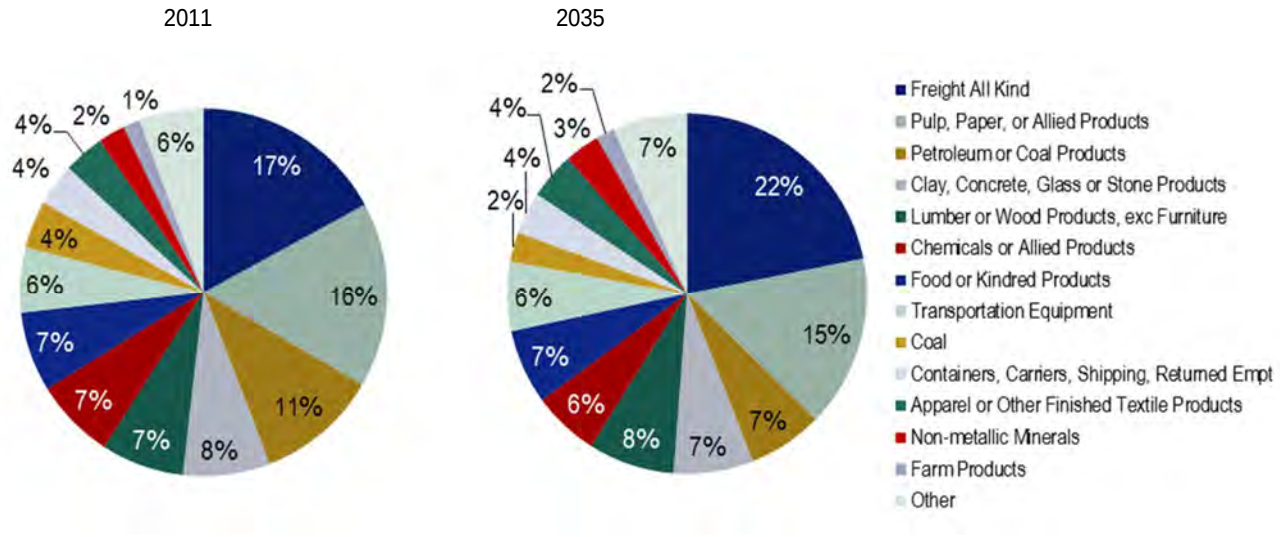
The top commodity in 2011 was freight-all-kinds (i.e., miscellaneous mixed shipments moving as intermodal shipments) accounting for 17 percent or 24 thousand containers of the total rail units. By 2035, freight-all-kinds are expected to grow 117 percent to 53 thousand containers - a 22 percent share of the 2035 rail units. Transportation equipment (e.g., freight and passenger autos), containers returned empty, and apparel or other finished textile products, accounted for 13 percent or 19 thousand units in 2011. By 2035, these commodities are expected to grow 84 percent to 34 thousand units (14 percent of the 2035 rail units).

Exhibit 50: Rail Commodities, 2011 and 2035 Units

STCC2	Commodity	2011 Units	2035 Units	% Change 2011-2035
46	Freight All Kind	24,320	52,732	117%
26	Pulp, Paper, or Allied Products	23,280	37,317	60%
29	Petroleum or Coal Products	15,320	16,253	6%
32	Clay, Concrete, Glass or Stone Products	10,920	17,267	58%
24	Lumber or Wood Products, excl. Furniture	10,400	18,701	80%
28	Chemicals or Allied Products	10,117	14,433	43%
20	Food or Kindred Products	9,980	16,170	62%
37	Transportation Equipment	8,236	15,162	84%
11	Coal	5,958	6,396	7%
42	Containers, Carriers or Devices, Shipping, Returned Empty	5,280	9,082	72%
23	Apparel or Other Finished Textile Products	5,120	10,025	96%
14	Non-metallic Minerals	3,376	7,663	127%
01	Farm Products	2,156	4,010	86%
	Other	8,068	16,154	100%
	TOTAL	**142,531**	**241,367**	**69%**

Source: STB 2011 Confidential Carload Waybill Sample and FHWA FAF 3.4 2035 forecast processed by Cambridge Systematics.

Exhibit 51: Distribution of Rail Commodities, 2011 - 2035 Units

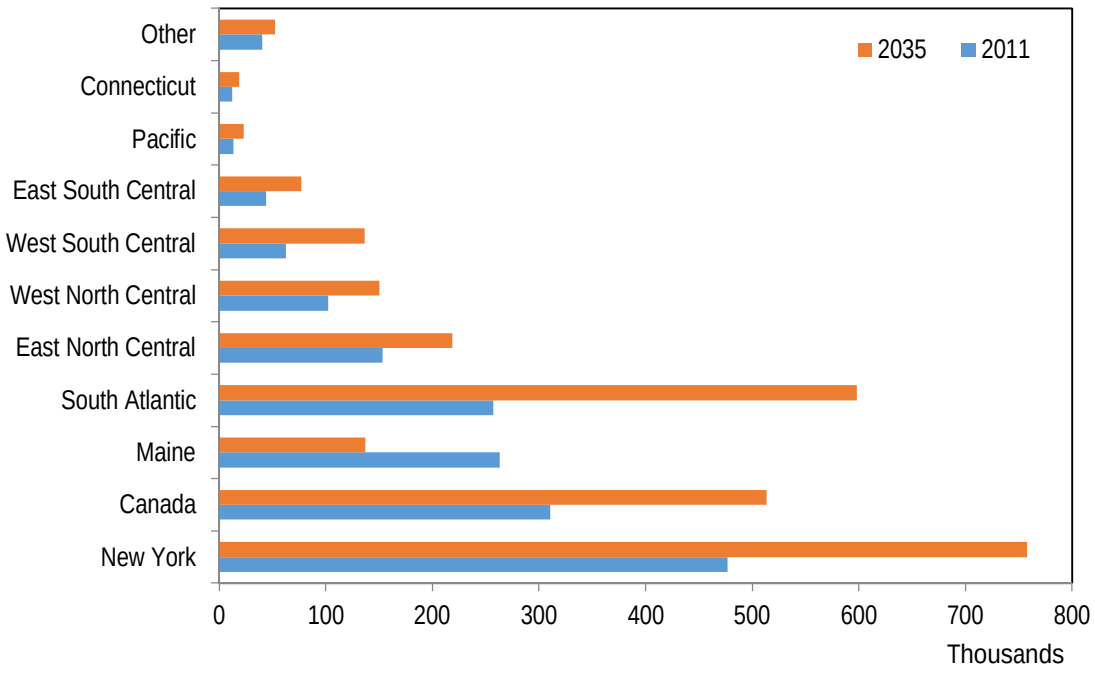


Source: STB 2011 Confidential Carload Waybill Sample and FHWA FAF 3.4 2035 forecast processed by Cambridge Systematics

Top Rail Trading Partners

Exhibit 52 displays the current and future tonnage for each of the top rail trading partners.

Exhibit 52: Top Rail Trading Partners, 2011 - 2035 Tons



Source: STB 2011 Confidential Carload Waybill Sample and FHWA FAF 3.4 2035 forecast processed by Cambridge Systematics.

By 2035, New York, Canada, Maine and the South Atlantic are projected to continue to account for 75 percent of Vermont's rail trade, exhibiting growth of 50 percent to two million tons. By 2035, New York is expected to

continue to be the top trading partner. Vermont's trade with New York is projected to grow 59 percent to 760 thousand tons (28 percent) of Vermont's inbound and outbound rail freight. The growth is mostly driven by high growth of rock salt shipments from New York. By 2035, Vermont's trade with Canada is expected to grow 65 percent to 500 thousand tons (19 percent). This growth is driven by an increase of inbound petroleum products, lumber or wood products, food, and outbound limestone slurry. By 2035, trade with Maine is expected to decrease by 48 percent to 140 thousand tons (5 percent) as a result of a continued decline of the state's paper industry. By 2035, South Atlantic shipments are expected to grow by 133 percent to 600 thousand tons representing 22 percent of the inbound and outbound trade. This high growth is mostly driven by an increase of limestone slurry shipments to the South Atlantic region.

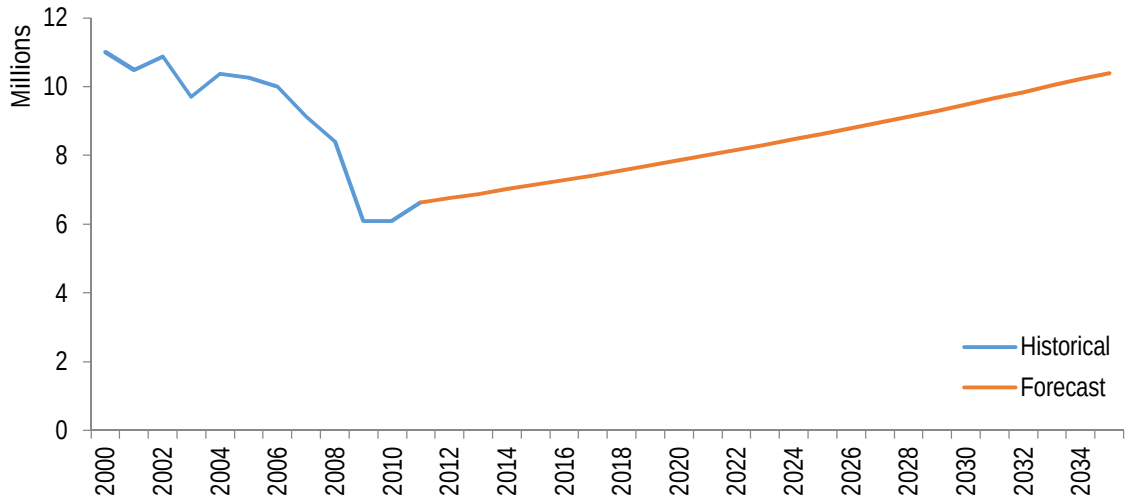
Comparison with Economy.Com Macroeconomic Forecast

The freight demand projections described above are all drawn from an IHS forecast incorporated into FAF 3.4. Since the FAF forecast does not explicitly include economic and demographic trends the project team used a Moody's Economy.com forecast for this purpose. The Economy.com forecast, which was updated in November 2013, projected an overall Compound Annual Growth Rate (CAGR) of 1.6 percent in Vermont's Gross State Product (GSP) between 2010 and 2040. For freight intensive industries, the 2010-2040 CAGR of Vermont's GSP is forecasted to be two percent. This compares to a 2011-2035 CAGR of two percent for Vermont's freight tonnage by all modes in the freight forecast developed in FHWA's FAF3.4. For freight tonnage moved by rail, the 2011-2035 CAGR in the rail freight forecast developed for this State Rail Plan was 1.9 percent.

Discussion

Although the projected 57 percent growth in tonnage through 2035 is significant, it is less consequential when viewed in the context of recent history. As is evident in Exhibit 53, which displays historic tonnage trends from 2000 onward, tonnage levels in the early 2000's were higher than the projected levels for 2035. The period from 2000 through 2009 saw a 45 percent decline in tonnage, with a modest recovery starting in 2010. While the major volume drop that occurred between 2007 and 2009 can be attributed to the severe recession of 2008-2009, traffic had already declined by over 17 percent in the preceding years as shown in Exhibit 53.

Exhibit 53: Vermont Rail Tonnage, 2000 - 2035



Source: Association of American Railroads Vermont State Summary 2000 through 2010, and STB 2011 Confidential Carload Waybill Sample and FHWA FAF 3.4 forecast for 2035 processed by Cambridge Systematics.

While any forecast should be interpreted with caution, conditions that are specific to Vermont make this forecast less robust than would typically be the case. Forecasts of the type incorporated into FAF3 are most beneficial in assessing general trends and expectations for future traffic development at a macro level. In states and regions with high volumes of freight traffic and a diversified mix of commodities and flows, projected traffic volumes will reasonably reflect economic activity (assuming of course that there are no shifts in the relative competitive modal balance, primary markets served, etc.). This is less the case for Vermont, and particularly with traffic originating and/or terminating in the State. With a handful of shippers handling the vast majority of the State's rail tonnage, volumes are highly sensitive to the specific conditions associated with those shippers and the rail-bound commodities that they handle. If those shippers do well, traffic is likely to be substantially higher than projected and the converse would also be true if these shippers do poorly. This situation was evident when Vermont's rail traffic declined by over 40 percent in just two years during the recession of 2008-2009, a decline that was far greater than the 15 percent decline in tonnage that the seven Class I railroads experienced overall between 2006 and 2009.[37]

Cross-border shipments represent 28 percent of Vermont's rail traffic. The integration of the U.S. and Canadian economies accelerated following the NAFTA treaty in 1994, but trade volumes continue to be highly sensitive to macro-economic factors, currency valuations, and border management practices by U.S. and Canadian customs authorities. Although these issues are not included in the forecast, they have a major impact on freight volumes, including rail. The future completion of a fully limited access highway connection to I-89 on the Quebec side of the border could also have an impact on the relative competitive balance between modes.

The recovery of Vermont rail traffic is primarily expected to rely on Vermont's long-standing traffic base, (e.g. the forest products, chemicals, food, and minerals sectors), but with some exceptions. Thus, the commodity with the highest expected growth (129 percent) and with significant tonnage is non-metallic minerals, which has accounted for over 90 percent of all rail traffic originated in Vermont in recent years.

[37] *Railroad Ten-Year Trends, 2000-2009, Association of American Railroads, Washington, DC, 2011, p. 43.*

The commodity with the highest unit growth is freight-all-kinds (FAK), which is intermodal service. This traffic transits through the State and has only minimal impact on the State's economy, but offers the strongest opportunity for traffic diversification. The forecast most likely understates the growth opportunity that intermodal presents. On the Pan Am Southern (PAS) route, projected physical improvements, which include increasing clearances in Massachusetts to accommodate full domestic doublestack operations, will greatly improve efficiency and service performance. Furthermore, as part of Norfolk Southern's Crescent Corridor initiative, PAS will eventually offer service into southeastern markets that are presently not accessible using rail intermodal. The New England Central Railroad, which has hosted sporadic intermodal service over the years, has placed a high priority on developing regular intermodal service between Canada and southern New England. The primary impetus has been the growing transpacific trade through the ports of Prince Rupert and Vancouver, BC, which can be linked efficiently with New England using a Canadian routing.

The positive outlook for intermodal may contribute to higher freight levels than the Exhibit 53 forecast indicates. However, achieving robust traffic growth that is directly associated with Vermont's economy will necessitate diversification of the railroad's customer base, and service offerings that meet the needs of its shippers. These topics are addressed in later sections of this Plan.

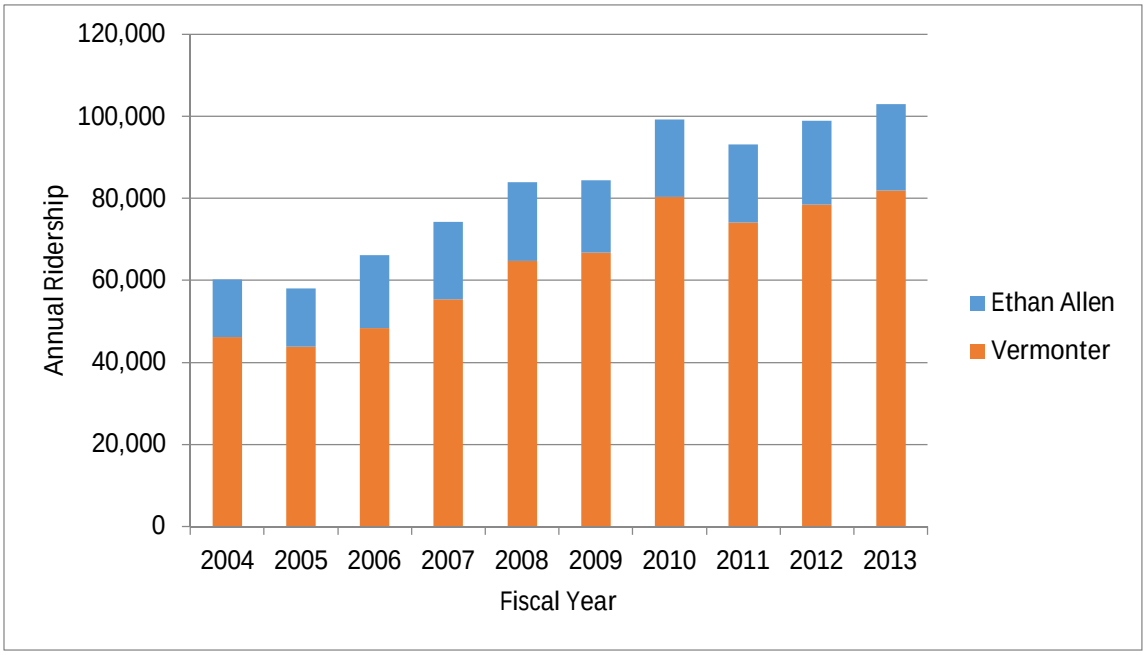
2.2.3 Vermont's Passenger Demand and Growth

Recent Trends

Ridership associated with boardings and/or alightings at Vermont stations has increased 60 percent from 2004 to 2013, from 59,860 trips to 102,952 trips[38], a trend that is evident in Exhibit 54. The *Vermonter* – with its lengthy route and multiple stops in the State - accounts for 75 percent of all Vermont passenger rail trips. The most recent ridership peak occurred in FY 2010, when the *Vermonter* carried 74,388 passengers. Causes for these increases include general ridership trends on Amtrak as well as changes specific to the *Vermonter*. The late 2000s were marked by significant track work, which led to improved on-time performance and higher operating speeds. In FY 2011, ridership dipped to 68,480, most likely due to diminished on-time performance and cancellations / service suspensions caused by track construction and Tropical Storm Irene. By FY 2013, volumes recovered to nearly peak 2010 levels.

[38] *Trips are calculated by summing total boardings and alightings at each Vermont station, including Claremont, NH*

Exhibit 54: Vermont Amtrak Annual Ridership



The Vermont ridership of the *Ethan Allen Express* experienced a recession-related dip in FY 2009, followed by a slow recovery. This recovery was dampened in part by poor track conditions and associated delays on the Whitehall, NY to Rutland segment. With track repairs completed in FY 2012, ridership rebounded and by FY 2013, the *Ethan Allen Express*'s Vermont ridership reached a new high of 21,026 passengers.

Another measure of service utilization is passenger miles traveled (PMT), which combines patronage with trip distance. Exhibit 55 illustrates PMTs for passengers boarding and/or alighting in Vermont for each route. The PMT trend is similar to ridership trends with the peak PMT on the *Vermonter* in FY 2011 although the FY 2013 PMT is nearly as high. PMT on the *Ethan Allen Express* has increased steadily since FY 2009.

In FY 2013, Vermont-related *Ethan Allen Express* passengers traveled an average distance of 218 miles (almost the entire distance to New York City), while the typical Vermonter passenger traveled 292 miles, roughly the distance between Randolph and New York City. Average distance traveled on the *Ethan Allen Express* has declined slightly, primarily due to the increased popularity of the Castleton station. On the *Vermonter*, miles traveled per passenger has trended down slightly because of growing intra-state traffic; however, the FY 2011 average is an anomaly due to construction and weather-related service outages.

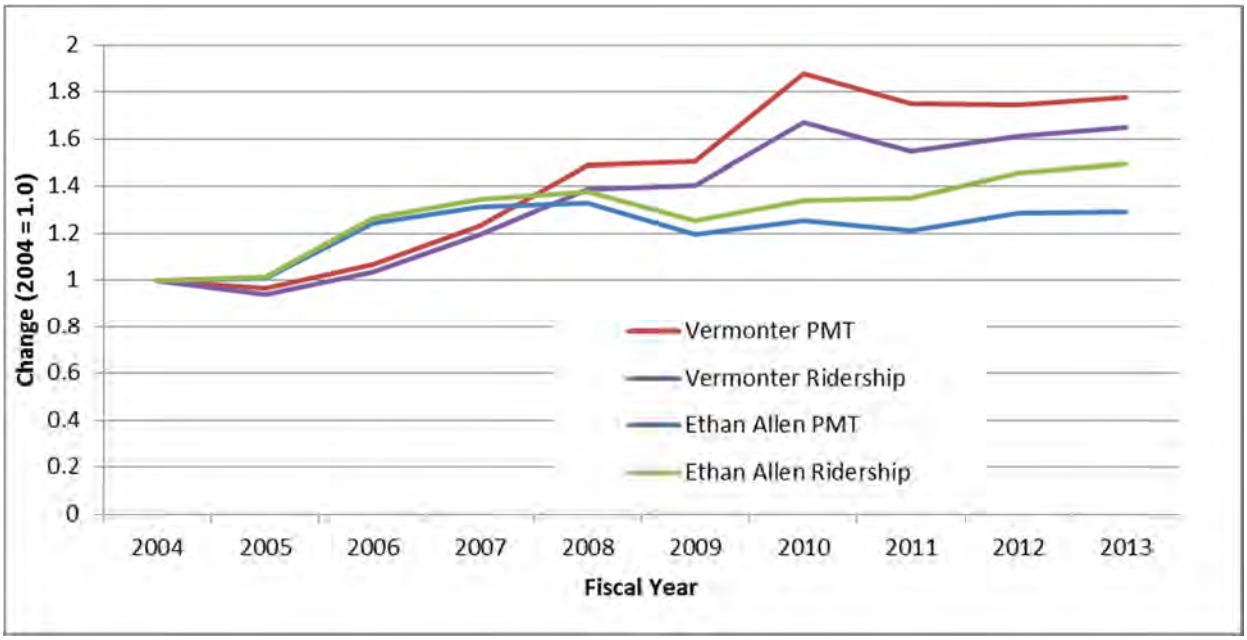
Exhibit 55: Total Passenger Miles Traveled and Average Trip Distance by Route from Vermont Trips

Fiscal Year	*Ethan Allen Express*		*Vermonter*	
	PMT (thousands)	Average Trip Length (Miles)	PMT (thousands)	Average Trip Length (Miles)
2004	3,198	228	13,786	317
2005	3,236	227	12,370	302
2006	3,949	223	13,641	302
2007	4,218	224	15,757	303
2008	4,327	224	18,713	311
2009	3,908	222	18,298	299
2010	4,116	219	21,973	303
2011	4,179	220	18,657	277
2012	4,497	220	20,880	298
2013	4,586	218	20,936	292

Exhibit 56 displays the relative change in trips and PMT within Vermont for the *Vermonter* and *Ethan Allen Express* Amtrak trains from FY 2004 to FY 2013. For the *Vermonter*, PMTs outgrew ridership growth by 13 percentage points between FY 2004 and FY 2013, which reflects an increase in average trip length from 93.2 to 100.5 miles within Vermont.

The PMT trend on the *Ethan Allen Express* shifted slightly in the opposite direction, with ridership increasing faster than PMT. This is the result of ridership growth at the Castleton station exceeding that of Rutland, and an associated trip that is 12 miles shorter than from Rutland. As Rutland traffic grew slightly from 2010 onward, when the switch from Fair Haven to Castleton took place, it seems that there was little if any diversion from Rutland to the new station (see further discussion below and Exhibit 56).

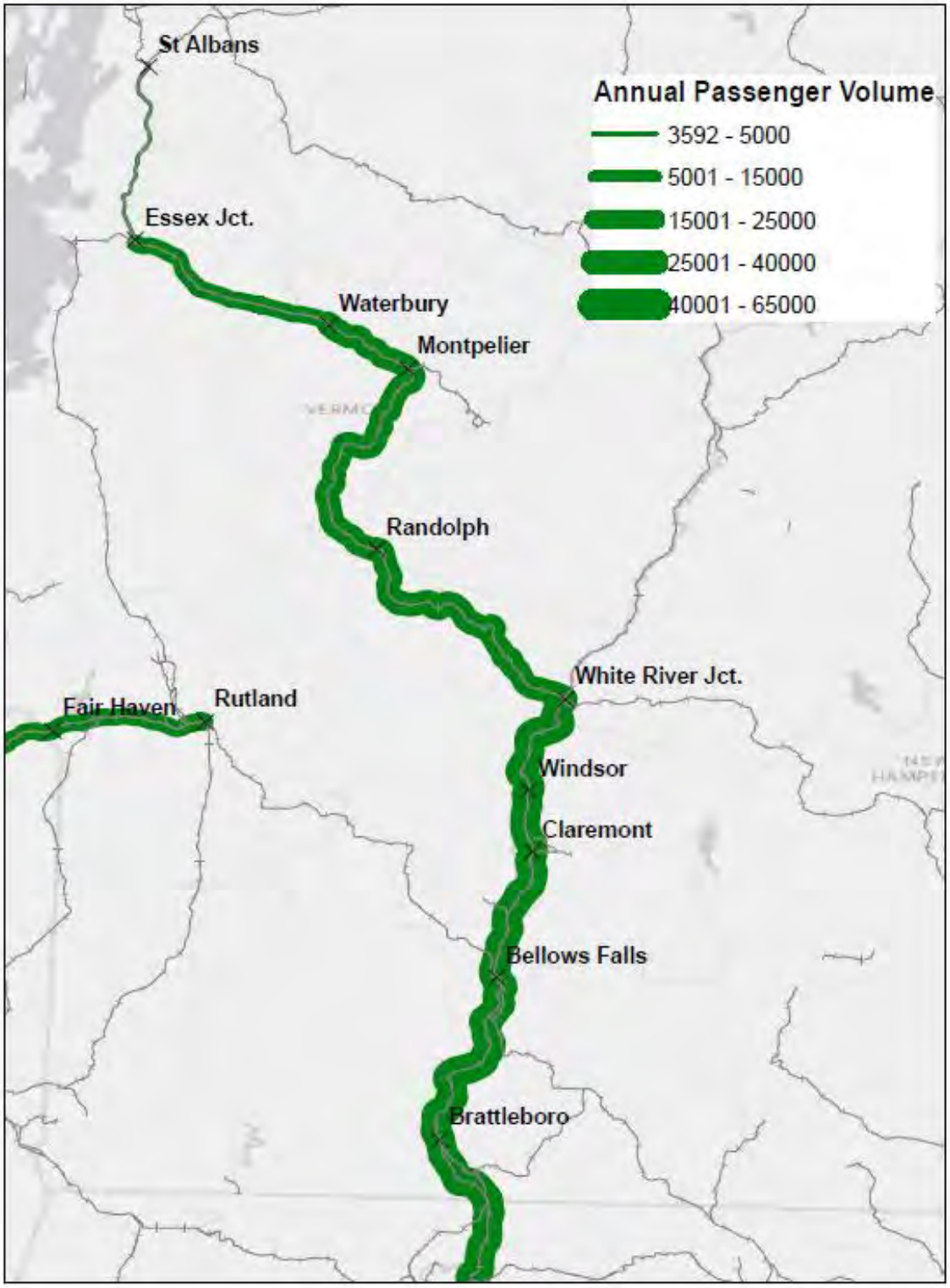
Exhibit 56: Vermont Amtrak Change in Annual Ridership and Passenger Miles Traveled (PMT) in Vermont



Passenger volume density along Vermont's Amtrak passenger routes is shown in Exhibit 57. With both routes, traffic consistently builds as the routes exit Vermont, since the primary destinations are located beyond the State's borders. There is virtually no intra-state traffic on the *Ethan Allen Express*, and while approximately 12 percent of

the *Vermonter*'s traffic is intra-state, it generally follows the same pattern as the interstate traffic on the route, increasing toward Brattleboro.

Exhibit 57: FY13 Annual Passenger Volume Density



Station Activity

Exhibit 58 and Exhibit 59 show the annual passenger activity for the *Ethan Allen Express* and *Vermonter* Vermont stations. For the *Ethan Allen Express*, statistics for Fair Haven and Castleton have been combined, since the former closed at the same time that the latter opened in 2010. The facility at Castleton has evidently had a positive effect on ridership (Exhibit 60), with volume almost doubling between FY 2010 and FY 2013 to 4,211 passengers. Rutland retains its status as Vermont's most important station on the *Ethan Allen Express*.

Exhibit 58: *Ethan Allen Express* Vermont Station Activity

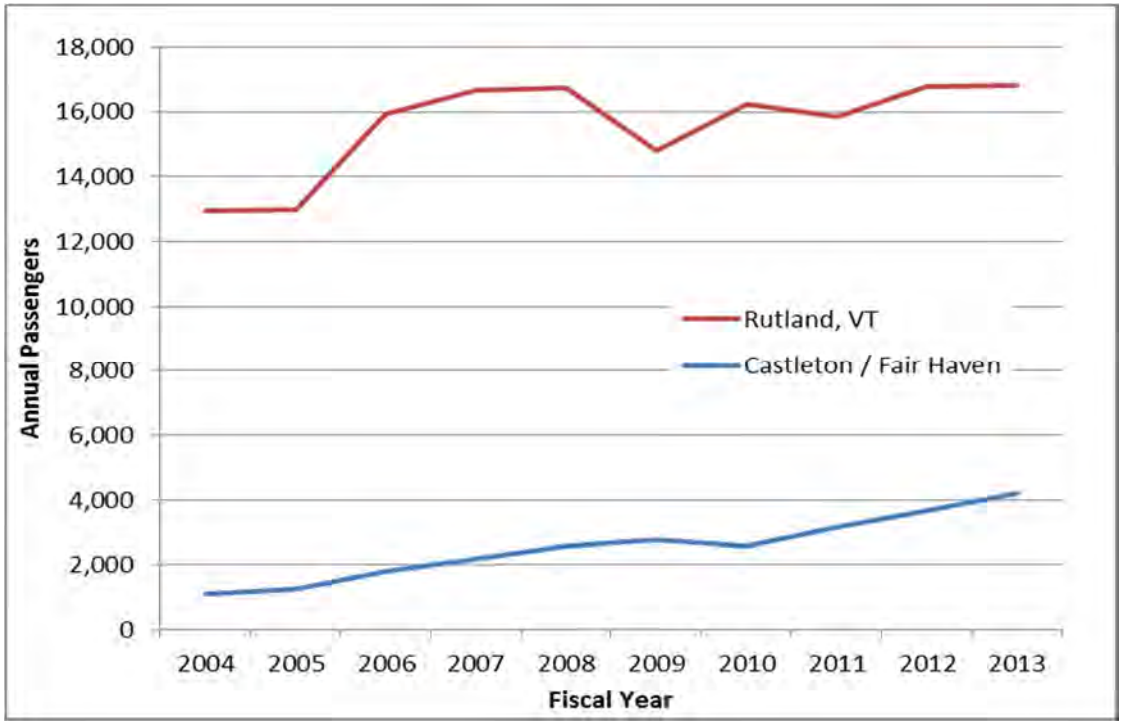


Exhibit 59: *Vermonter* Vermont Station Activity

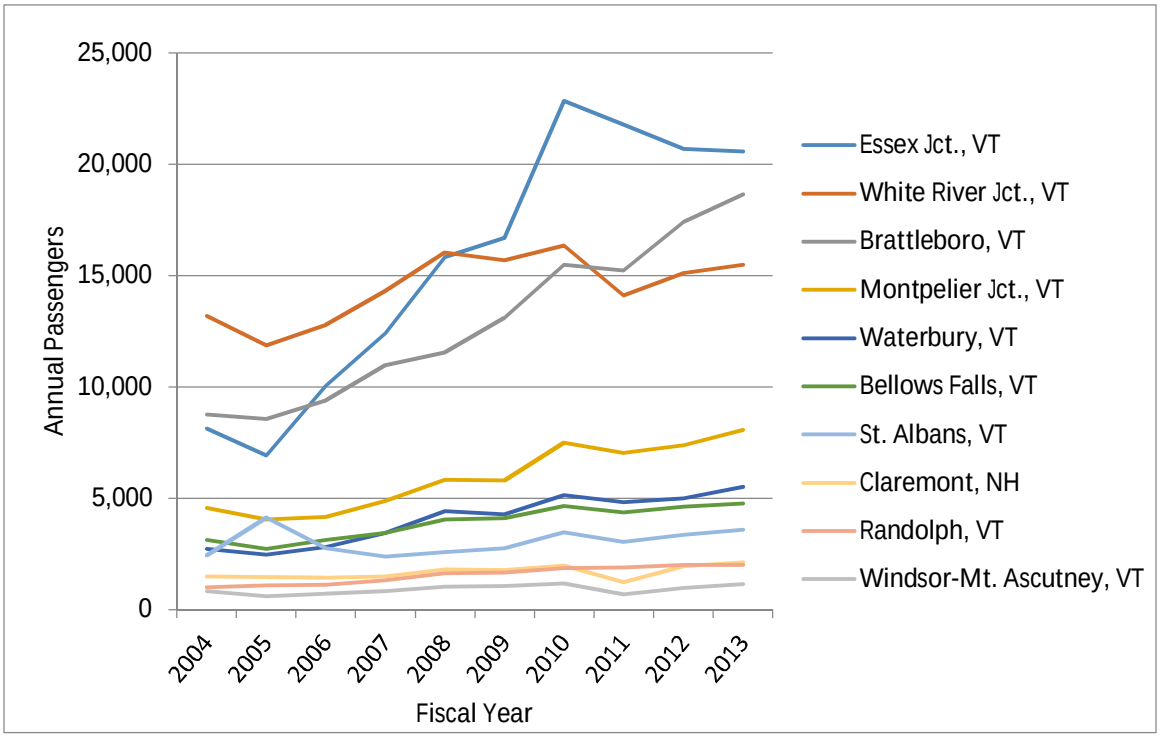


Exhibit 60: Annual Ridership by Station

The top three stations on the *Vermonter*, Essex Junction, White River Junction and Brattleboro, account for more than two-thirds of the total passenger activity. Brattleboro and Essex Junction account for much of the ridership growth since FY 2004. Since FY 2010, Brattleboro has continued to grow, with 2013 volume now second only to Essex Junction, while ridership at Essex Junction and White River Junction station has declined somewhat.

Intra- and Inter-State Trends

Nearly all ridership on the *Ethan Allen Express* is interstate. The *Vermonter* has a significant portion of intra-state trips, which have grown over 600 percent since 2004. As shown in Exhibit 61, the percentage of intra-state trips on the *Vermonter* has increased from 3 percent in FY 2004 to almost 8,400 riders and 12 percent in FY 2013. The number of interstate trips grew by 50 percent during this period, from approximately 42,000 to more than 63,000.

Exhibit 61: *Vermonter* Inter- and Intra-state Patronage Growth

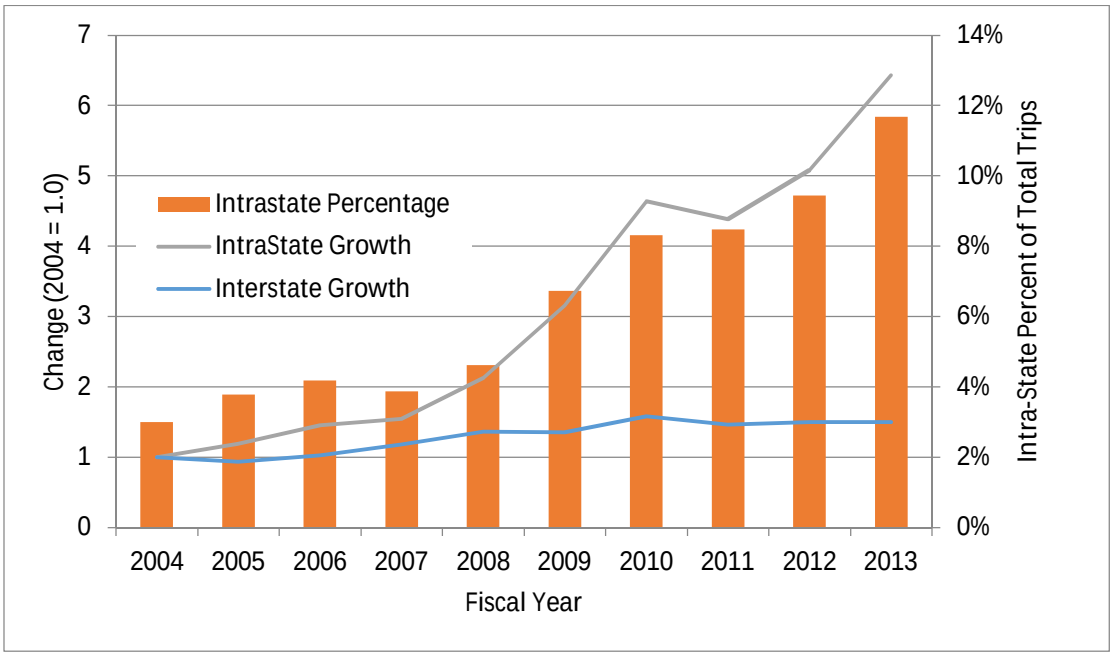


Exhibit 62 shows FY 2013 station-to-station intrastate passenger volumes. The most common intra-state trip was between Brattleboro and Essex Junction—a distance of 157 miles—representing 30 percent of trips and 2,552 passengers. In second place at ten percent and 853 riders was White River Junction – Essex Junction, a distance of 94 miles. Much of the remaining intra-state traffic also included one of these three stations as a start or end-point.

Exhibit 63 and Exhibit 64 show the linked interstate trip ends by state for the *Vermonter* and the *Ethan Allen Express*, respectively.

Exhibit 65 details travel between Vermont and New York State destinations on the *Ethan Allen Express*.

Upward trends in the overall ridership for both routes are evident at the state level, with all but one state (Florida) experiencing ridership increases between FY 2004 and 2012. On the *Vermonter*, Massachusetts and Connecticut ridership grew significantly, with the former increasing from 1,746 in 2004 to 5,437 riders in 2012, an increase of 211 percent. The *Ethan Allen Express* saw a 38 percent increase in traffic with New York State being the primary market, but many markets require connections – such as Virginia, Maryland the District of Columbia - grew even faster.

New York City is the most popular trip end for Vermont rail travel. For the *Vermonter*, the only station stop in New York is New York City, while all but two of the *Ethan Allen Express* twelve stations are in New York State. Given its continuous route to Washington, the *Vermonter*'s top ten states for ridership are concentrated along the Northeast Corridor, with the exception of 9th place Florida. Rhode Island, at 10th place, requires a circuitous route through either New Haven or Boston.

Exhibit 62: Table of Amtrak FY 2013 *Vermonter* Intrastate Ridership

			Destination										
	Station	distance (miles)	St. Albans, VT	Essex Jct., VT	Waterbury, VT	Montpelier Jct., VT	Randolph, VT	White River Jct., VT	Windsor-Mt. Ascutney, VT	Claremont, NH	Bellows Falls, VT	Brattleboro, VT	Total
Origin	St. Albans, VT	0		150	8	16	34	115	21	9	38	248	639
	Essex Jct., VT	24	21		79	99	90	480	60	79	263	1,248	2,419
	Waterbury, VT	47	57	30		26	16	35	5	7	91	340	607
	Montpelier Jct., VT	56	12	29	11		14	136	2	12	33	260	509
	Randolph, VT	86	24	78	0	12		43	5	2	3	102	269
	White River Jct., VT	118	118	373	21	27	26		28	15	79	239	926
	Windsor-Mt. Ascutney, VT	131	16	67	3	2	2	6		6	0	15	117
	Claremont, NH	140	16	81	8	12	1	11	2		4	13	148
	Bellows Falls, VT	157	43	311	29	29	2	26	0	4		61	505
	Brattleboro, VT	181	201	1,304	152	280	45	183	12	15	52		2,244
	Total		508	2,423	311	503	230	1,035	135	149	563	2,526	8,383

Exhibit 63: Table of Amtrak *Vermonter* Interstate Ridership by State[39]

	Fiscal Year								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
NY	18,257	17,982	20,729	23,461	26,231	26,531	29,635	26,052	26,642
CT	5,447	5,911	6,035	7,330	7,960	8,414	9,943	9,206	9,536
DC	4,712	3,596	3,954	4,964	6,280	6,005	7,525	6,990	7,602
PA	4,587	3,675	4,067	4,316	5,746	5,438	5,984	5,328	6,204
MA	1,746	2,466	2,646	3,191	3,462	4,092	5,073	6,854	5,437
NJ	3,133	2,669	2,706	2,972	3,433	2,963	3,766	3,200	3,305
MD	2,058	1,716	1,862	2,418	2,592	1,958	2,863	2,511	2,928
DE	886	737	799	891	1,181	1,060	1,219	1,062	1,248
FL	667	177	84	68	78	111	92	56	47
RI	67	89	97	108	134	135	200	153	206
Other	708	449	359	360	487	497	505	368	478
Total	42,268	39,467	43,338	50,079	57,584	57,204	66,805	61,780	63,633

[39] *Unlinked trip data was available through FY 2013, while linked trip was available only through FY 2012.*

Exhibit 64: Table of Amtrak FY 2013 *Ethan Allen Express* Unlinked Trip Ridership

			Destination												
	Station	distance (miles)	Rutland, VT	Castleton, VT	Fort Edward NY	Saratoga Springs, NY	Schenectady, NY	Albany-Rensselaer, NY	Hudson, NY	Rhinecliff, NY	Poughkeepsie, NY	Croton-Harmon, NY	Yonkers, NY	New York, NY	Total
	Rutland, VT	0		15	17	103	479	358	86	70	169	134	87	6,928	8,446
	Castleton, VT	9	0		3	12	50	80	5	9	55	60	24	1,770	2,068
	Fort Edward, NY	44	13	4											17
	Saratoga Springs, NY	63	167	11											178
	Schenectady, NY	82	454	70											524
	Albany-Rensselaer, NY	100	379	71											450
	Hudson, NY	128	105	11											116
	Rhinecliff, NY	153	77	21											98
	Poughkeepsie, NY	169	151	49											200
	Croton-Harmon, NY	209	122	49											171
Origin	Yonkers, NY	227	92	12											104
	New York, NY	241	6,809	1,830											8,639
	Total		8,369	2,143	20	115	529	438	91	79	224	194	111	8,698	21,011

Exhibit 65: Table of Amtrak *Ethan Allen Express* Interstate Ridership by State[40]

	Fiscal Year								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
NY	12,384	12,944	16,074	16,865	16,958	15,395	16,285	15,968	17,107
PA	439	346	415	447	651	590	667	750	779
DC	476	315	317	432	525	526	665	787	802
MD	155	160	213	168	224	155	251	283	327
IL	135	134	157	174	150	202	208	208	236
FL	105	83	169	223	213	174	112	203	233
VA	103	82	76	98	160	171	159	266	280
NJ	66	43	65	97	118	108	108	126	162
DE	47	44	81	110	81	58	94	105	114
GA	18	15	26	48	84	41	30	48	84
Other	98	86	128	175	142	159	214	248	293
Total	14,026	14,252	17,721	18,837	19,306	17,579	18,793	18,992	20,417

[40] *Unlinked trip data was available through FY 2013, while linked trip was available only through FY 2012. For the Claremont, NH station linked trip data was not provided and thus is not included in the table.*

Some destinations that require a change of trains in New York City, Albany or Schenectady have significant ridership, including Illinois, Florida, and Virginia.

Connecting Stations

In order to connect to other Amtrak services, passengers traveling to or from Vermont change trains at several locations. Exhibit 66 and Exhibit 67 show Vermont-related passenger volumes at the stations where most transfers occur for the *Ethan Allen Express* and *Vermonter*, respectively. The majority of passengers transferring to the *Ethan Allen Express* do so in New York City. The Schenectady and Albany-Rensselaer stations handle transfers with the Lake Shore Limited to Chicago and other trains serving Buffalo, Niagara Falls and Toronto. The shift in volume between Schenectady and Albany-Rensselaer that occurred between FY 2009 and 2011 is the result of schedule changes that made Schenectady the preferable location for some transfers.

Exhibit 66: Amtrak Ethan Allen Connecting Stations Ridership

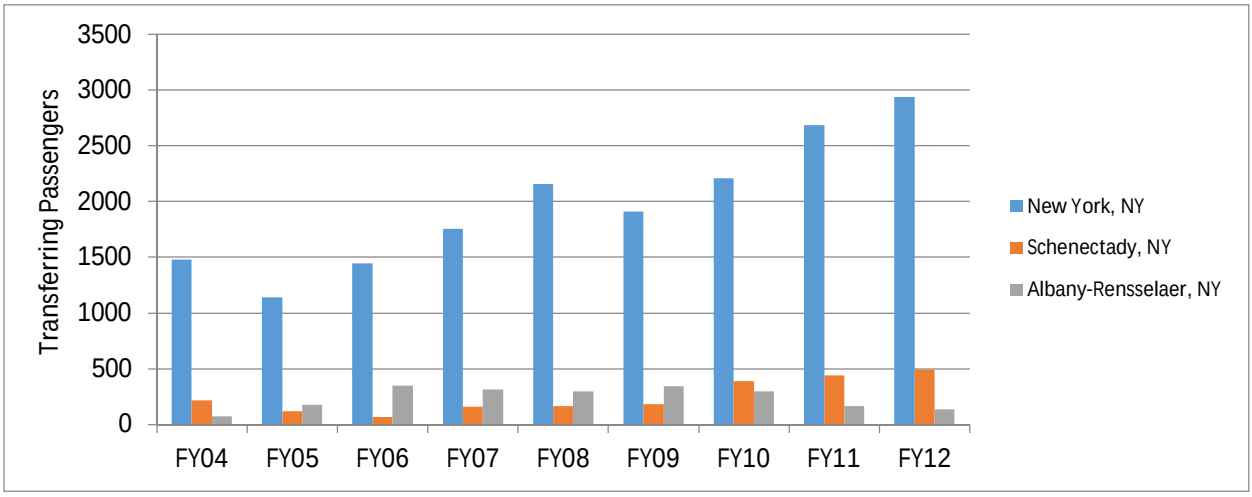
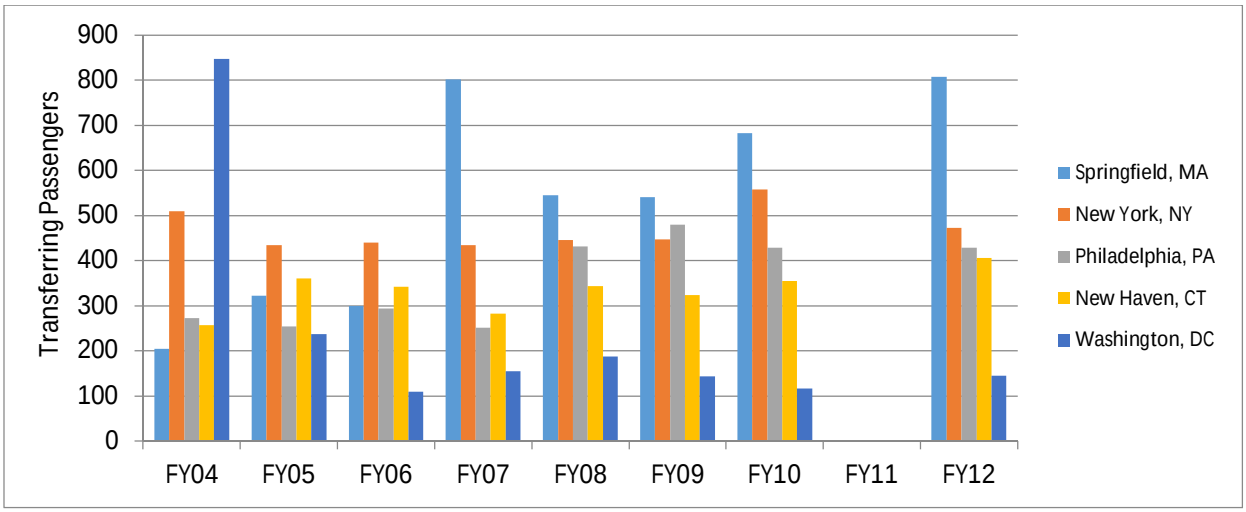


Exhibit 67: Amtrak Vermonter Connecting Stations Ridership[41]



[41] *FY11 transfer data not shown due to higher transfers around track work*

On the *Vermonter*, Springfield, MA has been the busiest transfer point since FY 2007. Note that FY 2011 is omitted from the chart because *Vermonter* service was substituted by bus connections during track work and rebuilding after Hurricane Irene. Evidently, this was reported as a connection in Amtrak's data.

Future Prospects

As noted above ridership has seen solid growth in the range of three percent CAGR across both Vermont Amtrak services.

Future ridership was estimated using three different growth rates from a 2013 base:

- 1.7 percent cumulative annual growth rate (CAGR), a very conservative base which produces a 45 percent increase in ridership by 2035.
- 3 percent CAGR, a continuation of Amtrak's general growth trends over the fifteen year period between 1997 and 2012[42]; and,
- 5 percent CAGR, representing a continuation of the historical patronage growth of the Vermont services between 2004 and 2013.

The base case ridership estimate assumes no changes in service frequencies, travel times, on-board amenities or reliability. However, incorporated into the forecast is the resumption of service in Massachusetts along the historical route between Springfield, Northampton and East Northfield, a shift that took place in December 2014. This change in route, which is 11 miles shorter than the route through Palmer, is expected to reduce travel time by around 25 minutes. The realignment removed a time consuming reverse move at Palmer and the need to allow double-ended operation. In addition, in lieu of just one station stop at Amherst, the *Vermonter* will now stop at three stations in Massachusetts – Holyoke, Northampton, and Greenfield.

The forecast ridership is shown in Exhibit 68. The busiest four stations in Vermont (Rutland, Essex Jct., White River Jct., and Brattleboro) are forecast to have higher passenger activity in 2035 than the FY2013 Essex Jct., which is currently the busiest station.

Exhibit 68: Amtrak Vermont Projected Ridership

Route/Station	FY13 Ridership	1.7% Growth 2035 Forecast	3% Growth 2035 Forecast	5% Growth 2035 Forecast
Ethan Allen Express				
Castleton, VT	4,211	6,100	8,100	12,300
Rutland, VT	16,815	24,400	32,300	49,300
Vermonter				
St. Albans, VT	3,592	5,200	6,900	10,500
Essex Jct., VT	20,579	29,800	39,400	60,200
Waterbury, VT	5,501	8,000	10,600	16,200
Montpelier Jct., VT	8,081	11,700	15,500	23,600
Randolph, VT	2,009	2,900	3,800	5,900
White River Jct., VT	15,480	22,400	29,600	45,200
Windsor-Mt. Ascutney, VT	1,126	1,600	2,100	3,200
Claremont, NH	2,123	3,100	4,100	6,200
Bellows Falls, VT	4,774	6,900	9,100	13,900
Brattleboro, VT	18,661	27,000	35,700	54,500
Total	**102,952**	**149,100**	**197,300**	**301,200**

[42] *A New Alignment: Strengthening America's Commitment to Passenger Rail U.S. Passenger Rail Ridership, Brookings Institute. 2013.*

2.2.4 Fuel Cost Trends

Exhibit 69 shows forecasted prices of gasoline and diesel in New England from 2011 to 2040. The price of both is projected to remain high over the next 25 years, rising steadily every year after 2018. The high price of fuel provides favorable conditions for increasing usage of rail, as rail is more fuel efficient than truck or automobile transportation. Thus, as fuel prices rise, rail becomes a relatively more cost-effective option for transporting people and goods. On the other hand truck operations have been switching to natural gas, which may moderate the impact of rising fuel prices on truck/rail modal share. Fuel prices are highly volatile, so forecasts are subject to error.

Exhibit 69: The Price of Gasoline and Diesel Fuel (in 2012 dollars per gallon) in New England, 2011 - 2040[43]

Fuel	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Gasoline	3.65	3.69	3.57	3.38	3.18	3.07	3.03	3.02	3.03	3.08
Diesel Fuel	3.89	3.95	3.88	3.68	3.54	3.50	3.50	3.53	3.61	3.67
Fuel	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Gasoline	3.12	3.17	3.22	3.26	3.29	3.32	3.36	3.37	3.40	3.43
Diesel Fuel	3.74	3.82	3.87	3.92	3.98	4.02	4.08	4.12	4.16	4.20
Fuel	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**
Gasoline	3.46	3.50	3.54	3.62	3.65	3.69	3.73	3.77	3.83	3.90
Diesel Fuel	4.25	4.30	4.36	4.43	4.47	4.51	4.54	4.58	4.65	4.73

2.2.5 Rail Congestion Trends

The rail system in Vermont experiences little or no congestion due to the relatively light density of traffic present on the network. Most rail lines in Vermont are unsignalized and rely on manual dispatch/track warrant control to direct train traffic. The Association of American Railroad's (AAR) *National Rail Freight Infrastructure Capacity and Investment Study* estimates that a rail line with single track, no signal/track warrant control dispatching, and mixed traffic would have a capacity to handle 16 trains per day. While admittedly the AAR's study ignores numerous factors that determine effective track capacity such as number, location, and size of sidings, grades, curves, nature of freight traffic and locomotive consists, etc., none of the rail lines in Vermont carry anywhere near 16 trains per day on a regular basis.

2.2.6 Highway and Airport Congestion Trends

Highways

In general, the capacity of Vermont's National Highway System is adequate to meet current demand. Congestion on Vermont's Interstates is generally low (although I-89 and I-189 in the Burlington area experience moderately slower conditions during the peak periods and warrant additional focus because of the critical role they play in moving people and goods regionally, nationally, and internationally). Peak period congestion (indicated by a volume/capacity ratio of greater than one) is mainly limited to US 2 and US 7 in greater Burlington (particularly near the I-89 and I-189 junctions), US 2 in Montpelier, and US 7 in Rutland; these segments deserve special attention moving forward.

The highest traffic volumes occur in and around Vermont's biggest population and employment centers, including Burlington, Montpelier, Rutland, White River Junction, and Brattleboro. Greater Burlington has the greatest concentration of traffic in Vermont, with I-89, I-189, US 2, and US 7 experiencing the highest volumes. The busiest segment in greater Burlington (and all of Vermont) is I-89 between South Burlington and Winooski, with an AADT

[43] *All information in the table from the Annual Energy Outlook compiled by the U.S. Energy Information Agency. Accessed "*

of 55,000[44]. The highest non-Interstate volume occurs on US 2 in the vicinity of I-89 Exit 14 in South Burlington (46,300). Exhibit 70 depicts AADT statewide using bandwidths to show volume. Each of the segments stated above should be continually monitored to ensure that they are meeting regional and statewide economic needs.

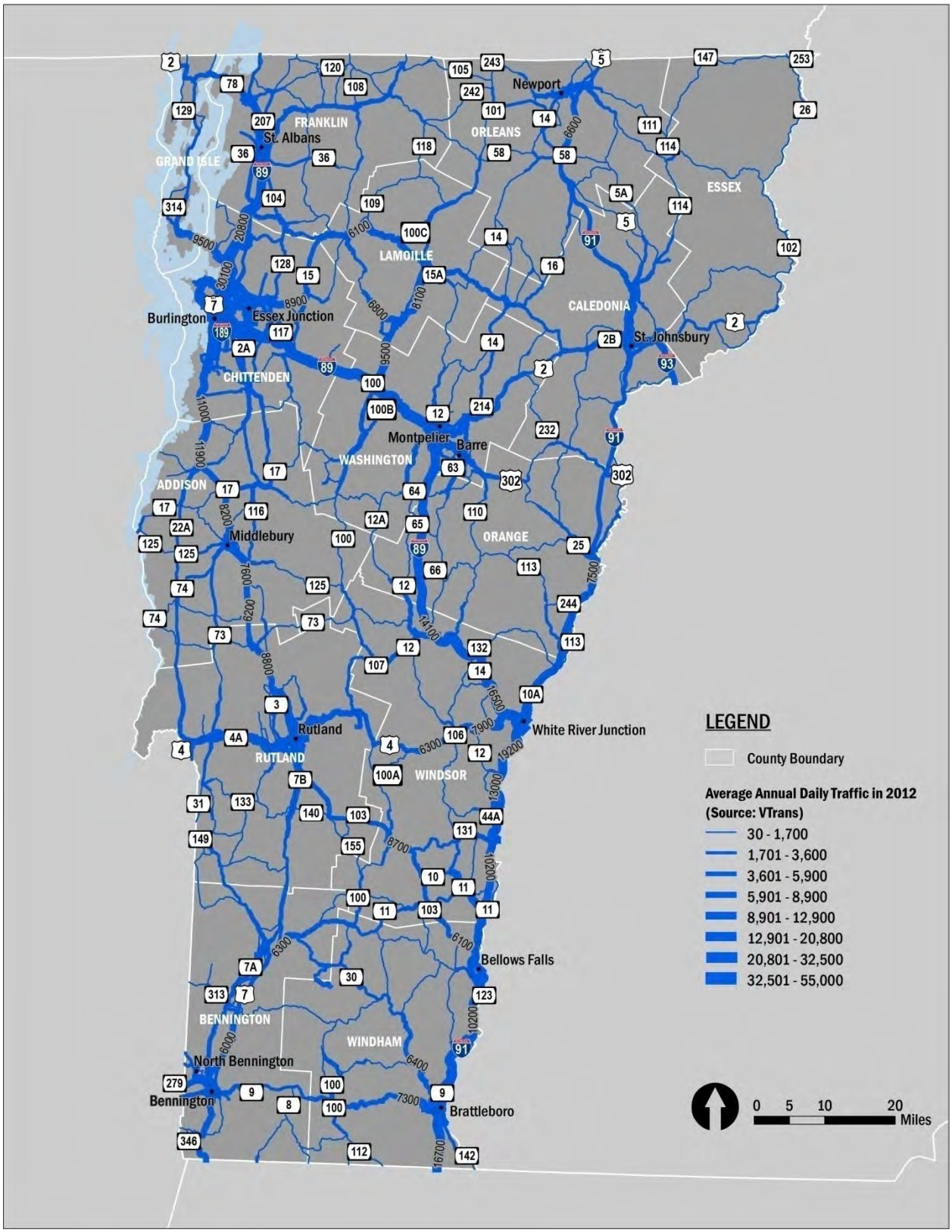
Several highway segments outside of greater Burlington experience traffic volumes in excess of 20,000 vehicles per day. I-89 through White River Junction is a high volume segment, with an AADT of 24,000 vehicles per day. US 7 in Rutland experiences traffic volumes in excess of 30,000 vehicles per day, with some congestion observed during peak periods. Traffic volumes on I-91 and I-93 are generally less than 20,000 vehicles per day. However, I-91 in the Brattleboro area carries 24,500 vehicles per day, while I-91 in White River Junction carries 27,500 vehicles per day.

The U.S./Canadian border crossings on I-89 (St. Armand/Philipsburg) and I-91 (Derby Line–Stanstead) are fairly low, with estimated AADT counts of 2,000 and 2,100 vehicles per day, respectively. However, the extension of Autoroute 35 - a provincial limited access highway linking Montreal with Saint-Jean-sur-Richelie—to the U.S. border may increase demand at St. Armand/Philipsburg crossing and on I-89. The extension of Autoroute 35, slated for opening in 2017, would complete a continuous 311-mile limited access highway between Montreal and Boston.

Statewide, people are driving less than they did a decade ago. Vehicle miles traveled (VMT) peaked in 2003, and has declined somewhat since then due in large part to increases in fuel prices and the economic slowdown caused by the Great Recession of the late 2000s. This trend may continue, due to high fuel prices.

[44] *Source: VTrans. 2012 AADTs State Highways.*

Exhibit 70: Average Annual Daily Traffic (AADT) in 2012

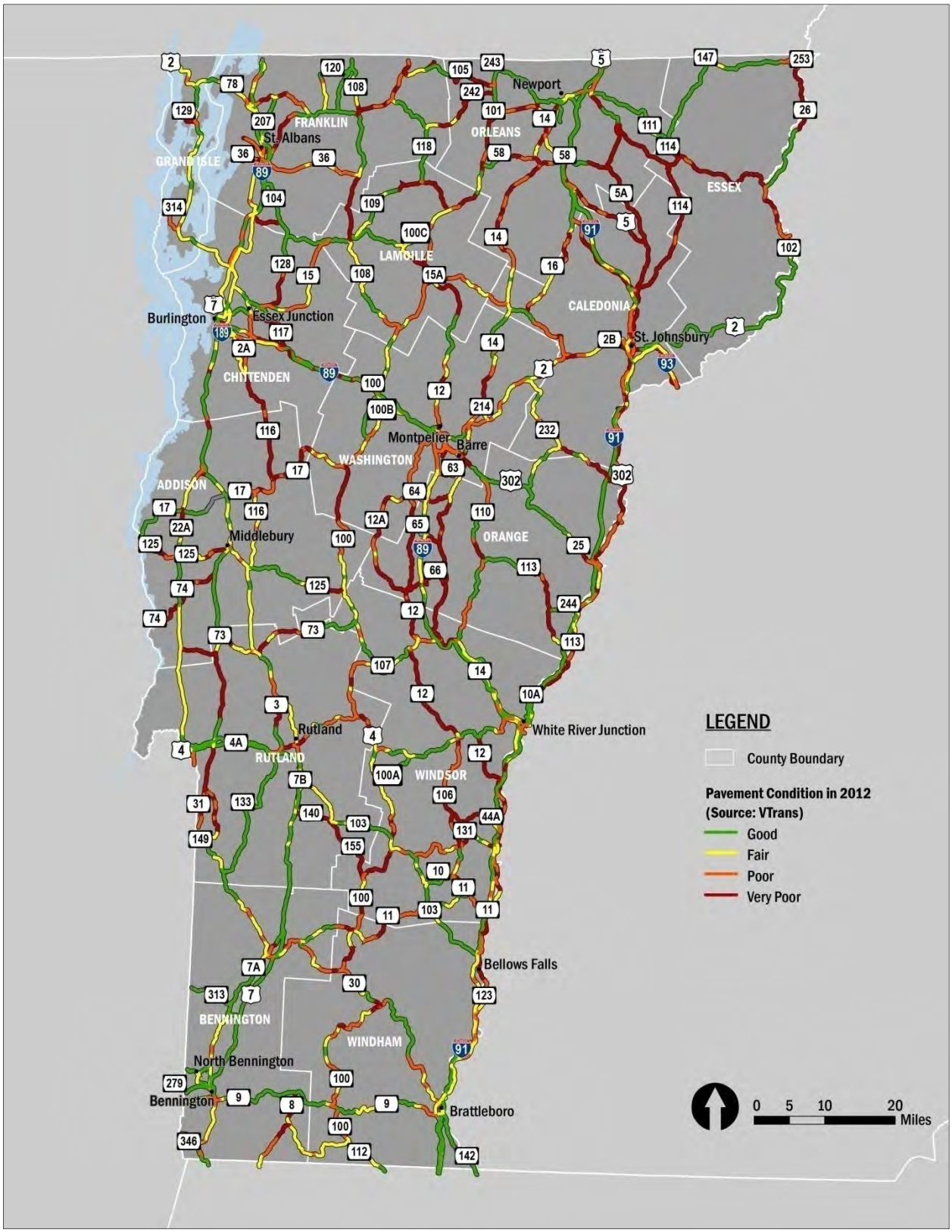


Road conditions across Vermont vary greatly, but generally have improved since the late 2000s. Across the State, unweighted pavement conditions (irrespective of roadway volume) are as follows: 38 percent good; 22 percent fair; 19 percent poor; 21 percent very poor.[45] The percentage of road pavement in very poor condition has decreased from a peak of 34 percent in 2009 to 21 percent in 2013. Roadway conditions for 2012—the latest available year in GIS—are shown graphically in Exhibit 71. In general, Vermont's Interstate Highways are in better condition than the rural undivided arterials.

Because Vermont roadways are not as congested as those in some other states, the primary congestion benefits that Vermont rail passengers realize by train travel will tend to relate to the other segments of their trips. Many of the trips on the *Vermonter* and *Ethan Allen Express* originate or terminate on the crowded Northeast Corridor, to or from metro areas such as New York, Washington and Philadelphia. The congestion on roadways in these areas is not expected to improve, and Vermont's passenger rail services provide a way to access these areas without adding to congestion.

[45] *Source: 2014 Fact Book – Vermont Agency of Transportation*

Exhibit 71: Pavement Condition in 2012



Airport Congestion Trends

Vermont has ten state-owned airports and one municipal airport (Burlington International Airport). Burlington International Airport (BTV) and Rutland–Southern Vermont Regional Airport, the State's number one and number two largest airports in terms of passenger and freight/mail volume, respectively, do not suffer from the congestion and delays seen at the larger hub airports in the Northeast.

Burlington International Airport (BTV)—the only major commercial airport in Vermont—is owned by the City of Burlington and located in South Burlington. BTV had 605,715 million arrivals and departures in 2013.[46] The 90-minute catchment area of BTV extends across the northern half of Vermont (excluding the Northeast Kingdom) and into southern Quebec and northern New York State. The BTV catchment area overlaps with the Montreal-Trudeau International Airport (YUL) catchment area near the Canadian border.[47] The majority of passenger traffic from Burlington is bound for destination airports located in the Northeast Corridor, including New York (JFK), Philadelphia (PHL), and Reagan National Airport in Washington, DC (DCA). US Airways Express (operated by Republic Airlines) carries the largest share of passengers (26 percent). Passenger enplanements at BTV are projected to grow, with an anticipated increase to 1.6 million by 2030.[48] Long-term BTV airport demand is expected to increase three to four percent annually.[49]

Air cargo service at Burlington International Airport is provided by FedEx Express, Royal Air Freight, and UPS Airlines. In 2014 (year ending in April), total freight/mail (scheduled and non-scheduled) at BTV was ten million pounds, a 10.63 percent increase over the previous year. Total freight/mail (scheduled and non-scheduled) at BTV has somewhat rebounded from the late 2000s Great Recession, when it fell below seven million (in April 2009). Road access to BTV is via US 2, an undivided highway that runs through the middle of South Burlington.

Rutland–Southern Vermont Regional Airport (RUT) is a state-owned public use airport with federally subsidized Essential Air Service (EAS) provided by Cape Air (three daily flights to Boston) and freight/mail service. EAS passenger service to RUT is due to expire in October 2017. Total freight/mail (scheduled and non-scheduled) at RUT in 2014 (ending in April) was 266,000 lbs, a 5.39 percent increase over the previous year. Total freight/mail at RUT has declined since the mid-2000s, when it exceeded 500,000 pounds.[50]

Similar to the case for roadways, many of the most significant airport congestion benefits of Vermont rail passenger service relate to origins/destinations outside of Vermont. As mentioned above, much of the traffic at Vermont's largest airport, BTV, originates/terminates on the Northeast Corridor. These are highly congested airports, and Vermont rail service has the potential to alleviate some of this congestion.

2.2.7 Land Use Trends

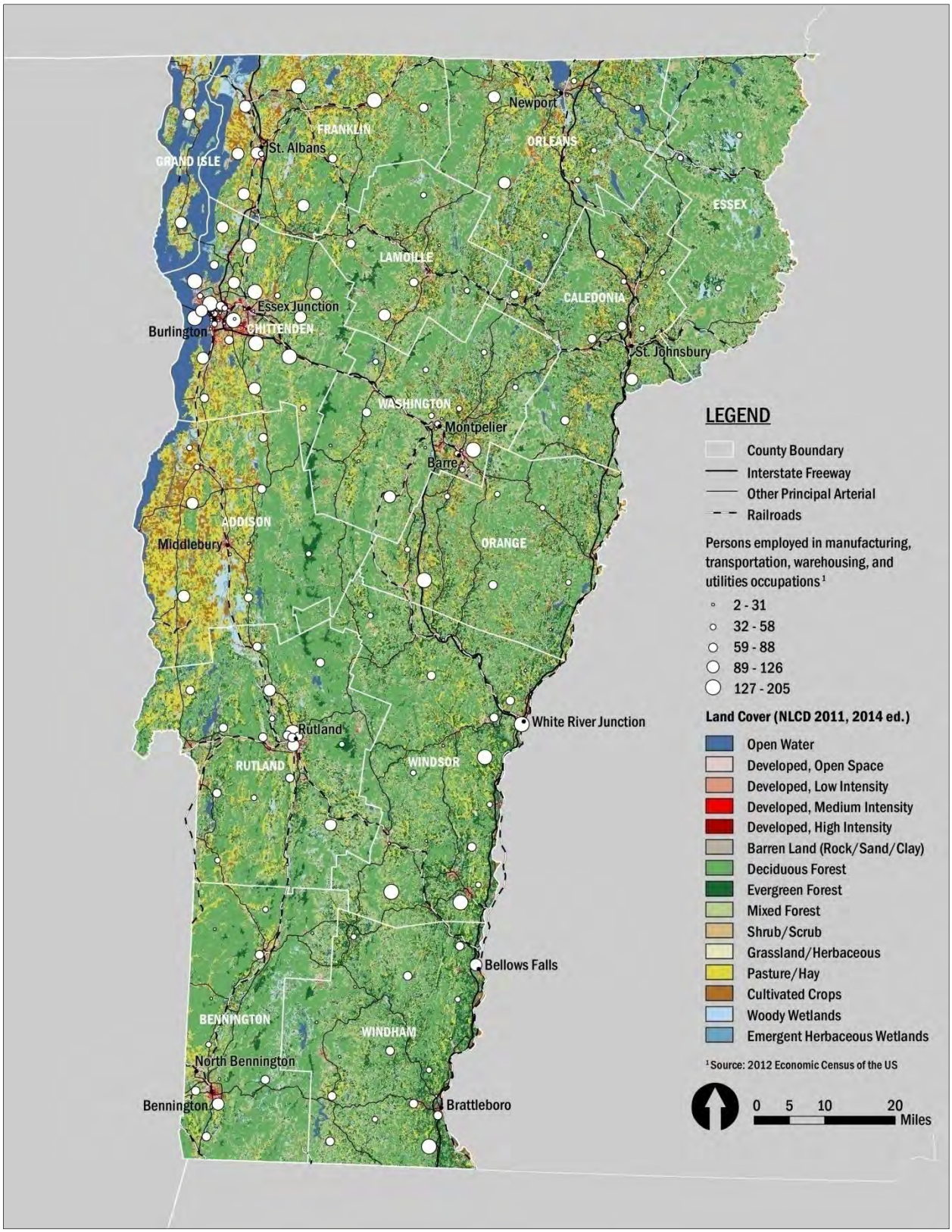
Vermont has eleven regional planning commissions, including one which serves as a metropolitan planning organization (RPCs and an MPO), that guide land use within their jurisdictions (although it should be noted that individual towns have the greatest influence because of their power to zone and issue permits). Throughout the State, there is a general acknowledgment by the MPOs and RPCs that future industrial uses should be located in already built-up areas having easy access to existing highways and railroads. Since the development of Vermont's Interstate Highway System in the 1960s, suburban industrial parks located in open space areas near highways have been the dominant style industrial development in the State. Many MPOs and RPCs hope to reverse this

[46] U.S. Bureau of Transportation Statistics
[47] *It is worth noting that southwestern Vermont, namely Bennington County, falls within the 90-minute catchment area*
[48] *Source: Burlington International Airport Vision 2030 Master Plan Update*
[49] *Ibid.*
[50] *Source: RITA/BTS*

trend by encouraging industrial development in historic city and town centers, which often have access to existing railroads and vacant industrial parcels in need of redevelopment. Industrial uses in historic town centers are generally supported by the RPCs because they preserve open space while encouraging economic development.

Exhibit 72 summarizes land cover and industry-related (non-service) jobs across the State. Clusters of industry-related jobs (including manufacturing, transportation, warehousing, and utilities) are shown with white dots; larger dots indicate more jobs. By and large, most of the State consists of deciduous forest and pastureland (mainly concentrated in the Champlain Valley) known for its dairy farms. The greatest concentration of urbanized land and industrial employment is located in greater Burlington. Throughout the State, industrial employment tends to be located near existing railroad corridors.

Exhibit 72: Land Cover and Industry Related Employment



Greater Burlington

The Chittenden County Regional Planning Commission (CCRPC), which serves as the MPO for greater Burlington, states in its regional plan that there is a lack of industrial sites to accommodate future economic growth, and that additional sites need to be identified. The CCRPC encourages higher density development practices that use less land, a better mix of land with traditional development patterns, and provide for all modes of transportation. The IBM plant in Essex Junction is Vermont's largest employer, and will continue to be an incubator for high-tech jobs in the region.

Northern Vermont

In northwestern Vermont, St. Albans in Franklin County is the dominant industrial city. Dairy is a major source of employment in the rest of Franklin County. The Northwest RPC, which guides land use in the northwestern Vermont, recommends that industrial development be targeted towards designated industrial areas with adequate infrastructure, located within or adjacent to designated growth centers, and be compatible with mixed uses.

Lamoille County, which includes Morristown and Stowe, lacks up-to-date information on the availability of industrial sites and has a limited supply of moderate cost industrial sites with infrastructure. The RPC there recommends that industrial areas have a high level of amenities, including access to major transportation routes, and that industrial areas not requiring a rural location should be directed towards already built up areas.

The Northeast Kingdom, which includes the commercial centers of Newport and St. Johnsbury, is exploring the creation of forest-related industrial zones using existing rail sidings for sawmills. It also seeks to expand the usage of existing railroads for shipping and interface with trucks, and encourages appropriate light industrial in town centers. Recent industrial development has occurred in industrial parks located in Orleans and Hardwick.

Central Vermont

Barre, Rutland, and White River Junction are the principal commercial centers in central Vermont. Throughout the region, smaller scale industrial uses that fit into the context of historic town and city areas are encouraged. The Central Vermont RPC, which includes Barre and Montpelier, acknowledges that some industrial or warehousing operations may be incompatible with the mix of uses found in traditional growth centers, and hence better suited to single use industrial parks. In Rutland, which continues to "de-industrialize" despite the presence of GE Aircraft Engines, the goal is to tie industrial uses to existing land use patterns.

Southern Vermont

During the heyday of industrial revolution in the 19th Century, Southern Vermont had the largest concentration of heavy industry in State—namely, the machine tool factories of the "Precision Valley," which includes Springfield, Windsor, Bellows Falls, and Brattleboro. The "Precision Valley" has yet to recover from a spate of factory abandonments in the 1970s and 1980s. Since then, several industrial parks have been built along major highways outside the older town centers.

The Southern Windsor County RPC and Windham Regional Commission, which guide land use in southeastern Vermont, both acknowledge that industrial uses be situated in traditional urban centers where rail service and an available stock of industrial property exists. The Southern Windsor County RPC is working to target old industrial sites for redevelopment with future industrial uses for local jobs. It also recommends that the Green Mountain Railroad (GMR), which runs northwest from Bellows Falls to Rutland, could allow for rail-oriented industrial development on vacant parcels in various towns along the line. Another goal of the Southern Windsor County RPC

is to promote local zoning that promotes the use of rail for industrial development consistent with the recommendations of the 1999 freight study.

Bennington County, which includes the urban centers of Bennington and Manchester, seeks to expand manufacturing industry in existing villages and urban centers where adequate supporting infrastructure exists. The Bennington County RPC encourages the use of rail service by industry and states in its regional plan that economic development efforts should be focused around rail access wherever possible.

2.3 Review of State Rail Plans from Neighboring States

Surrounded by three states and sharing an international border with Canada, Vermont's passenger and freight rail needs frequently reflect similar conditions and initiatives in adjacent states given the multi-state nature of these corridors. The importance of Vermont's rail network is recognized in these state rail plans, mentioning projects in Vermont that would have positive impacts in their own states, along with useful examples of rail funding and other programs in Vermont that could similarly be adopted in their own states.

For passenger rail, expansion of Amtrak's *Vermonter* to Montreal and new Western Corridor service through Bennington requires cooperation with the Province of Quebec and the State of New York, respectively. The addition of a second daily *Vermonter* frequency would also provide benefit to multiple states in the Northeast including the District of Columbia, Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, and Massachusetts. Currently, the *Vermonter* service is subsidized off the Northeast Corridor by agreement between the States of Vermont, Massachusetts, and Connecticut.

While not included in the New York State Rail Plan, the *New York-Vermont Bi-State Intercity Passenger Rail Study* is an important initiative to provide intercity passenger rail services to parts of these two states that are currently underserved or unserved by rail. Completed in 2012, the final study documents outline the investments needed for track, grade crossings, bridges and new stations to implement this service, with parallel investments in both states.

The Knowledge Corridor is described in the 2010 Massachusetts State Rail Plan explaining the FRA's High-Speed Intercity Passenger Rail Program (HSIPR) to rehabilitate 49 miles of track and construct two stations for the *Vermonter* service in Western Massachusetts, complementing similar projects in Connecticut and Vermont to improve service on the New Haven – St. Albans corridor. This project was completed in late 2014. Additionally, included in the Connecticut (2012) and Massachusetts State Rail Plans, the Northern New England Intercity Rail Initiative introduces the *Inland Route/Knowledge Corridor Montreal Study*, which will advance a study for the development of improved passenger rail service along two routes from Boston to New Haven via Springfield and from Boston to Montreal.

State rail plans for New York, Massachusetts and New Hampshire similarly describe needed freight-related improvements to achieve 286K track, higher load capacities on bridges, and rail replacement projects that are multi-state in nature. Specifically, 2009 New York State Rail Plan introduces the joint venture between Norfolk Southern (NS) and Pan Am Southern (PAS) to create the Pan Am Southern includes the upgrade project for the PAS main lines from Rotterdam, NY east through Mechanicville into Vermont and Massachusetts to achieve 286K capability. Multi-state freight rail project investments and their estimated return on investment are quantified for the specific state benefits in the New York State Rail Plan.

The 2012 New Hampshire State Rail Plan describes the improvements to the New England Central Railroad's route between St. Albans Vermont and the Massachusetts state line that were advanced by Vermont and funded by federal ARRA grants in 2009 and 2010.

As part of one freight rail investment scenario, the New Hampshire State Rail Plan also discusses a project for improvements to the St. Lawrence & Atlantic Railroad, which includes a 3.6-mile section in Vermont. The investment would provide the line with 286K-compatible rail, improving rail corridor connectivity through unrestricted movement of fully-loaded rail cars to the national and international rail networks.

Vertical clearance projects also involve neighboring states, with Container-on-Flatcar (COFC) and Trailer-on-Flatcar (TOFC) projects that would impact Vermont identified each of the surrounding states' rail plans. The New Hampshire SRP specifically recommends coordination with other New England states to develop a region-wide approach to eliminating vertical constraints to New England main lines.

Chapter 3: Passenger Rail Issues, Needs and Potential Improvements/Investments

Passenger rail issues, needs and potential improvement opportunities fall into several categories:

- Performance and cost of current service
- Proposed new services
- Long-term goals: 79 mile per hour operations, and gated crossings on passenger routes
- Other passenger rail goals: continuously welded rail on all passenger routes, gated crossings on passenger routes
- Station considerations
- Equipment considerations

3.1 Performance and Cost of Current Service

In a sense, the performance of existing services represent an opportunity. For example, the trip times on the *Vermonter* have shortened recently due to infrastructure improvements in Vermont and Massachusetts. Amtrak and the State of Vermont completed track upgrades along the *Vermonter* rail route owned by the New England Central Railroad in October 2012. Improvements to rail infrastructure have reduced Vermont travel time of the *Vermonter* by over 30 minutes and improved reliability. Other enhancements to the *Vermonter* route south of the state line have been improving the *Vermonter*'s performance as well. In Massachusetts, another 40 minutes of travel time was eliminated when the route was shifted along the Connecticut River between Northampton and Springfield. Once completed the New Haven Hartford Springfield project between New Haven, CT and Springfield, MA will save another ten minutes off the *Vermonter*'s travel time, plus increase reliability.

But as shown in Exhibit 19 and Exhibit 20, the *Vermonter* and *Ethan Allen Express* routes do not always meet their performance goals. Customer service ratings for some customer service criteria fall below Amtrak/FRA standards. On-time performance by some measures also misses Amtrak/FRA standards. To some extent, these are influenced by circumstances outside of Vermont. For example, one of the largest sources of delay for the *Ethan Allen Express* is the Canadian Pacific Railway, which hosts the *Ethan Allen Express* in New York State. Other sources of delay include Metro-North Railroad, which also hosts both the *Ethan Allen Express* and the *Vermonter* outside of Vermont. But Amtrak also does not always meet goals for Amtrak-caused delays. Vermont can continue to work with Amtrak and state partners to identify ways that performance can be improved on existing routes.

Another challenge facing Vermont is that of funding for state-supported passenger trains. PRIIA Section 209 greatly increased the allocated costs that states must cover paying for Amtrak "corridor" intercity passenger rail services. For fiscal year 2014, Vermont paid approximately $8 million for *Ethan Allen Express* and *Vermonter* services. In fiscal year 2014, the first year during which PRIIA Section 209 cost allocations were in effect, Vermont paid 19 percent more that in 2013. Vermont's costs for the *Ethan Allen Express* and *Vermonter* services will again increase for FY 2015. Similar to the case with service performance, Vermont will work with partner states to manage the contract with Amtrak to provide services and seek ways to reduce or at least curtail the increase in the cost burden.

3.2 Proposed New Services

As discussed on Page 45, Vermont has established a goal of quadrupling intercity passenger ridership to 400,000 per year over the next 20 years as part of the *Vermont Comprehensive Energy Plan*. As shown in Exhibit 68, even under an optimistic assumption of five percent annual growth in ridership, ridership only grows to 295,600 in 2035 with existing services. In order to meet Vermont's goal of quadrupling ridership, the State would need to expand services.

3.2.1 Extension of the Ethan Allen Express to Burlington

Service on the *Ethan Allen Express*, operated by Amtrak, began in 1996. The *Ethan Allen Express* serves the Empire Corridor from New York Penn Station to Albany and continues to Rutland. The *Ethan Allen Express* makes daytime stops in Vermont both northbound and southbound. The train serves Rutland and is a popular connection to the Killington ski area in central Vermont. VTrans proposed canceling the *Ethan Allen Express* in 2008 and 2009 as a cost cutting measure, an idea that was not advanced by the state legislature. After surviving these challenges, proposed changes shifted from curtailing service to improving and extending service.

There are several reasons to extend rail service to Burlington: western Vermont is not served by an interstate highway, and a rail line would make traveling to New York City and the rest of the Northeast Corridor easier for many in western Vermont. Middlebury College would likely benefit from a train connection allowing students and staff to travel without driving; ski resorts in north western Vermont would benefit from added connections for tourists; and the economy of the Burlington area would benefit from additional travel connections to New York City and the Northeast Corridor. Initial estimates suggest that expanding *Ethan Allen Express* to Burlington could greatly increase the *Ethan Allen Express* ridership.

Extending the *Ethan Allen Express* to Burlington has been studied most recently as part of the *Environmental Assessment: Rutland-Burlington High-Speed Intercity Passenger Rail (*2009*)*. This extension of service would entail extending the *Ethan Allen Express* from its terminus in Rutland 67.7 miles to Burlington via Middlebury.

Since 2012 the State of Vermont has been working on projects to prepare rail, stations, grade crossings, and bridges between Rutland and Burlington. These projects have utilized an earmark secured by Senator Jeffords. The largest project so far, at $18 million, has been in Middlebury where two overpasses needed to be replaced where the track travels through the town below grade. Work is expected to begin in mid-2015. The State of Vermont was awarded nearly $9 million in TIGER funds in 2013 to rehabilitate a portion of the rails between Rutland and Leicester. A new "temporary" station is required in Middlebury but the old station in Burlington doesn't require upgrades. VTrans estimates the cost of completing the remaining infrastructure work needed to extend the *Ethan Allen Express* to Burlington to be around $26.4 million. This would provide 59 mile per hour service, the minimum for effective intercity passenger rail service. Work to be completed would include:

- Continuously welded rail where it is not currently in place, as well as new ties and surfacing;
- New passing sidings;
- Crossing upgrades;
- Station platforms;
- Two new wye tracks.

Exhibit 73 provides a map of the proposed extension.

Exhibit 73: *Ethan Allen Express* Expansion to Burlington

In Exhibit 74 FY2013 ridership represents actual ridership for Vermont stations for the *Ethan Allen Express*. Also shown are the forecast ridership scenarios for 2035 that include both ridership increases due to the new service to Burlington and ridership increases due to general increases in ridership demand at an annual growth rate of 1.7 percent, three percent, or five percent.

Exhibit 74: Estimated Ridership of *Ethan Allen Express* Extension to Burlington

		1.7% Growth	3% Growth	5% Growth
Station	FY2013 Ridership	2035 Forecast	2035 Forecast	2035 Forecast
Burlington	0	21,000	27,800	42,400
Middlebury	0	7,000	9,300	14,100
Rutland	16,815	25,400	33,600	51,300
Castleton	4,211	6,400	8,500	12,900
Total	21,026	59,800	79,200	120,700

VTrans estimates that as a result of the project, Vermont subsidies for the *Ethan Allen Express* service will increase by up to $1 million per year.

3.2.2 Vermonter Montreal Extension

From 1972 through 1995 the Amtrak *Montrealer* service traveled from Washington, DC to Montreal via Vermont. Stations in Vermont were served in the late night and early morning hours. In 1995 the *Montrealer* service ended and was replaced by the *Vermonter*. The *Vermonter* serves the Northeast Corridor from Washington D.C. to New Haven and continues to St. Albans. The *Vermonter* makes daytime stops in Vermont both northbound and southbound.

Since the change from the *Montrealer* to the *Vermonter*, there has been interest among some members of the public and government officials in restoring service to Montreal. Reasons for expanding the *Vermonter*'s service to Montreal include better integration of Vermont's economy with the nearby large metropolitan area of Montreal, increased connectivity between Montreal, New England and the Northeast Corridor, and expanded options for travelers. Based on initial estimates expanding the *Vermonter* to Montreal could greatly increase the *Vermonter*'s ridership.

Extending the *Vermonter* to Montreal has been studied most recently as part of the *Northern New England Intercity Rail Study (*ongoing*)*. This extension of service would mean continuing the route of the *Vermonter* from its terminus in St. Albans 71.4 miles to Montreal. The expanded *Vermonter* service would continue to operate as a daytime train through Vermont in both directions. The "local service" option presented in the *Northern New England Intercity Rail Study* would include trains traveling up to 60 miles per hour. VTrans believes that the infrastructure within Vermont is sufficient for the service extension. Between grants under the High Speed Intercity Passenger Rail Program (HISPR) and the TIGER IV Discretionary Grant Program, over $90 million has been spent on the corridor. This includes upgrades to the entire line from the Massachusetts border to the Canadian border. Much of the rest of the extension within Canada would share the same route as the existing Adirondack service and would share the same station in Montreal.

Exhibit 75: *Vermonter* Expansion to Montreal

In March 2015 the United States Department of Homeland Security and The Government of Canada signed a preclearance agreement that will make new train service agreements easier by setting up an agreed upon process for border crossing, customs, and other cross-border activities.[51]

While VTrans does not believe that extending the *Vermonter* to Montreal will require incremental capital investment from Vermont, the service will likely require additional subsidies. Amtrak would need an operating or track agreement with VIA Rail in Canada; baggage, ticketing, and customs infrastructure and agreements must be worked out. The allocation of other costs such an engine turn, train cleaning, and crew quarters would need to be

[51] *http://www.dhs.gov/news/2015/03/16/united-states-and-canada-sign-preclearance-agreement*

determined. For other U.S./Canada routes such as the *Adirondack* service to Montreal, the *Maple Leaf* service to Toronto, or the *Cascades* service to Vancouver, sponsoring agencies in the U.S. subsidize the service into Canada.

In Exhibit 76, FY2013 ridership represents actual ridership for Vermont stations, and Claremont, NH as Vermont is responsible for financial support of service at this station, on the *Vermonter*. Also shown is the forecast ridership scenarios for 2035 that include both ridership increases due to the new service to Montreal and ridership increases due to general increases in ridership demand at an annual growth rate of 1.7 percent, three percent, or five percent.

Exhibit 76: Estimated Ridership of Vermonter Extension to Montreal

Station	FY2013 Ridership	1.7% Growth 2035 Forecast	3% Growth 2035 Forecast	5% Growth 2035 Forecast
St. Albans, VT	3,592	9,000	11,900	18,200
Essex Jct., VT	20,579	52,100	68,900	105,200
Waterbury, VT	5,501	14,300	18,900	28,900
Montpelier Jct., VT	8,081	19,800	26,200	40,000
Randolph, VT	2,009	4,200	5,600	8,500
White River Jct., VT	15,480	41,600	55,000	84,000
Windsor-Mt. Ascutney, VT	1,126	2,400	3,200	4,800
Claremont, NH	2,123	5,700	7,500	11,500
Bellows Falls, VT	4,774	10,000	13,200	20,200
Brattleboro, VT	18,661	43,600	57,700	88,000
Total	81,926	202,700	268,100	409,300

VTrans estimates that the incremental annual subsidy associated with extending the *Vermonter* to Montreal would be about $2 million.

3.2.3 New Service from Albany to Burlington via North Bennington and Rutland

The *Environmental Assessment New York-Vermont Bi-State Intercity Passenger Rail Study* (2014) (Bi State Study) examined the addition of a new passenger rail service in New York and southwestern Vermont. The service would begin in Albany and follow the routes of the *Ethan Allen Express* and *Adirondack* to Schenectady and then split, running along the CSX line to Mechanicville, NY, on the Pan Am Southern line to Hoosick Junction, then to Rutland on the Vermont Railways, serving North Bennington, and Manchester Center. Although not examined in the Bi State Study, the service could be further extended to Burlington via Middlebury once improvements associated with the *Ethan Allen Express* extension to Burlington have been completed.

From Albany to Glenville the new service would cover 22.6 miles of track already utilized by Amtrak services; the remaining journey to Rutland would cover 161.8 miles of track that is currently in freight service that would require upgrades for passenger service.

This new rail service concept was developed to meet several goals and create benefits for western Vermont. The Purpose and Need in the *Environmental Assessment New York-Vermont Bi-State Intercity Passenger Rail Study* (2014) identifies need for this rail service (between Albany and Rutland) to accomplish the following in southwestern Vermont:

- Extend Intercity Passenger Rail Access and Improve Mobility;
- Support Economic Development and Sustainable Development;
- Maximize Transportation Efficiencies; and,
- Protect Environmental Quality.

A new passenger rail service would improve mobility and boost the regional economy in southwestern Vermont. Currently, the roadway network in this area is not as well developed as in other parts of Vermont, and residents have limited public transportation options. The project would better connect southeastern Vermont with Albany, with further rail connections to New York City and points beyond. The project would boost the attractiveness of the region to tourists and visitors. The infrastructure upgrades would also benefit the freight network, since the upgrades to the rail lines would improve the operation of freight trains.

Exhibit 77: New Service from Albany to Burlington via Bennington, Rutland, and Middlebury

In Exhibit 78 FY2013 ridership represents actual ridership for Vermont stations that would be served by the new service. Also shown is the forecast ridership scenarios for 2035 for Vermont stations that includes the new service from Albany to Burlington via North Bennington and Rutland. Ridership at Rutland includes estimates based on the new service and growth in ridership on the *Ethan Allen Express* at 1.7 percent, three percent, and five percent annually. Ridership at the stations with new service is grown at 1.7 percent, three percent, and five percent from their opening year estimates.

Exhibit 78: Estimated Ridership on New Service between Albany and Burlington via Rutland, Including *Ethan Allen Express* Service

Station	FY2013 Ridership	1.7% Growth 2035 Forecast	3% Growth 2035 Forecast	5% Growth 2035 Forecast
Burlington	0	14,400	19,000	29,100
Middlebury	0	4,800	6,300	9,700
Rutland	16,815	32,000	42,300	64,600
Manchester	0	7,400	9,800	14,900
N. Bennington	0	11,000	14,500	22,200
Total	16,815	69,600	91,900	140,500

The capital cost of the project is expected to total $88 million, which includes the following elements:

- New siding tracks;
- Mainline track upgrades;
- A signal system;
- Crossing upgrades;
- Improvements to bridges in poor condition.

Based on operating revenues and costs for the Albany – Rutland service, it is estimated that the required operating subsidies for the Albany – Burlington service would be about $4 million per year.

3.2.4 Extension of Ethan Allen Express to Essex Junction

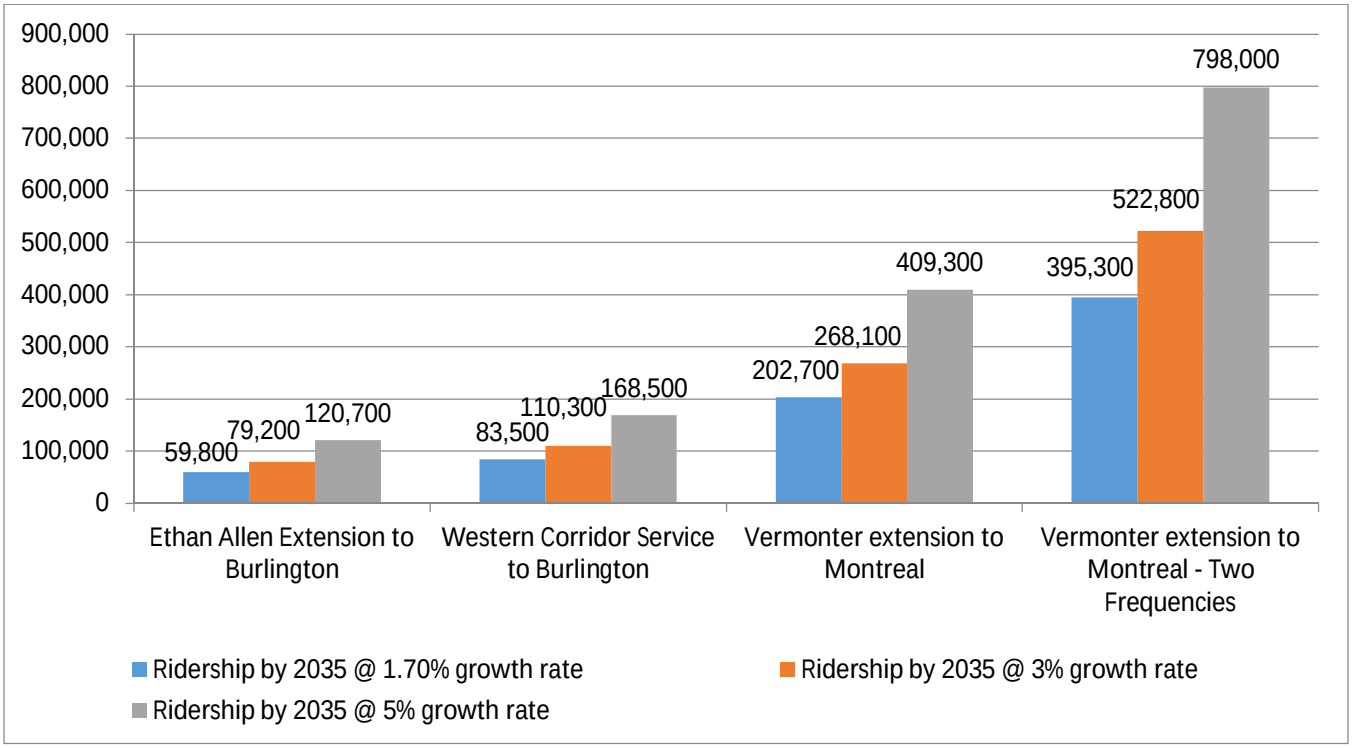
This project would further extend the *Ethan Allen Express* from Union Station in downtown Burlington to Essex Junction. The route would be extended along the lightly used Winooski Branch, owned by the New England Central Railroad. The track on the Winooski Branch would need to be upgraded and improved for regular passenger service. Track is old and obsolete, and ties are in a state of poor repair. The New England Central estimates the cost of upgrading the line would be about $4 million, although the New England Central's estimates are relevant to freight rail operations. Additional study would be required to derive the full required capital cost of establishing passenger operations on the line. For the purposes of this Plan, rehabilitating the line for freight and upgrading for passenger operations are assumed to be the same.

The *Ethan Allen Express* extension to Essex Junction will complete the Albany-Bennington-Rutland-Burlington-Essex (ABRBE) vision of an integrated multimodal transportation corridor connecting Albany and western Vermont. Essex Junction is Vermont's busiest station and is forecasted to remain so. The planned extension of the *Vermonter* to Montreal will add more ridership to this station, as will the long-term goal two frequencies along the *Vermonte*r. This extension could make possible connections between the *Vermonter* and the *Ethan Allen Express*. It could have operational benefits as well. Railroad track configuration at Essex Junction could enable *Ethan Allen Express* trains to reverse direction, something that would not be possible given the current track configuration in downtown Burlington.

3.2.5 Summary of Ridership Impacts of New Services

Exhibit 79 displays the ridership impact of proposed new services. Extending the *Vermonter* to Montreal is expected to have the highest impact on ridership. Extending the *Vermonter* to Montreal and adding a second frequency could potentially allow Vermont to reach the 400,000 rider goal by itself.

Exhibit 79: Summary of Ridership Impacts of Proposed New Services - 2035



3.3 Long-Term Initiative to Upgrade to FRA Track Class 4 Standards

Vermont has established a long-term goal to upgrade passenger rail lines within the State to 79 mile per hour operations, or FRA Track Class 4 standards. This would enable rail transit times to be more competitive with automobile travel, so that traveling by rail could be as fast or faster than traveling by automobile, including the time for station stops, and travel to/from stations.

The practicality of upgrading Vermont's rail lines to these high speeds is influenced by track geometry. Train speeds are limited by curves. Adding banking or "super elevation" to curves can help rail lines to accommodate faster train speeds. By doing so, the outer rail in a curve is raised above the lower rail, so that more of the outward pressure associated with the train negotiating the curve is transferred into the ground rather than the outer rail. But adding super elevation can be costly. Curves must be redesigned, and track moved in order to accommodate the super elevation. Furthermore, there are limits to the practicality of slow-moving freight trains using tracks with significant super elevation intended for fast-moving passenger trains. Uneven tracks cause freight trains to create excessive wear on the lower rails. Due to this situation, it would be impractical for train speeds to approach 79 miles per hour through curves with much more than approximately 2 degrees of curvature. Furthermore, the distance between curves must be significant in order for passenger trains to benefit from the higher speeds. Trains are limited in their ability to accelerate or decelerate. If a 79 mile per hour segment is too short, the train would never have time to accelerate in time to benefit from this speed, and still have time to decelerate to negotiate the next curve. Trains also use more fuel if they are constantly accelerating and decelerating.

Current and proposed passenger rail routes have been assessed assuming that rail line segments must have curves of no more than 2 degrees for five or more miles to approach 79 mile per hour operations. The results suggest that train speeds on the *Vermonter* route on the New England Central Railroad would benefit relatively little from

FRA Track Class 4 operations within its current right of way. Only about 15 percent of the route within Vermont is straight enough permit train speeds approaching 79 miles per hour. The rail lines for the intended passenger services between North Bennington and Burlington are straighter. Based strictly on the presence or absence of curves, about 40 percent of the line between North Bennington and Rutland could theoretically be upgraded to speeds approaching 79 miles per hour, while roughly 75 percent of the line between Rutland and Burlington could be upgraded speeds approaching 79 miles per hour.

Beyond potentially adding super elevation to curves, two modifications would need to be made for Vermont passenger routes to operate at 79 mile per hour speeds:

- Crossings would need to be upgraded. Additional train-activated countermeasures would need to be added to any crossings that currently lack adequate countermeasures. For those crossings already equipped with train-activated countermeasures, these would need to be adjusted so that flashing lights and gates provide constant same warning time, whether the approaching train is traveling 79 or 15 miles per hour.
- All segments would need to be equipped with Centralized Traffic Control (CTC) dispatching. By CTC, train movements and authority to occupy segments of track are governed by signal indications. From a console, a dispatcher remotely controls signals and powered switches. Trains need only to observe the controlled signals to obtain movement authority.

The Northern New England Intercity Rail Initiative has developed estimates of the capital costs of a "Build Alternative" in which trains would operate at a maximum speed of 79 miles per hour on the *Vermonter* route in Vermont. This study contemplates CTC in areas where CTC is currently not available and upgrades to areas currently covered by CTC. Fifty-seven intermediate signals would be installed approximately every two miles along the line and interlocking signals will be added at both ends of key existing passing sidings intended for use in this area. Grade crossings would be brought to a state of good repair in order to meet the speed and service goals. Warning devices that have reached the end of their useful life would be upgraded as well as unequipped public crossings. Active warning devices would be installed at 83 locations along the NECR. In addition, passive signage would be installed at 161 private crossings of the NECR.

Exhibit 80: CTC Signal Mast on New England Central Railroad near Windsor

The study estimates the cost of upgrading the crossing to be about $65.4 million, with the cost of adding and upgrading CTC to be approximately $74.6 million. The study also recommends the addition of several segments

of double track, plus bridge modifications to accommodate the additional double track in order to provide the capacity for faster, expanded passenger service. These would add another approximately $37.2 million in costs.

The costs of adding CTC to the rail segment between the New York/Vermont border near North Bennington on the Vermont Railway line and Rutland is included in the $88 million capital cost from the Bi State Study. Adding CTC to enable FRA Class 4 operations on the Vermont Railway between Rutland and Burlington, as well as the Clarendon & Pittsford Railroad is estimated to cost approximately $42 million. Assuming that all public crossings have train-activated warning devices, the cost of adding constant warning time to all public crossings on the Vermont Railway and the Clarendon & Pittsford Railroad would be approximately $36 million.

3.4 Continuously Welded Rail and Gated Crossings on All Passenger Rail Routes

Another passenger rail goal of Vermont's is for all passenger rail routes to be equipped with continuously welded rail (CWR). Through CWR, rails are welded together to form one uninterrupted rail that may be several miles long. Although CWR is normally one continuous rail, it may contain joints for one or more reasons, such as to separate track segments for signaling purposes. Continuously welded rail has a number of advantages, including longer rail life, savings in general track maintenance, reduced wear and tear on equipment, and reduced frequency and cost of rail relays. Currently, the entire *Vermonter* route is CWR. For the *Ethan Allen Express*, five of the 15 miles of CLP in Vermont is jointed rail and needs to be upgraded to CWR. Sections of the Vermont Railway that have been proposed for passenger rail service are also jointed rail, but Vermont's proposed passenger rail initiatives include rail replacement to CWR.

Exhibit 81: Welded Rail Joint

Source: "Geschweisster schienenstoss" by LosHawlos - Own work.

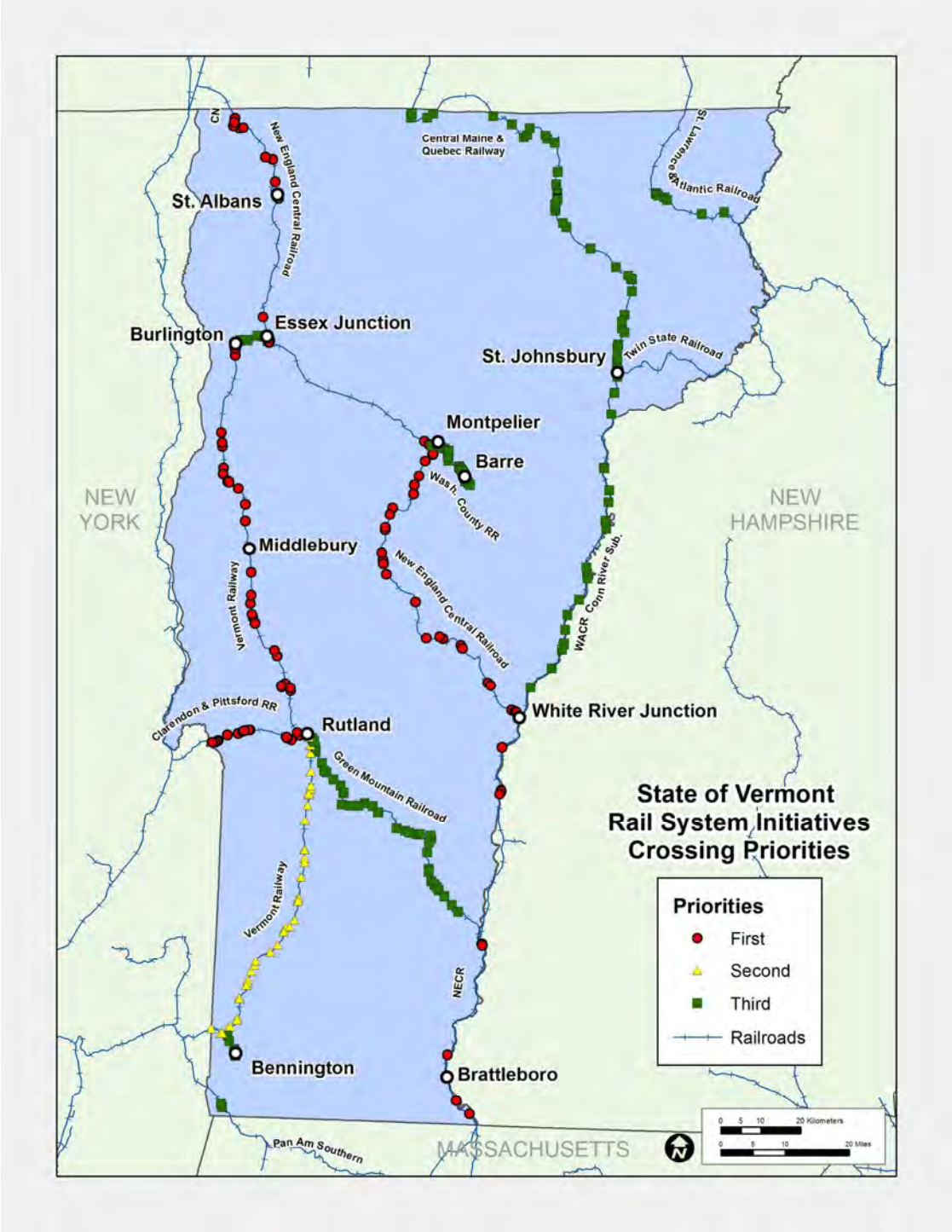
Vermont has also established a long-term goal of protecting all public highway-rail grade crossings on passenger rail routes with flashing lights and gates. As shown in Exhibit 82, passenger rail trains have been a significant factor in accidents at highway-rail grade crossings, accounting for 10 of 33 accidents between 2004 and 2013.

Exhibit 82: 2004 – 2013 Public Crossing Accident Statistics Involving Freight and Passenger Trains

Year	Fatalities	Injuries	Property Only	Total
Freight Total	0	11	12	23
Passenger Total	2	2	6	10
10 Year Total	2	13	18	33

Exhibit 83 displays crossings that are not currently equipped with flashing lights and gates. Upgrades to these crossings have been prioritized so that the highest priorities are crossings that are located either on existing passenger rail routes or on the proposed extension of the *Ethan Allen Express* between Rutland and Burlington. Second priority are crossings on the Vermont Railways line between the Vermont/New York border near North Bennington to Rutland, for which passenger service has been proposed. Third priority are crossings on freight-only rail lines in the State.

Exhibit 83: Long-Term Crossing Priorities



3.5 Station Considerations

Rail stations in Vermont are owned by a variety of parties, including municipalities and freight railroads whose antecedents provided passenger service prior to the establishment of Amtrak. In cases where stations are owned by freight railroads, they are then leased to Amtrak as part of the Amtrak access agreement. Like other rail assets,

railroad stations must be maintained and kept in a state of good repair. Vermont rail stations vary widely in their amenities, ranging from historic buildings with restrooms and waiting areas, to simple platforms with shelters. It is necessary that any rail stations not readily accessible to and usable by individuals with disabilities under the Americans with Disabilities Act (ADA) be upgraded to be ADA compliant. It is anticipated that upgrades, whether related to state of good repair issues, added amenities, or ADA compliance, will be required to at least some stations over the coming years and that VTrans will be involved in these upgrades.

3.6 Equipment Considerations

As current passenger rail services are maintained and new passenger rail services are considered, Vermont will face issues in terms of the maintenance of existing equipment and potential alternatives for new equipment.

3.6.1 Diesel Multiple Units (DMUs)

DMUs are self-powered diesel rail vehicles, typically operating in 2-4 car units. In the mid-2000's, Vermont considered adopting DMUs as a lower cost option for providing passenger rail service in the State. This effort faltered when agreement could not be reached on the financial terms, and the equipment supplier subsequently went into bankruptcy.

DMUs can provide greater operational flexibility as compared to locomotive-hauled passenger trains. Historically, DMU service was common in New England with the country's largest fleet of Budd Rail Diesel Cars (RDC) in use from the 1950's through the 1970s. Amtrak and the State of Connecticut experimented with an updated RDC model, the SPV 2000 during the 1980's, but they were prone to failure, difficult to maintain, and as a result were converted to coaches during the 1990's. U.S. commuter railroads and Amtrak have focused primarily on locomotive hauled passenger trains since that time.

In the late 1990's, the FRA began a process to update rail car safety standards. These standards make it more difficult for a DMU to comply with the FRA requirements due to the structural requirements for crash-worthiness (generally referred to as FRA compliance). In addition, recent Environmental Protection Agency (EPA) emissions rules have added significant new requirements for compliance. Both of these regulations have made it harder to design and build a DMU due to the increases in weight and complexity involved.

A revival of interest in DMUs began during the mid-2000s. One builder, Colorado Railcar Company built several FRA-compliant DMUs prior to declaring bankruptcy during the 2008 financial crisis. At the same time, non-FRA compliant DMUs have also been delivered for the U.S. transit and commuter markets. Based on European designs, these DMUs have required FRA "waivers" for operation on rail liens with both freight and conventional passenger rail service because they do not meet all of the FRA safety standards. Since then, the most recent generation of DMUs of Nippon Sharyo have achieved full FRA compliance, and other manufacturers are also offering compliant vehicles.

In recent years, DMUs have been used in very specific applications in North America. Presently, they are purely used for transit or commuter rail over short distances of less than 50 miles. Several of these services were specifically designed to be "diesel light rail lines," to avoid the high capital costs associated with electric propulsion.

Maintenance support for DMUs is an important consideration. In modern rolling stock design and construction, modularity is a key feature of the vehicle's subsystems and components design, and it will influence maintenance processes and costs. In the past, a consistent drawback of DMUs was that they are considered locomotives under FRA rules, which required a more frequent inspection schedule than passenger coaches. However, in June 2012,

FRA relaxed its locomotive inspection requirements from 92 to 184 days for newly manufactured locomotives that are equipped with self-diagnostic systems. The implications for various DMU options are still undetermined. This makes inspection intervals similar to those of passenger coaches (180 days).

Another important issue to consider is funding and "Buy America" issues. Alstom, Stadler and Siemens DMUs are all manufactured in Europe and imported. If any FRA or FTA funding was used to purchase DMUs, they would have to be assembled in the USA and comply with "Buy America" requirements.

The primary potential benefits from deploying DMUs are in achieving operating savings through reduced fuel consumption, lower operating labor requirements, and a degree of flexibility not commonly available with locomotive hauled trains. Modern DMU fuel consumption can be substantially lower than for a typical locomotive hauled train. Labor cost savings can be achieved through reduced crew sizes; in short-haul applications they are typically operated by a crew of one or two; in an intercity application as might be applicable in Vermont, a minimum 2-person crew would likely be necessary. Achieving these labor savings is contingent upon successful labor negotiations. They can operate in multiple units (see photo below) on a main line like a conventional locomotive hauled train, and then be split at a station to service a branch line, while the rest of the train continues on. Interestingly, no U.S. operator presently takes advantage of this flexibility, but in Europe and Japan this is quite common.

Despite these issues, DMUs can be utilized as a specific strategy for rail passenger service in markets that are perhaps not well suited to locomotive-hauled passenger trains. Issues such as freight service, crew size, FRA approvals, and maintenance must be considered in depth.

Exhibit 84: DMU New Jersey Transit's River Line between Camden and Trenton

3.6.2 Next-Generation Corridor Equipment Pool Committee

The *Ethan Allen Express* service currently uses Amtrak's existing fleet of P32DM dual mode (Diesel and electric 3rd rail) locomotives to access Penn Station New York. The ability to operate in electric or diesel mode is of benefit for the *Ethan Allen Express* route, since a portion of the route (between Penn Station and Croton-Harmon) is electrified, while other sections of the route are not. This fleet of locomotives, used by New York State and Vermont state-supported intercity rail passenger services, will be nearing the end of their useful lives over the next five years. The States of New York, Connecticut, and Vermont are working together with the PRIIA 305 Next Generation Equipment Committee (NGEC) to develop a specification for new dual mode locomotives to replace the existing fleet. Once the specification is completed by the technical committee and approved by the executive committee, it may be used to procure these locomotives when funding becomes available. The NGEC has also developed a single-level car specification. This specification could be used by Amtrak, or states, to procure replacement rolling stock for Amtrak's aging Amfleet 1's, such as are used on the *Vermonter* and *Ethan Allen Express*. Amtrak's *Fleet Strategy 3.1*[52] mentions that Amtrak's P42 locomotives, used on the *Vermonter*, are approximately 20 years old and are nearing the end of their useful lives. The NGEC has also developed a diesel locomotive specification, referred to as the "Charger," that is being used to procure new locomotives for the Midwest, California, and the Pacific Northwest. This could be used for the replacement of the P42 locomotives, such as are used on the *Vermonter*. Ensuring consistency with other equipment on the Amtrak Northeast Corridor is an important consideration.

[52] http://www.amtrak.com/ccurl/36/921/2012-Amtrak-Fleet-Strategy-v3.1-%2003-29-12.pdf.

Chapter 4: Freight Rail Needs and Potential Improvements/Investments

The State of Vermont is committed to maintaining and improving the rail system network to realize the vision, goals, and objectives as outlined in this Plan. Proposed investments and improvements were developed based upon previous studies and the findings in this Rail Plan, as well as discussions with stakeholders within Vermont. The areas of investment are:

- FRA Track Classification/Slow Orders;
- Railroad Bridge Condition and Capacity/Upgrade to 286,000 Pound Standard;
- Track Condition/Upgrade to 286,000 Pound Standard;
- Improvements to Yards and Structures;
- Economic Development and Industrial Access;
- Clearance Improvements.

4.1 FRA Track Classification/Slow Orders

The FRA has established minimum track safety standards requirements and maintenance levels for railroad operators, which dictate the minimum track conditions that are allowable for train operations at given operating speeds. Track classes and allowable speeds are shown in Exhibit 85. Track classification can serve as a proxy for the condition of rail lines. Rail lines of higher FRA track classification are typically in better condition than rail lines with lower FRA track classification. Track that is rated "Excepted" is considered to be in poor state of repair, while track rated Class 1 is at the bottom of FRA standards. While FRA standards set minimum requirements for operations at given speeds, as a practical matter, railroads must maintain their tracks above the FRA standards to routinely operate at those speeds.

Exhibit 85: Allowable Operating Speeds by FRA Track Class

Track Class	Maximum Allowable Operating Speeds (mph)	
	Freight Trains	Passenger Trains
Excepted Track	10	Not Allowed
Class 1	10	15
Class 2	25	30
Class 3	40	60
Class 4	60	80
Class 5	80	90

If a line is not maintained sufficiently for trains to operate at the class of track associated with published timetable speeds, then slow orders must be placed on the tracks. If maintenance is not performed over a period of time, permanent slow orders must be imposed on those sections of track. Railroad operators of state-owned lines are required to maintain the track class established in their lease with the State.

Rail operators in the State were surveyed regarding slow orders on their systems. In general, state-owned rail lines are limited by a number of slow orders. Causes are varied and sometimes result from the condition of bridges, to be discussed below. Slow orders are listed in bulletins distributed to train crews. New England Central indicated that the railroad does not anticipate any major permanent slow orders on its lines once track improvements have been completed.

Exhibit 86 lists the FRA track class of rail lines in Vermont.

Exhibit 86: FRA Track Class of Rail Lines in Vermont

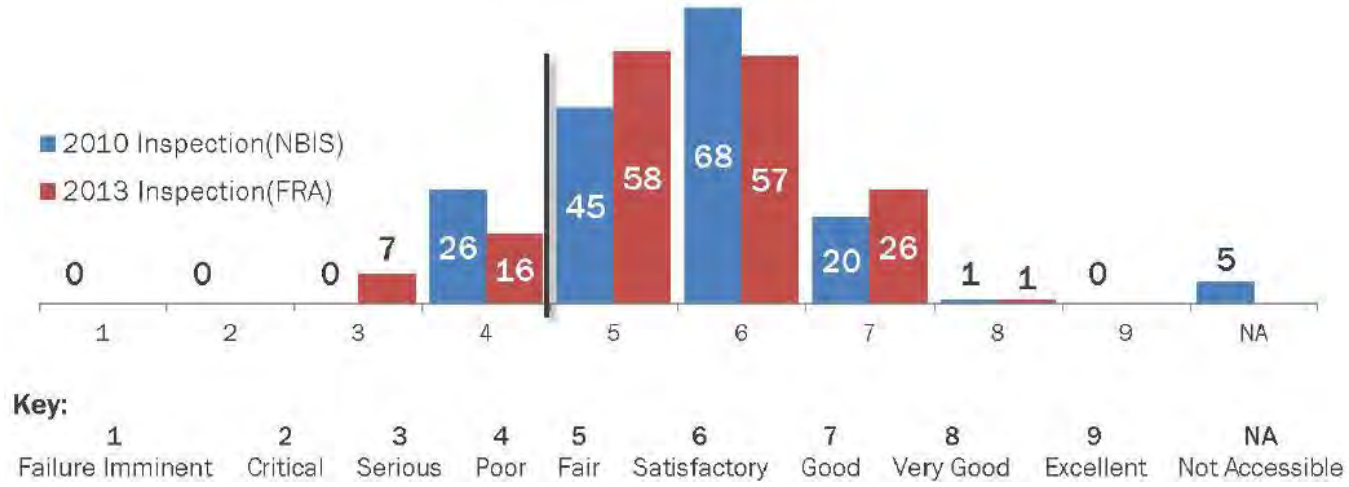
Railroad	Line	FRA Track Class
Clarendon & Pittsford	Main Line	3
Clarendon & Pittsford	Florence Branch	1
Pan Am Southern	Main Line	3
Green Mountain Railroad	Main Line	2
Central Maine & Quebec	Newport Subdivision	2
Central Maine & Quebec	Lydonville Subdivision	2
New England Central	Palmer Subdivision	3
New England Central	Roxbury Subdivision	3
New England Central	Swanton Subdivision	2
New England Central	Winooski Branch	1
St. Lawrence & Atlantic	Sherbrooke Subdivision	2
St. Lawrence & Atlantic	Berlin Subdivision	2
Vermont Railway	Bennington Branch	1
Vermont Railway	Hoosick Main	3
Vermont Railway	N. Bennington – Manchester Main	3
Vermont Railway	Manchester – Rutland Main	2
Vermont Railway	Northern Subdivision	3
Washington County Railroad	Montpelier & Barre Division	1
Washington County Railroad	Connecticut River Subdivision	2

4.2 Railroad Bridge Condition/ Upgrade to 286,000 Pound Capacity

4.2.1 Status/Capacity of Bridges

Vermont's railroad capital program includes inspection, analysis and rehabilitation of railroad abutments and superstructures. On lines owned by the State, per operating agreements, VTrans is responsible for bridges ten feet of length or longer over waterways and all bridges over roads and highways. The State has agreed to maintain, replace, repair and install non-track elements on these longer structures. The FRA established federal safety requirements for railroad bridges in 2010, and VTrans established a Rail Bridge Management Program in September 2012 in accordance with these regulations. These regulations mandated that annual safety inspections be performed for each bridge and that all bridges have an initial load capacity rating by September 2017. Of the 214 bridges on State-owned property, the State is responsible for 165 bridges, while the railroad operator is responsible for the remaining 49 per existing lease agreements. Exhibit 87 displays the status of the 165 bridges for which the State has responsibility, per 2010 and 2013 inspections.

Exhibit 87: Bridge Condition Ratings from 2010 and 2013 Inspections



Ability to Handle 263,000 and 286,000 Pound Railcars

Vermont, served primarily by short line and regional railroads, faces a challenge in updating its railroad infrastructure to accommodate heavier and larger rail freight cars. This trend to "larger and heavier" is driven by large Class I railroads seeking to achieve greater economies of scale in the transport of freight.

The industry shift from 263,000- to 286,000-pound railcars began in the early 1990s. It was the result of a series of tests sponsored by the Class I railroads to find an appropriate weight of railcars that would reduce operating expenses while not increasing maintenance of way expenditures excessively. This higher weight is now standard on large railroads (Class I railroads with revenues in excess of $467.0 million). Some segments of the rail industry, such as coal, rely almost exclusively on 286,000-pound cars, while others carry most freight in 286,000-pound railcars. For example, analysts at the U.S. Department of Agriculture estimate that about 70 percent of grain shipments are originated in 286,000 pound covered hoppers.[53]

The ability to only accommodate 263,000-pound railcars places many Vermont rail operators at a significant disadvantage. Heavier axle railcars can carry ten or 11 percent more freight per carload. For many car types, a 263,000-pound car can carry around 100 tons of freight, whereas a 286,000-pound car can carry around 110 to 112 tons of freight. Not only are the railcars bigger, but the ratio of railcar equipment weight (tare) to payload weight is more favorable. A study conducted by the Association of American Railroads (AAR) found that shifting from 263,000 pound to 286,000-pound railcars reduces operating expenses by about six percent, including the net of the increased maintenance of way expenditures.[54] Although the Class I railroads have adopted the 286,000 pound railcar loading standard, the track and bridge structure of many short line and regional railroads are incapable of supporting the heavier weight limit. The American Short Line and Regional Railroad Association have reported that the cost to upgrade the nation's short lines and regional lines to the 286K standard is approximately $6.86 billion (1999).

Shippers prefer not to locate on lines that can only accommodate 263,000 pound railcars, and in many instances, Class I railroads prefer not to interchange or to route their freight around railroads that cannot handle industry

[53] U.S. Department of Agriculture, Agricultural Marketing Service, The Shift to Larger Railcars for the Shipment of Grain. August 2013,Web, <http://dx.doi.org/10.9752/TS087.08-2013>
[54] M.B. Hargrove, Thomas S. Guins, and Carl D. Martland, "Economics of Increased Axle Loads: FAST/HAL Phase II Results," Report No. LA-007, Association of American Railroads, October 1996.

standard railcars. According to one rail operator in Vermont, the company frequently is forced to turn freight traffic away as a result of not being able to accommodate 286,000 pound railcars. Exhibit 88 lists Vermont rail lines by their ability to handle heavy axle loads. The problem will only become worse as the industry continues to shift to higher capacity railcars.

Exhibit 88: Weight Capacity of Vermont Rail Lines

Railroad	Maximum Railcar Weight (Pounds)
New England Central Mainline	286,000
New England Central Burlington Branch	263,000
Clarendon and Pittsford	286,000
Green Mountain Railroad	263,000
Vermont Railway	263,000
Washington County Railroad	263,000
Washington County Railroad – Connecticut River Division	263,000
St. Lawrence and Atlantic	263,000
Central Maine and Quebec Railway	263,000

Upgrading these rail lines in Vermont would accomplish little if lines outside of Vermont are unable to accommodate heavy railcars. Some of the gateways on which Vermont rail lines depend are capable of handling these heavier railcars, including the Pan Am Southern in Massachusetts and New York State and the Canadian Pacific route between Albany and Montreal. The New England Central Railway is currently unable to accommodate 286,000 pound railcars in Massachusetts and Connecticut. The company recently reached an agreement with the State of Massachusetts to upgrade the line, although this agreement has not been formalized. In Connecticut, the New England Central Railroad was awarded a TIGER VI grant to upgrade the line in Connecticut, so this will be upgraded. In two or three years, the entire New England Central line could presumably be able to accommodate 286,000–pound railcars, although this may be contingent on agreements in Massachusetts. However, its function as a fully 286,000 pound compliant route from Montreal to New England will not occur until the segment owned by Canadian National in Quebec is upgraded as well. The Central Maine and Quebec Railway is also unable to accommodate 286,000–pound railcars.

As of April 2015, VTrans has estimated load capacity of 125 of 165 bridges for which the State is responsible. Twenty-one bridges in Vermont are in need of rehabilitation in order to continue to safely accommodate current rail traffic (generally cars with a gross weight of 263,000 pounds). Bridge rehabilitation is generally the responsibility of the bridge owner (either state or private railroad company) as part of general ownership responsibilities. The cost of rehabilitating bridges is large and must be programmed years in advance and must compete for funding with other priorities. VTrans was forced to place an embargo on any rail operations on the Washington County Railroad – Montpelier Branch in early 2015, since several bridges were found to be inadequate for any freight operations.

Exhibit 89: Weight Capacity of Vermont State-Owned Bridges

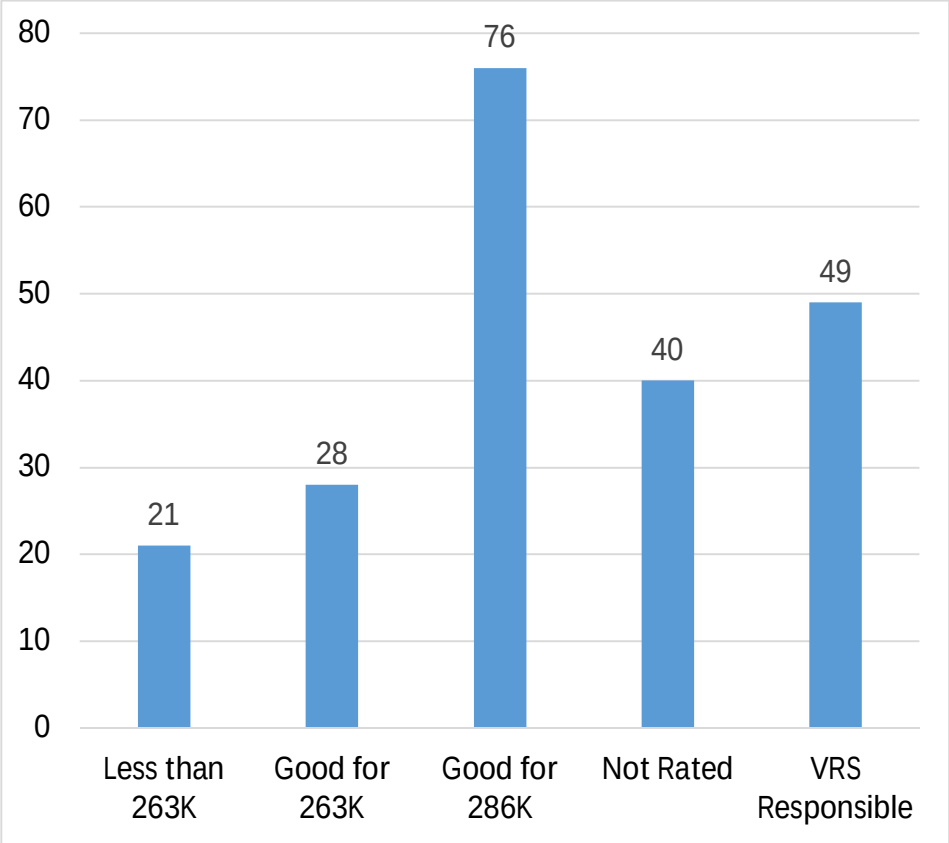
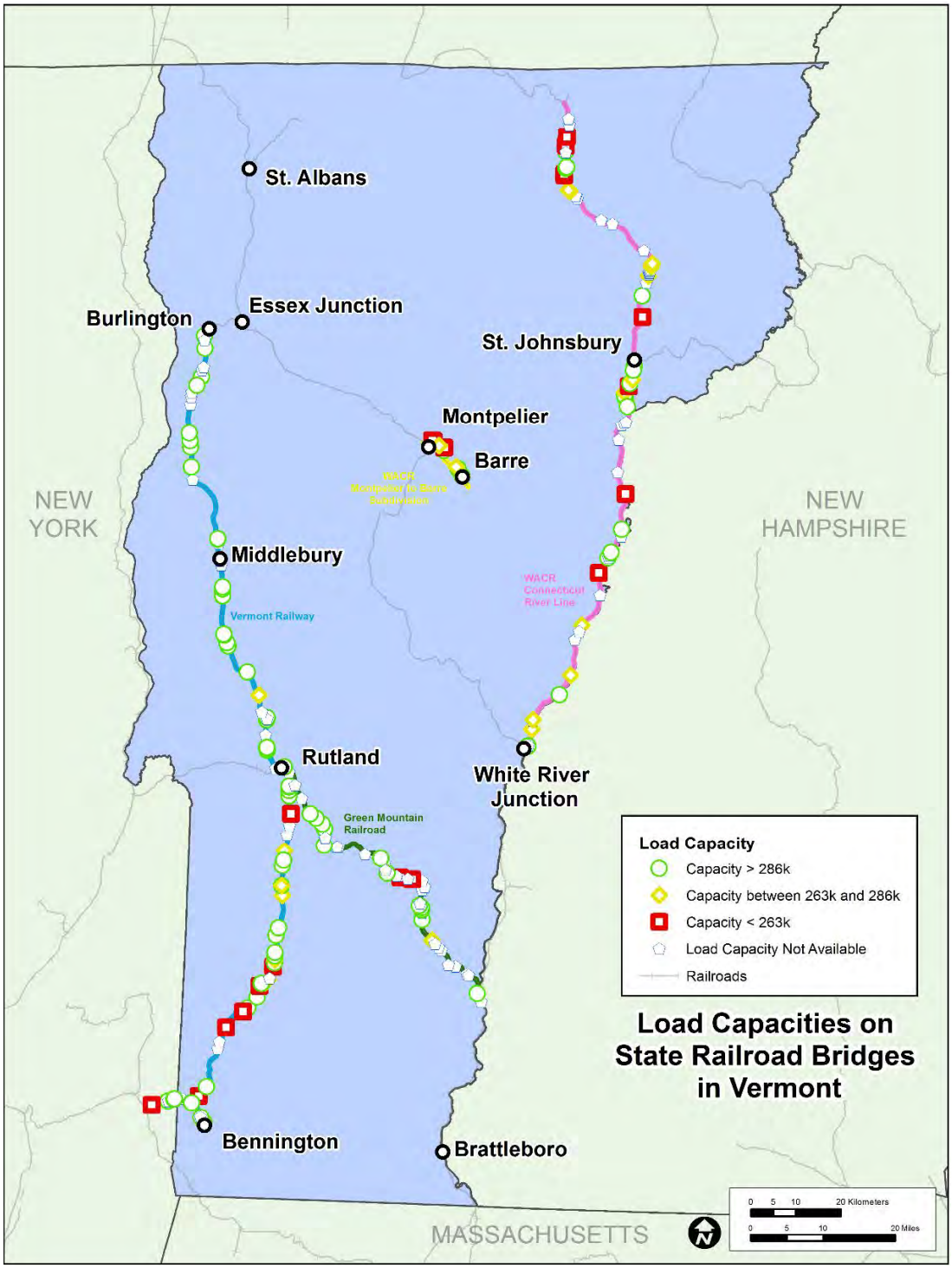


Exhibit 90 displays the load capacity of bridges for which the State is responsible, based upon the load capacity ratings that have been completed as of April 2015.

Exhibit 90: Load Capacity of State Responsible Railroad Bridges



VTrans' Rail Section has estimated the cost of upgrading bridges to a state of good repair and capable of accommodating 286,000 pound railcars over the next 20 years. VTrans estimates that the cost of upgrading the superstructures alone would be approximately $164 million. Upgrading and maintaining the substructures would add another $40 million in costs.

Exhibit 91: VTrans Estimates for Repairing and Upgrading State-Owned Bridges

Line	Long Term Cost Estimate
Cost of Bringing Bridge Superstructures to 286K	
Vermont Railway Northern Subdivision	$18,473,725
Vermont Railway Bennington & Rutland Subdivision	$28,958,565
Vermont Railway Hoosick Subdivision	$5,618,000
Green Mountain Railroad	$46,211,420
Washington County Railroad Connecticut River Line	$60,112,270
Washington County Railroad Montpelier & Barre Subdivision	$4,310,000
Total	**$163,683,980**
Repairs to Substructures	**$40,000,000**
Total Superstructures and Substructures	**Approx. $203,683,980**

4.3 Rail Line State of Good Repair/286,000 Pound Capacity

4.3.1 Status/Capacity of Track Infrastructure

In some cases, track conditions may limit the ability of rail lines to accommodate 286,000 pound railcars. Exhibit 92 below displays the ability of rail lines to accommodate 286,000 pound railcars as a function of freight density as measured in million gross tons per mile (MGT), operating speeds in miles per hour (MPH) and rail weight as measured in pounds per yard.[55] The ability of rail lines to accommodate 286,000 pound railcars is also a function of tie and ballast conditions.

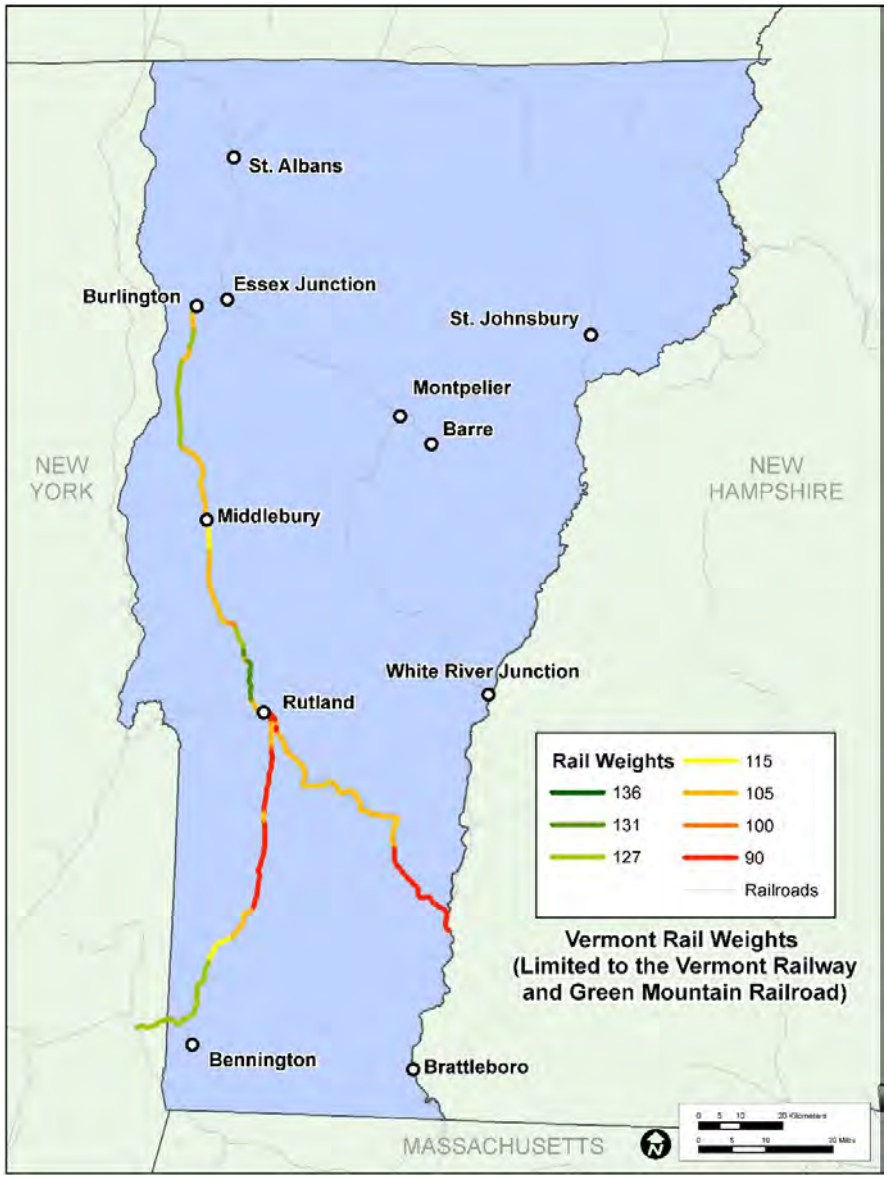
Exhibit 92: Relationship between Rail Weight, Freight Density, Speed, and the Ability of Rail Lines to Accommodate 286,000 Pound Railcars

Rail Weight	<1 MGT	1- 10 MGT
10 MPH – 25 MPH		
100+	OK	OK
90 – 99	OK	Marginal
>25 MPH		
≥ 115	OK	OK
100 - 114	OK	Marginal
90 – 99	Replace	Replace

As shown in Exhibit 92, 286,000-pound railcars can operate over segments with rail weight below 100 pounds per yard, but in general all other conditions must be ideal, meaning operating speeds would need to be low and freight densities light, ties in ballast in very good condition. For operating speeds between ten and 25 miles per hour, rail weight between 100 and 115 pounds is reasonable for very low density operations, but for freight speeds above 25 miles per hour or higher freight densities, rail weight should be at least 115 pounds. Most rail in Vermont has a weight of 100 pounds per yard or higher, except for sections of the Green Mountain Railroad, as well as the Vermont Railway south of Rutland, which have 90 pound rail. Exhibit 93 below displays rail weights on the Green Mountain Railroad and the Vermont Railway, identifying areas of 90 pound rail. These areas of lighter rail would not be able to accommodate 286,000 pound railcars whether the bridges could or not. Beyond upgrading the 90 pound rail, it is a long-term goal of Vermont to ensure that all rail within the State is at least 115 pound.

[55] *An Estimation of the Investment in Track and Structures Needed to Handle 129,844 kg (286,000 lb.) Rail Cars on Short Line Railroads,* by ZETA-TECH Associates, Inc. for the FRA and American Short Line and Regional Railroad Association.

Exhibit 93: Rail Weights on the Green Mountain Railroad and Vermont Railway



Research suggests that to support 286,000 pound cars at any speed or traffic density, rail lines should have at least ten crossties in good condition per standard 39 foot rail length.[56] Fifteen good ties per rail length are required for operations over ten miles per hour and or any significant freight density, while 20 good times per rail length are required to accommodate 286,000 pound cars over 25 miles per hour. In some sections of the Washington County Railroad – Connecticut River line, tie conditions are such that the line could not support 286,000 pound railcars even at slow speeds and light density.

Exhibit 94 presents cost estimates for upgrading rail lines in the State. With the exception of the upgrades on the Central Maine & Quebec, the work listed would enable rail lines to accommodate 286,000 pound railcars. Most improvements would involve the replacement of jointed rail with 115 pound CWR, replacing all defective crossties,

[56] *Ibid.*

replacing turnouts, and surfacing. These segments would not only be able accommodate 286,000 railcars, but would also be in a very good state of repair. Estimates for state-owned rail lines were provided by VTrans.

Exhibit 94: Track Improvements for Good State of Repair and 286,000 Pound Capacity

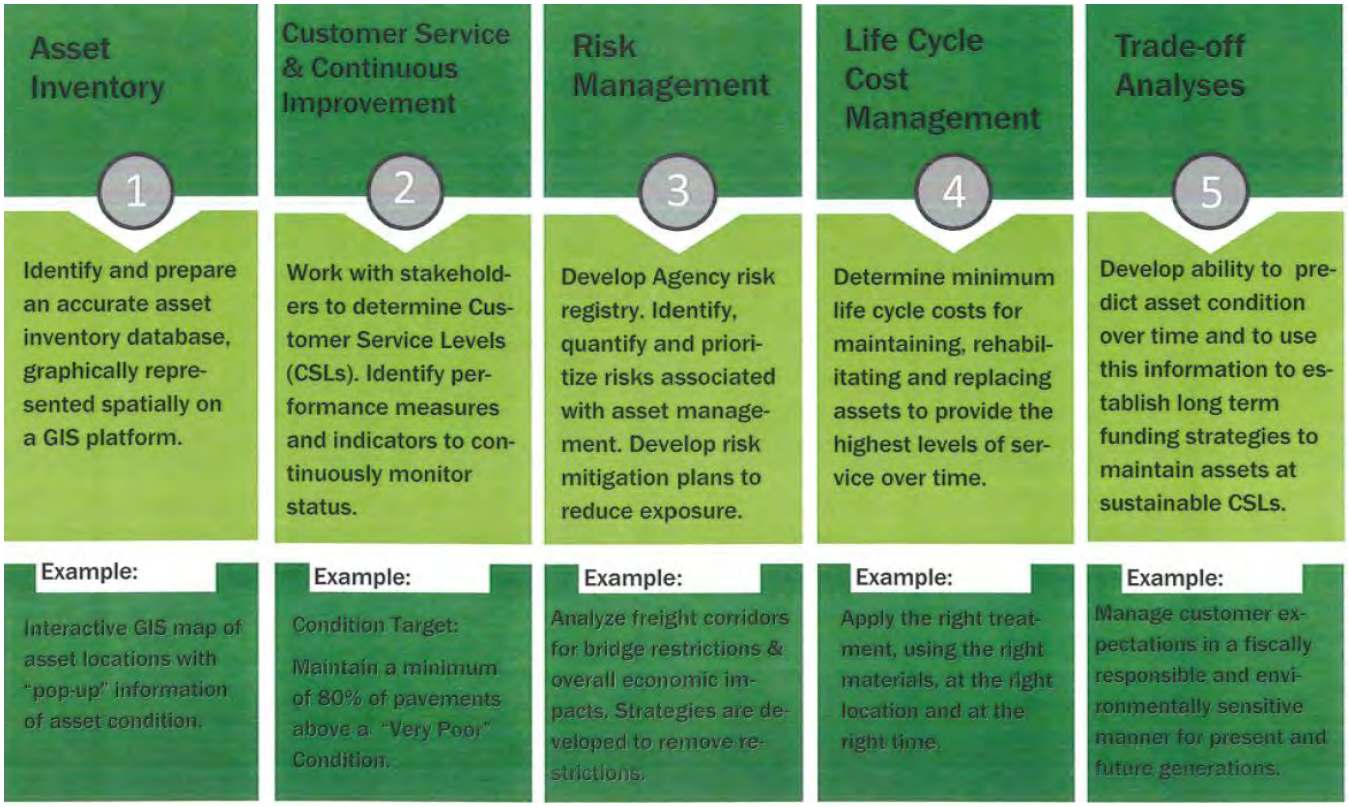
Line	Long-Term Cost Estimate
Vermont Railway Northern Subdivision	$12,000,000
Vermont Railway Bennington & Rutland Subdivision	$16,500,000
Vermont Railway Hoosick Subdivision	$4,800,000
Green Mountain Railroad	$18,500,000
Washington County Railroad Connecticut River Line	$22,500,000
Washington County Railroad Montpelier & Barre Subdivision	$6,500,000
New England Central Railroad Winooski Subdivision	$4,000,000
St. Lawrence & Atlantic Track and Bridge	$3,300,000
Central Maine & Quebec Ties and Bridge	$1,300,000
Total	**$89,400,000**

4.4 VTrans Asset Management

Cost estimates for improvements to State-owned bridges and track can provide one step in the process of implementing the Vermont Transportation Asset Management Plan (TAMP). VTrans institutionalized its commitment to the TAMP in the *VTrans Asset Management Policy Statement,* signed by VTrans executive leadership on April 21, 2014.[57] The purpose of Asset Management is to meet the required level of service, in the most cost effective manner through the management of assets for present and future customers. Asset Management is a highly information-intensive process, and VTrans is continuing to collect information on State assets. A key component of asset management practices includes working with stakeholders to determine customer service levels. In the context of state-owned bridges and upgrades to state-owned trackage, this would include meetings with the railroads to determine their required levels of service. Another key aspect is to determine the minimum life cycle costs for maintaining, rehabilitating, and replacing assets to provide the highest levels of service over time. In the case of state-owned rail bridges, this would entail determining appropriate scopes of work to maintain, repair, replace, and upgrade bridges over time while ensuring the efficient uses of public funds. Another key component of the VTrans commitment to Asset Management is transparency, so that railroads, tax payers, and others can understand the nature, cost, and decision-making regarding State assets.

[57] *http://vtrans.vermont.gov/sites/aot/files/documents/other/ExecPolicyStatementsigned042114.pdf.*

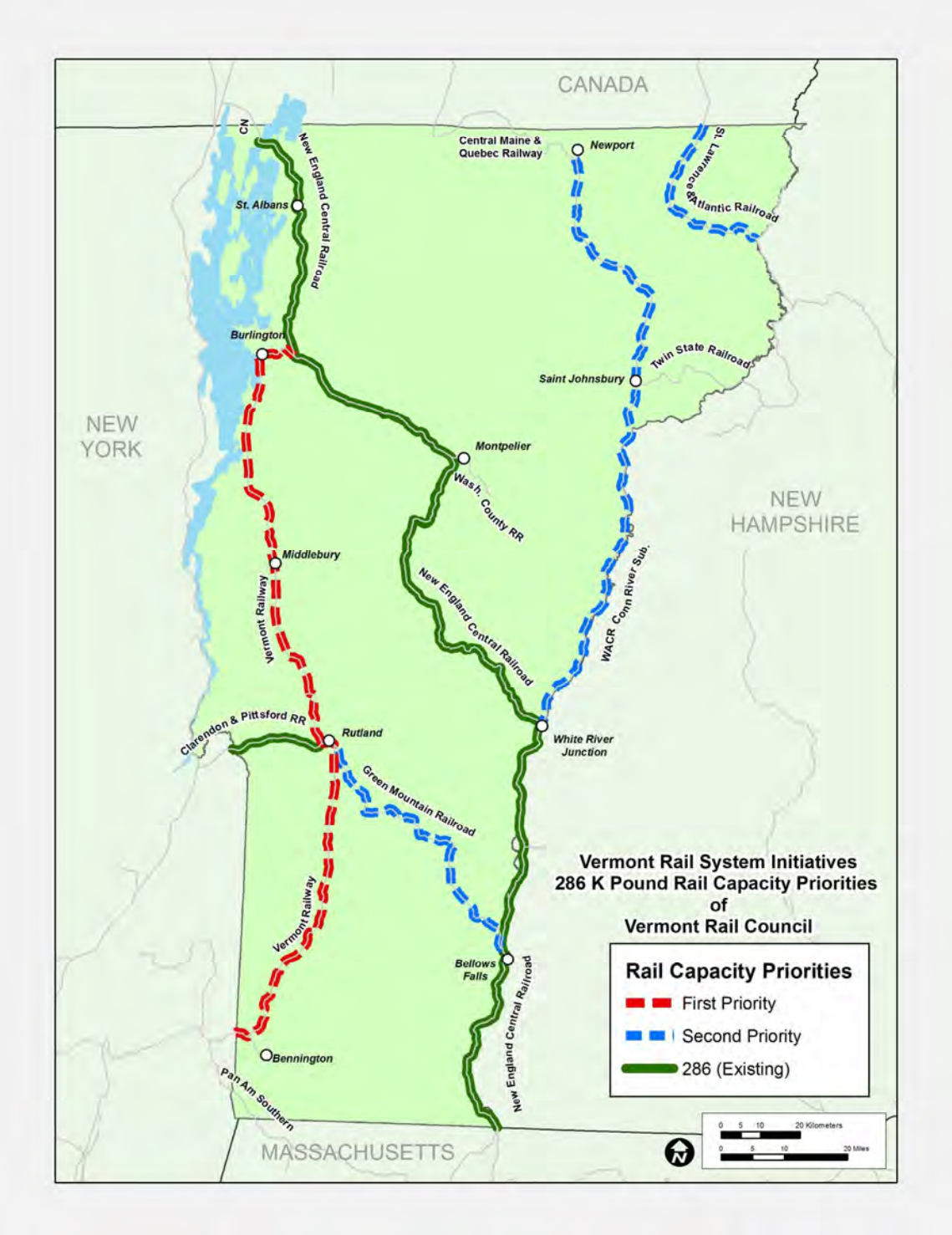
Exhibit 95: Asset Management Best Practices from *VTrans Asset Management Policy Statement*



4.5 Phasing of Capacity Upgrades

Exhibit 96 displays proposed prioritization of capacity upgrades for 286,000 pound railcars. These priorities have been established in consultation with the Vermont Rail Advisory Council (VRAC), of which representatives from Vermont Rail Systems and New England Central Railroad are members. VTrans will continue to consult VRAC members as Vermont freight flows and opportunities evolve and priorities may change.

Exhibit 96: Priorities for 286,000 Pound Railcar Capacity



4.6 Improvements to Rail Yards and Structures

Infrastructure needs are not limited to rail lines and bridges. Rail yards also represent key components of railroad operations. Yards serve numerous purposes. Cars are sorted into and out of trains for various destinations.

Transload facilities are often located in rail yards, where freight is transferred between trucks and railcars. Support functions are performed in rail yards, such as car repair, storage and inspection, locomotive fueling and service, and train crew bases. As with other rail infrastructure, yards must have adequate capacity to perform their functions adequately. Yard infrastructure must also be kept in a good state of repair. Yard improvements can boost the efficiency of operations. Railroads operating within Vermont have put forward a variety of rail yard needs, including:

- Improvements to structures;
- Lengthening or adding yard tracks;
- Rehabilitation of yard tracks.

The Burlington Railyard Enterprise project is aimed at improving transportation connections, promoting economic development, and improving livability in the area around the Vermont Railway yard in Burlington. Among the alternatives considered involve the relocation of some rail activities in the yard in order to make way for additional roadway connections.

In addition, railroads have suggested improvements to the interchanges between railroads, so that railcars can be more efficiently transferred between rail carriers. Recommended improvements to rail yards and interchanges are listed in Exhibit 97. In the case of the NECR/GMRC interchange, it is uncertain whether this project would be applicable to Vermont or to New Hampshire. Currently, the interchange is located in Vermont, but the proposed interchange track may be located in New Hampshire as a component to a rerouting of New Hampshire Route 12A in North Walpole, NH.

Exhibit 97: Yard and Interchange Needs of Vermont Railroads

Project	Cost
CMQ Newport	$184,000
NECR White River Jct, St. Albans	$4,339,000
NECR/GMRC Interchange	$4,003,000
NECR St. Albans Roundhouse	$300,000
GMRC Yard Projects	$800,000
VTR Yard Projects	$800,000
WACR Conn River Yard Projects	$700,000

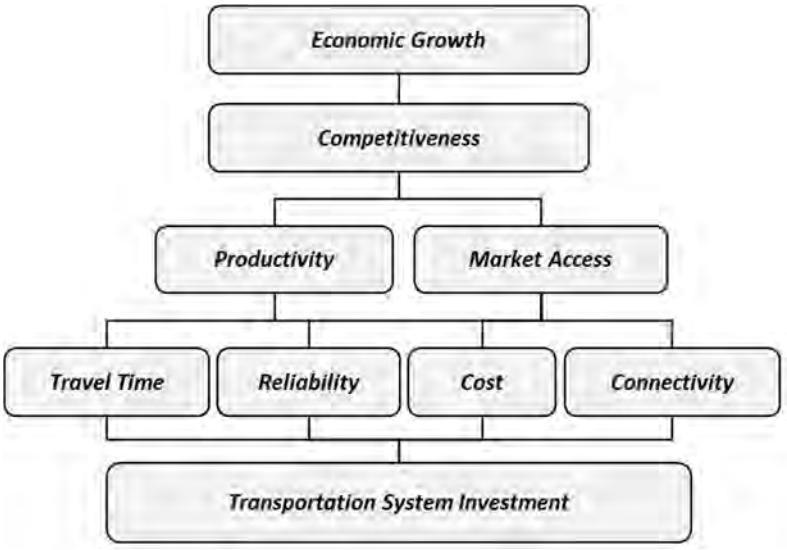
4.7 Economic Development and Industrial Access

As mentioned on page 45, the Vermont Comprehensive Energy Plan includes a goal to double the volume of freight shipped by rail from Vermont by 2030. The infrastructure initiatives discussed earlier in this chapter can be expected to encourage shippers to ship by rail, since these infrastructure improvements would render the rail network more efficient and effective, thus reducing the costs of shipping by rail. But there are other ways to increase usage of the rail network as well. Companies in rail-intensive industries can be encouraged to move to Vermont and locate at rail-accessible sites. Access for existing companies can be enhanced by building or improving sidings, spurs, or other access to the rail network. These types of activities are often performed in conjunction with economic development agencies.

During the public outreach for this State Rail Plan, Vermont business, industry, and government leaders have repeatedly emphasized the importance of encouraging statewide economic growth and development. Investment in freight transportation is an effective strategy for promoting economic development. As illustrated in Exhibit 98, investment in the freight transportation system can reduce travel time and cost, improve the reliability of trips,

and provide greater connectivity to statewide, regional and global markets. These changes enable business and industry to improve productivity. In turn, increases in productivity and market access make business and industry more competitive and able to invest earnings in expansion and more jobs.

Exhibit 98: Linking Transportation Investments to Economic Growth



Investment in the freight rail system in Vermont offers an opportunity to support economic growth. The Vermont road network is constrained by limited Interstate Highway coverage, dwindling resources for repairing state and town roads, and a long list of bridges in need of repair. By comparison, the rail network is extensive, but underutilized.

There are significant challenges. The volume of traffic using the Vermont rail network dropped by 41 percent between 2005 and 2009. Lumber shipments dropped due to foreign competition and the collapse in construction activity, but the industry and rail shipments are starting to recover. The bankruptcy of the Montreal Maine and Atlantic Railway following the Lac Megantic disaster greatly diminished freight shipments on the Washington County Railroad, Connecticut River Line. This line should recover as the new Central Maine & Quebec becomes an established presence in the region.

Overall, rail freight levels are expected to slowly recover and climb over the next 20 years. No single commodity is currently expected to be a "game changer" in terms of freight rail in Vermont; however, rail freight in Vermont is dependent on just a few shippers, and freight levels could rebound to their 2005 levels depending on the activity of this relative handful of shippers.

Geographically, some of the greatest opportunities for economic development through rail transportation may lie with eastern Canada, since this area is expected to grow quickly in terms of employment and general economy. Contingent on trade policy, cross border trade may be a growth area in the coming decades.

Two strategies could promote goods movement and economic development. They are:

- Attract rail business that currently terminates elsewhere. Some freight destined for Vermont customers travels to out-of-state locations by rail and is then trucked into the State. Traffic is routed this way because Vermont is not served by Class I carriers and the vast majority of the State's rail network does not support industry-standard 286,000 pound railcars. Improvements to rail infrastructure and service could bring

increased transloading activity into Vermont, thereby reducing the number of truck-miles of travel on Vermont roads and the related wear-and-tear on pavements and bridges. However, transload centers located along Class I main lines are often able to offer superior service compared to transload center services offered by short line railroads because the Class I railroads handle more trains more frequently and can avoid delay-prone interchanges. More reliable and timely interchange of traffic between Class I carriers and their connections would help short lines compete for transload business and maximize the potential for transloading services in Vermont.

- Better link economic development and transportation policies, programs and investment to compete more effectively as a region in national and global markets. As a relatively small state, most rail freight to, from, or across Vermont relies on a regional rail network. Working together, the New England states could be more competitive.

The Vermont Employment Growth Incentive (VEGI) Program is available to businesses in any sector which create new jobs in Vermont. Based on the revenue return generated to the State by prospective qualifying job and payroll creation and capital investments, the VEGI program can provide a cash payment to businesses that have been authorized to earn the incentive and who then meet performance requirements.[58]

The VEGI program provides incentives from the State of Vermont to businesses to encourage prospective economic activity in Vermont that is beyond an applicant's "organic" or background growth and that would not occur, would not occur in Vermont, or would occur in a significantly different and less desirable manner, except for the incentive provided. The economic activity can be generated by a Vermont company or a Vermont division adding new qualifying employees, a company that is considering Vermont to locate a new business or division, or start-up business activity. Once authorized, the incentives can only be earned and installments paid if performance requirements are met and maintained.

Authorization for the incentives occurs through application to the Vermont Economic Progress Council, which must determine if the company and project meet statutory approval requirements.

If a company is authorized, the total amount of incentive available is determined by a cost-benefit model analysis that calculates the revenue benefits and costs to the State, based on the qualifying jobs, payroll, and capital investments projected by the applicant, for up to five years following approval.

Additionally, the State is looking to create a group to advance rail-oriented industrial development. The mission of the Rail Recruitment and Expansion Committee (RREC) is to facilitate the recruitment of new businesses and expansion of existing businesses along rail lines. The Committee membership is to include the following organizations, state agencies, and railroads:

- Vermont Rail Action Network
- New England Central Railroad
- Vermont Rail System
- Agency of Commerce and Community Development
- Agency of Natural Resources
- Agency of Transportation

[58] http://accd.vermont.gov/business/start/vegi

The RREC will be charged to:

- Work with businesses interested in locating new business or expanding existing businesses along rail lines.
- Conduct site evaluations and evaluate property conducive to rail-oriented businesses.
- Identify tax and other incentives to attract more businesses / expanding businesses to locate along rail lines.
- Undertake necessary studies in support of the committee's mission.

The Barton Rail Siding Project, which is described in the text box below, is a leading example of the type of rail investments that could support economic development in Vermont.

A Case Study in Linking Rail Investments to Economic Growth: Barton Siding Project

The project consists of installing a 2,500 ft rail siding for a new Washington County Railroad transload facility, located in the Town of Barton, Orleans County, VT. The siding will be built along right-of-way owned by the State, with the State contributing rail from its inventory. The total project cost is estimated at $382,120, of which $250,000 will come from Northern Border Regional Commission funding, $63,350 from in-kind contributions by the Washington County Railroad, and $68,770 from the value of state-owned rail. The Washington County Railroad has an operating lease with the state. The project is anticipated to need three months for completion. The State will complete documentation under a National Environmental Protection Act document, assumed to be a Categorical Exclusion.

The siding will allow rail access to a transload facility, which will enable area businesses access to the North American railroad network. The project site is near the Canadian border, with full access to rail for U.S. exports. Couture Trucking, Inc. has been supplying transportation services for the bulk industry since 1976. The shipper has 26 full-time employees a fleet of 48 over the road semi-tractors, and trailers and tractors (dry bulk tankers, liquid bulk tankers, dump trailers, gram hopper trailers, and dry box). The company specializes in food grade dry bulk transportation and dairy industry supplements. The company's substantial growth over the years is credited to the Washington County Railroad, which has provided direct rail access and transload capacity at a site in Lyndonville, which has reached its maximum capacity. The new site at Barton will allow for expanded operations.

Railroads in Vermont have recommended a number of projects that can be expected to help shippers access the railroad network and thereby increase freight rail volumes. They include:

- Construct a spur to access an industrial area;
- Add a new siding to access a customer;
- Rehabilitate existing siding;
- Repair or rehabilitate structures used for loading railcars.

Also included are projects to rehabilitate or construct passing sidings, since these project often are intended to make it easier to access customers. The anticipated growth in rail freight will necessitate rail yard and siding infrastructure. However, the location of these facilities will be dependent on the location of freight and shipper-railroad business decisions. Exhibit 99 displays proposed projects to improve industrial access.

Exhibit 99: Projects to Improve Industrial Access, Transload Facilities

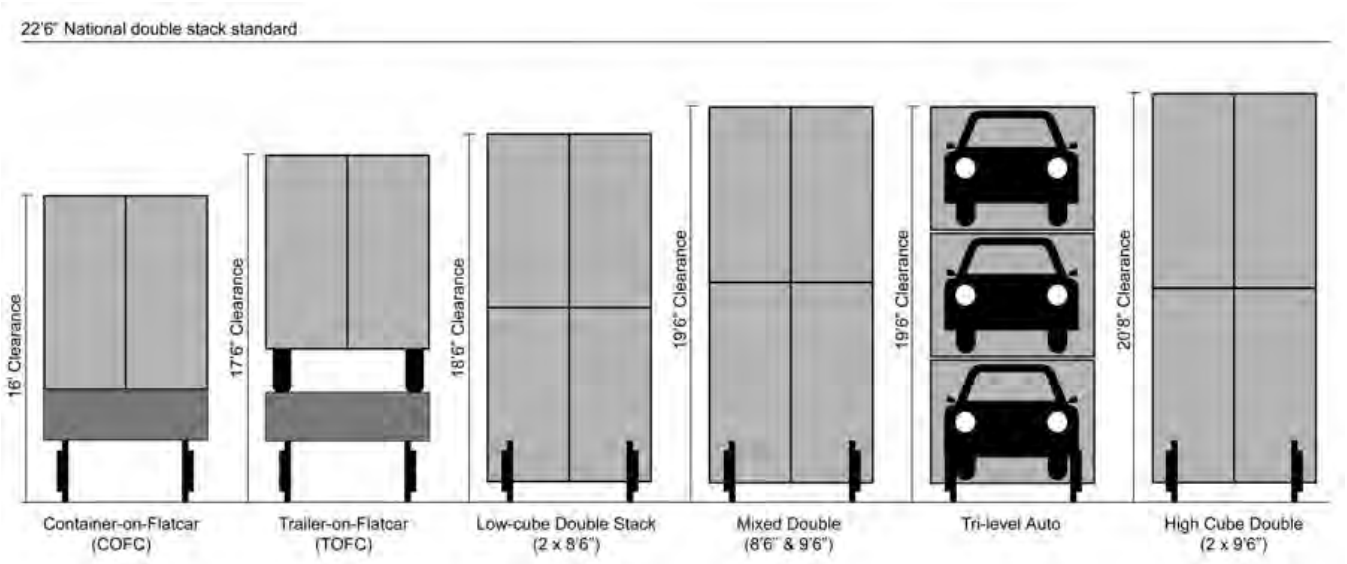
Project	Cost
Access to Franklin Industrial Park, former Goodyear Power Plant in Windsor	$260,000
GMRC Sidings	$478,000
WACR Montpelier Branch Sidings	$1,584,000
VTR Sidings and Structures	$1,675,000
WACR Connecticut River Line Sidings	$1,927,000
GMRC Passing Sidings	$1,155,000
VTR Passing Sidings	$2,002,000
WACR Conn River Passing Sidings	$3,344,000

4.8 Clearance Improvements

4.8.1 Vertical Clearance

When most rail lines were built in the United States, railcars were no higher than 15 feet, six inches. However, new types of railcars have necessitated greater clearance over rail lines. For example hicube boxcars are 17 feet high. Most intermodal containers shipped in the United States are now shipped in "double stack" where one container is stacked on the other. This is the most efficient configuration, since railroads can fit more containers on each railcar and on each train. High cube containers are nine feet six inches high, while low cube containers are eight foot six inches high. The AAR has established "plates" that provide the standard dimensions for railcars (called plates because of the diagrams that describe the dimensions). Trains with mixed high and low cubed containers fall under the AAR "Plate J" standard which has a height of 19 feet 0 inches over tracks. If one assumes a six inch buffer, the required clearance to accommodate these railcars is 19 feet six inches. This is also the typical requirement for multi-level flat cars which are used for shipping automobiles. Unrestricted intermodal operations, where two high cube containers can be stacked on top of the other fall under the AAR "Plate H" standard and have a height of 20 feet two inches over the track. If one assumes a buffer of six inches, the required clearance to accommodate these trains is 20 foot eight inches. The AAR has established a standard of 22 foot six inches for unrestricted rail operations.

Exhibit 100: Clearance Requirements of Railcars



While significant portions of Vermont's rail infrastructure can accommodate the 19 foot six inch standard (the Vermont Railway lines being an exception), most rail lines in Vermont do not meet the national standard of 22 feet six inches and could not accommodate unrestricted double stack operations. Exhibit 101 displays the number of obstructions on Vermont rail lines that would block unrestricted double stack operations.

Exhibit 101: Vertical Clearance Obstructions of Vermont Rail Lines

Railroad	Obstructions to Unrestricted Double Stack Operations
New England Central Railroad	14 obstructions, including 8 overpasses and 6 bridges.
Clarendon & Pittsford Railroad	4 bridges
Vermont Railways	20 bridges, one overpass, two other obstructions
Green Mountain Railroad	7 bridges, one other obstruction
Washington County Railroad (north of Wells)	9 bridges, 5 overpasses
Pan Am Southern	None in Vermont
St. Lawrence & Atlantic	None
Central Maine & Quebec	One clearance restriction

Intermodal rail services typically link large metropolitan areas. In the case of intermodal services that cross Vermont, the State would most logically provide a link between New England and the Montreal metropolitan area. Recently, the Canadian National service between Montreal and Worcester crossed Vermont on the New England Central Railroad, and up until late 2014, the Canadian National service between Montreal and Auburn, ME crossed Vermont on the St. Lawrence & Atlantic Railroad. The Pan Am Railways/Norfolk Southern Railroad service to Ayer, MA cuts through the southwest corner of Vermont.

Similar to the case for removing weight limitations, improving the clearance of Vermont rail lines is limited by the clearance of these lines as they pass into neighboring states. The status of New England gateways are as follows:

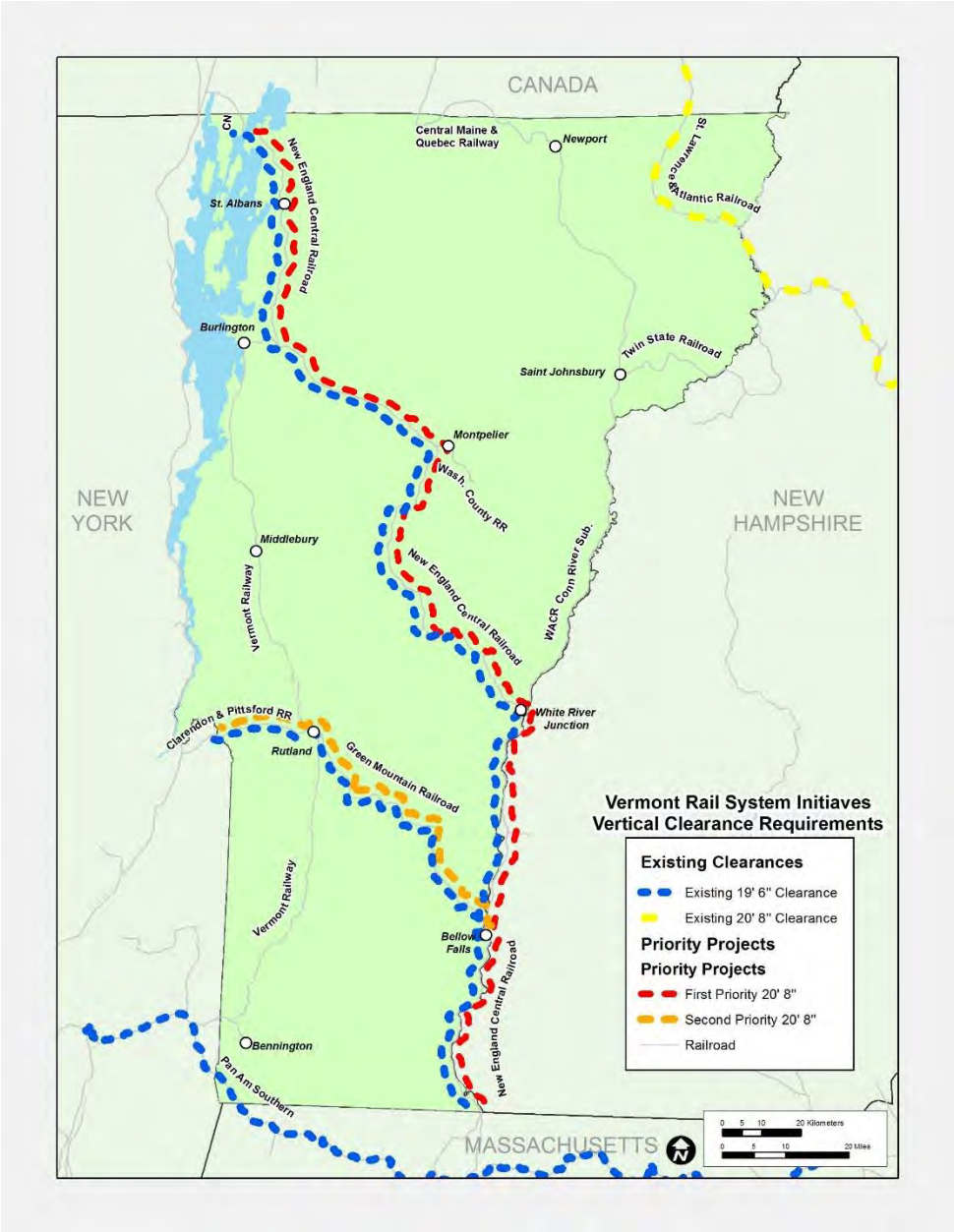
- The New England Central has identified 38 obstructions that would need to be cleared in Massachusetts and Connecticut in order to allow unrestricted double stack operations. The total cost of clearing the New England Central to unrestricted double stack operations would be about $21.98 million, of which $5.7 million would be associated with obstructions located in Vermont. The Providence and Worcester has identified nine obstructions on its line between Willimantic, CT and Worcester, MA, which would cost about $3.85 million to clear to unrestricted double stack.
- The Canadian Pacific line that runs parallel to the Vermont/New York border in New York is cleared to unrestricted double stack operations except for the segment between Ticonderoga and Whitehall, which is cleared to 19' 6".
- The Pan Am line between Ayer, Massachusetts and Mechanicville, New York is cleared to 19' 6" but not unrestricted double stack operations.
- The Commonwealth of Massachusetts has sponsored an initiative to raise the clearance of the CSX line that runs east/west in the State to unrestricted double stack operations.

The priority for clearing obstructions relates to the likelihood that these routes would serve railcars requiring high clearances. Given that the New England Central Railroad recently handled double stack intermodal cars, increasing the clearances on this line would logically occupy the highest priority for clearance projects. The Canadian National/New England Central service would benefit from unrestricted double stack operations. To provide the service, Canadian National had to reorganize containers bound for Worcester on intermodal railcars in Montreal to accommodate the New England Central and Providence and Worcester's inability to handle unrestricted double

stack intermodal trains. Saving this step could save money and increase the demand for the Canadian National service to Worcester.

The second highest priority would be those rail lines that have not recently handled high clearance railcars, but would be potential routes in the future. VTrans has established clearing the Clarendon & Pittsford Railroad/Green Mountain Railroad as a second priority behind the New England Central clearance as shown on Exhibit 102 below. The estimated cost of clearing the Clarendon & Pittsford Railroad and the Green Mountain Railroad to unrestricted double stack operations would be approximately $10.3 million.

Exhibit 102: Vermont Vertical Clearance Priorities



Chapter 5: The State's Rail Service and Investment Program

The Vermont rail service and investment program is intended to advance VTrans' vision to provide a safe, reliable and multimodal transportation system that promotes Vermont's quality of life and economic wellbeing. Rail is an integral component of Vermont's multimodal transportation system, and provides energy-efficient travel choices and options, supports livability, contributes to the national rail system, and furthers the state's economic development and prosperity.

The passenger rail projects proposed will connect people and places, providing needed travel options in-state and within the wider northeast region. The Plan envisions a doubling of train frequencies, thus enabling an intercity network that can also be used for commuting. Residents and visitors will be able board and deboard trains in cities/towns such as Middlebury and Burlington, walk and bike to their destinations, or use local transit. Connections to other major towns and destinations in New York, Massachusetts, Canada, and beyond will become available as the state's rail system and services are fully built-out.

The freight projects proposed will ensure that Vermont businesses, as well of those in neighboring states, will be able to fully participate in the national economy by having access to cost-competitive shipping options, and export markets accessed by the national and continental rail system. The State's economic prosperity is tied to exports and rail is a major shipping mode. Freight rail improvements will also contribute to reducing wear and tear on the State's highways, which suffer from a backlog of deferred maintenance. The service and investment program will also support the specific rail vision, goals, and objectives set forth in this Plan as found on page 1. Impacts of the program on goals and objectives are further detailed on page 134.

Projects have been identified through ongoing planning efforts by VTrans, consultation with a variety of stakeholders, as well as discussions with the Vermont Rail Advisory Council.

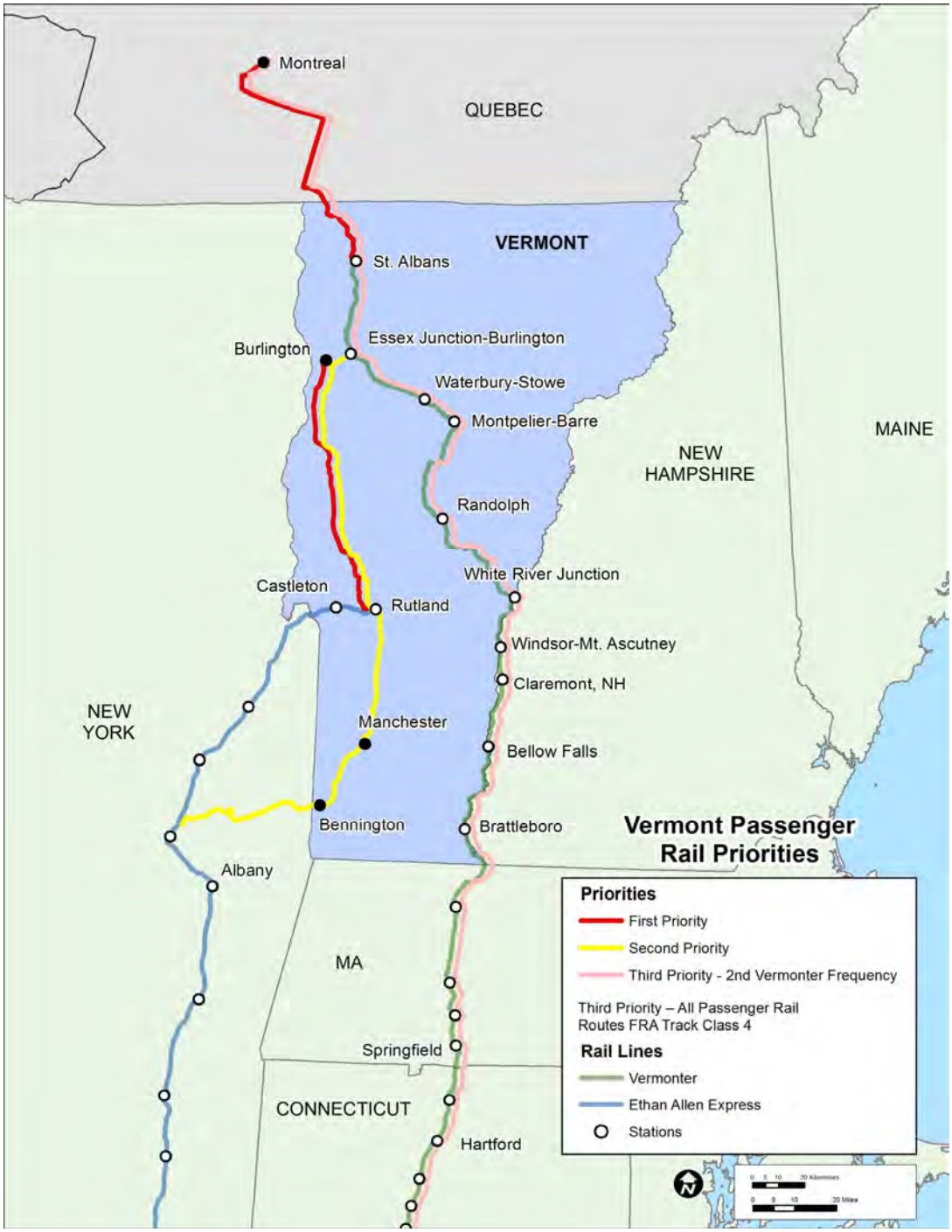
5.1 Passenger Element

A total of $380.3 million in passenger rail infrastructure initiatives were identified in Chapter 3. Based on planning activities within the State, VTrans has identified the following passenger rail capital priorities:

- First Priority
  - Extend *Ethan Allen Express* service to Burlington;
  - Extend the *Vermonter* to Montreal (although this is not anticipated to require additional infrastructure investment);
- Second Priority
  - Initiate a new service between Albany and Burlington through North Bennington and Manchester;
  - Further extend *Ethan Allen Express* beyond downtown Burlington to Essex Junction;
  - Improve stations throughout the State;
- Third Priority
  - Upgrade all passenger rail routes to FRA Track Class 4 (maximum 79 miles per hour) operations;
  - Add a second frequency to the *Vermonter* service.

Exhibit 103 displays the geography of Vermont's passenger rail infrastructure improvement priorities.

Exhibit 103: Prioritization of Passenger Rail Initiatives



Assuming that this passenger rail investment program would be completed over the next 20 years (2016 – 2035), the rail line upgrades necessary for the *Ethan Allen Express* to extend to Burlington and then to Essex Junction and the Bennington-Manchester route would occur during the first ten years, while upgrades to bring passenger routes to FRA Track Class 4 standards would occur during the next ten years. Passenger rail projects would benefit freight rail as well. The *Ethan Allen Express* extension and the Bennington-Manchester route service would involve the upgrade of rail, crossties, and ballast, crossings, and turnouts. These projects would enable trackage on these

lines to accommodate 286,000 pound railcars (although the bridges would still be a constraint) and would improve the fluidity of freight train movements. Maintenance costs would be reduced, in part because much of the infrastructure would be new, but also because the infrastructure would be better. For example, continuously welded rail requires less maintenance than jointed rail.

Exhibit 104: Phasing of Passenger Rail Initiatives

2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Ethan Allen Express to Burlington $26.4M																			
				Ethan Allen Express Burlington to Essex Jct $0M*															
Vermonter Extension to Montreal $0																			
		Rail Station Upgrades (Statewide) $10M																	
										Enhanced 79 mph *Vermonter* Upgrades $177.3M									
				New Albany-Bennington-Manchester Route $88M															
										Enhanced 79 mph Western Corridor Upgrades $78.6M									

*Cost of rail line upgrades included with freight rail projects

5.2 Freight Element

Approximately $305.3 million in freight rail infrastructure projects were identified in Chapter 4, excluding trackage improvements on rail lines that host current or proposed passenger rail service. Most of the identified needs, $203.7 million, relate to the maintenance, replacement, and upgrade of state-owned bridges. Improvements to high density rail lines are expected to yield greater benefits than improvements to low density rail lines and hence be of value to a larger base of freight traffic.

Exhibit 105: Phasing of Freight Rail Initiatives

2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Bridge Upgrades on VTR and GMRC $123.5M																			
										Bridge Upgrades on WACR $80.2M									
Non Passenger Track Upgrades on GMRC, NECR Winooski, SLR, CMQ $27.1M																			
										Non Passenger Track Upgrades on WACR $29M									
Yard Improvements, Economic Dev. Passing Sidings, $19.5M																			
		Burlington Railyard Enterprise $10M																	
NECR Unrestricted Double Stack Clearance $5.7M																			
					GMRC/CLP Double Stack $10.3M														

5.3 Program Effects

Potential rail investments will generate a range of economic impacts in the areas served by the improvements. This section provides a discussion of the range of impacts that these investments may bring about.

Economic impacts are typically categorized as being either direct or indirect. Direct impacts are those that are closely associated with the investment during planning and construction, and subsequent implementation. During construction, typical direct impacts include construction jobs and supplier purchases. Once operational, the range of user benefits include out-of-pocket cost reductions by system users (including the operator and their customers), time savings, reduced maintenance costs on parallel highways, and gains in safety from a reduction in accidents. For passengers, examples include savings in overall travel time and direct out of pocket cost savings from using the train in lieu of taking the trip by auto or air. For shippers, potential direct gains include the ability to use 286,000 pound instead of 263,000-pound railcars, lower rates per unit of weight, along with travel time reductions and improved service reliability.

Indirect economic impacts refer to the broader economic impacts that an investment will have on a region's economy. For example, new passenger rail service may expand tourism opportunities and, with it, increase the level of investment and jobs in that sector. For freight, changes in a region's economy will occur because of changes in the cost of doing business associated with the cost of freight transportation. Business costs affect productivity and profitability, and ultimately also the competitiveness of a region's businesses. The value of this cost differs by industry, depending on the extent to which each industry relies on rail freight, trucking or "on-the-clock" employee travel.

Criteria for evaluating projects based on the goals of the Vermont State Rail Plan, along with some additional goals and measures recommended by the FRA are shown in Exhibit 106. For each goal, the impacts from potential improvements are categorized into three levels: High, Potential, and No Change. Each level has an associated criterion that is described in Criteria Description. In the subsequent sections discussing the relative merits of each of the proposed projects, impact categories experiencing high impacts are indicated with a green circle, those with a potential impacts a blue circle, and no change a yellow circle.

Exhibit 106: Project Evaluation Criteria

Goal	Evaluation Criteria		Criteria Description
Maintain the state's rail system in a state of good repair	**Maintain all bridges to the 263,000 lbs carload standard. Maintain track to appropriate FRA track class. Remove slow orders – with priority along passenger rail routes. Upgrade rail to continuously welded rail along passenger routes. Rehabilitate passenger rail stations.**	High Impact:	Project maintains/upgrades rail facilities to standards described in evaluation criteria
		Potential Impact:	Project maintains/upgrades rail facilities to standards below evaluation criteria
		No Change:	Project does not maintain/upgrade to rail standards
Expand the rail system's capacity to accommodate growth objectives	**Upgrade all bridges to efficiently accommodate 286,000 lbs carload standard. Upgrade to 115 pound/yard rail. Eliminate vertical clearance obstacles. Install platforms at new passenger stations.**	High Impact:	Project upgrades rail facilities to standards described in evaluation critera
		Potential Impact:	Project upgrades rail facilities to standards below evaluation criteria
		No Change:	Project does not upgrade to rail standards

Goal	Evaluation Criteria		Criteria Description
Expand rail system usage	Increase the use of rail by existing shippers and receivers using rail. Attract new rail-oriented industries to locate along rail lines. Preserve inactive rail corridors. Implement new intercity passenger rail service along the western corridor and extend Vermonter to Montreal. Exceed FRA Intercity Passenger Rail Performance and Service Quality indicators. Increase existing and planned passenger routes to a minimum of FRA Class 4 Track in order to allow operating speeds of up to 79 MPH.	High Impact:	Project increases rail system usage for freight and passenger services.
		Potential Impact:	Project may increase the rail use of existing and new passenger or freight users
		No Change:	Project does not increase rail system usage by existing and new passenger or freight users
Provide a rail system that is financially sustainable	Examine alternative schemes for operating passenger services in order to reduce state subsidy and improve service. Pursue alternative funding opportunities (e.g., federal grants, public-private partnerships) to rehabilitate and upgrade the rail network.	High Impact:	Project pursues federal grant opportunities or examines ways to reduce operating subsidies
		Potential Impact:	Project may pursue federal grant opportunities or examine ways to reduce operating subsidies
		No Change:	Project does not pursue federal grants or examine ways to reduce operating subsidies
Improve intermodal connectivity	Integrate rail stations with local and intercity bus transportation. Promote multimodal freight solutions, such as transload facilities.	High Impact:	Project improves passenger and freight intermodal connectivity
		Potential Impact:	Project may improve passenger and freight intermodal connectivity
		No Change:	Project does not improve passenger and freight intermodal connectivity
Improve the rail system to support economic development and employment opportunities	Coordinate rail and economic development efforts. Provide incentives for new and existing businesses to use rail. Support the development of transload facilities, and preservation of property suitable for rail oriented uses.	High Impact:	Project incentivizes businesses to use rail and/or promotes coordination between rail and economic development efforts.
		Potential Impact:	Project may incentivize businesses to use rail and/or promote coordination between rail and economic development efforts.
		No Change:	Project does not incentivize businesses to use rail and/or promote coordination between rail and economic development efforts.
Enhance safety of the rail system	Reduce rail-highway grade crossing collisions. Participate in disaster planning with local, state, federal authorities.	High Impact:	Project increases rail safety
		Potential Impact:	Project has the potential to increase rail safety
		No Change:	Project does not increase rail safety
Improve resiliency of the rail system	Retain and enhance modal options for freight and passenger transportation across state. Strengthen rail infrastructure against effects of potential severe weather events.	High Impact:	Project increases rail network resiliency
		Potential Impact:	Project has the potential to increase rail network resiliency
		No Change:	Project does not increase rail network resiliency

Goal	Evaluation Criteria		Criteria Description
Reduce environmental impacts	**Incentivize modal balance and encourage rail use where suitable. Minimize rail operational impacts on the state's environment. Minimize construction and maintenance impacts.**	High Impact:	Project reduces environmental impacts as described in evalutation criteria
		Potential Impact:	Project has the potential to reduce environmental impacts as described in evalutation criteria
		No Change:	Project does not reduce environmental impacts

This list is by no means exhaustive, and in the future the State may wish to incorporate additional qualitative as well as quantitative criteria, including factors reflecting private sector perspectives. It is important to note that projects should regularly be re-evaluated as conditions and priorities evolve and change.

5.3.1 Passenger Rail Projects and Impacts

As described in detail in previous chapters the following passenger rail investments and improvements are being proposed in the State Rail Plan.

- First Priority: Extend *Ethan Allen Express* service to Burlington;
- First Priority: Extend the *Vermonter* to Montreal (although this is not anticipated to require additional infrastructure investment);
- Second Priority: Initiate a new passenger service between Albany and Burlington through North Bennington and Manchester;
- Second Priority: Extend *Ethan Allen Express* from Burlington to Essex Junction;
- Third Priority: Upgrade all passenger rail routes to FRA Track Class 4 (maximum 79 miles per hour) operations;
- Third Priority: Add a second frequency to the *Vermonter* service.

Individual projects were evaluated and results were summarized to determine the collective impacts by project and rail line. Exhibit 107 shows a summary of this qualitative evaluation, by rail line, across each of the goals. First and second priority projects are generally categorized as providing high impacts, specifically in achieving goals of state of good repair, expand capacity, expand use, financial sustainability, and intermodal connectivity. Upgrading all passenger rail routes to FRA Track Class 4 operations will lead to increased rail use, capacity, state of good repair, safety and resiliency. Adding a second frequency to the Vermonter will produce high impacts in expanding capacity, rail use, financial sustainability and resiliency.

Exhibit 107: Evaluation of Rail System Passenger Projects Based on Rail Plan Goals

Rail Line	Project	Goals									Overall Impacts
		State of Good Repair	Expand Capacity	Expand Use	Financial Sustain-ability	Inter-modal Connec-tivity	Economic Develop-ment	Safety	Resil-iency	Environ-mental Sustain-ability	
Rutland to Burlington, VT	Extend Ethan Allen Express to Burlington	●	●	●	●	●	●	●	●	●	●
St. Albans, VT to Montreal	Extend the Vermonter to Montreal	●	●	●	●	●	●	●	●	●	●
Albany, NY to Rutland, VT	New Service between Albany and Burlington through North Bennington and Manchester	●	●	●	●	●	●	●	●	●	●
Burlington, VT to Essex Junction, VT	Extend Ethan Allen Express from Burlington to Essex Junction	●	●	●	●	●	●	●	●	●	●
All passenger rail routes	Rail station upgrades	●	●	●	●	●	●	●	●	●	●
All passenger rail routes	Upgrade all passenger rail routes to FRA Track Class 4 operations	●	●	●	●	●	●	●	●	●	●
Vermonter	Add second frequency to Vermonter	●	●	●	●	●	●	●	●	●	●

● = High Benefits ● = Potential Benefits ● = No Change

5.3.2 *Freight Rail Projects and Impacts*

Proposed rail freight investments and improvements were developed based upon previous studies and the findings in this Rail Plan, as well as discussions with stakeholders. The proposed projects are:

- Railroad bridge upgrades on VTR and GMRC;
- Non-passenger track upgrades on GMRC, SLR, NECR Winooski, and CMQ.

- Yard improvements on: CMQ Newport, NECR White River Jct, St. Albans, NECR/GMRC Interchange at Bellows Falls, NECR St. Albans Roundhouse, GMRC Yard Projects, VTR Yard Projects, WACR Conn River Yard Projects, Burlington Enterprise;
- Economic development and industrial access projects: Access to Franklin Industrial Park in St. Albans, former Goodyear Plant in Windsor, GMRC Sidings, WACR Montpelier Branch Sidings, VTR Sidings and Structures, WACR Connecticut River Line Sidings, GMRC Passing Sidings, VTR Passing Sidings, and WACR Conn River Passing Sidings;
- NECR unrestricted (full domestic height) double stack clearance;
- GMRC and CLP double stack clearance;
- Bridge upgrades on WACR;
- Non-passenger track upgrades on WACR.

Individual freight projects were evaluated and results were summarized to determine the collective impacts by project and rail line. Exhibit 108 shows a summary of this qualitative evaluation by rail line across each of the goals. Railroad bridge upgrades and non-passenger track upgrade projects are generally categorized as providing high impacts, specifically in achieving goals of state of good repair, expand capacity, safety and resiliency. Yard improvements and rail siding construction and rehabilitation to enhance industrial rail access will yield high impacts maintaining state of good repair, expanding capacity, expanding use and supporting economic development. Double stack clearance improvements will produce high impacts in expanding capacity and expanding use if used in significant volumes.

Exhibit 108: Evaluation of Rail System Freight Projects Based on Rail Plan Goals

Rail Line	Project	Rail Plan Goals									Overall Impacts
		State of Good Repair	Expand Capacity	Expand Use	Financial Sustain-ability	Inter-modal Connec-tivity	Economic Develop-ment	Safety	Resil-iency	Environ-mental Sustain-ability	
VTR	Railroad Bridge Upgrade										
GMRC	Railroad Bridge Upgrade										
GMRC	Non passenger track upgrades										
SLR	Non passenger track upgrades										
NECR Winooski	Non passenger track upgrades										
CMQ	Non passenger track upgrades										
CMQ Newport	Yard improvements										
NECR White River Jct. & St. Albans	Yard improvements										

Rail Line	Project	Rail Plan Goals									
		State of Good Repair	Expand Capacity	Expand Use	Financial Sustain-ability	Inter-modal Connec-tivity	Economic Develop-ment	Safety	Resil-iency	Environ-mental Sustain-ability	Overall Impacts
NECR/ GMRC Inter-change	Yard improvements										
NECR St. Albans Round-house	Yard improvements										
GMRC Yard Projects	Yard improvements										
VTR Yard Projects	Yard improvements										
WACR Conn River Yard Projects	Yard improvements										
Access to Franklin Industrial Park, former Goodyear Power Plant in Windsor	Enhance industrial access										
GMRC Sidings	Enhance industrial access										
WACR Montpelier Branch Sidings	Enhance industrial access										
VTR Sidings and Structures,	Enhance industrial access										
WACR Connecticut River Line Sidings	Enhance industrial access										
GMRC Passing Sidings	Enhance industrial access										
VTR Passing Sidings	Enhance industrial access										
WACR Conn River Passing Sidings.	Enhance industrial access										

Rail Line	Project	Rail Plan Goals									
		State of Good Repair	Expand Capacity	Expand Use	Financial Sustain-ability	Inter-modal Connec-tivity	Economic Develop-ment	Safety	Resil-iency	Environ-mental Sustain-ability	Overall Impacts
NECR	Double stack clearance										
GMRC	Double stack clearance										
CLP	Double stack clearance										
WACR	Railroad Bridge Upgrade										
WACR	Non passenger track upgrades										

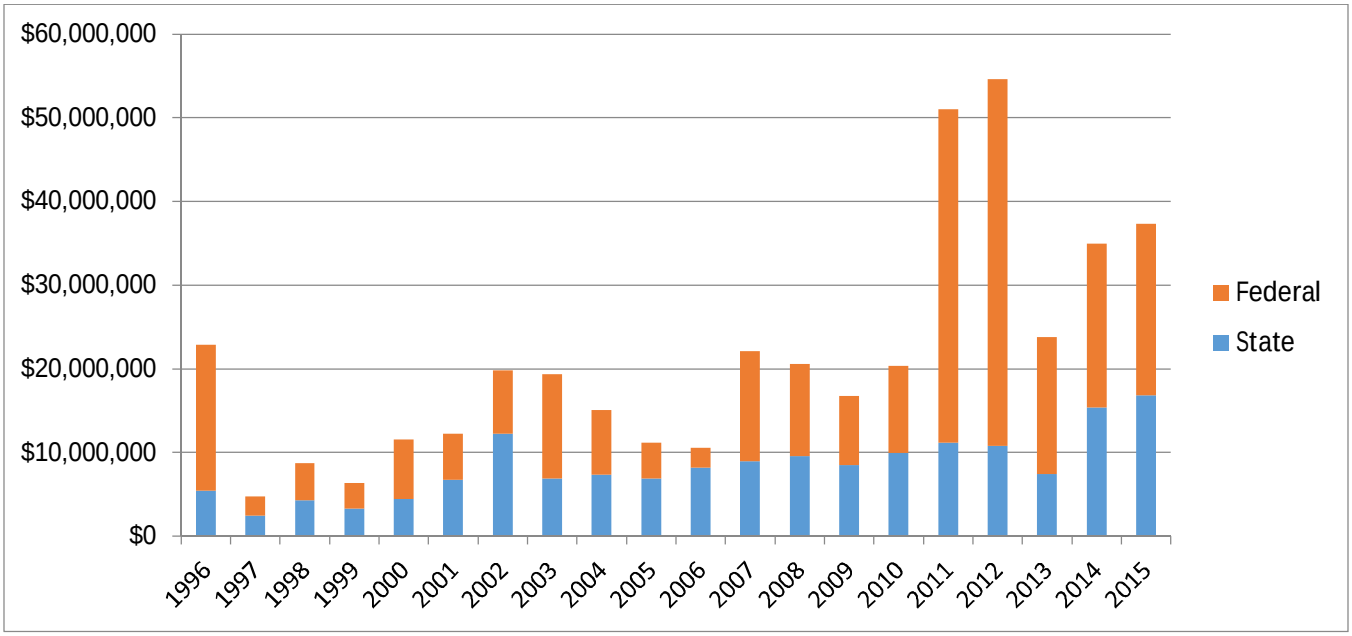
= High Benefits = Potential Benefits = No Change

5.4 Financing

The annual State funding available to cover capital needs is approximately $4 million. Over a 20 year period, this would total to around $80 million. While appropriations for rail activities by the Vermont legislature are much higher than $4 million per year, most VTrans funding for rail covers operating expenses, such as Amtrak service subsidies and is not available for capital expenditures.

As shown in Exhibit 109 , federal funding levels for rail in Vermont have varied dramatically, from $2.3 million in Vermont Fiscal Year 2006 (ending June 30) to $43.8 million in 2012. Overall funding levels for rail in Vermont have increased over the past 20 years, from both state and federal sources. Since 2002, federal funding levels have averaged slightly over $15 million per year. A variety of federal funding sources have supported rail in Vermont, including grants, such as the TIGER Discretionary Grant programs and the High Speed Intercity Passenger Rail (HSIPR) program. Upgrades to crossings are supported by the FHWA Section 130 Crossing Improvement Program. Obligations from the $25 million earmark secured by Senator Jeffords have also been applied to improvements on the Vermont Railway. Vermont additionally received funds from the Federal Emergency Management Administration (FEMA) following the destruction from Tropical Storm Irene.

Exhibit 109: Annual Appropriation Levels for VTrans Rail Program



Because there is no consistent, dedicated federal funding source for rail transportation in the United States, and most funding for Vermont's capital needs would have to come from federal sources, it is difficult to predict the money that would be available to fund the capital needs identified in this Plan. Fortunately, Vermont has been successful in securing federal funding for rail in the past. But it is not certain that VTrans will be as successful in the future. Furthermore, the largest single source of federal money over the past decade was the $50 million federal grant to upgrade the *Vermonter* route, funded through the American Recovery and Reinvestment Act (ARRA). But ARRA represented an unprecedented amount of money available for rail, and it is questionable whether such a funding source would become available again over the next 20 years.

For freight rail projects, private railroads have participated in funding in the past. In cases where projects are on privately owned rail lines, participation by freight railroads has tended to be higher, since these carriers are investing in their own properties. Non-federal funding for freight rail projects on state-owned rail lines tends to come from state or a mixture of private and state sources.

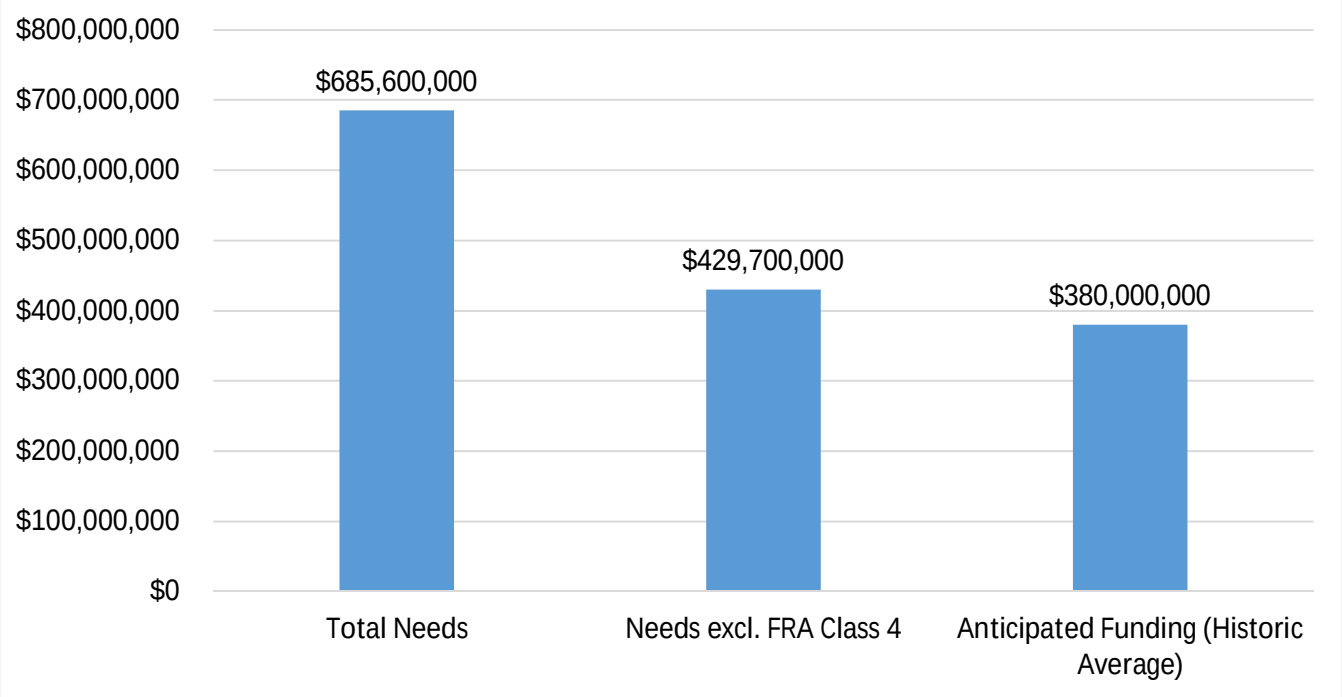
Nevertheless, if funding for rail in Vermont were to be consistent with previous levels since 2002, then available funding over the next 20 years is estimated to be approximately $380 million ($15 million federal x 20 years + $4 million state x 20 years). This compares to $685.6 million in needs that have been identified in this Plan. Thus, the shortfall would be $305.6 million or 45 percent of the total. Exhibit 110 displays annual investments per the phasing of projects identified in Exhibit 104 and Exhibit 105. These amounts assume that the investments are spread evenly over the period of each initiative. The funding assumes that projects are funded 20 percent by the State, and 80 percent by the federal government on passenger rail projects. Funding would be 80 percent federal, 20 percent private for freight rail projects on privately owned rail lines. For freight projects on state-owned lines, funding would be 80 percent federal and probably state or a mixture of state and private funding for the remainder.

Exhibit 110: Vermont State Rail Plan Capital Investment Program by Year (2015 $'s)

Year	Passenger Rail Program	Freight Rail Program	Total	Funding	
				State or Private Share	Federal Share
2016	$6,600,000	$18,150,000	$24,750,000	$4,950,000	$19,800,000
2017	$6,600,000	$18,150,000	$24,750,000	$4,950,000	$19,800,000
2018	$7,600,000	$20,150,000	$27,750,000	$5,550,000	$22,200,000
2019	$7,600,000	$20,150,000	$27,750,000	$5,550,000	$22,200,000
2020	$18,600,000	$20,150,000	$38,750,000	$7,750,000	$31,000,000
2021	$18,600,000	$21,070,000	$39,670,000	$7,934,000	$31,736,000
2022	$18,600,000	$21,070,000	$39,670,000	$7,934,000	$31,736,000
2023	$18,600,000	$19,070,000	$37,670,000	$7,534,000	$30,136,000
2024	$18,600,000	$19,070,000	$37,670,000	$7,534,000	$30,136,000
2025	$1,000,000	$19,070,000	$20,070,000	$4,014,000	$16,056,000
2026	$26,590,000	$10,920,000	$37,510,000	$7,502,000	$30,008,000
2027	$26,590,000	$10,920,000	$37,510,000	$7,502,000	$30,008,000
2028	$25,590,000	$10,920,000	$36,510,000	$7,302,000	$29,208,000
2029	$25,590,000	$10,920,000	$36,510,000	$7,302,000	$29,208,000
2030	$25,590,000	$10,920,000	$36,510,000	$7,302,000	$29,208,000
2031	$25,590,000	$10,920,000	$36,510,000	$7,302,000	$29,208,000
2032	$25,590,000	$10,920,000	$36,510,000	$7,302,000	$29,208,000
2033	$25,590,000	$10,920,000	$36,510,000	$7,302,000	$29,208,000
2034	$25,590,000	$10,920,000	$36,510,000	$7,302,000	$29,208,000
2035	$25,590,000	$10,920,000	$36,510,000	$7,302,000	$29,208,000

Of the $685.6 million in capital needs, efforts to upgrade Vermont's passenger rail routes to FRA Track Class 4 (79 mph) standards represent $255.9 million or 37 percent of the total. Delaying upgrades of passenger rail lines to FRA Track Class 4 standard beyond the 20 years of this Rail Plan significantly closes the funding gap, so that the identified needs are $429.7 million or $49.7 million higher than the assumed funding levels.

Exhibit 111: Comparison of Assumed Funding Levels with Identified Needs, both including and excluding Passenger Route Upgrades to FRA Track Class 4



Beyond delaying the upgrade of passenger rail lines to FRA Track Class 4 standards, the application of asset management techniques as described on page 121 may also help to close the funding gap. VTrans could look for areas where investments provide a level of service that is "good enough" for rail asset users rather than necessarily ideal. As an example, in order to accommodate 286,000 pound railcars, railroad track infrastructure generally must have rail of at least 100 pounds per yard, two-thirds of ties in good condition, and ballast in good condition.[59] While trackage meeting these minimum conditions may not be ideal, it could suffice for railroads to operate 286,000 pound railcars. The same may be the case for railroad bridge upgrades, where the scope of improvements may range from upgraded replacement to good enough to meet users' needs.

Exhibit 112 displays a project-level summary of proposed investments put forward in this Plan.

[59] *An Estimation of the Investment in Track and Structures Needed to Handle 129,844 kg (286,000 lb.) Rail Cars on Short Line Railroads,* by ZETA-TECH Associates, Inc. for the FRA and American Short Line and Regional Railroad Association.

Exhibit 112: Summary of Projects by Costs, Likely Funding Source, Program Effects, and Timing

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
Passenger Rail Projects					
Ethan Allen Express Extension to Burlington	$26,400,000	$350,000 - $1,000,000	State rail program, federal grants	*The State's Transportation System:* Provides a new intercity transportation service to northwestern Vermont. *Public:* New transportation options, increases intercity passenger rail ridership by 29,300 riders per year by 2030, also diverts freight from highways. *Private:* Improves efficiency of freight operations. *Rail Capacity and Congestion:* Increases the capacity of rail line between Rutland and Burlington *Transportation System Capacity, Congestion, Safety, and Resiliency:* Increases total capacity of intercity passenger transportation system, improves safety because rail is safer than single occupancy vehicles. *Environmental, Economic, Livability and Employment Conditions:* Reduces auto emissions and promotes healthy environment by diverting drivers from cars, promotes employment by enabling mobility between Vermont and nearby employment centers. *Distribution of Benefits to Regions:* Benefits of improvement will be felt by users of the *Ethan Allen Express* with destinations in northwest Vermont.	2016 - 2019
Vermonter Extension to Montreal	$0	$2,000,000	State rail program	*The State's Transportation System:* Enables Vermont rail passengers to travel to/from Montreal, reduces automobile travel between Montreal and points in U.S. *Public:* New transportation options, increases intercity passenger rail ridership by 155,700 riders per year by 2030. *Rail Capacity and Congestion:* NA *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety because rail is safer than single occupancy vehicles, adds capacity by reducing vehicle trips to/from Montreal. *Environmental, Economic, Livability and Employment Conditions:* Reduces auto emissions and promotes healthy environment by diverting drivers from cars, promotes employment by enabling cross border tourism. *Distribution of Benefits to Regions:* Benefits will be distributed across *Vermonter* route, but also across *Ethan Allen Express* route if *Ethan Allen Express* is extended to interchange at Essex Junction.	2016 - 2019

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
Ethan Allen Express Extension from Burlington to Essex Junction	$0 (Cost included as a freight project)	Unknown	State rail program, federal grants, NECR	*The State's Transportation System:* Will provide passenger with the ability to interchange between the expanded *Ethan Allen Express* service and the *Vermonter* service. Will also improve efficiency of *Ethan Allen Express* operations. *Public:* Improved connectivity of passenger rail network, also diverts freight from highways. *Private:* Ability to operate 286,000 pound railcars, more efficient freight operations. *Rail Capacity and Congestion:* Increases capacity of rail line between Burlington and Essex Junction, enabling line to accommodate 286,000 pound cars. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Increases connectivity of transportation system, improves safety because rail is safer than single occupancy vehicles. *Environmental, Economic, Livability and Employment Conditions:* Reduces auto emissions and promotes healthy environment by diverting drivers from cars, promotes employment by increasing mobility. *Distribution of Benefits to Regions:* Will benefit passengers on either the *Ethan Allen Express* or the *Vermonter* interchanging through Burlington.	2020 - 2024
New Albany-Bennington-Manchester Route	$88,000,000	$4,100,000	State rail program, federal grants	*The State's Transportation System:* Provides people traveling to/from western Vermont with a new transportation option between Albany, NY and Burlington. *Public:* New transportation options, increases intercity passenger rail ridership by 53,000 riders per year by 2030, supports economy and tourism, also diverts freight from highways *Private:* Improves efficiency of freight operations *Rail Capacity and Congestion:* Increases capacity of rail line between Rutland and New York border. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Increases total capacity of intercity passenger transportation system, improves safety because rail is safer than single occupancy vehicles. Promotes safety because rail is safer than single occupant automobile travel. *Environmental, Economic, Livability and Employment Conditions:* Reduces auto emissions and promotes healthy environment by diverting drivers from cars, promotes employment by increasing mobility and supports access to Vermont tourist attractions. *Distribution of Benefits to Regions:* Benefits will accrue to Western Vermont.	2020 - 2024

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
Passenger Rail Station Improvements	$10,000,000	Unknown	State rail program, federal grants	*The State's Transportation System:* May bring stations to a state of good repair, improve accessibility of stations, or provide new passenger amenities. *Public:* Returns stations to a state of good repair, improves public experience of intercity passenger rail travel. *Rail Capacity and Congestion:* NA *Transportation System Capacity, Congestion, Safety, and Resiliency:* Diverts passengers from auto travel, thereby freeing roadway capacity, improving safety because rail is a safer mode of transportation than single occupancy vehicle transportation. *Environmental, Economic, Livability and Employment Conditions:* Reduces auto emissions and promotes healthy environment by diverting drivers from cars. *Distribution of Benefits to Regions:* Unknown.	2018 - 2027
Enhanced 79 mph *Vermonter* upgrades	$177,300,000	Unknown	State rail program, federal grants	*The State's Transportation System:* Upgrades crossings and signal system, increases capacity of the *Vermonter* route to allow more, faster trains. *Public:* Increases intercity passenger rail ridership, reduces travel times, improves safety due to crossing improvements. *Rail Capacity and Congestion:* Increases capacity of the *Vermonter* route. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Diverts passengers from auto travel, thereby freeing roadway capacity, improving safety because rail is a safer mode of transportation than single occupancy vehicle transportation. Improves safety of crossings. *Environmental, Economic, Livability and Employment Conditions:* Reduces auto emissions and promotes healthy environment by diverting drivers from cars, supports employment by improving mobility between Vermont and nearby employment centers. *Distribution of Benefits to Regions:* Will benefit communities served by the *Vermonter*, but may serve other communities on the Western Corridor as connections are established.	2026 - 2035
Enhanced 79 mph Western Corridor Upgrades	$78,600,000	Unknown	State rail program, federal grants	*The State's Transportation System:* Upgrades crossings and signal system, increases capacity on the Western Corridor to allow more, faster trains. *Public:* Increases intercity passenger rail ridership, reduces travel times, improves safety due to crossing improvements. *Rail Capacity and Congestion:* Increases capacity of the Western Corridor. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Diverts passengers from auto travel, thereby freeing roadway capacity, improving safety because rail is a safer mode of transportation than single occupancy vehicle transportation. Improves safety of crossings. *Environmental, Economic, Livability and Employment Conditions:* Reduces auto emissions and promotes healthy environment by diverting drivers from cars, supports employment by improving mobility between Vermont and nearby employment centers. *Distribution of Benefits to Regions:* Will benefit communities on the Western Corridor, but may serve other communities on the *Vermonter* route as connections are established.	2026 - 2035

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
Freight Rail Projects					
Upgrade VTR Bridges	$53,050,290	$0	State rail program, federal grants	*The State's Transportation System:* Brings bridges on the VTR to a state of good repair and able to accommodate 286,000 pound railcars. *Public:* Brings Vermont-owned bridges to a state of good repair, diverts freight from highways. *Private:* Enables 286,000 pound operations, removes slow orders. *Rail Capacity and Congestion:* Enables rail line to accommodate higher capacity railcars. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits VTR corridor, corridors that interchange with the VTR.	2016 - 2025
Upgrade GMRC Bridges	$46,211,420	$0	State rail program, federal grants	*The State's Transportation System:* Brings bridges on the GMRC to a state of good repair and able to accommodate 286,000 pound railcars. *Public:* Brings Vermont-owned bridges to a state of good repair, diverts freight from highways *Private:* Partially enables 286,000 pound operations, removes slow orders *Rail Capacity and Congestion:* Partially enables rail line to accommodate higher capacity railcars. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits GMRC corridor, corridors that interchange with the GMRC.	2016 - 2025

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
Upgrade WACR Connecticut River Line Bridges	$60,112,270	$0	State rail program, federal grants	*The State's Transportation System:* Brings bridges on the WACR Connecticut River Line to a state of good repair and able to accommodate 286,000 pound railcars. *Public:* Brings Vermont-owned bridges to a state of good repair, diverts freight from highways. *Private:* Partially enables 286,000 pound operations, removes slow orders. *Rail Capacity and Congestion:* Partially enables rail line to accommodate higher capacity railcars. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits WACR Conn River corridor, corridors that interchange with the WACR Conn River corridor.	2026 - 2035
Upgrade WACR Montpelier & Barre Sub. Bridges	$4,310,000	$0	State rail program, federal grants	*The State's Transportation System:* Brings bridges on the WACR M&B Sub to a state of good repair and able to accommodate 286,000 pound railcars. *Public:* Brings Vermont-owned bridges to a state of good repair, diverts freight from highways *Private:* Partially enables 286,000 pound operations, removes slow orders. *Rail Capacity and Congestion:* Partially enables rail line to accommodate higher capacity railcars. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits WACR M&B corridor, corridors that interchange with the WACR M&B corridor.	2026 - 2035

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
Repairs to Substructures of State-Owned Bridges	$40,000,000	$0	State rail program, federal grants	*The State's Transportation System:* Brings bride substructures to a state of good repair and able to accommodate 286,000 pound railcars. *Public:* Brings Vermont-owned bridges to a state of good repair, diverts freight from highways. *Private:* Partially enables 286,000 pound operations, removes slow orders. *Rail Capacity and Congestion:* Partially enables 286,000 pound operations. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. Increases resiliency by enabling bridges to better withstand flooding. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Unknown.	2016 - 2035
GMRC Track Upgrade	$18,500,000	$0	State rail program, federal grants, potential private contribution	*The State's Transportation System:* Brings tracks, ties, ballast, turnouts to a state of good repair and current standards. *Public:* Brings Vermont-owned rail line to a state of good repair, diverts freight from highways. *Private:* Partially enables 286,000 pound operations, removes slow orders, reduces future maintenance. *Rail Capacity and Congestion:* Partially enables rail line to accommodate higher capacity railcars. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits GMRC corridor, corridors that interchange with the GMRC.	2016 - 2025

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
WACR Connecticut River Line Track Upgrade	$22,500,000	$0	State rail program, federal grants, potential private contribution	*The State's Transportation System:* Brings tracks, ties, ballast, turnouts to a state of good repair and current standards. *Public:* Brings Vermont-owned rail line to a state of good repair, diverts freight from highways. *Private:* Partially enables 286,000 pound operations, removes slow orders, reduces future maintenance. *Rail Capacity and Congestion:* Partially enables 286,000 pound operations. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits the WACR Conn. River corridor, corridors that interchange with the WACR Conn. River.	2026 - 2035
WACR Montpelier & Barre Sub. Track Upgrade	$6,500,000	$0	State rail program, federal grants, potential private contribution	*The State's Transportation System:* Brings tracks, ties, ballast, turnouts to a state of good repair and current standards. *Public:* Brings Vermont-owned rail line to a state of good repair, diverts freight from highways. *Private:* Partially enables 286,000 pound operations, removes slow orders, reduces future maintenance. *Rail Capacity and Congestion:* Partially enables rail line to accommodate higher capacity railcars, removes slow orders. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits WACR M&B corridor, corridors that interchange with the WACR M&B.	2026 - 2035

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
NECR Winooski Branch Track Upgrade	$4,000,000	$0	State rail program, federal grants, potential private contribution	*The State's Transportation System:* Upgrades rail on the NECR Winooski Branch between Burlington and Essex Junction. *Public:* Diverts freight from highways, enables potential extension of *Ethan Allen Express* from Burlington to Essex Junction. *Private:* Enables 286,000 pound operations, removes slow orders, reduces future maintenance, brings Winooski Branch to a state of good repair, improves operations. *Rail Capacity and Congestion:* Enables 286,000 pound freight operations, passenger rail operations. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits the Winooski Branch, but also potentially benefits the *Ethan Allen Express* and the *Vermonter* routes.	2015 - 2025
SLA Track and Bridge Upgrade	$3,300,000	$0	Federal grants, SLA	*The State's Transportation System:* Brings tracks, ties, ballast, turnouts, and bridges to a state of good repair and current standards. *Public:* Diverts freight from highways. *Private:* Brings SLA line to a state of good repair, enables 286,000 pound operations, removes slow orders, reduces future maintenance. *Rail Capacity and Congestion:* Enables 286,000 pound operations. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves safety by diverting freight from highway to rail, which is a safer mode of transportation, frees roadway capacity. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits SLA corridor, corridors that interchange with the SLA.	2016 - 2025

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
CMQ Tie, Bridge, and Yard Upgrade	$1,484,000	$0	Federal grants, CMQ	*The State's Transportation System:* Brings tracks, ties, ballast, turnouts, bridge, and rail yard to a state of good repair and current standards. *Public:* Diverts freight from highways. *Private:* Brings the CMQ line to a state of good repair, removes slow orders, reduces future maintenance, improves operations *Rail Capacity and Congestion:* Increases the capacity of the CMQ line in Vermont. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Environmental, Economic, Livability and Employment Conditions:* Reduces greenhouse gas emissions by diverting freight from truck to rail, reduces the cost of rail transportation. *Distribution of Benefits to Regions:* Benefits CMQ corridor, corridors that interchange with CMQ.	2016 - 2025
Burlington Railyard Enterprise	$10,000,000	$0	Federal grants, local funding	*The State's Transportation System:* Constructs roadways through the Burlington rail yard, potentially causing some portions of the yard to be moved. *Public:* Improves connectivity and livability, promotes economic development *Rail Capacity and Congestion:* NA *Transportation System Capacity, Congestion, Safety, and Resiliency:* May reduce roadway congestion in Burlington. *Environmental, Economic, Livability and Employment Conditions:* Promotes livability and economic development in Burlington. *Distribution of Benefits to Regions:* Burlington.	2018 - 2022
NECR Yard Projects, including St. Albans Roundhouse	$4,523,000	$0	Federal grants, NECR	*The State's Transportation System:* Improves efficiency of NECR yards in St. Albans and White River Junction. *Public:* Diverts freight from highways. *Private:* Improves operations, brings yards and roundhouse to a state of good repair *Rail Capacity and Congestion:* Improves capacity of NECR yards in St. Albans, White River Junction. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves total transportation system capacity by boosting rail operations, promotes safety by diverting freight from truck to rail. *Environmental, Economic, Livability and Employment Conditions:* Improves rail operations and thereby diverts freight from truck to rail, which is a more energy efficient transportation mode. *Distribution of Benefits to Regions:* NECR corridor.	2016 – 2025

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
GMRC and VTR Yard Projects	$1,600,000	$0	State rail program, federal grants, potential private contribution	*The State's Transportation System:* Improves the efficiency, capacity, and condition of yards on the VTR and GMRC. *Public:* Diverts freight from highways, brings state-owned yards to a state of good repair *Private:* Improves operations *Rail Capacity and Congestion:* Improves capacity of rail yards. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves total transportation system capacity by boosting rail operations, promotes safety by diverting freight from truck to rail. *Environmental, Economic, Livability and Employment Conditions:* Improves rail operations and thereby diverts freight from truck to rail, which is a more energy efficient transportation mode. *Distribution of Benefits to Regions:* GMRC and VTR corridors.	2016 - 2025
WACR Connecticut River Line Yard Projects	$700,000	$0	State rail program, federal grants, potential private contribution	*The State's Transportation System:* Improves the efficiency, capacity, and condition of yards on the WACR Conn. River Line. *Public:* Diverts freight from highways, brings state-owned yards to a state of good repair *Private:* Improves operations *Rail Capacity and Congestion:* Improves capacity of rail yards. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Improves total transportation system capacity by boosting rail operations, promotes safety by diverting freight from truck to rail. *Environmental, Economic, Livability and Employment Conditions:* Improves rail operations and thereby diverts freight from truck to rail, which is a more energy efficient transportation mode. *Distribution of Benefits to Regions:* WACR Conn. River Line corridor.	2016 - 2025
NECR Industrial Access in Franklin, Winsor	$260,000	$0	State rail program, federal grants, NECR, potential shipper contribution	*The State's Transportation System:* Provides access to industrial sites in Franklin and Winsor. *Public:* Diverts freight from highways, supports economic development. *Private:* Access to new customers. *Rail Capacity and Congestion:* NA *Transportation System Capacity, Congestion, Safety, and Resiliency:* Promotes safety by diverting freight from truck to rail. *Environmental, Economic, Livability and Employment Conditions:* Supports employment by promoting economic development in Franklin, Winsor. *Distribution of Benefits to Regions:* Franklin, Winsor, NECR corridor.	2016 - 2025

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
VTR Sidings and Structures	$3,677,000	$0	State rail program, federal grants, VTR, potential shipper contribution	*The State's Transportation System:* Improves, adds sidings and structures so that VTR can better serve customers. *Public:* Diverts freight from highways, supports economic development. *Private:* Access to new customers, improved operations, better serve existing customers *Rail Capacity and Congestion:* NA *Transportation System Capacity, Congestion, Safety, and Resiliency:* *Environmental, Economic, Livability and Employment Conditions:* Supports employment by promoting economic development in locations served by VTR. *Distribution of Benefits to Regions:* VTR corridor.	2016 - 2025
GMRC Sidings	$1,633,000	$0	State rail program, federal grants, GMRC, potential shipper contribution	*The State's Transportation System:* *Public:* Diverts freight from highways, supports economic development. *Private:* Access to new customers, improved operations, better serve existing customers. *Rail Capacity and Congestion:* NA *Transportation System Capacity, Congestion, Safety, and Resiliency:* Promotes safety by diverting freight from truck to rail. *Environmental, Economic, Livability and Employment Conditions:* Supports employment by promoting economic development in locations served by VTR. *Distribution of Benefits to Regions:* GMRC corridor.	2016 - 2025
WACR Connecticut River Line Sidings	$5,271,000	$0	State rail program, federal grants, WACR, potential shipper contribution	*The State's Transportation System:* *Public:* Diverts freight from highways, supports economic development. *Private:* Access to new customers, improved operations, better serve existing customers. *Rail Capacity and Congestion:* NA *Transportation System Capacity, Congestion, Safety, and Resiliency:* Promotes safety by diverting freight from truck to rail. *Environmental, Economic, Livability and Employment Conditions:* Supports employment by promoting economic development in locations served by WACR Conn. River Line. *Distribution of Benefits to Regions:* WACR Conn. River Line corridor.	2016 - 2025
WACR Montpelier & Barre Sub. Sidings	$1,584,000	$0	State rail program, federal grants, WACR, potential shipper contribution	*The State's Transportation System:* Add sidings on the WACR M&B line so that WACR can better serve customers. *Public:* Diverts freight from highways, supports economic development. *Private:* Access to new customers, improved operations. *Rail Capacity and Congestion:* NA *Transportation System Capacity, Congestion, Safety, and Resiliency:* Promotes safety by diverting freight from truck to rail. *Environmental, Economic, Livability and Employment Conditions:* Supports employment by promoting economic development in locations served by WACR M&B line. *Distribution of Benefits to Regions:* Montpelier – Barre.	2016 - 2025

Project	Capital Costs (2015 Dollars)	Incremental Annual Operating Expense	Funding Source	Program Effects	Timing
NECR Double Stack Clearance	$5,700,000	$0	State rail program, federal grants	*The State's Transportation System:* Remove obstructions to allow double stack intermodal cars of any configuration to use NECR route in Vermont. *Public:* Potential to divert freight from highways *Private:* Potential new sources of overhead freight traffic. *Rail Capacity and Congestion:* Increases capacity of NECR line to accommodate high clearance railcars. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Promotes safety by diverting freight from truck to rail. *Environmental, Economic, Livability and Employment Conditions:* Promotes environmental sustainability by diverting freight from truck to rail. *Distribution of Benefits to Regions:* NECR corridor.	2016 - 2025
GMRC/CLP Double Stack Clearance	$10,300,000	$0	State rail program, federal grants	*The State's Transportation System:* Remove obstructions to allow certain double stack intermodal and automobile cars to use GMRC/CLP corridor. *Public:* Potential to divert freight from highways. *Private:* Potential new sources of overhead freight traffic. *Rail Capacity and Congestion:* Increases the capacity of the CMRC/CLP lines to accommodate high clearance railcars. *Transportation System Capacity, Congestion, Safety, and Resiliency:* Promotes safety by diverting freight from truck to rail. *Environmental, Economic, Livability and Employment Conditions:* Promotes environmental sustainability by diverting freight from truck to rail. *Distribution of Benefits to Regions:* GMRC/CLP and connecting corridors.	2016 - 2025

5.5 Vermont Performance Measures

5.5.1 Introduction

A series of performance measures was created for the 2006 Vermont Rail Plan to evaluate investments made in the State's rail system. These performance measures have since been updated for the current plan. Performance Measure Targets provide a benchmark for assessing the return on investments to the State's rail infrastructure and will help to monitor the progress of the Vermont State Rail Plan. Performance measurement was heavily emphasized in MAP-21, the most recent long-term federal highway authorization bill. The bill requires that performance measures be incorporated into state planning efforts, such as Statewide Long-Range Plans. The MAP-21 emphasis on performance measures is applicable to rail planning, as the Rail Plan will be integrated with other modal planning efforts, such as freight planning and multimodal long-range planning.

5.5.2 Categories and Goals

Performance measures are grouped into three categories.

- Rail system effectiveness performance measures
- Rail system condition performance measures
- Rail system initiative performance measures

The performance categories match Vermont rail system goals developed from public input for the Rail Capital Investment Plan (2001) and the State of Vermont State Rail & Policy Plan, 2006, and continued for the current Rail Plan. Rail System Effectiveness Performance Measures assess the overall health and viability of the State's rail system. These measures focus on state freight rail volumes and passenger rail ridership. Higher freight and passenger rail usage indicate a rail system that is providing value and meeting the needs of users.

Rail System Condition Performance Measures provide an indicator of the current physical state of rail infrastructure. They focus on keeping the rail network in good condition to ensure reliable rail service and support system expansion. High quality and expandable rail service fosters economic development.

Rail System Initiative Performance Measures track the progress of multi-year system projects that make the rail system more economically competitive and beneficial to the public. It is likely that these initiatives and performance measures will change in future rail policy plans as issues and requirements for maintaining a thriving rail network change.

5.5.3 Summary of Performance Measure Results

Exhibit 113 provides a summary of the performance measure results.

Exhibit 113: Performance Measure Results

		Performance Measure	Associated Performance Goal	Existing Conditions	Target
Performance Category	*System Effectiveness*	Freight rail volumes originating or destined for Vermont	Expand rail system use; Provide a rail system that is financially sustainable; Support economic development	2 million tons	3 million tons
		Recruitment of new rail businesses in Vermont	Expand the rail system's use; Support economic development	1	2 businesses per railroad annually
		Passenger rail trips in Vermont	Expand the rail system's use	100,829	5% increase
		FRA IPR Performance and Service Quality Indicators	Expand the rail system's use	Variable	Above national average in half or more reporting categories
	System Condition	Bridges meeting 263,000 lbs. standard	State of good repair		All bridges to be 263K
		Bridges meeting 286,000 lbs. standard	Expand rail system capacity	76 of 125 rated	Improve 3 or more annually
		Rehabilitate and upgrade grade crossings	State of good repair; Safety	Variable	Improve 3 or more annually
		115lb rail	State of good repair	266 mi <115 lb	5 miles annually
	System Initiatives	Eliminate permanent slow orders along passenger routes	State of good repair; Expand rail system use	Variable	3 per year
		Continuously-welded rail along all passenger routes	State of good repair; Expand rail system use	82 mi jointed rail	CWR along all current and planned passenger routes
		Vertical clearances	State of good repair; Expand rail system capacity	63	Remove all obstructions to allow unrestricted double stack
		Minimum Class 4 track for passenger routes	Expand rail system capacity	307 mi < Class 4	Class 4 operating speeds along all current and planned passenger routes

5.5.4 System Effectiveness Performance Measures

System effectiveness measures describe the overall health and viability of the Vermont rail system.

Freight Rail Volumes in Vermont

Originating and terminating freight traffic are shown in Exhibit 114. Currently, originating and terminating tonnage totals about 2.2 million. The performance target is three million.

Exhibit 114: Tons originating and terminating in Vermont (2005 – 2012)

Year	Rail Tons Originated	Rail Tons Terminated	Rail Tons Originating and Terminating
2005	830,160	1,333,916	2,166,081
2006	516,600	1,481,224	1,999,830
2007	392,000	1,403,072	1,797,079
2008	404,560	1,179,972	1,586,540
2009	348,000	1,166,000	1,516,009
2010	615,000	1,141,000	1,758,010
2011	639,000	1,414,000	2,055,011
2012	659,000	1,553,000	2,214,012

Sources: US Department of Transportation Bureau of Transportation Statistics, Association of American Railroads

Recruitment of Rail-Using Businesses

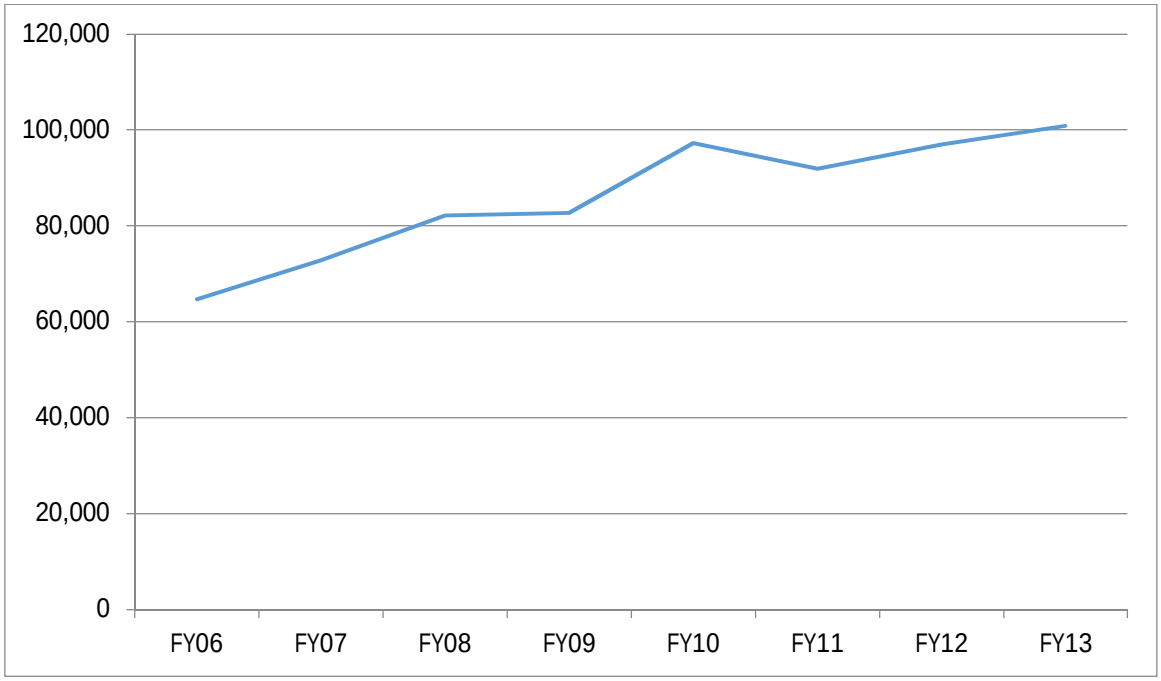
Economic development and Vermont's goals of increasing rail usage benefit when businesses that use rail are recruited to locate in the State. VTrans has estimated that a single establishment that will use rail was recruited to locate in Vermont on Vermont's rail network over the past year. The target recruitment is two establishments per year.

Passenger trips on Amtrak

Passenger rail performance is measured by the annual number of on and offs at stations in Vermont.[60] For the federal fiscal year 2006 (ending September 30, 2006), there were 64,647 on and offs at Vermont stations. In federal fiscal year 2013, the State's passenger volume was 102,952 on and offs, which corresponds to an average annual increase of almost eight percent from 2006. VTrans has set a performance goal of five percent annual increase going forward.

[60] *This differs slightly from ridership figures, since an intrastate trip would generate 2 on/offs but one trip per ridership statistics.*

Exhibit 115: Vermont Station On and Off's by Year



Amtrak/FRA Performance Measures

As a requirement of PRIIA, Amtrak and the FRA established a set of performance measures and targets in order to monitor Amtrak intercity passenger rail service. As shown in Exhibit 19 and Exhibit 20, the performance of Amtrak services serving Vermont has been mixed. Some standards have been met, while others have not. Vermont's target is for performance metrics to be above national average in half or more reporting categories

5.5.5 System Condition Performance Measures

Railroad Bridge Capacity

As of April 2015, VTrans is currently load rating state-owned bridges, so that information on the capacity of state-owned bridges is incomplete. However, of 125 bridges that have been load rated, 21 have been found to be not rated to accommodate the minimum interchange standard of 263,000 pounds at the applicable FRA track class standard. The State's standard is for all bridges to meet the basic minimum interchange standard of 263,000 pounds. Thus, the target has not yet been met.

Of bridges that have been load rated, 49 are not rated to accommodate 286,000 pound railcars, the industry standard. VTrans has established a goal of improving three or more bridges annually.

Grade Crossing Rating

VTrans oversees railroad operations, public information, and funding for grade crossing safety in Vermont. This includes the administration of the federally-funded Section 130 program, aimed at improving the safety of crossings. The agency is also responsible for resurfacing and maintenance of crossings. The 2006 Vermont Rail Plan called for three or more grade crossing to be improved annually. This standard is maintained in the current plan.

Rail Weight

The weight of rail as measured in pounds per yard has a significant influence on rail infrastructure performance. As discussed on page 119, rail lines with 115 pound rail can accommodate 286,000 pound railcars under a range of conditions. Currently, about 266 miles of rail infrastructure within Vermont has less than 115 pound rail. The VTrans performance target is to upgrade at least five miles per year to a minimum of 115 pound rail weight.

5.5.6 System Initiatives Performance Measures

Eliminate Permanent Slow Orders

As mentioned on page 113, Vermont rail lines are rated to FRA track classifications, which establish maximum allowable speeds that trains safely can pass over these lines. But specific areas on those rail lines are subject to slow orders, which decrease train speeds below the FRA track classifications. The slow orders result from a variety of factors, including bridge and track conditions. Vermont has established a performance target to reduce permanent slow orders by three per year.

Continuously Welded Rail on Passenger Routes

Continuously welded rail (CWR) greatly reduces rail maintenance and rail replacement. Vermont's performance target is to have CWR on all current and planned passenger routes.

Minimum Class 4 Track for Passenger Routes

VTrans has established a long-term performance target of improving all passenger routes to FRA Track Class 4 operating speeds (maximum speeds of 79 miles per hour). Currently, 15 miles of the *Vermonter* route is rated to FRA Track Class 4. The remaining 307 miles of existing and planned passenger rail routes have operating speeds less than FRA Track Class 4 standard.

5.6 Rail Agencies

As of the preparation of this Plan, Vermont has not planned for any significant rail agency organizational changes, policy or legislative changes, or new programs.

5.7 Rail Studies and Reports

Recent Vermont rail planning studies include the following:

- 2006 State Rail Plan
- Northern New England Intercity Rail Initiative Study Documents
- New York-Vermont Bi-State Intercity Passenger Rail Study
- Ethan Allen Extension to Burlington Tier 1 Environmental Assessment
- Western Corridor Transportation Management Plan
- Vermont Freight Plan (2013)

At this time, Vermont does not anticipate any additional studies regarding intercity passenger rail or freight rail. However, as intercity passenger rail initiatives advance, it may be necessary to complete additional studies as necessary. Vermont has identified a need to complete a study of options for commuter rail for the corridors between St. Albans, Burlington, and Montpelier.

Chapter 6: Coordination and Review

6.1 Approach to Public and Agency Participation

At the initiation of the State Rail Plan, a Public Involvement Plan was developed that detailed an approach to public meetings, stakeholder interviews, and how communications and outreach activities will be integrated into the development of the State Rail Plan. Public outreach was designed with these goals:

- Inform stakeholders and the public about the rail planning effort.
- Receive input – Stakeholders will have opportunities to both convey needs and desires for the rail system and be able review and provide comment on the draft plan and recommendations.
- Target specific stakeholders – especially those most affected by rail.
- Integrate information received from the public in a timely manner to inform the development of the plan.

In the development of the State Rail Plan, outreach was targeted to key stakeholders, regional, state and federal agencies, railroad operators, and the Rail Advisory Council. The team specifically reached out to individuals and organizations that had shown an interest in advocating for rail or participated in other rail planning efforts. Opportunities for the general public to become engaged and weigh in on the draft plan were also provided.

6.1.1 Project Web Site

In keeping with VTrans' policy of transparency when developing transportation plans, all materials related to the State Rail Plan were made accessible on the Agency's website, http://rail.vermont.gov/about_us/reports_plans . Reports, public meeting notices and summaries, rail bulletins and the Draft Rail Plan were posted to inform and engage the public.

6.1.2 Public Meetings

Two rounds of public meetings were held, with two meetings per round. The first round occurred early in the planning process, in March 2014, to announce the development of the plan and to receive input on the plan's goals and objectives. Near the end of the plan's development, when a draft was ready for review, a second round was held in July, 2015 so the public could provide input before the plan was finalized. Public meetings were held in geographically dispersed regions of Vermont, and located on both sides of the Green Mountain spine for each round. VTrans hosted meetings in Rutland, Brattleboro, Essex Junction and White River Junction – all areas with a healthy rail presence.

Members of the State Rail Plan team presented information about the status of the plan, issues and needs of the Vermont Rail network, draft performance measures and recommendations for future investment in rail. Comments made at the public meetings were both focused on specific needs of the geographical area where the meeting was held as well as well as broader concerns. Lack of connectivity between rail and transit, the need for upgraded infrastructure for freight, more frequent passenger rail service and connecting beyond Vermont's borders were common themes. Section 6.3 details how concerns raised at public meetings are addressed in the Draft State Rail Plan.

6.1.3 Railroad Interviews

Representative from the Vermont Rail System and Genesee & Wyoming, Inc. were interviewed regarding their views on Vermont rail issues and the needs for the companies' freight operations in Vermont. General discussions with Vermont Rail System occurred on October 24, 2013 and August 27, 2014. General discussions with Genesee & Wyoming, Inc. occurred on October 3, 2013; March 3, 2014; and August 22, 2014. Both companies were also repeatedly contacted for specific information requests. The State Rail Plan team also solicited information from the Central Maine & Quebec Railway. The Canadian National Railroad and the Providence & Worcester Railroad were each contacted regarding the clearance of their rail lines on the Montreal – Worcester, MA double stack intermodal route.

6.1.4 Regional Planning Commission Review

Public information and engagement for a state-wide plan necessitates the strategic use of communication tools and collaboration with others to reach all regions of the state. Vermont's Regional Planning Commissions (RPCs) provide a vital link between VTrans and the public. Through the Transportation Planning Initiative, VTrans and the RPCs work closely to obtain public input into the transportation planning process.

All Regional Planning Commissions were engaged in the development and enlisting public opinion in the State Rail Plan by collaborating on public meeting planning and publicizing these meeting through their Transportation Advisory Councils and regional communication networks. RPCs also were responsible for distributing four rail bulletins about the State Rail Plan. The one-page, two sided bulletin tracked the development of the plan through its initiation through final recommendations and included special focus issues on passenger and freight rail. Electronic communication is an efficient and cost effective method of communication within Vermont, due the state's largely rural character and high educational level of its population.

6.1.5 Vermont Rail Advisory Council

Vermont Rail Advisory Council (VRAC) was established in 2003, a successor group to the Vermont Rail Council, created by Executive Order ten years previously. The Council's purpose is to provide advice to the Governor and the Agency of Transportation on rail issues. Membership is drawn from owners of private rail industry, operators on state-owned railroads, freight shippers, environmental and economic development organizations, regional chambers of commerce, regional planning commissions, the House and Senate transportation committees and travel and recreation organizations.

The Council meets quarterly or as needs dictate and the meetings are open to the public. During the course of developing the State Rail Plan, the study team met with the Rail Advisory Council six times. Topics of discussion with this group included the purpose of updating the State Rail Plan and preliminary goals and objectives of the plan. VRAC members suggested that passenger rail ridership goals link to the benchmarks of the state's comprehensive energy plan as well as strengthening rail's role in supporting businesses and jobs in the state. VRAC members and the study team discussed options for state-owned rail lines, ridership estimates produced as part of the Plan, and the preliminary rail service investment program.

6.2 Coordination with Neighboring States

Neighboring states were forwarded drafts of the Vermont State Rail Plan for review. In addition, content from a number of multi-state initiatives have been incorporated into this Plan, including the *New York – Vermont Bi-State Intercity Passenger Rail Study* and the Northern New England Intercity Rail Initiative.

6.3 Issues Raised, and How They Were Addressed in the Rail Plan

A total of approximately 100 individuals attended the public information meetings, averaging 25 persons for each meeting. Rail issues were also discussed individually with rail operators and other key stakeholders. Listed below are the main concerns raised and how they are addressed in the State Rail Plan.

6.3.1 Freight Rail Issues

- The Plan should have as a top priority upgrading the system to carry 286,000 pound weight rail cars, up from 263,000. A secondary priority should be rebuilding bridges to enable double-stacks. Without these upgrades, Vermont rail's ability to be competitive is limited.
  The Rail Plan recommends upgrading all track in the state to accommodate 286,000 pound railcars. Clearance of lines for double-stacks is detailed in the plan.
- The rail yards in New England have a limited ability to handle traffic. Their capacity needs to be addressed. There is no place to take the trains apart. It's in Vermont's interest to have viable rail yards. Here in Rutland the relocation of the rail yard seems to be on hold.
  Improvements to rail yards, such as upgrading and adding track and transload facilities are identified in the plan. The Rutland rail yard relocation is not addressed in the plan.
- What will be done to incentivize freight rail within Vermont to achieve economic development?
  The Plan describes the three-way program, in the railroad, State, and shipper each pay one third of the cost of providing rail access to a shipper facility. The Plan also describes other measures to boost rail-oriented economic development such as the Rail Recruitment and Expansion Committee.
- There is an opportunity to carry waste granite on the WACR line to seacoast ports, opening up a potential market as granite is resistant to salt erosion.
  A major focus of the Plan is to increase Vermont-generated freight as it is considered important for freight railroads to remain viable, and support the state's economic development. The needs of the Washington County Railroad Montpelier Barre Subdivision are included in the Plan.
- The Middlebury spur is designed to take truck traffic off of Route 7.
  The Middlebury spur is not included in the Plan.
- The MMA line should be preserved as it's an important connection between Canada and the Connecticut River rail line
  The needs of the Central Maine & Quebec Railway in Vermont are included in the Plan.
- The infrastructure of the Green Mountain Railroad needs upgrading, especially because hazardous material is shipped over that line.
  Upgrading the Green Mountain Railroad is identified as a second tier priority in the plan.
- Can the Twin State rail line between Newport, St. Johnsbury and Littleton, NH be revived?
  The rehabilitation of the Twin State rail line is not included in the Plan.
- Concern about the balance between expanding rail's usage as a goal of the plan with a community's goal of revitalization of its downtown. The state is spending money to enhance downtowns but concern that promoting more freight rail on rail line through the town is inconsistent.
  Plan addresses community concerns, particularly as they related to highway-rail grade crossings and safety issues.

- Significant benefits would result from relatively little expenditure if tracks are upgraded between Essex Junction and Burlington. If New England Central Railroad contributed 20 percent, can the State come up with the rest of the money?

  Improvement of this line is included within the investment program.

- Rail carrier mentioned the need for regional coordination. Capacity improvements such as the ability to accommodate 286,000 pound railcars or unrestricted double stack clearance will not necessarily provide significant benefits unless similar improvements are made in states that share the same corridors.
  The Plan discusses improvements in adjoining states that would be necessary to make multi-state services possible.
- Rail carrier believes that better coordination between rail and industrial development is required. As an example, an industrial park was recently build without rail access. Tenants have since expressed interest in rail.
  The Plan includes discussion of initiatives to increase usage of rail, which presumably would involve coordinating industrial development with rail.

6.3.2 Passenger Rail Issues

- Rail system interconnectivity with transit is very important. Site the two together. Consider better connections between rail and the ski areas.

  More intercity bus service and service that is compatible with train schedules is recognized as a need but is not directly addressed in the Plan.

- There is serious need for international cooperation to get trains into Montreal. It's important because there is a huge population to our north and restored train service will be good for our local economy.

  Ongoing planning efforts to reconnect service to Montreal are noted in the Plan and identified as a priority.

- The plan should have a goal to increase passenger rail in the Connecticut River Valley. There should be 4-5 trains a day to Springfield, MA with through ticketing to points beyond so you don't need two tickets. Presently there is one train in Brattleboro that stops in the middle of the day. It takes three days to get back and forth to New York City. We need better access to Springfield so we can connect to the larger regional network.
  The Plan has established adding a second Vermonter frequency as a long-term goal. Other, more frequent service solely within the Connecticut River Valley is not addressed.

- The State's emissions reduction goals are quite ambitious. Rail can be part of the solution as more train use will reduce traffic volumes on our roads. The State's energy plan seeks to quadruple rail ridership by the year 2035.

  The Plan has adopted the goal of achieving 400,000 rail passengers by 2035. This would be achieved by increasing service on the existing *Vermonter* and *Ethan Allen* routes as well as establishing new service in the Western Corridor between Rutland and Burlington.

- The State should pursue the opportunity to establish train service between Rutland-Bennington-New York.

  The Plan includes service between Albany, NY and Burlington via North Bennington and Manchester. At Albany, NY are numerous connections to New York City.

- If rail service was established along the Western Corridor, track would be improved and this would help freight, an important factor as freight is needed to support passenger rail. Both services would benefit. Would the federal government support commuter rail between Rutland and Burlington?
  Upgrading the Western Corridor has been identified as a priority item in the plan. Presently efforts to improve sections of this corridor are underway. Commuter rail will be addressed in a separate transit planning effort and is not included in the Rail Plan. In response to a legislative mandate, VTrans will study the feasibility of establishing a commuter line between St Albans and Montpelier.
- Suggestion to consider increasing train frequency between White River Junction and Montpelier. It is a common commuter destination.
  Commuter rail is not addressed in the Plan, but the Plan does include adding a second frequency to the Vermonter, along with estimates of the additional subsidies, ridership.
- Suggestion to consider commuter rail in Pownal. A rail line is in place for the service, and the railroad has expressed interest in service between Schenectady and Pownal. There should be a train from Pownal to North Adams, Greenfield and Boston. There is federal money available to have this commuter route. Thirty-five million dollars would fund commuter rail. Positive Train Control signals are already in place.
  Commuter rail is not addressed in the Plan.
- Not convinced that service on the Western Corridor is worth the money. Should invest in more Vermonter service. Also, would be concerned about the conflict between freight and passenger rail in the Western Corridor.
  The Plan includes both passenger rail service on the Western Corridor and adding an additional frequency to the Vermonter. Establishing service on the Western Corridor has a higher priority than adding a second frequency to the Vermonter.
- Suggests that the State recommend improvements to the timing of connections for the Vermonter, which arrives at connecting stations after trains have left.
  VTrans is investigating rescheduling the Vermonter. This will take place within the context of other developments. Specific scheduling is not addressed by the Plan.
- More marketing of trains is needed and bathrooms at the stations need to be upgraded. There are examples here in Vermont where local communities taking initiatives to improve train passengers' experience when they arrive at train stations.
  Upgrades to train stations are mentioned in the Plan and the need has been recognized.
- Recommend that Vermont be more active in advertising rail services.
  VTrans is not responsible for marketing, and this has not been included in the Plan. But VTrans is in communication with state agencies that are responsible for marketing.
- Vermont rail could support the local economy by 1) having Vermont food products sold on the trains in café cars and 2) coordinating through the National Main Street Program, a program that could connect visits to Vermont downtowns.
  While these are good ideas to improve the experience of rail passengers and add to the local economy, they are not within the purview of a state rail plan.
- Would like to extend the West River Trail along the NECR line. Will the State Rail Plan address conversion of abandoned rail lines into Rail to Trails?

This has not been addressed in the Plan, since the Plan's focus is on rail services rather than recreational trails.

6.3.3 Safety Issues

- Rail carrier expressed concern safety issues, in particular trespassing and highway-rail crossing issues.
  The Plan addresses safety issues, reviewing VTrans priorities for highway-rail crossing improvements and discussing how crossing improvements are typically prioritized in other states.
- Concern by resident of Pownal who says that over 5,000 railcar loads of fuel per year pass through the town of 3,500 people, with three trailer parks right next to the rail line. If there were an emergency, the nearest foam truck would come from either Pittsfield or Rutland for mutual aid. Need more resources – tankers, hazmat suits and training to be prepared for an incident.
  In response to public comments, the Plan discusses emergency response.
- There seems to be a gap in emergency planning for rail. A local fire chief should know ahead of time what when trains with hazardous materials are coming through the town so that he could feel more prepared. Hazardous materials travel through all the time. There should be a better system in place to work with local departments.
  In response to public comments, the Plan discusses emergency response.
- Comment that risks of hazmat need to be placed into perspective. In 40 years there have been two serious hazmat incidents. Eighteen factors lead the Lac Megantic disaster.
  In response to public comments, the Plan will discuss emergency response and issues related to the transportation of hazardous materials.
- It is critical to safety that laws regarding grade crossings be changed. Right now a driver can come to a crossing, stop, and can legally go across the tracks.
  Crossing issues are discussed in the Plan, although this particular regulatory issue is not.

6.4 Coordination with other Transportation Planning Programs

This State Rail Plan has been reviewed for consistency with the following documents:

- Vermont Long Range Transportation Business Plan of 2009;
- Vermont Freight Plan of 2012, revised in 2013 and 2014;
- Vermont Public Transit Policy Plan of 2012.

Vermont's Long Range Transportation Plan (LRTP) represents the State's long-term vision for transportation, and contains several goals of which rail is a critical component in the implementing of the vision:

1. Optimize Transportation System Management & Operations
2. Preserve, Manage, & Operate the State's Existing Transportation System to Provide Capacity, Safety, Flexibility, and Reliability in the Most Effective and Efficient Manner
3. Improve & Connect All Modes of Vermont's Transportation System to Provide Vermonters with Options
4. Strengthen the Economy, Protect & Enhance the Quality of the Natural Environment, Promote Energy Conservation, & Improve Vermonters' Quality of Life.

Rail is a key component of Vermont's transportation systems management approach. It is an underutilized asset with strong potential to provide expanded mobility, capacity, and direct highway congestion mitigation benefits. Many Vermont communities do not have access to interstate highways, relying on primarily two-lane rural highways as the major passenger and freight corridors. VTrans has undertaken numerous planning initiatives to develop passenger and freight services along these corridors, including service development plans, corridor studies, and environmental assessments.

Significant planning has also been undertaken on downtown revitalization efforts, and well as bicycle and pedestrian planning. VTrans has and continues to participate in interagency projects which redevelop downtowns into more functional spaces. A key component of this effort is to ensure that new rail stations are located in downtown areas, allowing multimodal access to origin and destination points.

VTrans has also been involved in statewide and regional freight planning. These efforts culminated into the Vermont Freight Plan. Efforts have been centered on collaborating with railroads and economic development organizations to understand and address multimodal freight access needs, and improving 286,000 pound capacities in order to enable connections of the State's railroads to the major Class I railroads throughout the Northeast.