VERMONT FREIGHT PLAN

DECEMBER 2021

Revised October 2022 (IIJA Compliance)
Revised December 2022 (NHFP Projects Update)

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Appendices

Three technical memoranda were prepared during the development of the Vermont Freight Plan. The final versions serve as the appendices. They are listed below and are available with all the Freight Plan contents on the Vermont Agency of Transportation's Freight Plan webpage: https://vtrans.vermont.gov/planning/freight.

1 Existing Conditions

2 Commodity Flow and Economic Futures

3. Vision, Goals, Needs, and Potential Initiatives

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LIST OF ACRONYMS

AADTT	Average Annual Daily Truck Traffic
AAR	Association of American Railroads
ACCD	Agency of Commerce and Community Development
VTrans	Vermont Agency of Transportation
BUILD	U.S. Department of Transportation's Better Utilizing Investments to Leverage Development (grant program)
BVT	Burlington International Airport
CAV	Connected and Autonomous Vehicles
CBP	U.S. Customs and Border Protection
CFS	Commodity Flow Survey
CLP	Clarendon & Pittsford Railroad
CN	Canadian National
COVID-19	Coronavirus Disease 2019
CP	Canadian Pacific
FAA	Federal Aviation Administration
FAST	Fixing America's Surface Transportation Act
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FPAC	Freight Plan Advisory Committee
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	Greenhouse Gas
GIS	Geographic Information System
GMRC	Green Mountain Railroad
GW	Genesee and Wyoming
HAZMAT	Hazardous Materials
IIJA	Infrastructure Investment and Jobs Act (2021)
ITS	Intelligent Transportation Systems
LRTP	Long Range Transportation Plan
MPH	Miles per hour
MPO	Metropolitan Planning Organization
NECR	New England Central Railroad
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NHS	National Highway System
NHTSA	National Highway Traffic Safety Administration
OS/OW	Oversize/Overweight (trucks)
PAR	Pan Am Railways
PAS	Pan Am Southern
PHSMA	Pipeline and Hazardous Materials Safety Administration
RPC	Regional Planning Commission
RSIA	Rail Safety Improvement Act of 2008
SDP	Service Development Plan
SIB	State Infrastructure Bank
SLR	St. Lawrence & Atlantic Railroad
SRP	State Rail Plan
TIB	Transportation Infrastructure Bonds
TIGER	Transportation Investment Generating Economic Recovery
TIP	Transportation Improvement Program
TTTR	Truck Travel Time Reliability
VASP	Vermont Airport System Plan (2020)
VMT	Vehicles Miles Travelled
VPSP2	Vermont Project Selection & Prioritization Processes
VRAC	Vermont Rail Advisory Council
VRS	Vermont Rail System
VTR	Vermont Railway
VTrans (also AoT)	Vermont Agency of Transportation
WACR	Washington County Railroad

ACKNOWLEDGEMENTS

The Vermont Agency of Transportation thanks the many organizations and individuals who participated in the Freight Plan Advisory Committee for their time and contribution in making this Plan possible. Freight Plan Adivsory Committee participants include:

- Kevin Andrews, Vermont Department of Motor Vehicles
- Charles Baker, Chittenden County Regional Planning Commission
- Eileen Bigelow, U.S. Customs and Border Protection
- Kiersten Bourgeois, St. Albans Cooperative Creamery
- Chris Campany, Windham Regional Planning Commission
- Chris Carrigan, Vermont Chamber of Commerce
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- Michel Pariseau, U.S. Customs and Border Protection
- Gene Richards, Burlington International Airport
- Tim Smith, Franklin County Industrial Development Corporation
- William Smith, Vermont Truck & Bus Association

1.0 INTRODUCTION

The movement of freight by truck, rail, and air keeps Vermont's economy growing and supports the quality of life Vermonters enjoy. The Vermont Freight Plan comes at a time of change in supply chain logistics, technological development, freight railroad industry flux, and an an economic recovery from a global pandemic that has accelerated trends in household consumption.

In April 2020, the Vermont Agency of Transportation (VTrans) began to update the State Freight Plan (2012 with minor revisions in 2013, 2015 and 2017) and State Rail Plan (2015) to meet with Federal regulations under the Fixing America's Surface Transportation (FAST) Act and Passenger Rail Investment and Improvement Act (PRIIA). Although two separate documents, there is a significant amount of overlap between the efforts as shown in Figure 1.1. The State Rail Plan was published in May 2021.[i]

The emerging work the state is conducting on emissions reductions through the passage of the Climate Action Plan, ground-breaking work on flood resilience planning, and initiatives to protect, preserve and restore wildlife habitat connectivity, are all described in the Freight Plan with references for additional detailed information.

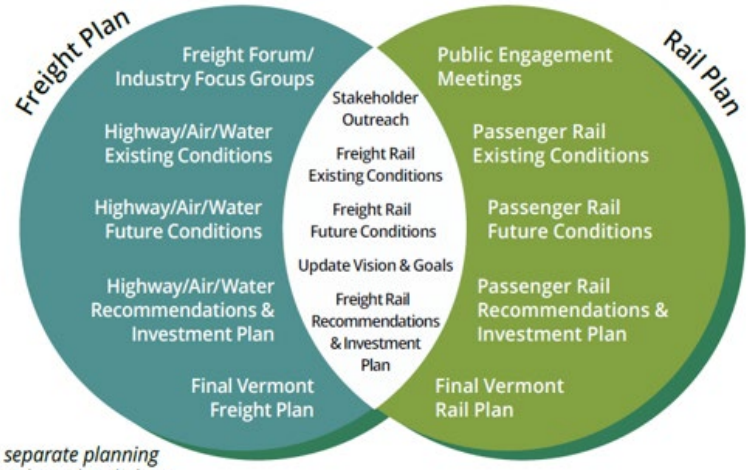
The Climate Action Plan includes ambitious initiatives to electrify medium and heavy-duty vehicle fleets (see CAP p. 83) and construct infrastructure supporting this transition.

Vermont is a leader in water-quality and stormwater management planning through the development of the Transportation Resilience Planning Tool and is currently expanding the tool to include rail corridors as a direct outcome of the Freight Plan and recent Vermont Rail Plan update.

This document—the Vermont Freight Plan—provides a framework for maintaining and enhancing the State's multimodal freight transportation system in a manner that also supports other State and national goals.

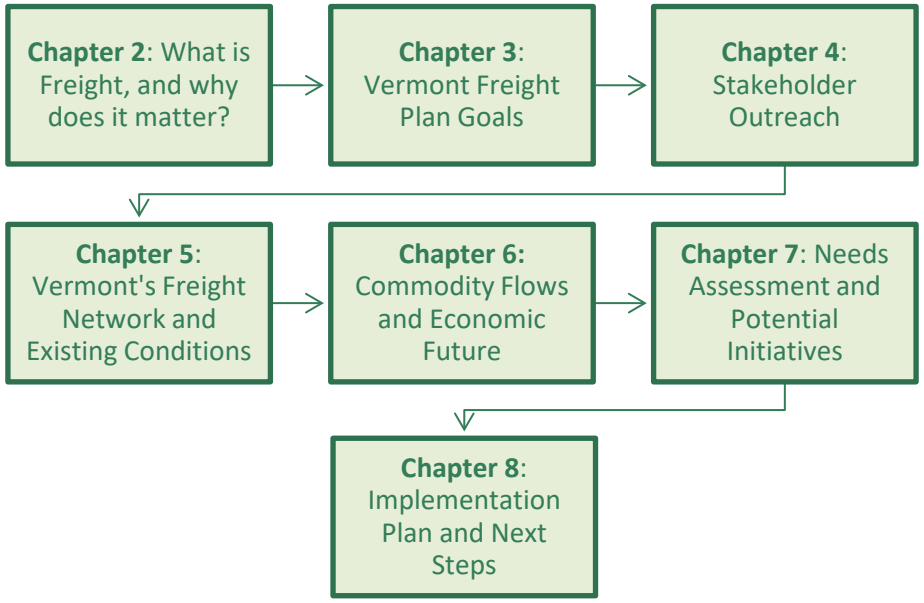
The Freight Plan is an engaging overview that refers readers to appropriate sections of the substantial supporting technical (tech) memos. It consists of interconnected chapters shown in Figure 1.2. **Key points are bolded throughout this report to call the reader's attention to the most important findings and recommendations.**

FIGURE 1.1 VERMONT FREIGHT AND RAIL PLAN ELEMENTS



Source: Cambridge Systematics, 2020.

FIGURE 1.2 VERMONT FREIGHT PLAN CHAPTERS



The tech memos are available on the VTrans Freight Plan web page (https://vtrans.vermont.gov/planning/freight) and include:

- Tech Memo 1 – Existing Conditions;
- Tech Memo 2 – Commodity Flow and Economic Futures; and
- Tech Memo 3 – Multimodal Freight Needs and Initiatives.

The Vermont Freight Plan is fully compliant with the FAST Act, as shown in Table 1.1, with information provided both in the Plan itself as well as the Tech Memos posted online. **New Freight Plan requirements included in the Infrastructure Investment and Jobs Act (IIJA) of 2021 are addressed throughout the plan and in an addendum at the end of this report.**

TABLE 1.1 FAST ACT REQUIREMENTS (SEE ADDENDUM FOR IIJA REQUIREMENTS)

FAST Act Freight Plan Requirement	Where found?
1. State's significant freight system needs and issues	Ch. 7 & Tech Memo 3
2. Freight policies, strategies, and performance measures that will guide the State's freight-related transportation investment decisions	Ch. 7 & Tech Memo 3
3. Identification of Critical Rural Freight Corridors and Critical Urban Freight Corridors, if applicable.	N/A. Vermont has not identified such corridors.
4. A description of how the plan will improve the ability of the State to meet the national multimodal freight policy goals and the national highway freight program goals	Ch. 3
5. A description of how innovative technology and operational strategies, including freight intelligent transportation systems (ITS), that improve the safety and efficiency of freight movement, were considered	Ch. 7 & Tech Memo 3
6. In the case of roadways on which travel by heavy vehicles is projected to substantially deteriorate the condition of the roadways, a description of improvements that may be required to reduce or impede the deterioration	Ch. 7 & Tech Memo 3
7. An inventory of facilities with freight mobility issues, such as bottlenecks, within the State, and for those facilities that are State owned or operated, a description of the strategies the State is employing to address the freight mobility issues	Ch. 5, Ch. 7, Tech Memo 1, & Tech Memo 3
8. Consideration of any significant congestion or delay caused by freight movements and any strategies to mitigate that congestion or delay	Ch. 5 & Tech Memo 1
9. A freight investment plan that includes a list of fiscally constrained priority projects and describes how funds made available would be invested and matched	Ch. 8
10. Consultation with the State Freight Advisory Committee, if applicable	Ch. 4

2.0 WHAT IS FREIGHT AND WHY DOES IT MATTER?

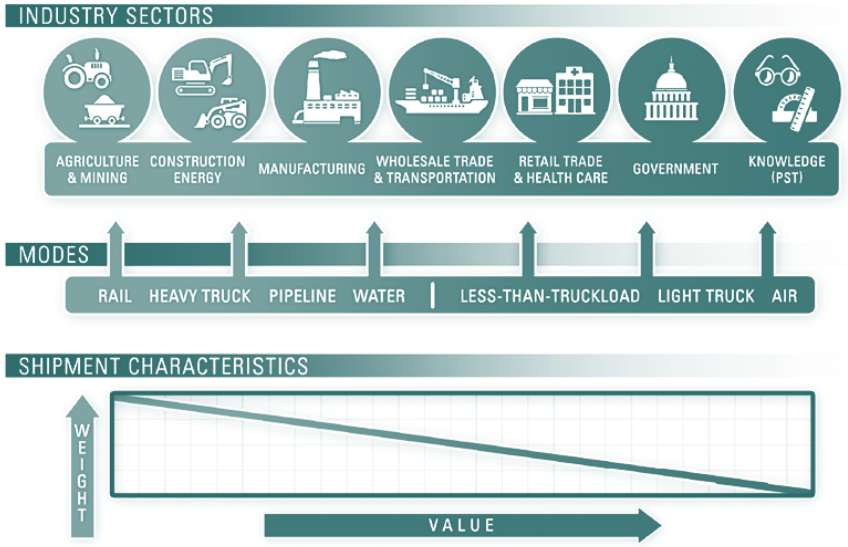
Freight can be many different things, from timber transported by truck to a sawmill for lumber production, to electronics ordered online and delivered to your doorstep. Raw milk for cheese producers, hops for breweries, and the groceries you purchase at your local grocery store are all freight at some point, and transported by truck, train, aircraft, pipeline, or water to their destinations.

Freight supports the economy of the state and the nation. Businesses in the manufacturing, utilities, construction, wholesale and retail trades, and agriculture sectors, especially, depend upon the movement of raw materials and/or manufactured goods.

About one-third of Vermont's workforce is employed in these "freight-reliant" industry sectors, and these sectors produce about one-third of Vermont's Gross State Product. However, all sectors rely upon freight at least to some degree. Professional services, hospitality, education, and health care industries need deliveries of supplies and other goods, and generate waste that needs to be picked up and transported to recycling or disposal sites. In addition, households are playing increasingly important roles in freight transportation, as consumers make more purchases online and receive parcel deliveries, and generate household waste.

Freight moves by different modes of transportation, including by truck, rail, air, pipeline, and water. Each mode has relative advantages and disadvantages, and is suited for certain types of shipments, as Figure 2.1 shows. Goods that are heavy, bulky, and/or moving long distances are ideal for rail. Truck transportation is ideal for distributing smaller shipments that may be dispersed across multiple origin or destination points. Truck also plays a key role in transporting goods for the "last mile" between rail terminals and the shipment's ultimate origin or destination location.

FIGURE 2.1 COMMON FREIGHT MODES BY INDUSTRY SECTOR



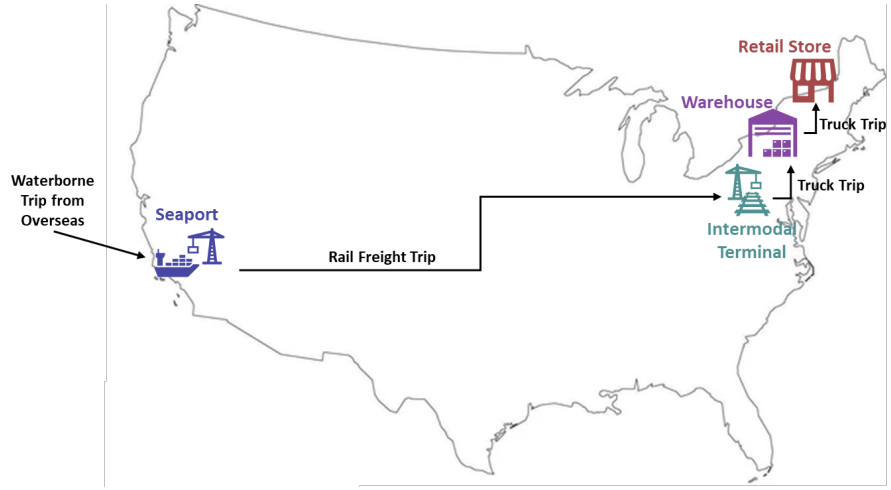
Note: PST includes the professional, scientific, and technical services industry sectors.

Figure 2.2 shows an example of a multimodal logistics chain, illustrating how the transportation modes often work together across the span of a shipment's journey across the globe and across the nation.

In the illustrated example, shipments of consumer electronics originating overseas travel from Asia to a U.S. Port of Entry on the West Coast by water. The international container is then emptied and the goods loaded into a domestic container, which is transported across the country by rail to an intermodal terminal in the northeastern U.S. The nearest intermodal terminals to Vermont are in Massachusetts, Montreal, and the Capital District of New York. At the intermodal terminal, the container is transferred from rail to truck.

Trucks are used to transport the goods to warehouses or distribution centers, and trucks or smaller delivery vehicles may be used to deliver goods to retail stores or consumers' front doors.

FIGURE 2.2 MULTI-MODAL SUPPLY CHAIN EXAMPLE



Not all logistics chains span the globe. Locally-produced foods may use agricultural products produced in Vermont. Farm products may be delivered to a processing facility, and then transported from that facility to stores, farmers markets, and other points of sale.

Due to the quantity of goods, short distances, and value of such products, truck (or van) is usually the most cost- and time-effective transportation mode to use for these types of shipments. Because of the handling time and costs associated with getting shipments onto and off of the rail system, rail is typically cost-competitive for trips 400-500 miles or longer.

2.1 Why is Freight Planning Important?

Developing a State Freight Plan is a smart thing for Vermont to do for several reasons:

1. States are required to develop and update state freight plans at five-year intervals in order to access some freight-specific federal funds;

2. Freight planning helps agencies like VTrans, and other freight transportation stakeholders, to identify and determine how freight moves in the state, what issues are likely affecting the movement of goods now and into the future, and initiatives that can address issues and needs while promoting other state and national planning and policy goals; and

3. Freight plans can be useful reference documents for educating policymakers, public and private stakeholdres, and the public at large, on a variety of freight-related topics, themes, and needs.

2.2 Freight Planning Participants and Roles

Federal, state, regional, and local agencies, as well as private sector companies play important roles in the processes of planning, programming, and implementing capital projects and programmatic initiatives that address Vermont's freight needs. A brief overview of the responsibilities of each is provided below.

Federal Agencies

The **United States Department of Transportation (USDOT)** is the primary federal agency responsible for transportation policy and funding.

USDOT includes 11 operating administrations that have jurisdiction over specific aspects of the nation's transportation, including several with interest or responsibilities related to Vermont's multimodal freight transportation system. These include:

- Federal Highway Administration (FHWA)

- Federal Railroad Administration (FRA)
- Federal Aviation Administration (FAA)
- Federal Motor Carrier Safety Administration (FMCSA)
- National Highway Traffic Safety Administration (NHTSA)
- Pipelines and Hazardous Materials Safety Administration (PHSMA)

The USDOT and its component administrations have the responsibility of implementing and administering federal laws and programs that govern freight transportation. These include, but are not limited to, establishing and implementing the National Freight Strategic Plan[ii] , developing guidance for states and other agencies to improve transportation safety, and administering federal funding that is distributed to the states through formula funding, competitive grant programs, and other programs described in Section 8.1.

Other Federal agencies with interest in Vermont's freight transportation system include:

- **Environmental Protection Agency (EPA)** regulates emissions from freight industries and reviews potential infrastructure projects for environmental impacts.
- **Department of Homeland Security (DHS)** includes the agencies that inspect and clear international freight at customs (Transportation Security Administration [TSA], Customs and Border Protection [CBP]) as well as the US Coast Guard.
- **Department of Commerce** governs the US position on international trade and the Economic Development Agency (EDA).
- **Department of Labor** governs the relationship between workforce and management.
- **Surface Transportation Board (STB)** is and independent, Congressionally-mandated body, which regulates rail service and collects and disseminates data on rail traffic.

Vermont State Agencies

The **Vermont Agency of Transportation (VTrans)** plans, develops, implements, and manages a statewide transportation network - including roads, bridges, railroads, airports, park-and-rides, bicycle and pedestrian facilities, and public transportation facilities and services.

VTrans has the responsibility of developing and updating Vermont's Freight Plan every five years, in accordance with federal requirements under the Fixing America's Surface Transportation (FAST) Act. VTrans also administers federal and state funds that are obligated in the State Transportation Improvement Program and VTrans Capital Program[iii] and other state and federal funding that supports transportation capital and programmatic initiatives.

The **Department of Motor Vehicles (DMV)**, which is organized under the Agency of Transportation, reviews applications and issues permits for oversized and overweight loads that travel in Vermont by truck. The DMV's Enforcement and Safety Division is comprised of a contingent of sworn law enforcement officers and non-sworn civilian staff, including the **Commercial Vehicle Enforcement Section**, that works to enforce commercial vehicle size and weight regulations.

More information about VTrans' authority and role in freight and rail planning is available in Tech Memo 1.

Other state agencies that have interests in freight transportation in the state include:

- **Agency of Natural Resources (ANR)** is the primary environmental and natural resources management agency for the State. ANR includes the Department of Environmental Conservation, Fish and Wildlife Service, and the Forest, Parks, and Recreation Department. Issues such as emissions reduction and reduced consumption of fossil fuels and other resources are at the nexus of freight transportation and ANR's mission.

- **Agency of Commerce and Community Development (ACCD)** encompasses three major state departments and many programs that that enhance the Vermont business climate, marketing Vermont to tourists and others, and strengthening our communities in a wide variety of ways. Economic development, workforce development, and tourism marketing, all of which support and/or are supported by freight transportation, are in ACCD's portfolio.

Regional and Local Agencies

Regional Planning Commissions (RPCs) are political subdivisions of the State created by their member municipalities (24 VSA §4341). RPCs provide technical assistance to municipalities, and since Vermont does not have county governments, RPCs act as a link between municipal affairs and state government. RPCs work in fields that directly and indirectly affect the public at large: land use, transportation, housing, economic development, environmental quality, and more.

Vermont has 11 RPCs. All of them participated in the development of the Vermont Freight Plan through the Freight Plan Advisory Committee, Vermont Rail Advisory Committee, updates at Transportation Planning Initiative (TPI) meetings, and presentations by VTrans staff for RPC Transportation Advisory Committee meetings as described in Chapter 4.

One of Vermont's RPCs, the Chittenden County Regional Planning Commission (CCRPC) is also a **Metropolitan Planning Organization (MPO)**. MPOs are federally-mandated in urban areas with at least 50,000 residents. MPOs are required to develop a long-range transportation plan for their region to guide transportation decisionmaking, and a short-range program of projects to be implemented with federal transportation funds, called a Transportation Improvement Program (TIP).

Vermont **towns and cities** own many key freight facilities, including local roads and bridges, and Burlington International Airport. **Municipalities** are key collaborators with the RPCs and VTrans in the development and implementation of regional and statewide plans and studies, the STIP, and the TIP in the MPO region. Towns and cities often bring issues of local community concern to the attention of regional and state officials through these efforts and other channels.

Neighboring Jurisdictions (Other States and Canada)

Much of the freight moving into, out of, or through Vermont originates, terminates, and/or passes through other states and Canadian provinces. Vermont's transportation connections to neighboring jurisdications facilitates trade and economic development. Implementing initiatives that address issues associated with cross-border or multi-state freight flows will require coordination with Vermont's neighbors.

Vermont participates in many planning and other coordination venues in which multiple states and/or Canadian provinces also participate. Through forums such as the **American Association of State Highway and Transportation Officials (AASHTO), The Eastern Transportation Coalition, Eastern Border Transportation Coalition, Coalition of Northeastern Governors (CONEG)**, among others, Vermont officials work with counterparts in other jurisdictions to address regional and national issues, and to address issues outside Vermont's borders that impact transportation and the economy of Vermont.

Private Sector

Companies and organizations representing the private sector play critical roles in the operations, maintenance, and construction of the multimodal freight system in Vermont. For example:

- Although the State of Vermont owns a substantial portion of the freight rail infrastructure in the state, much of the freight rail infrastructure is owned by private companies. The operators using freight rail throughout the state are private companies.
- Freight moved by truck travels on public roads, but is moved by private motor carrier companies that acquire and maintain tractors and trailers, and hire and manage drivers. It is important to note that not all motor carriers employ their own drivers. Some are contractors.
- Air cargo is moved in dedicated cargo planes or in the bellies of passenger aircraft, which are owned and maintained by private companies.
- Private companies also develop warehouses and distribution centers, produce and consume goods that generate freight trips, and/or manage logistics systems for other companies.

The participation of private sector representatives, through forums such as the Freight Plan Advisory Committee and Vermont Rail Advisory Committee, one-on-one interviews, and other communications channels, enhances the Vermont Freight Plan with insight into how the freight transportation system is used, the trends and effects likely to shape future freight flows, and other needs that the Freight Plan should address in order to meet the goals of the Plan.

The private sector also plays an important role in providing funding for transportation improvements, particularly when the improvements are made to privately-owned infrastructure (railroads, terminals, etc.), and through public-private partnerships (P3).

The VTrans Public Private Partnership (P3) Program is intended to permit private entities to establish a mutually beneficial relationship with the State of Vermont in developing alternative mechanisms for the delivery, maintenance, operation, and/or financing of projects related to transportation infrastructure. The goal of P3 is to engage the public to identify opportunities for innovative arrangements with the private sector that may benefit the public, increase efficiency, quality, and cost savings in the procurement and management of State transporation systems and assets.[iv]

Public at large

Residents, employers, and others have a stake and role in freight planning and implementation as well. The public has many interests and diverse, sometimes competing, expectations, including:

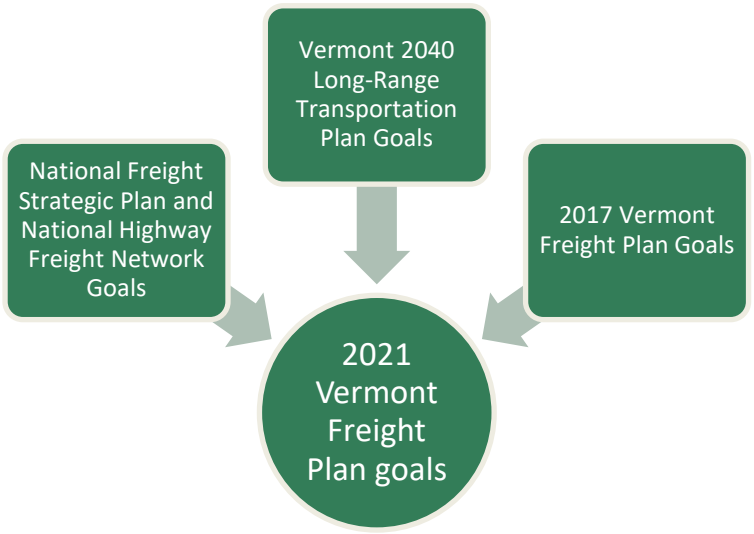
- expecting retail stores to be stocked with products, to receive shipments of goods ordered online, and to have access to the jobs that freight supports.
- expecting that freight moves safely, with as few as possible negative impacts, such as noise, traffic impacts, emissions, and other impacts to quality of life.

The public can participate in the implementation of the Freight Plan through direct contact with government agencies, the freight industry, and retail businesses, as well as through State legislators. VTrans also seeks public input, including the virtual public meetings held to support the Vermont Rail Plan and the two virtual Vermont Freight Forums held to support the Vermont Freight Plan.

3.0 VERMONT FREIGHT PLAN GOALS

The goals of the Vermont Freight Plan were derived from several sources, as shown in Figure 3.1.

FIGURE 3.1 KEY INPUTS TO VERMONT FREIGHT PLAN GOALS



Vermont's Long Range Transportation Plan (LRTP) includes an overall vision for a safe, reliable and multimodal transportation system that serves vulnerable populations, is affordable to use and operate, and grows the State's economy. Numerous LRTP goals support the freight portion of that vision.

In addition, the National Freight Strategic Plan[v] and the FAST Act established several strategic goals to improve the movement of freight on the National Highway Freight Network (NHFN) and throughout the country more generally. A list of the National Freight Strategic Plan and FAST Act National Highway Freight Network goals is provided in Tech Memo 3.

The prior freight plan[vi] found that overall, the State's freight system was adequate to meet current and future freight needs as long as three "meta-goals" were advanced. These "meta-goals" were discussed with the Freight Plan Advisory Committee (FPAC) during the development of the Freight Plan Update and were confirmed to still be valid.

Combining and distilling the LRTP goals that address freight, National Freight Strategic Plan and FAST Act goals, and the prior freight plan meta-goals produces a set of six goals for the 2021 Vermont Freight Plan:

1. **Improve the safety, security, and resilience** of the freight system;
2. **Modernize freight infrastructure and operations** to grow the economy, increase competitiveness, and improve quality of life;
3. Prepare for the future by **supporting the development of data, technologies, and workforce** capabilities that improve freight system performance.[vii]
4. **Increase freight rail usage** by expanding capacity, improving intermodal connectivity, and acting on opportunities for ancillary economic development.
5. **Ensure reliable travel times** between Vermont and its major regional markets such Boston, New York City, Albany, and Montreal.
6. Keep highway, rail, aviation, and water **transportation infrastructure in a state of good repair**; and
7. **Reduce environmental impacts** of freight transportation through emissions reductions gained by transitioning to alternative fuels, modal shift of some shipments from truck to rail, and other strategies which will lessen the impacts of extreme weather, flooding and stormwater runoff, and wildlife habitat loss.

4.0 STAKEHOLDER OUTREACH

For this effort, VTrans developed a strategy that leveraged digital engagement and provided several opportunities for interaction while maintaining public health protocols. The process was interactive: feedback informed plan development and recommendations, and stakeholders were frequently updated on plan progress. The outreach approach followed a set of guiding principles:

- **Be flexible and engaging.** Given the unforeseen nature of the pandemic, we developed many communication channels, including virtual meetings, an interactive web map (see Figure 4.2), e-blasts, social media, and digital newsletters (see Figure 4.3).
- **Entice with "carrots".** The team attracted involvement by communicating how stakeholders can directly benefit from sharing ideas and input, and by demonstrating how previous efforts have led to positive change.
- **Seeing is believing.** Visuals help people comprehend and remember.
- **Learn by listening.** Stakeholder feedback validated data and influenced the plan findings and recommendations.

4.1 Virtual Meetings

Virtual meetings, using Microsoft Teams and Zoom, are a dynamic forum to deliver information and discuss questions or comments in real time. VTrans used virtual meetings to engage three groups of stakeholders over the course of the Vermont Freight Plan's development. The groups included:

- **Freight Plan Advisory Committee (FPAC)**. Representatives from several Vermont state agencies, all Regional Planning Commissions, and private sector representatives (including carriers, shippers, and other companies that send, receive, or carry freight) were invited to participate on the FPAC. The FPAC was assembled in order to engage key freight stakeholders, gather valuable input into the approach, draft findings, and draft recommendations of the Freight Plan, and to serve as the freight advisory committee referenced in the FAST Act Freight Plan requirements. The FPAC was convened on three occasions via virtual meeting to review progress toward developing the Freight Plan and to provide valuable input from participants' respective perspectives.

- **Vermont Rail Advisory Council (VRAC).** VRAC membership is drawn from private rail operators, operators on state-owned railroads, freight shippers, environmental and economic development organizations, regional chambers of commerce, RPCs, the House and Senate transportation committees, and travel and recreation organizations. This group meets quarterly and advises the Governor and VTrans on rail policy matters. VRAC meetings are open to the public and serve as another forum by which non-members may become informed and comment on Vermont's rail system and issues. The VRAC received four briefings on the development of both the Vermont Freight Plan and the Vermont Rail Plan, which was being developed on an overlapping schedule. The briefings provided members the opportunity to vet information and provide valuable input.

- **Vermont Freight Forums.** VTrans held two Vermont Freight Forum virtual meetings that were well-advertised and intended to achieve the participation of a wider range of stakeholders and the public. There were two Vermont Freight Forum meetings—one held in May 2021 to review key issues and needs, and one held in August 2021 to review and collect feedback on preliminary draft initiatives. The Vermont Freight Forum virtual meetings used a combination of presentation, virtual real-time polling, and breakout discussion groups to promote engagement and active participation of meeting attendees. A screen-

capture of the first Vermont Freight Forum meeting in progress is shown in Figure 4.1.

- **Regional Planning Commission meetings**. VTrans held more than 11 discussions with the Transportation Advisory Committees of Regional Planning Commissions (RPC) across the State. VTrans project staff conducted various informal discussions and meetings with VTrans staff in other program areas.

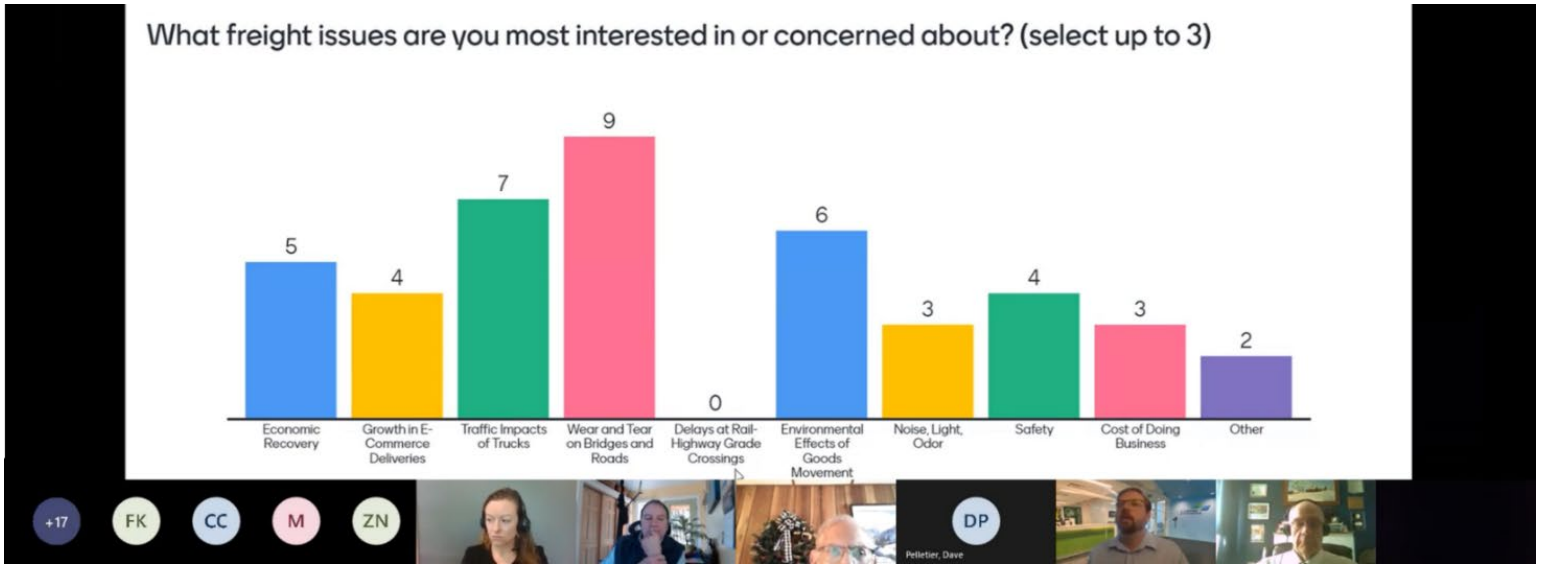
These outreach efforts were supplemented by interviews with railroads operating in the State, specifically calls with Genesee & Wyoming (July 2020), Vermont Rail Systems (July 2020), Pan Am Southern (August 2020), and Canadian Pacific (October 2020). Interviews with shippers, receivers, and carriers that participate in the movement of key freight commodities in Vermont were also subjects of interviews in January, February, and March of 2021. These interviews gathered useful information to help identify key issues, trends, and needs.

4.2 Digital Communications

VTrans relied heavily on digital communication to receive input and keep stakeholders up-to-date during Plan development. VTrans provided content and updates through their plan web page. VTrans also developed and maintained an interactive geographic information system (GIS)-based web tool, which served two distinct purposes. As a central resource, it succinctly compiles publicly-available data that can be difficult to find otherwise. Second, the tool acted as a platform to collect information, ideas, and feedback from stakeholders. A screenshot of this tool is shown in Figure 4.2.

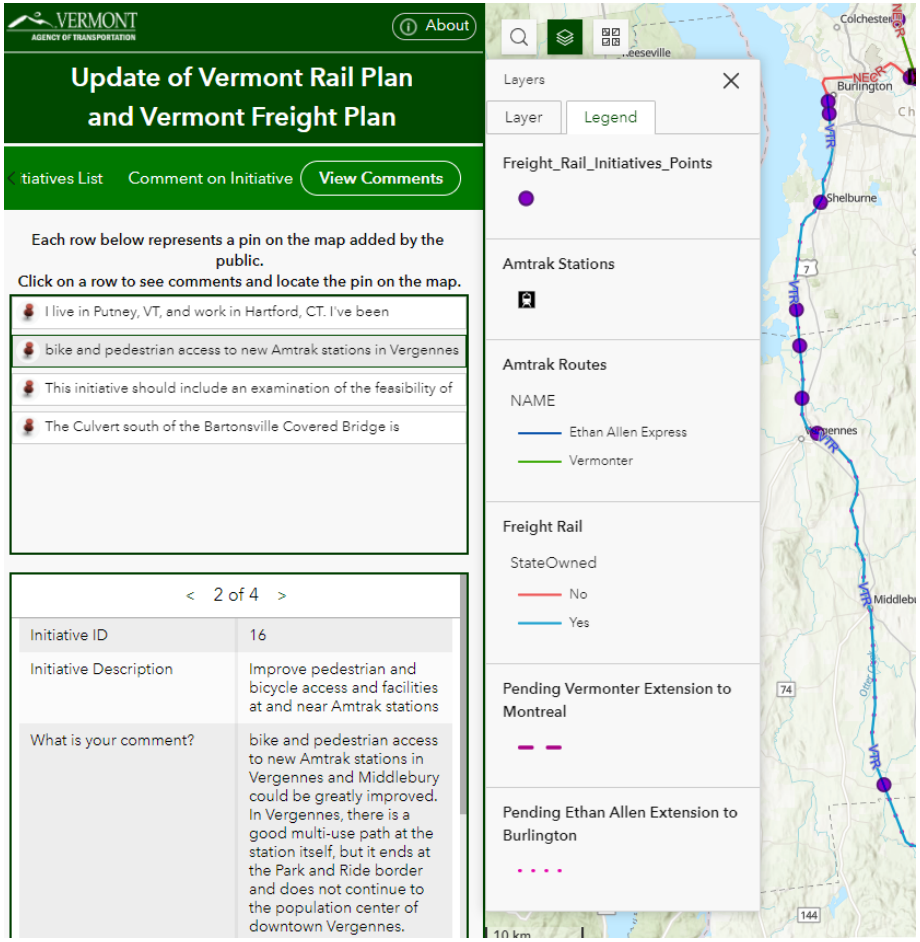
To provide updates and increase awareness, four digital newsletters were created. Each two-page newsletter outlined essential content such as project happenings, meeting dates, and relevant data through infographics, photos, and text. An example from the Spring 2021 newsleter is shown in Figure 4.3. The newsletters were delivered to the stakeholder database using VTrans' Constant Contact platform and advertised on VTrans' social media feeds.

FIGURE 4.1 SCREEN CAPTURE OF VERMONT FREIGHT FORUM



Source: VTrans

FIGURE 4.2 WEB TOOL SCREEN CAPTURE



Source: VTrans

FIGURE 4.3 NEWSLETTER ISSUE 4 EXAMPLE

VERMONT
FREIGHT PLAN & RAIL PLAN UPDATES
NEWSLETTER ISSUE 4 | SPRING 2021

Freight activity ensures your grocery store shelves and refrigerators are stocked.

"Last Stop!" Vermont Rail Plan is Completed

The 2021 Vermont Rail Plan is now available online. After inviting comments on the draft updated materials in January, VTrans received many thoughtful, helpful suggestions from various stakeholders. These comments were useful in developing the final version of the stand-alone executive summary, plan, and appendices.

After review by VTrans staff and the Vermont Rail Advisory Council, the updated Vermont Rail Plan was posted in April. The Federal Railroad Administration is reviewing the document for Federal compliance.

Thank you to everyone who participated in Town Hall meetings, submitted comments, or otherwise participated in the process!

The Vermont Rail Plan and all supporting documents are available here. If you have questions about the Vermont Rail Plan, contact Zoe Neaderland at zoe.neaderland@vermont.gov.

Rail Plan Cover

"Hammer Down!" Work to Develop Vermont's Freight Plan Proceeds

The Vermont Freight Plan identifies freight system issues and needs, and subsequent policies and strategies to guide freight-related transportation investments in Vermont. The Freight Plan update is being guided by a Freight Plan Advisory Committee and outreach to public and private stakeholders.

To date, the effort has identified components of the multimodal freight transportation system, evaluated commodity flows and economic drivers of freight demand, described performance of the system, and identified initial needs and deficiencies.

Gathering input from various stakeholders through meeting with the Freight Plan Advisory Committee, one-on-one interviews with major freight shippers and carriers, and events such as the Vermont Freight Forum, is producing more insight and helping VTrans to identify more needs, issues, and opportunities from the freight system users' perspective. Over the next few months, VTrans

(continued on p. 2)

VERMONT
AGENCY OF TRANSPORTATION

Source: VTrans

4.3 Comments and Feedback

The stakeholder comments received in response to the outreach activities and posting of the Draft Freight Plan include several key themes:

Environment – Stakeholders recognize the role freight transportation plays in contributing to greenhouse gas emissions and other environmental effects. There is a desire among stakeholders to see a reduction in freight-related emissions by facilitating alternative fuels and/or modal shift of some shipments from truck to rail.

Resiliency – There is a widespread concern for the effects extreme weather and climate change can have on the transportation system. Stakeholders want to make sure Vermont's freight transportation system is resilient and can withstand such events.

Community effects and equity – Stakeholders recognize the economic benefits of freight, but also express concerns regarding truck traffic, noise, safety, and other effects, especially in town centers and urban communities.

Preparing for the future – There is a lot of uncertainty, especially due to the COVID-19 pandemic, about how trends will shape the future, and how Vermont can anticipate future needs and issues. Economic recovery from the pandemic, emerging technologies, and growing demand for e-commerce are among key trends that are likely to have impacts on freight.

Workforce – Several private-sector stakeholders described a need to equip Vermont's workforce with skills that will help them excel in freight-related jobs and careers, including supply chain logistics, technology and equipment operation and care. Trucking companies and railroads are concerned about how to back-fill an aging workforce in years to come.

Planning and coordination –Vermont's economy and freight flows are connected to the rest of the world, so addressing many of the issues and needs identified in this plan will require enhanced coordination and efforts in other states and Canada. Also, issues such as workforce development and community effects and equity will require engagement with agencies and organizations that are not typically "freight stakeholders," thus requiring a more strategic outreach approach.

Thinking "bigger" – There is a desire among some stakholders to recognize the broader context of freight planning, and to facilitate more sweeping changes to the logistics system. Freight Planning in Vermont should seek opportunities to facilitate more rapid technological development and deployment, changes to logistics models, etc.

In response to these comments, the Vermont Freight Plan, and its tech memos, were revised to include:

- Discussion of ways in which technology, operations, and consumer behaviors can help to reduce freight-related emissions;
- Enhancement of the Needs Assessment and Freight Plan Initiatives to more fully address environmental, community effects, emerging trends, and workforce development needs;
- Suggestions regarding planning, data tools, and coordination activities that can help VTrans anticipate the potential effects of future trends and engage stakeholders who are not often involved in freight planning, but who work with community, workforce, and other issues that are connected with freight issues and needs.

5.0 VERMONT'S FREIGHT NETWORK AND EXISTING CONDITIONS

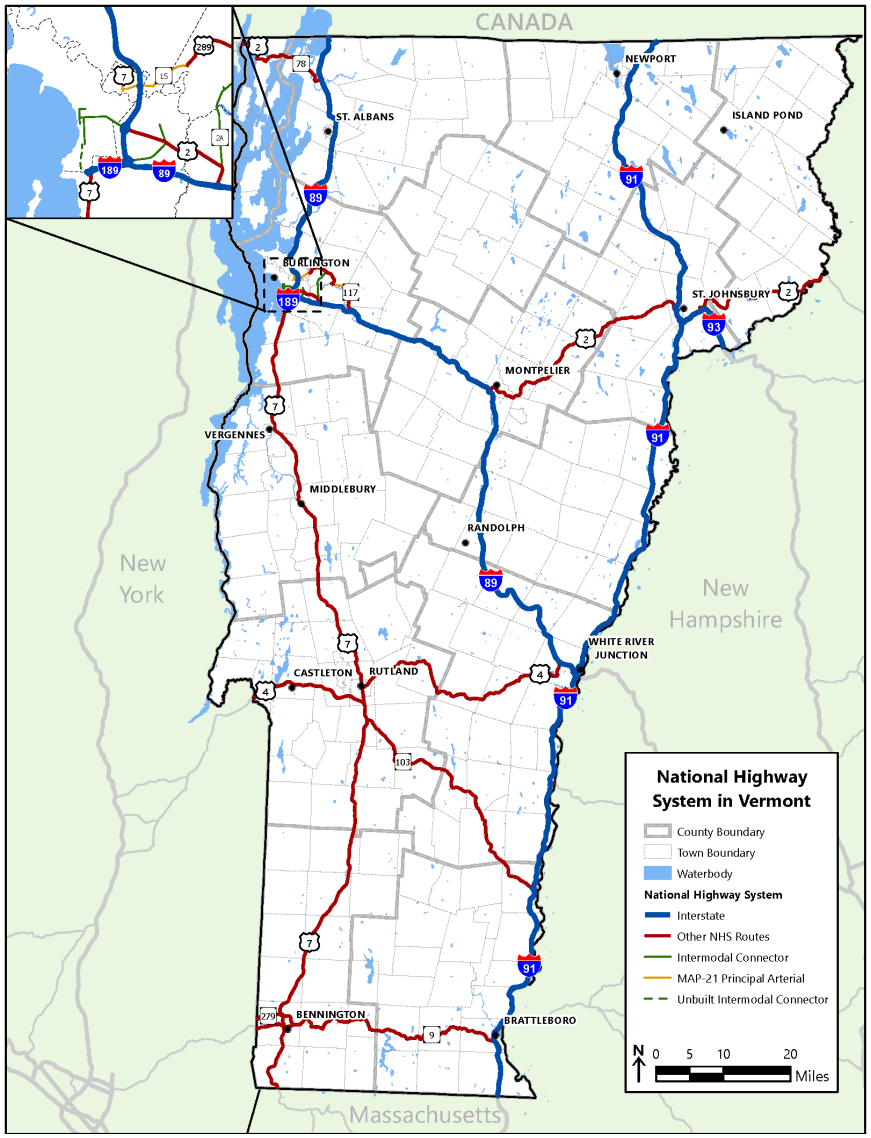
Vermont's freight transportation system consists of highway, rail, air, water, and pipeline networks that work together to move goods into, out from, within and through Vermont. Freight relies on other modes as well to smaller degrees, such as helicopters to move freight after natural disasters. This chapter provides an overview of the components and condition of the network for each major mode. More details about the freight network and existing conditions are available in Tech Memo 1.

5.1 Highway (Truck) Freight Network and Conditions

Vermont has 15,801 miles of public highway, including both state and local highways The State-owned portion of these roads consist of the Interstate highway system, U.S. routes, and state routes, totaling3,870 miles.[viii]

About 1,063 miles of those highways are part of the National Highway System(NHS). The NHS is composed of Interstates, other principal arterials, the strategic highway network, major strategic highway network connectors, and key intermodal connectors. The highways and roads included in the NHS are vital for the economic stability, national defense, and overall health of the United States as a whole.[ix] VTrans maintains 1,016 (96%) of the NHS miles in Vermont, and municipalities are responsible for 47 NHS miles (4%).[x] The NHS is illustrated in Figure 5.1.

FIGURE 5.1 NATIONAL HIGHWAY SYSTEM IN VERMONT



Source: FHWA, Analysis by VHB, 2020.

23 CFR 658 establishes a National Network of highways that can safely accommodate large vehicles, including many large truck configurations. This network includes the Interstate System plus other qualifying Federal-aid Primary System Highways. In Vermont, the interstate highways and portions of US 4 between the New York State Line and Rutland, US 7 between Wallingford and Rutland, and VT 9 between I-91 and the New Hampshire state line, are part of this National Network.

Vermont's highway network serves as arteries for the State's goods, residents, and visitors. **Trucks carried approximately 84% of all goods moving in, out, within, and through the State by weight in 2018.**

Truck Parking

Vermont has 236 formal commercial vehicle truck parking spaces spread throughout the state. An average of six spaces are available at each of the 44 locations. Just over 200 of these spaces are located directly along the 320 miles of interstate highway, while the remainder of the total spaces are on portions of National Highway System routes including VT 9, US 7, and US 4. The combined interstate mileage and segments of the latter routes comprise Vermont's portion of the National Highway Freight Network.

During the development of the Plan, we heard no comments on issues with truck parking related to shortage or other challenges. Vermont Truck and Bus Association (VTBA) commented directly that truck parking in Vermont is sufficient, and the Vermont Department of Motor Vehicles cited no recurring enforcement issues related to availability of truck parking. Ensuring that sufficient, safe truck parking is available across the state is a priority and will be studied in more detail as an outcome of this Freight Plan.

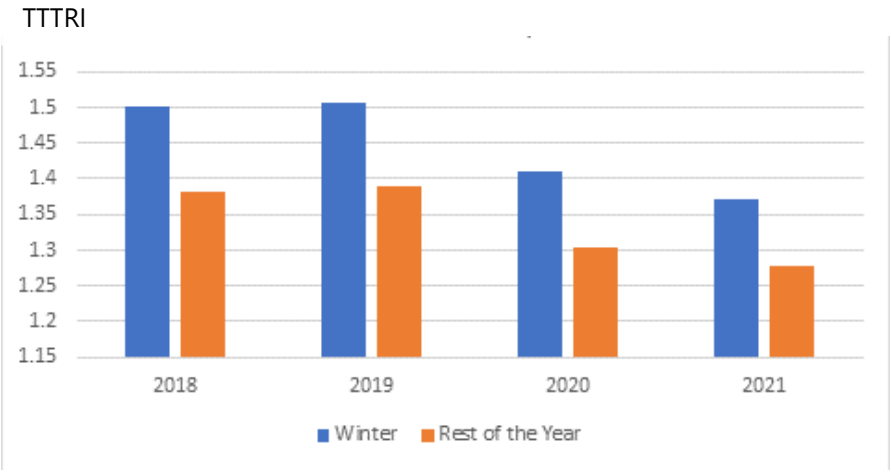
Truck Volumes and Travel Time Reliability

Figure 5.3 illustrates annual average daily truck traffic (AADTT) on Vermont's highways. The truck volumes are highest on the interstates, especially I-89 near Burlington and I-91 near Brattleboro, followed by US 7, US 9, US 4 and portions of US 2.

The FAST Act requires Vermont to set goals for truck travel time reliability and to track reliability performance on Interstate highways. Vermont is meeting the reliability performance goal across the system, however there are some areas where reliability is an issue. One area is I-189. Another is the vicinity of the Highgate Springs-St. Armand U.S.-Canadian border crossing, which is one of the top-15 busiest border crossings in the United States.

Occasional disruptions due to inclement weather are also observed throughout Vermont, especially in winter. Figure 5.2 shows the travel time reliability for trucks on interstate highways in winter (December-March) and non-winter (April-November) periods between 2018 and 2021. Larger numbers represent more variability (or unreliability) in travel times for trucks. **In the winter months, travel times for trucks can be 7-9% more variable than during the rest of the year**, based upon this data. This **uncertainty in travel time can impact how businesses decide to dispatch loads, and require trucking companies to plan for potential delays and reduced operating efficiency, resulting in higher transportation costs.**

FIGURE 5.2 TRUCK TRAVEL TIME RELIABILITY INDEX (TTTRI) ON VERMONT INTERSTATE HIGHWAYS BY SEASON, 2018-2021



Source: National Performance Measures Research Data Set (NPMRDS), analyzed by Cambridge Systematics.

Pavement Condition

VTrans evaluates pavement condition for the entire NHS—both the 96% it maintains, plus almost the entire remainder maintained by other entities, for a total of 1,063 miles. Based upon data available as of 2020, 69% of the NHS miles were in fair or good condition. On the interstate highway portion of the NHS, the pavement condition is even better--94% of those miles were in fair or good condition. Vermont is meeting state and federal pavement condition goals based upon the linear miles of pavement in fair or good condition, however, when weighting the analysis by volume of travel, some further improvement is needed in order to meet Vermont's goals. [xi]

It has taken, and will continue to require, substantial investments in order to continue improving and maintaining pavement in a state of good repair. Between 2022 and 2025, Vermont has budgeted approximately $108 million per year, on average, in the Transportation Capital Program for paving projects statewide.[xii] Vermont's Transportation Asset Management Plan (2018) estimated an annualized cost of $206 million per year will be needed in order to achieve and sustain pavement condition goals long-term, however.[xiii] Thus, there remains a substantial gap between avaialble funds and desired investment goals.

Bridge Condition

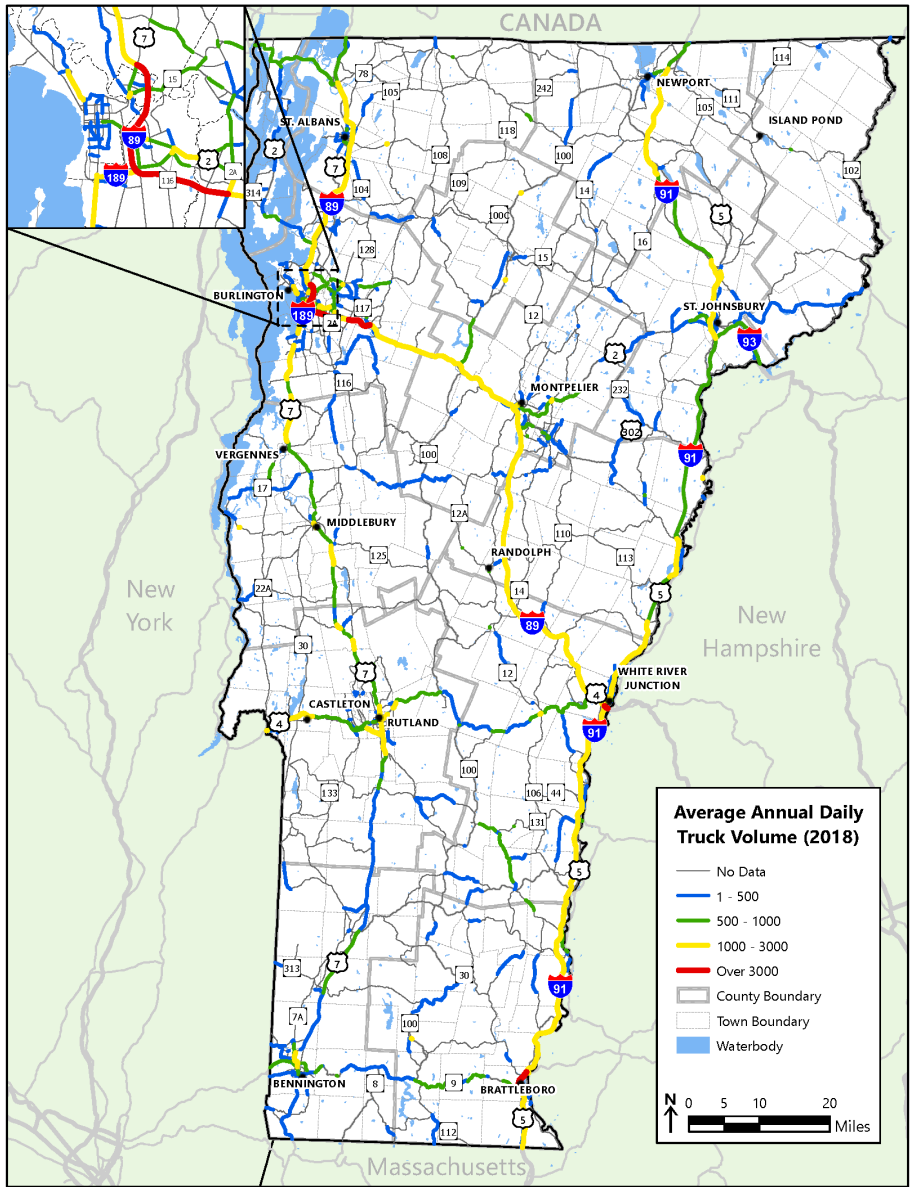
"Structures" refer to long bridges (greater than 20 feet in length and located on public roads) and "short structures" (six feet to 20 feet llong on public roads). Vermont's roadway inventory includes:

- 2,791 long bridge structures, 1,642 of which are municipally-owned but subject to state inspections;[xiv] and
- 1,260 short structures on the state-owned system (the state does not inspect municipally-owned short structures.[xv]

Only 2 percent of interstate bridges are structurally deficient, 4 percent of state highway system bridges are structurally deficient and only 2 percent of town highway system bridges subject to state inspection are structurally deficient.

As of 2020, compared to neighboring states, Vermont has better pavement conditions, and similar bridge condition. Compared to national averages, Vermont has similar pavement condition and slightly worse bridge condition.[xvi]

FIGURE 5.3 TRUCK VOLUMES IN VERMONT (2018)



Source: HPMS; Analysis by VHB, 2020.

5.2 Rail Freight Network and Conditions

With approximately 580 miles of active rail lines split nearly equally between private and state ownership, Vermont's rail network encompasses much of the State as shown in Figure 5.4. All of the lines are used for freight service, while two routes are used for intercity passenger rail service in addition to freight. Railroads operating in Vermont include:

- **Pan Am Southern (PAS)** – PAS began in 2009 as a joint venture between Pan Am Railways (PAR) and Norfolk Southern Railway Company. Seven miles are within Vermont near Pownal.
- **Canadian National (CN)** – CN, North America's fifth largest railroad by revenue, operates an important three-mile link to the New England Central Railroad at Alburgh, VT with CN's Canadian rail network.
- **Vermont Rail System (VRS)** – Privately-owned, VRS' operations in Vermont consist of five properties operating in a seamless fashion:
    - **Clarendon & Pittsford Railroad (CLP)** – CLP operates 18 miles of track between Rutland, Fair Haven, and Whitehall, NY. This line hosts Amtrak's Ethan Allen Express service
    - **Washington County Railroad (WACR)** – WACR runs between Montpelier Junction and Barre to the New England Central Railroad.
    - **Connecticut River Subdivision of the WACR** - WACR also operates over the State-owned Connecticut River Division line from White River Jct., to Newport where it connects to CP.
    - **Green Mountain Railroad (GMRC)** – GMRC operates 50 miles of State-owned track between Rutland and Bellows Falls. GMRC connects to VTR and CLP in Rutland and with the NECR in Bellows Falls.

  - **Vermont Railway (VTR)** – VTR operates the State-owned Western Corridor between Burlington, North Bennington, and Hoosick Junction, NY where it connects with PAS. At North Bennington, a spur goes to Bennington. VTR hosts Amtrak's Ethan Allen Express at Rutland.

- **Canadian Pacific (CP)** – CP is the 6th largest railroad by revenue in North America. The 24-mile segment in Vermont provides access to Brookport, Quebec and CP's main line between Montreal and Searsport, ME.

- **Genesee and Wyoming (GW)** – A subsidiary of Brookfield Infrastructure, GW is the world's largest short line holding company. It owns or leases 113 properties in North America. Two are active in Vermont:

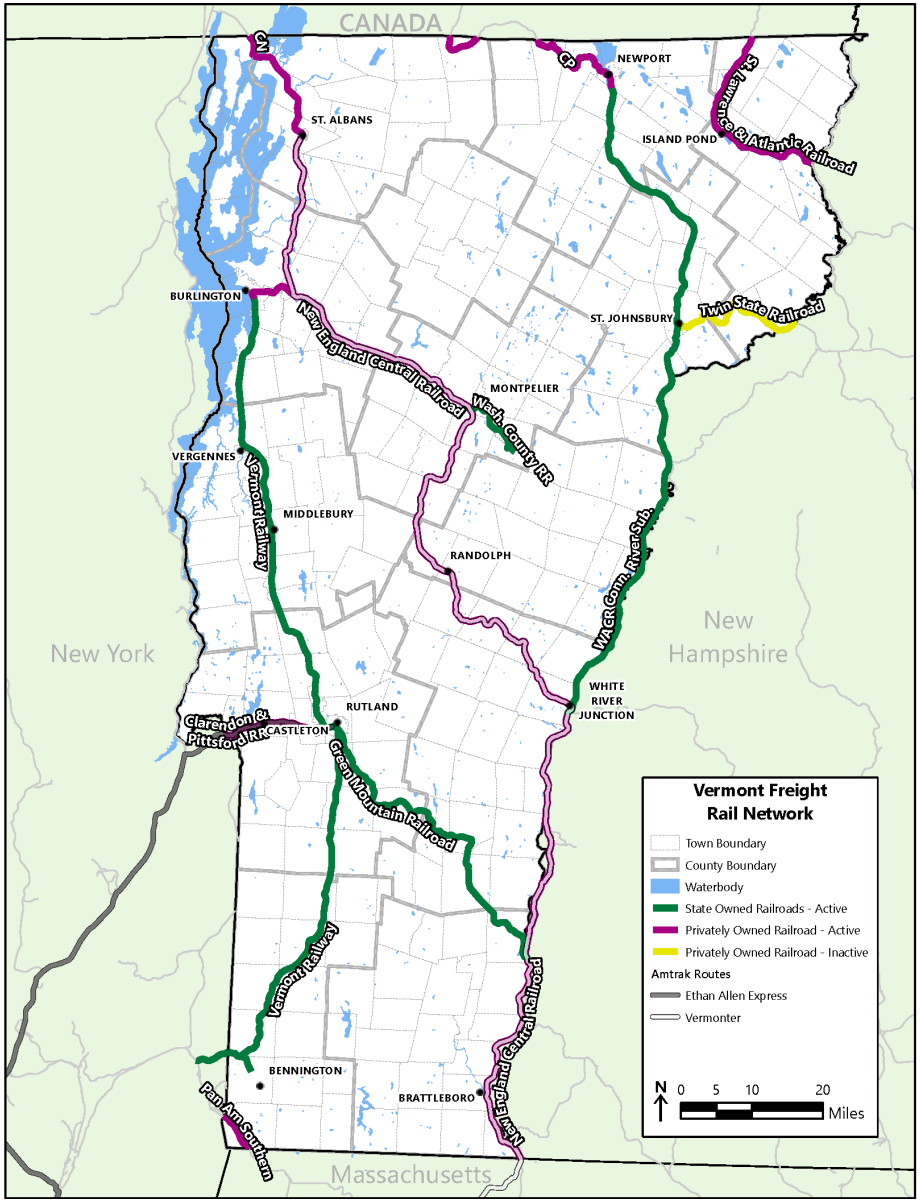
  - **New England Central Railroad Company (NECR)** – NECR operates 228 miles in Vermont that links Alburgh (connection to CN) and White River Junction to points south. This line hosts Amtrak's Vermonter service between St. Albans and East Northfield, MA.

  - **St. Lawrence & Atlantic (SLR)** – SLR operates approximately 31 miles of track in northeast Vermont from Norton to North Stratford, NH connecting to CN in Richmond, QC and PAR in Auburn, ME.

Weight Restrictions

The weight limits for Vermont's rail network vary between 263,000 and 286,000 pounds per railcar. The current national standard railcar weight is 286,000 pounds, so having that capacity allows seamless operations between Vermont and other parts of the country. Weight limits are determined by both bridge and rail conditions. Weight restrictions on a line located outside Vermont can limit weights in Vermont. For example, although the NECR in Vermont can carry 286,000 pound cars, the line is in reality limited to 263,000 pounds due to weight limits in Massachusetts and on the CN line that it connects to in Alburgh. **This situation emphasizes the importance of regional coordination of system investments.**

FIGURE 5.4 VERMONT FREIGHT RAIL NETWORK



Source: VHB, 2020.

Bridge Weight Capacity

A rail line's weight limit is often constrained by its bridges. All of Vermont's bridges can handle 263,000 pound rail cars. However, of the 217 bridges on State-owned lines, 45 (21 percent) cannot carry 286,000 pound rail cars. The State is responsible for maintaining 27 of these structures as shown in Figure 5.5.

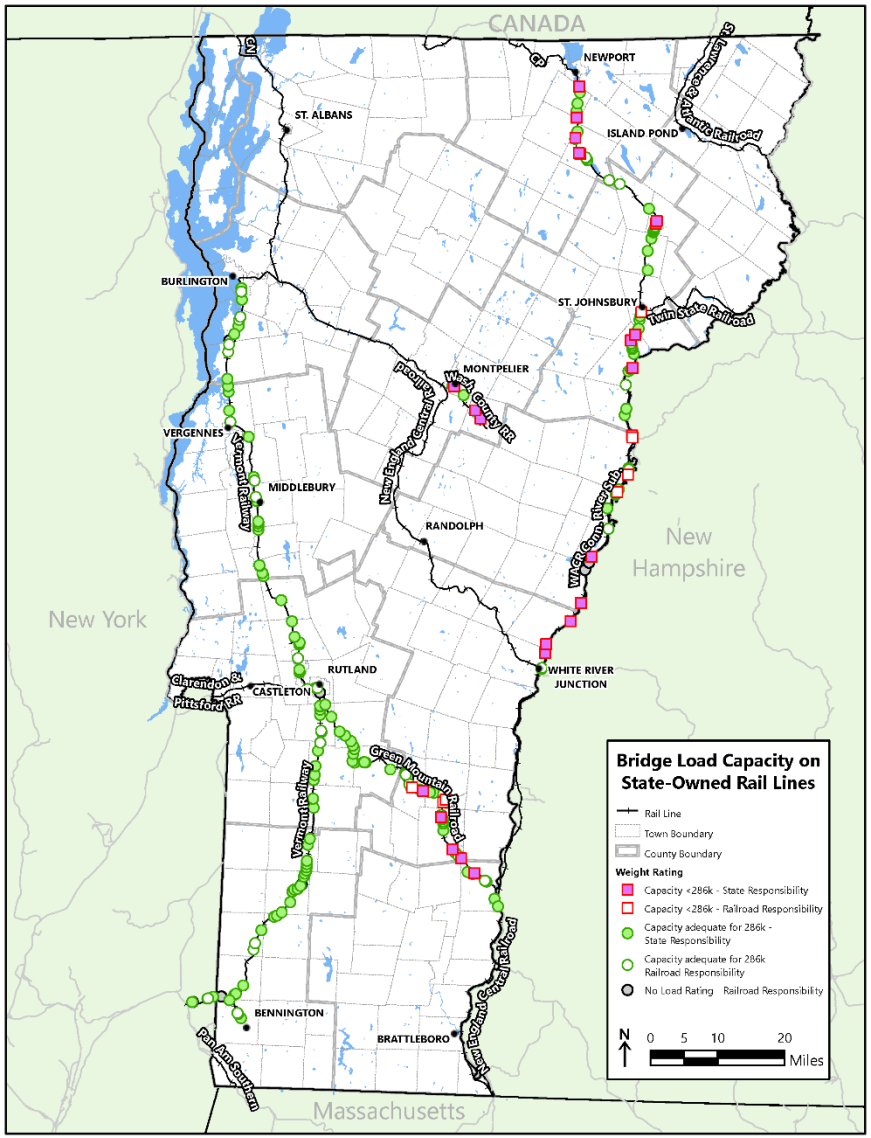
Rail Weight (115 Pound Rail)

In addition to limits imposed by bridges, track conditions—principally rail weight and tie conditions—can limit the freight system. While trackage with light weight rail (typically under 105 pounds/yard) can accommodate 286,000 cars, it does so at increased operating and maintenance costs, as well as higher derailment risk,

Approximately 34 miles of track between Proctor and South Burlington have been upgraded to 115 pounds since 2015, an average of more than six miles per year, which represents good progress toward increasing weight capacity on the Western Corridor.[xvii]

Sections of VTR track south of Rutland with less than 90 pound rail still pose problems for both freight and possible future passenger service from Albany to Rutland via Bennington. In addition, any work undertaken to improve bridges on the GMRC should also include rail work to allow for 286,000 pound cars as this corridor provides an essential east-west alternative to the PAS route through southwest Vermont.

FIGURE 5.5 STATE-OWNED RAIL BRIDGE WEIGHT CAPACITY



Source: VTrans; Analysis by VHB, 2020. Note that as of 2021, bridges on the VTR between Hoosick Junction, NY and Rutland, VT are being upgraded to allow 286,000 pound cars.

Vertical Clearances

The ability to move two containers stacked one on top of the other, known as "double-stack", greatly improves the capacity and operating efficiency of a train. The Association of American Railroads (AAR) has established a vertical clearance standard of 22 foot six inches for unrestricted operations, though most rail rolling stock requires less clearance.

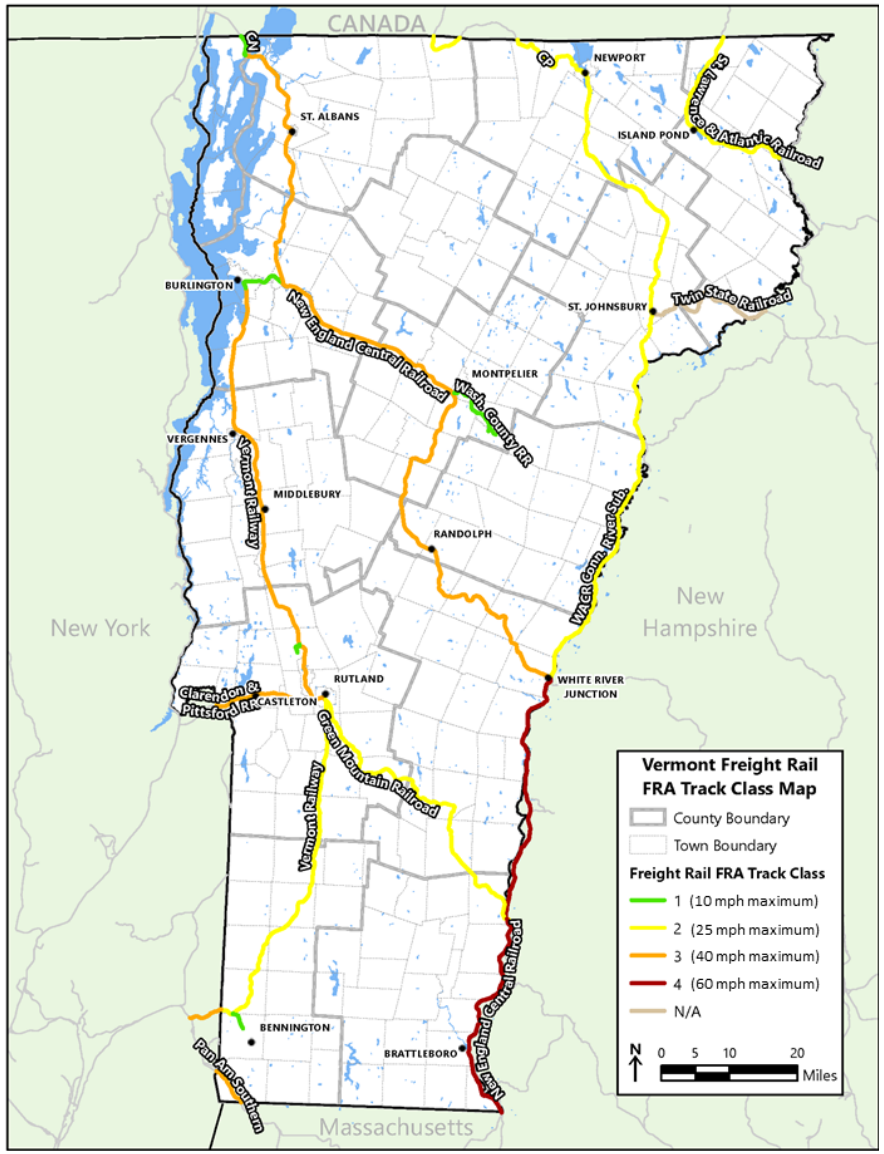
There are numerous obstacles to unrestricted double-stack service, both within Vermont and in neighboring states and Canada.

Given that the NECR is the only rail line handling double stack intermodal cars, increasing the clearances on this line is a logical first step. Currently, CN must reshuffle containers bound for Worcester, Massachusetts in Montreal to accommodate clearance limitations on the NECR and Providence & Worcester lines. Saving this step would create the potential of a competitive intermodal option between southern New England and major Canadian and US trade centers.

Train Speed (FRA Track Class)

The FRA has established minimum track safety standards and maintenance levels for trains to operate at different speeds. The lower the track class, the lower the allowable operating speed (see Figure 5.6). Most of Vermont's rail lines support operation at 25 to 40 MPH (Class 2 or 3). The NECR south of White River Junction is the only segment with a maximum speed of 60 MPH (Class 4). There are also segments with the slowest FRA allowable speeds (Class 1), including the NECR Winooski Branch which connects Burlington to Essex Junction.

FIGURE 5.6 FRA TRACK CLASS



Source: VTrans, Interviews with railroads. Analysis by VHB, 2020.

5.3 Air Freight

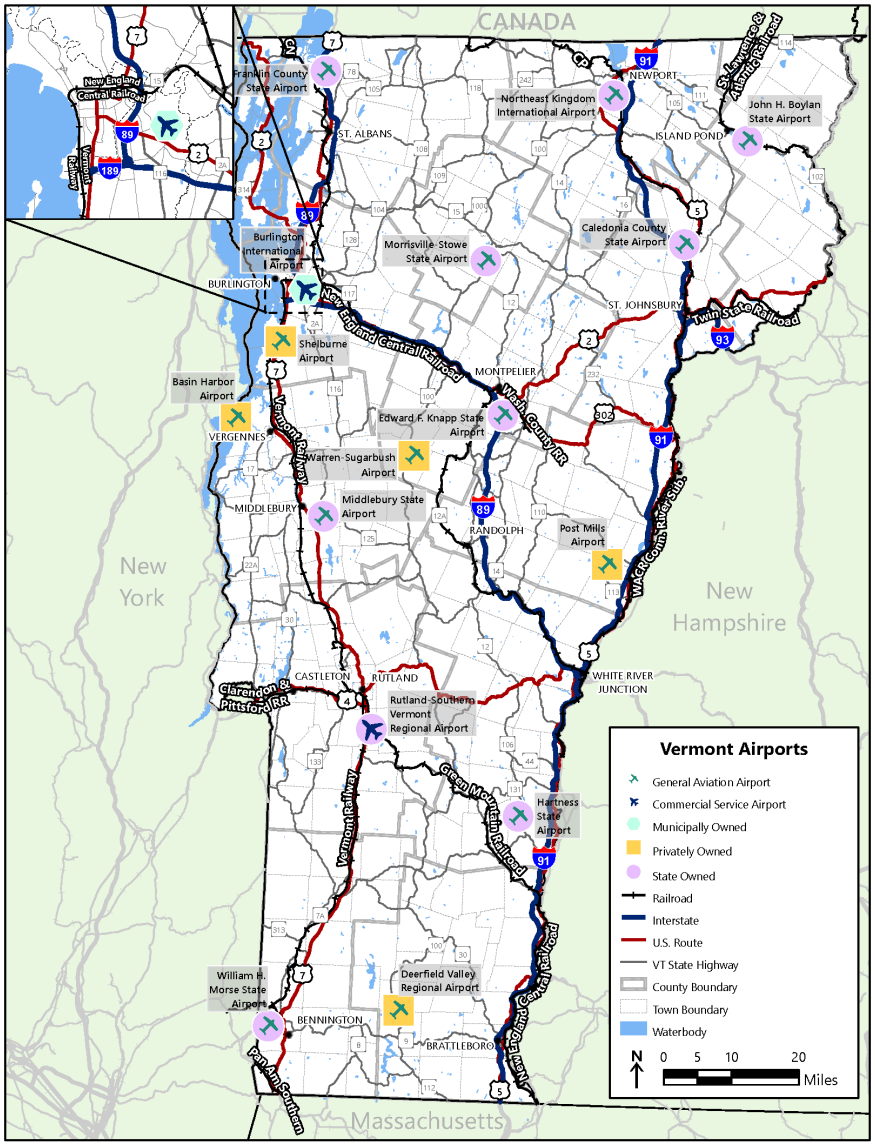
The cargo moved by air is typically of high value, high-time sensitivity and/or high security. Air can be the fastest, most secure, and often best-tracked method to move goods. High-value electronics, pharmaceuticals, some agricultural product, and essential replacement parts for manufacturing lines are examples of goods commonly moved by air. Although air cargo comprises a small fraction of the overall total of goods moved to, from, and within Vermont it provides crucial options to the State's businesses and residents.

There are 16 public-use airports in Vermont. The State of Vermont owns ten of these airports, one is owned by a municipality (Burlington International), and five are privately owned. Of these, Burlington and Rutland-Southern Vermont have commercial service (see Figure 5.7).[xviii] Details are included inTech Memo 1.

According to the 2021 Vermont Airport System Plan, five of the system airports have a primary runway length greater than 5,000 feet. The longest runway in the system is at Burlington International, which boasts a primary runway length of more than 8,300 feet. **The runway conditions at these airports are adequate for current operations.** Ongoing master planning work for Burlington International Airport may reveal additional needs.

Three of Vermont's airports receive or originate substantial volumes of cargo. In 2019, approximately 4.9 million pounds of freight were received and 3.7 million pounds originated (8.6 million pounds total) at Burlington International Airport. In 2016, an estimated 1.5 million pounds moved through Rutland and 545,000 pounds moved through E.F. Knapp Airport located in Berlin.[xix]

FIGURE 5.7 VERMONT AIRPORTS



Source: Vermont Airport System Plan (2021).

5.4 Waterborne Freight

In addition to two major bridges crossing Lake Champlain, Vermont's highway system is connected to New York's by privately operated water transportation services crossing Lake Champlain in four locations. Lake Champlain Ferries operated by Lake Champlain Transportation Company (LCT) provides regular ferry service between Grand Isle, VT and Plattsburgh, NY; Burlington, VT to Port Kent, NY; and Charlotte, VT to Essex, NY. Farther to the south and under different ownership, the Fort Ticonderoga Ferry provides service between Ticonderoga, NY and Shoreham, VT in Addison County.

The lake itself also serves as a link in a continuous navigable water route connecting the Hudson River at Albany with the St. Lawrence River in Sorel Quebec. The Champlain Canal connects the southern end of Lake Champlain at Whitehall, New York with the Hudson River north of Albany. To the north, the Richelieu River, through the Canal-de-Chambly and the Canal-de-Saint-Ours, provides the connection to the St. Lawrence River. Once a major freight artery, the route is now largely used for recreational purposes, with freight being virtually non-existent. Operational constraints such as lengthy seasonal closures, daytime operations, limited barge capacity because of physical constraints, and deferred maintenance have greatly diminished the attractiveness of the route for commercial haulage.

5.5 Pipelines

Pipelines are used to transport or distribute liquid or gas products. Vermont has 891 miles of pipeline statewide. Only Hawaii has fewer pipeline miles. **Most (72%) of the pipelines in Vermont are gas distribution main pipelines, which transport natural gas to communities.** Service lines (which connect customer homes to the distribution main lines) are not included in the reported data.

175 of Vermont's pipeline miles transport hazardous liquids, which consists of petroleum products, and are primarily located in the Northeast Kingdom region of the state.

County-level pipeline mapping information is available from the Pipeline and Hazardous Materials Safety Administration.[xx]

5.6 Truck-Rail Intermodal Connections

Freight can be transferred from rail to truck by two methods—intermodal transfer and transloading.

Intermodal facilities allow for easy transfer between rail and truck for containers, automobiles, and other packaged material. Containers or other packaged goods are moved beween modes without breaking down the cargo into smaller pieces. There are no intermodal container facilities located in Vermont, although numerous nearby facilities serve Vermont's needs from Western Massachusetts (Ayer, Palmer, Worcester, West Springfield), New York (Mechanicville), and Canada (Montreal).

Transload facilities provide locations for the transfer of non-containerized shipments between rail and truck (or rail and pipeline in some cases). While this allows for a wider range of goods to be transferred, it is most suitable for bulk and break-bulk commodities where the risk of product damage is modest. All of Vermont's transload facilities are operated by private customers to move their goods between modes. These facilities are listed in Table 5.1.

TABLE 5.1 VERMONT TRUCK-RAIL TRANSLOAD FACILITIES

Company	Location	Railroad	Key Goods/Services
Green Mountain Railroad	Rockingham	GMRC	Propane
Riverside Reload	Rockingham	GMRC	Forest products, metals, building material
Dubois Construction Inc	Middlesex	NECR	Construction material
Irving Propane	White River Junction	NECR	Heating fuel
Oliver Seed Company	Milton	NECR	Agricultural products
FW Cobs Company, Inc.	St. Albans	NECR	Agricultural products
RSD Distribution	White River Junction	NECR	Food grade warehouse space
RCP Transit, Inc	Island Pond	SLR	
Barrett Trucking	Burlington	VTR	Dry bulk, salt, oversize/overweight shipments
Shelburne Transload	Shelburne	VTR	Salt, animal feed, heating fuel
SLC Transfer	Burlington	VTR	Dry bulk, agricultural limestone
Couture Trucking	Barton	WACR Conn. River	Malted barley
CTI Bulk	Orleans, Lyndonville	WACR Conn. River	Dry bulk, chemicals, fertilizer, petroleum
Northeast Kingdom Transload	St. Johnsbury	WACR Conn. River	Logs/lumber, cement, consumer and retail goods
White River Traffic Group	White River Junction	WACR Conn. River	Crossdocking, warehousing

Source: http://www.vrs.us.com/vrs_connect/SLCtransfer.html; Interviews with railroads.

5.7 Military Freight Considerations

The largest military installation in Vermont is the Vermont Air National Guard base at the Burlington International Airport (BIA) in South Burlington. Freight access from the nearby Interstate to the BIA is of critical importance. The BIA is located within the planning area boundaries of the Chittenden County Regional Planning Commission (CCRPC), a designated federal-aid Metropolitan Planning Organization. The BIA is represented on both the CCRPC's Policy Board and Technical Advisory Committee who are responsible for transportation planning efforts and project funding decisions within the area. Close coordination between the BIA and Air National Guard assure that military freight to and from the Base is considered in the planning process.

The CCRPC is in the process of completing a I-89 corridor study through the Burlington area which identifies specific short and long-term improvements to assure transportation mobility to the Air Base.

Army National Guard military bases are also located throughout the state in Bradford, Colchester, Jericho, Lyndonville, Ludlow, Morrisville, Rutland, and St. Albans. Our Statewide and Metropolitan Planning processes including the development of the Statewide Long-Range Plan, the Metropolitan Transportation Plan, the Statewide Transportation Improvement Program and Regional Planning Commissions work all provide extensive public involvement opportunities for our military installations to provide input on transportation and freight needs

6.0 ECONOMIC FUTURE AND COMMODITY FLOWS

6.1 Vermont's Economy: Now and in the Future

Freight plays a large role in Vermont's economy, and the performance of Vermont's economy influences freight demand and output. For example:

- Growth in population and consumer spending fuel demand for products and construction materials to build or improve homes.
- Growth in consumer demand contributes to growth in manufacturing, wholesale, retail, and other industry sectors.
- Growth in those industry sectors contributes to more population and economic growth, and the cycle continues.

Approximately one-third of Vermont's jobs and gross domestic product (GDP) are derived from the eight industries identified as freight-reliant. That number grows to approximately 40 percent in terms of number of employers and total salary brought home by workers in those industries.

Other factors, includingaverage income, educational attainment, the cost of energy, and labor productivity, also play a role in the State's economic competitiveness. These are among the factors that many freight-generating businesses consider when deciding where and when to move or expand.

Between 2010 and 2020, Vermont's population increased about 2.8%, from 625,741 to 643,077. Vermont's population growth lagged the United States as a whole (7.4%) and the Northeast region (4.1%). Population growth was observed in most Vermont counties. The COVID-19 pandemic was in its early

days on the April 1, 2020 Census count date. Home sales document that the pandemic has contributed to additional population growth since April 2020, but how this trend will hold into the future is still being explored.

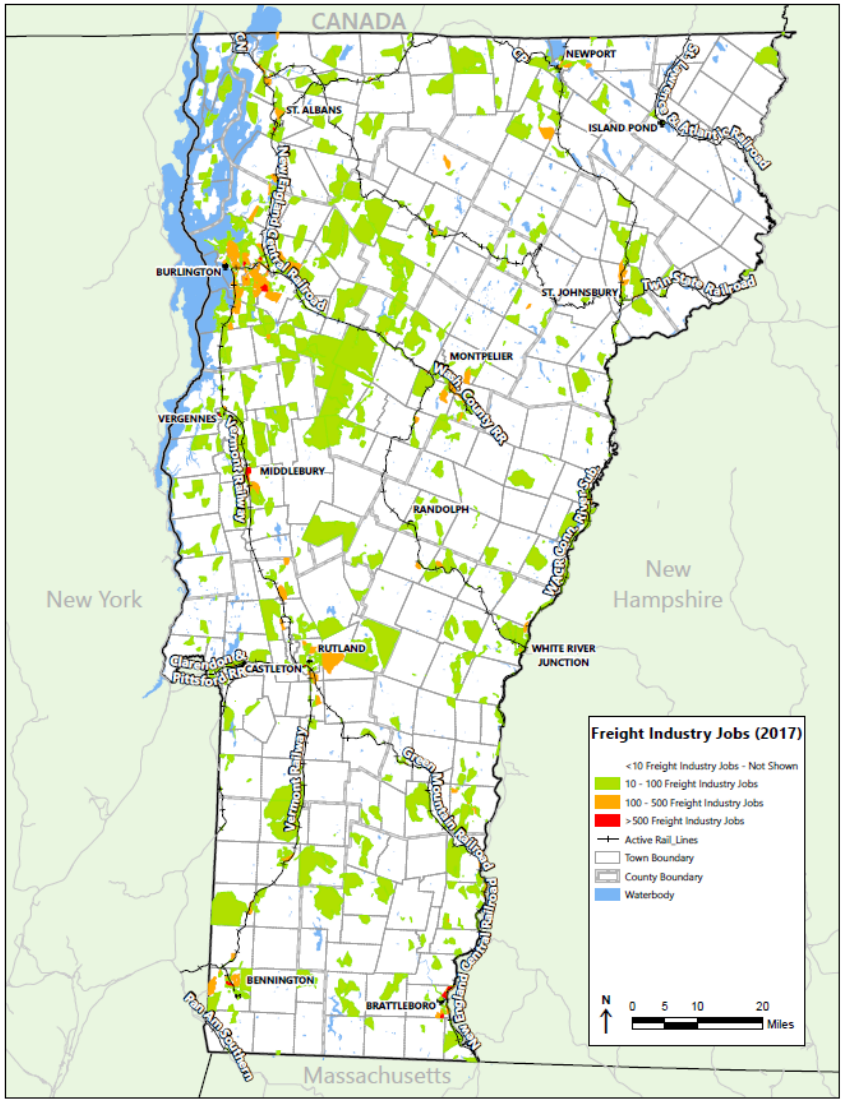
Cover of Telework Final Report (Vermont Futures Project, 2020)

Several sectors of Vermont's economy are especially reliant upon freight. These include agriculture, mining and quarrying, utilities, construction, manufacturing, wholesale trade, retail trade, and transportation and warehousing.

The greatest concentrations of employment in freight-reliant industry sectors are found in the western part of the state along the VTR rail line and along US 7. Outside this, the Brattleboro area and smaller areas near Montpelier, Barre, White River Junction, and St. Johnsbury also appear. These clusters are shown in Figure 6.1.

Looking into the future, the Vermont Department of Labor projects employment by major occupational groups out to 2026 (with 2016 base year). Although much of the growth is projected in social services, education, and other non-freight reliant categories, the continued growth in farm, fishing, and forestry related jobs (more than 10%) as well as transportation (3%) and construction/extraction (about 2%) will produce demand for freight into the future.

FIGURE 6.1 VERMONT FREIGHT-RELIANT INDUSTRY EMPLOYMENT BY CENSUS TRACT (2017)



Source: US LODES WAC Data (2017); Analysis by Cambridge Systematics, 2020.

6.2 Commodity Flow Overview

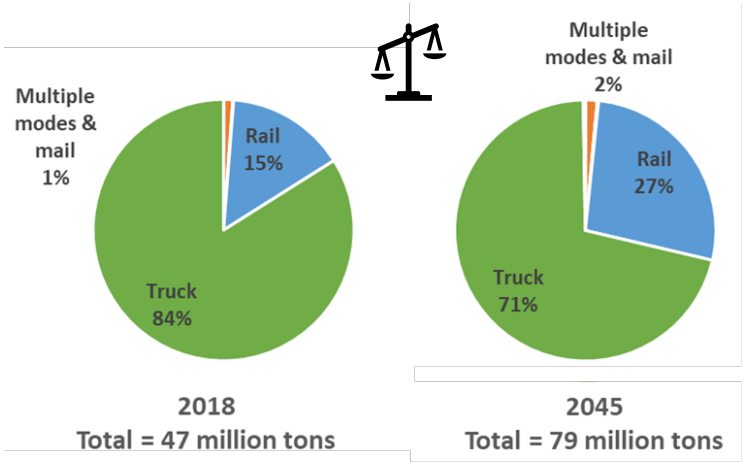
To support informed planning for Vermont's freight transportation needs, it is important to understand how much freight moves in the state now, how much freight is expected to move in the future, and characteristics of those commodity movements. More details are available in Tech Memo 2.

The data used for the commodity flow analysis was from the USDOT Freight Analysis Framework (FAF) database and rail waybill data provided by the Surface Transportation Board. Analysis was of multimodal freight commodity movements into, out from, within, and through Vermont. The base year was 2018 and 2045 was the forecast horizon.

In 2018, approximately 46.7 million tons of freight moved into, out from, through, or within Vermont. Trucks carried about 84% of that freight, rail carried 15%. By 2045, the volume of freight (when measured by weight) is **expected to increase 68%** to 78.7 million tons. By 2045, rail is expected to move a larger share of the freight in Vermont.

Analyzing freight flows by dollar value, as opposed to tonnage, produces somewhat similar results. As shown in Figure 6.3, the total value of tonnage transported within Vermont in 2018 was approximately $70.9 billion. While trucks still account for a majority (67% in 2018), multiple modes and mail (13%) and air (3%) provide a more sizable contribution. Overall, an approximate doubling in total value (measured in constant 2012 dollars) across all modes is expected through 2045 from just under $71 billion to $135 billion. This rate of growth is close to the projected growth in value of goods moved nationally.

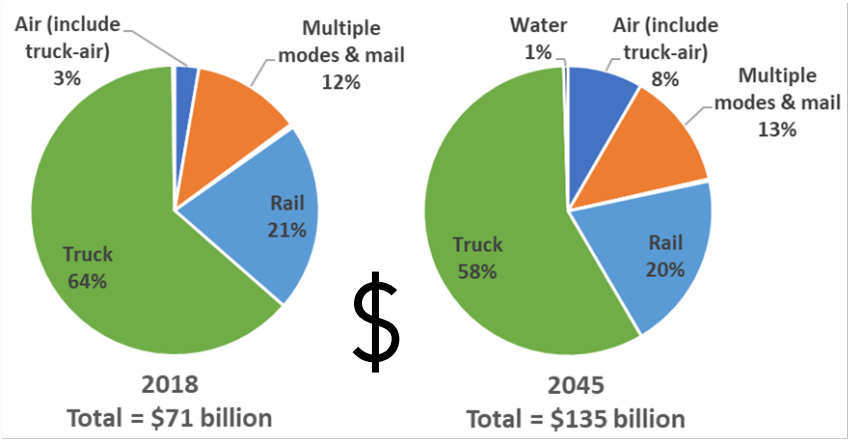
FIGURE 6.2 MODAL DISTRIBUTION OF FREIGHT BY TONNAGE



Note: Pipeline, Water, and Air carried less than 1% of freight tonnage in 2018 and are expected to carry less than 1% in 2045

Source: FAF, STB Confidential Waybill Sample; Analysis by Cambridge Systematics, 2020.

FIGURE 6.3 MODAL DISTRIBUTION OF FREIGHT BY VALUE



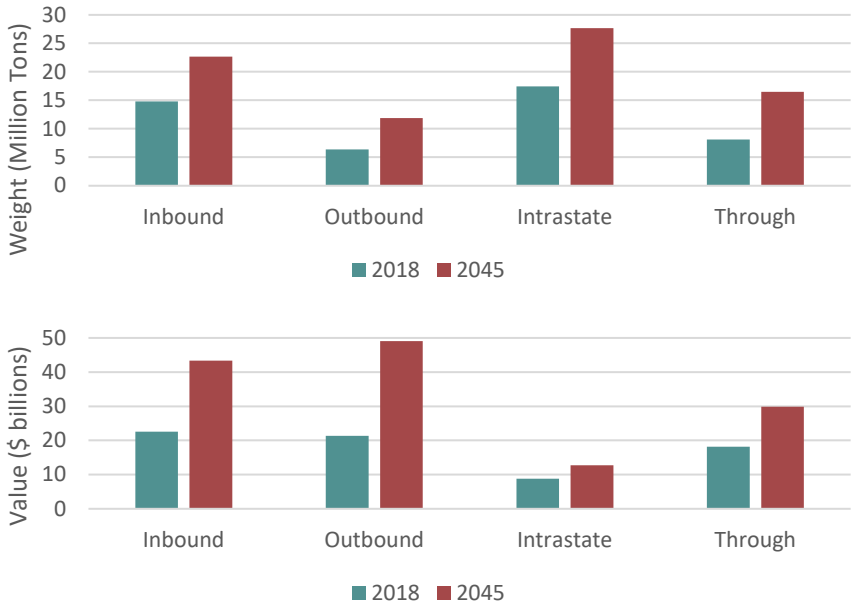
Note: Pipeline and Water carried less than 1% of freight by value in 2018 and are expected to carry less than 1% in 2045

Source: FAF, STB Confidential Waybill Sample; Analysis by Cambridge Systematics, 2020.

Direction of Travel refers to the flow of freight within Vermont, based on origin and destination patterns. Four directions of movement are analyzed by tonnage and value: Inbound, Outbound, Intrastate (exclusively within Vermont), and Through (passing through but not originating or terminating within Vermont).

As Figure 6.4 shows, **intrastate travel comprises the largest proportion of freight tonnage at 37%, followed by inbound freight (32%).** Measured by value, inbound and outbound moves make up the largest shares of flows, each representing about one-third of freight flows. Through 2045, increases in the tons and value of goods moved in all directions are expected, though the share of goods moving in the through direction are expected to represent a greater share of freight tons moved, and outbound moves are expected to represent a greater proportion of the value of goods moved in 2045.

FIGURE 6.4 FREIGHT TONS AND VALUE BY DIRECTION



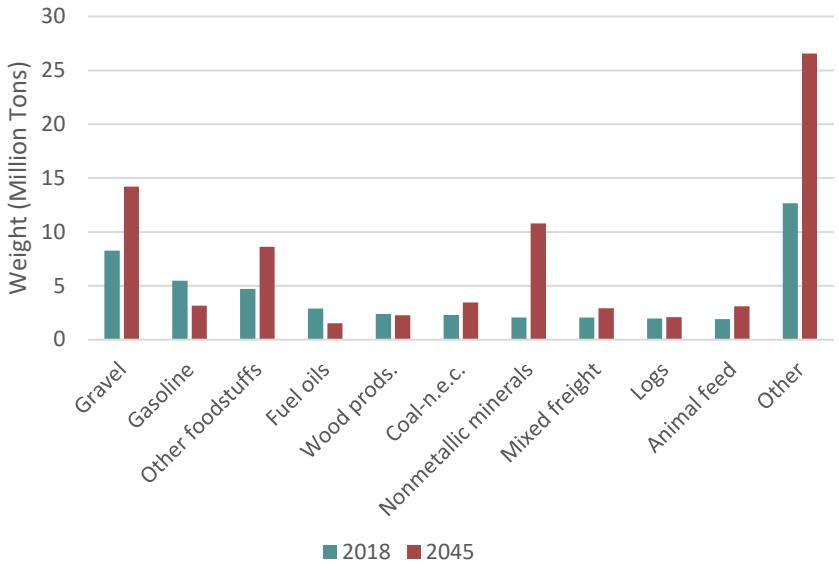
Source: FAF, STB Confidential Waybill Sample; Analysis by Cambridge Systematics, 2020.

Figure 6.5 and Figure 6.6 show the distribution of tons and value of goods by commodity group. This figure illustrates the relationship between weight and value across different commodity groups. For example, **gravel is the top**

commodity by weight of goods moved in Vermont, but due to the relatively low value of gravel, it does not appear among the top commodities by value. **High-value goods, such as electronics and pharmaceuticals, appear among the top commodities by value,** but they are light-weight commodities, often moved by truck or air, and do not appear among the top commodities by weight.

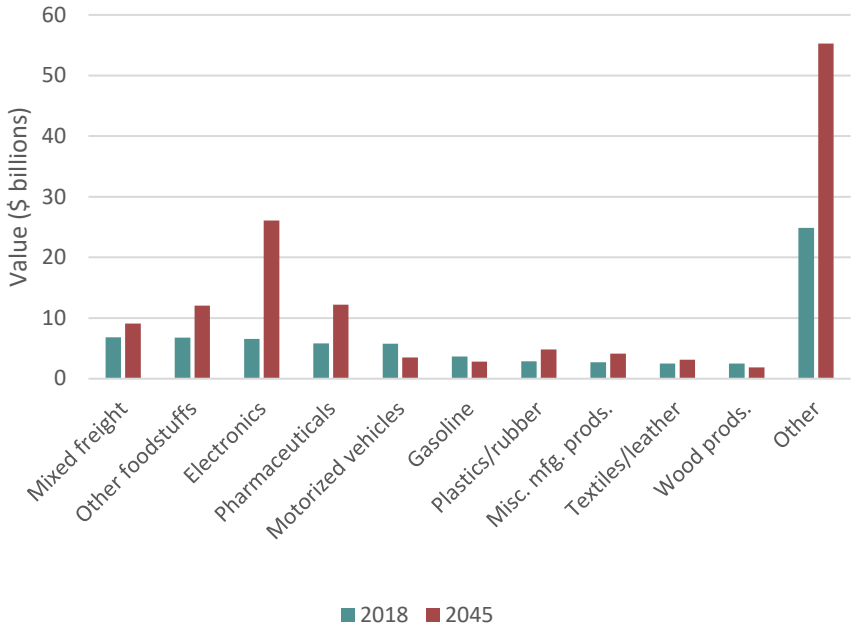
Between 2018 and 2045, nonmetallic minerals used for construction materials (for example, gypsum, clay, and sand) and fertilizers, gravel, and food products are expected to increase in volume by weight. The value of electronics is expected to outpace growth in value of most other commodities through 2045.

FIGURE 6.5 TOP COMMODITIES BY WEIGHT, 2018-2045



Source: FAF, STB Confidential Waybill Sample; Analysis by Cambridge Systematics, 2020.

FIGURE 6.6 TOP COMMODITIES BY VALUE, 2018-2045

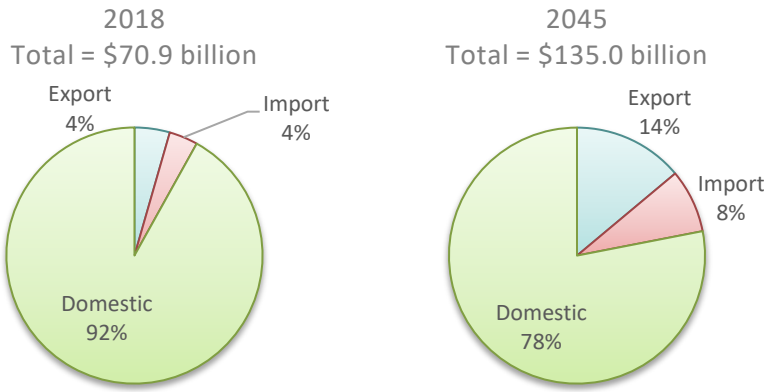


Source: FAF, STB Confidential Waybill Sample; Analysis by Cambridge Systematics, 2020.

6.3 Domestic and Foreign Trade

Measured by weight or by value, more than 90% of the freight moving in Vermont represents domestic trade, between origins and destinations within the United States. Figure 6.7 shows the expected change in distribution of trade by import, export, or domestic trade type, for freight flows measured by value. Foreign trade is expected to increase at a greater rate than domestic trade through 2045.

FIGURE 6.7 FREIGHT VALUE BY TRADE TYPE, 2018-2045



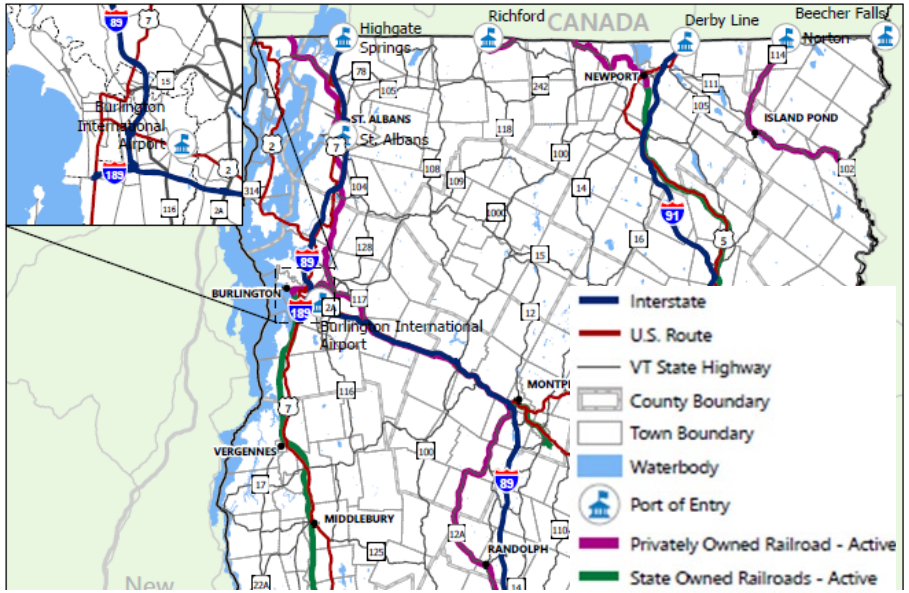
Source: FAF, STB Confidential Waybill Sample; Analysis by Cambridge Systematics, 2020.

The top domestic trading partners (origins and destinations) are neighboring states, including Massachusetts (20%), New Hampshire (16%), New York (15%), and Maine (6%). Through 2045, the share of freight traded with New York is expected to increase relative to other neighboring states to 20% of Vermont's total domestic trade, matching the 20% share Massachusetts is expected to maintain.

Canada accounted for 50% of foreign trade (by value) in 2018. Trade with Eastern Asia represented 28%, Europe represented 10%, and Southeastern Asia and Oceania represented 8% of foreign trade in 2018. **Growth in trade with Asia is expected to outpace growth in trade with Canada through 2045.** In 2045, Canada (44%), Eastern Asia (29%), Europe (11%), and Southeastern Asia and Oceania (11%) are expected to be the top foreign trading partners for Vermont.

Canadian trade is and will remain vitally important to Vermont's economy. It depends upon the Ports of Entry along Vermont's land border with Canada (see Figure 6.8).

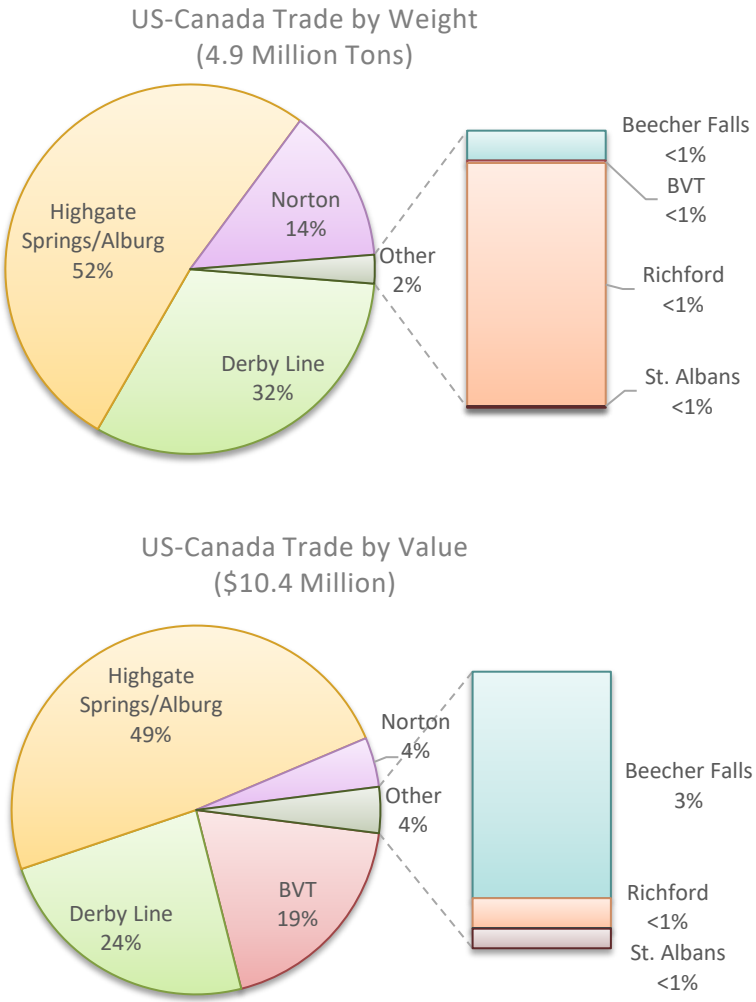
FIGURE 6.8 VERMONT-CANADA PORTS OF ENTRY



Source: VTrans, US Customs and Border Protection

As Figure 6.9 shows, the Highgate Springs/Alburg Port of Entry is the gateway for about half of the U.S.-Canadian trade that uses Ports of Entry in Vermont. Derby Line also is an major crossing, handling about 32% of trade by weight and ¼ of trade by value. Burlington International Airport (BVT) is the Port of Entry used for about 19% of the U.S.-Canada trade entering or leaving Vermont, measured by value.

FIGURE 6.9 VERMONT-CANADA TRADE BY VERMONT PORT OF ENTRY (2019)



Source: US Bureau of Transportation Statistics; Analysis by Cambridge Systematics, 2020.

7.0 NEEDS ASSESSMENT AND POTENTIAL INITIATIVES

7.1 Freight System Performance

Understanding progress towards meeting established freight performance targets provides insight into remaining gaps in the system and thus potential initiatives that could help to address those gaps.

Performance measures from the 2012 Freight Plan were reviewed and are used in this Plan. These measures are shown in Table 7.1 and include measures that track:

- The performance of Vermont's economy and overall freight system;
- The physical condition of Vermont's freight transportation infrastructure;
- Travel time and reliability for trucks moving in Vermont, wait times and delays that affect cross-border trade between Vermont and Canada;
- The frequency of hazardous materials (HAZMAT) incidents involving trucks and rail; and
- Truck-involved crashes and fatalities on Vermont's highway system.

Across most measures, Vermont is performing well, either meeting or exceeding specified targets or more general "desired outcomes." Key exceptions include:

- Recent declines in freight and economic output, some of which is associated with the COVID-19 pandemic and may be temporary;
- Establishing double-stack clearances on freight rail lines; and
- Truck-involved crashes, as there is no clear trend to determine whether the goal of reducing crashes is being attained.

More information and data are available in Tech Memo 3.

TABLE 7.1 VERMONT FREIGHT PERFORMANCE MEASURES, TARGETS, AND OUTCOMES

*These measures are described in more detail in the Vermont Rail Plan and Vermont Rail Plan Tech Memo 3.

Category	Mode	Measure	Target or Desired Outcome	Observed Outcome
Freight and Overall System Performance	Multi-Modal	Gross State Product	Increase	Modest increase until COVID-19 resulted in a decrease in 2020
	Multi-Modal	Freight demand (by tons and value of goods)	Increase	Tonnage declined slightly 2007-2018, value increased.
	Rail	Number of businesses using rail	Increase	Slight increase in total freight rail users between 2016-2018
	Rail	Percent of Vermont within 100 miles of a transload facility	100%	100% of Vermont is within 100 miles of a transload facility
	Rail	Percent of Vermont within 100 miles of an intermodal terminal	100%	83% of Vermont is within 100 miles of an intermodal terminal
	Air	Number of airports served by overnight carriers	At least 3 airports	3 airports
Infrastructure Performance - State of Good Repair	Highway	Pavement condition	Improve pavement rating	"Poor" or "Very Poor" pavement decreased from 50% to 30% of all highway miles between 2009-2019
	Highway	Bridge condition (% of bridges that are structurally deficient)	6% Interstate bridges 10% state highway bridges 12% town highway bridges	2% Interstate bridges (ahead of target) 4% state highway bridges (ahead of target) 2% town highway bridges (ahead of target)
	Rail	Bridges meeting 263,000-pound standard*	All bridges	Target is being met
	Rail	Bridges meeting 286,000-pound standard*	Improve 3 or more annually	Target is being met
	Rail	Rehabilitate and upgrade rail crossings*	Improve 3 or more annually	Target is being met
	Rail	115-pound rail*	5 miles annually	Target is being met
	Rail	Vertical clearances*	Remove all obstructions to allow unrestricted double stack operations	Target is not being met
	Air	Runway conditions, adequacy for current operations	Various attributes	Targets are being met at airports that handle significant cargo volumes
Travel Time and Reliability	Highway	Truck Travel Time and Reliability (TTTR)	TTTR Index of 1.75	Target is being met
U.S.-Canada Border Crossing Delays	Highway	Border Wait Times	Decrease	Wait times decreased in 2020, but may increase due to increased traffic post-pandemic and upcoming construction projects
	Rail	Border Wait Times	Decrease	Railroads say wait times are not a major concern
Hazardous Materials	Highway	HAZMAT Incidents	Decrease	Slight downward trend from 2012-2020
	Rail	HAZMAT Incidents	Decrease	Only 1 reported incident between 2012-2020
Truck-Involved Crashes	Highway	Truck-Involved Crashes	Decrease	No clear trend in crashes or fatalities

7.2 Key and Emerging Issues and Trends

In addition to the performance measure-related needs and gaps discussed in the previous sections, there are additional areas where initiatives could help meet freight needs in the State. Some of these areas are specific to certain modes, while others cut across multiple modes and/or external effects of freight. These areas of need include:

- Technological Innovation
- Post-COVID-19 Economic Recovery
- E-Commerce and Last-Mile Delivery
- Cross-Border Issues
- Truck Size and Weight Permitting Harmonization
- Freight Workforce
- Climate Change and Resiliency
- Freight as a "Good Neighbor"
- Asset Management

TABLE 7.2 SUMMARY NEEDS RELATED TO EACH OF THE KEY AND EMERGING ISSUES

Issue	Need
Technological Innovation	Anticipate deployment; partner with innovators
COVID Recovery	Monitor to anticipate potential effects on freight in Vermont
E-Commerce and Last-Mile Delivery	Acquire data and estimate the potential effects of deliveries on highways, emissions, and the economy
Cross-Border Issues	Continue coordinating among stakeholders and taking actions
Truck Permitting and Harmonization	Streamline permitting for trips between VT, other New England states, and NY
Freight Workforce	Support the development of workforce capabilities that improve freight system performance
Climate Change and Resiliency	Support initiatives to reduce greenhouse gas emissions, and harden vulnerable freight infrastructure
Freight as a "Good Neighbor"	Coordinate discussions around "good neighbor" strategies and practices
Asset Management	Engage as Vermont Asset Management Information System (VAMIS) develops for freight planning aspects

Technological Innovation

Technological innovation has been transforming supply chain logistics since there was a need to transport goods from one location to another. Today, robust networks of information technology are used to manage inventory, track shipments across the globe, monitor performance, and respond to disruptions. Among the technological advancements that are being developed and deployed across the supply chain, **alternative fuel technologies, connected and autonomous vehicles technology, and intelligent transportation systems technology are likely to have widespread effects on the freight transportation system in Vermont.**

Vermont needs to anticipate and be prepared for the development and deployment of these and other technological innovations that could change the demands on the multimodal freight transportation system. "Getting ahead of the curve" could include efforts by VTrans and other organizations in the state to partner with research institutions, tech companies, transportation equipment manufacturers, and other innovators, to manufacture and/or pilot-test equipment in Vermont. In addition, Vermont officials could work with neighboring states to harmonize regulations that affect technological development and deployment. This work should including continued participation in New England Transportatoin Consortium[xxi] efforts such as the development of 20-4 New England Connected and Automated Vehicle Legal, Regulatory and Policy Assessment[xxii] and the implementation of the recommendations therein.

Post-COVID-19 Economic Recovery

The COVID-19 pandemic introduced a number of challenges to supply chain systems and freight logistics. Shifts in demand resulted in problems with product production and logistics. In perhaps the most famous example, toilet

Vermont-based Company is Testing Electric-Powered Aircraft

Alternative propulsion technology could change aviation as well. Burlington-based BETA Technologies began testing an electric-powered aircraft in 2020 in Plattsburgh, NY.

The aircraft, named "ALIA," takes off and lands vertically, like a helicopter, but moves forward similar to an airplane. ALIA has a range of 250 nautical miles and can be recharged in 50 minutes. This aircraft has a 200 cubic foot cargo volume capacity and could transport high-value, time-sensitive cargo, such as medical supplies, to hospitals.

Ultimately, the aircraft could transport other time-sensitive cargo, such as business-to-business machinery or equipment moves, or parcels ultimately destined for consumer households. BETA Technologies is also thinking about potential future passenger applications for this type of aircraft. ALIA is a piloted aircraft, but could one day be flown as an autonomous aircraft, if and when Federal regulations allow.

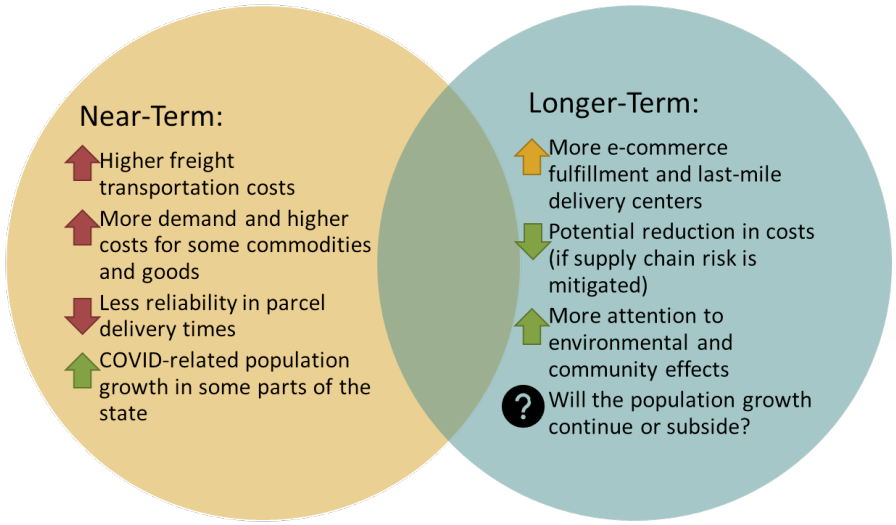
Source: BETA Technologies

paper "shortages" were reported when demand instantly shifted from institutional and commercial customers (e.g., public places, schools, and office building restrooms) to consumers seeking product to purchase and use in their homes. This change in demand also changed the distribution of product and logistics between two different supply channels. In short, the product was in the wrong logistics pipeline, thus giving the consumer the impression of a supply shortage.

The pandemic resulted in a decline in business for many goods-producing and freight companies in Vermont. Milk producers who developed products consumed in public schools lost a large portion of their business when schools closed. Food product manufacturers and distributors that serve restaurants, hotels, and other businesses that rely upon tourism lost revenue when visitors stayed home.

The economic recovery from the pandemic has been uneven, when viewed by the effect on employment of high-wage versus low-wage workers, and by industry sector. Transportation costs are high and impacting the cost of goods businesses and consumers pay. While Vermont observed some growth in population during the pandemic, it is uncertain if that growth will continue long-term, or if some will return to major metropolitan areas. A summary of these, and other near- and long-term economic effects is shown in Figure 7.1.

FIGURE 7.1 NEAR-TERM AND LONG-TERM EFFECTS OF THE COVID-19 PANDEMIC ON FREIGHT

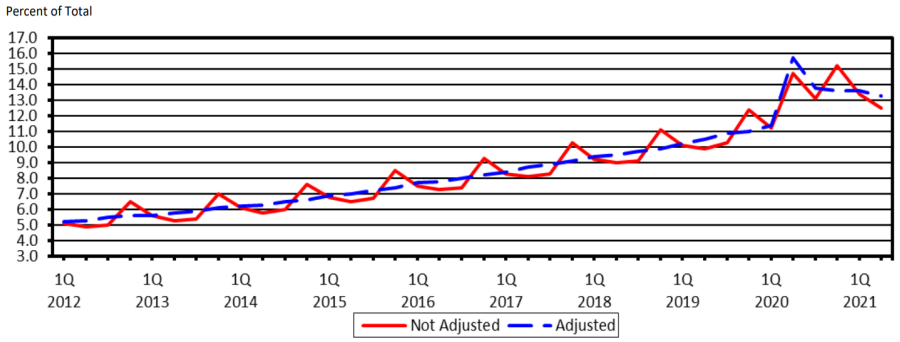


Vermont needs to monitor population and demographic trends, economic and logistics trends, and, if resources allow, develop more advanced modeling and forecasting capabilities to anticipate the potential effects of various future scenarios on freight demand in the state.

E-Commerce and Last-Mile Delivery

E-commerce is typically defined as the processing of customer orders electronically, using the Internet, and shipment and delivery of the ordered products to the customer's specified location. Growth in online sales has widely outpaced overall retail sales growth. Between the fourth quarter of 1999 and the second quarter of 2021, quarterly e-commerce sales increased by an average of 20% year-over-year, compared to a pace of just 3% for total retail sales. As a result, e-commerce accounts for about 13% of total US retail sales as of the 2nd quarter of 2021. Figure 7.2 shows the growth trend in e-commerce as a percent of total retail sales from 2012 through the 2nd quarter of 2021.

FIGURE 7.2 E-COMMERCE AS PERCENT OF TOTAL RETAIL SALES, 2012-2021



Source: "Quarterly Retail E-Commerce Sales, 2nd Quarter 2021," U.S. Census Bureau.

E-commerce has altered consumer expectations and demands for rapid, time-definite delviery, and retailers and logistics companies have been developing more robust networks of distribution and fulfillment centers, cargo vans and other delivery vehicle fleets, and information systems to support a logistics network that meets these growing demands.

Looking forward, **e-commerce is likely to continue increasing its share of retail sales for the foreseeable future**. In addition, the "reverse logistics" flow of unwanted items that consumers return places demands on parcel carriers and retailers' warehousing capacity. The potential growth in orders (and returns) is likely to result in many more delivery vehicle trips and potential issues with parking and loading activities, particularly in town centers and urban areas. Use of emergingtechnologies, including robots, drones, and/or curb parking management technologies could address some of these potential issues.

Vermont needs to acquire more data and forecasting capacity in order to estimate the potential effects of e-commerce delivery trips on the performance of the highway system, town roads, emissions, and the economy.

FIGURE 7.3 E-COMMERCE PACKAGES BEING DELIVERED

Cross-Border Issues

Several construction projects are underway or anticipated on I-89 at Highgate Springs, and its continuation into Canada as Autoroute 35. These construction activities, which are projected to be completed around 2025, will affect vehicular mobility throughout the region, particularly for cross-border traffic.

Increases in processing time, lane/roadway closures, compromised roadway geometry, and detours will likely lead to periods of extended congestion at POEs as well as impact alternative state and Interstate routes, including I-91 at Derby Line VT and I-87 at Champlain, NY. **VTrans should continue with a strong voice to coordinate activities among the involved parties, and undertake mitigating actions if needed.**

In an increasingly competitive freight rail environment, Class I railroads (the largest railroad companies in North America) are challenging each other to gain competitive advantages in their respective Canadian and U.S. markets. These competitive developments could affect the volume of freight and the

level of service offered to rail shippers in Vermont and result in some shifts of freight shipments from rail to truck or vice versa.

Through multi-state and cross-border forums such as the Northeast Association of State Transportation Officials (NASTO) and the Eastern Border Transportation Coalition (EBTC), **Vermont should work with other states and Canadian provinces in the region to anticipate and coordinate efforts that support or expand freight rail service, intermodal and transload terminal development, and truck and rail traffic associated with those developments.**

FIGURE 7.4 HIGHGATE SPRINGS PORT OF ENTRY

Truck Size and Weight Permitting Harmonization

The maximum size and weight of trucks that can travel on highways in Vermont are determined by a combination of federal and state laws and enforcement policies. Vermont's size and weight laws are enumerated in Title 23 of the Vermont Statutes.[xxiii]

While the Federal weight limit (gross vehicle weight) on Interstate highways is 80,000 lbs. nationally, Vermont and Maine were parts of a pilot study in 2010 that aimed to study the effects of higher weight limits on Interstates. As part of that program the weight limit on Vermont Interstate highways was effectively increased to 99,000 lbs. on 6 axles, with an annual permit**. This pilot provision equalized the weight limit on Interstate and non-Interstate Vermont highways.**[xxiv] As part of the Moving Ahead for Progress in the 21st Century (MAP-21) Act, the pilot program was **extended through December 31, 2031.**[xxv] Because the pilot program's extension is not widely documented outside of MAP-21 and contemporary news articles, **there is often confusion, even within the motor carrier industry and other transportation practitioners, regarding the effective legal limits on interstate highways in Vermont.**

Vermont's highway weight limits are relatively well-coordinated with those of neighboring states, with slight variations in maximum weights on non-Interstate highways and exemptions.

Vermont, New Hampshire, Massachusetts, Maine, and Rhode Island formed the New England Transportation Consortium (NETC), which developed a common approach to issuing multi-state permits for the movement of non-divisible loads. The multi-state agreement helps to streamline the process of applying for and issuing permits for oversize and overweight loads in the New England region. However, the program is expected to expire in 2022.

Working with other New England states and with New York could further streamline the permitting process, improving administrative performance and reducing costs to carriers and shippers.

Freight Workforce

The transportation and logistics sector is facing some critical workforce challenges (explained in further detail in Tech Memo 2) including:

- Many jobs in the transportation and goods movement industries are considered "middle skill" jobs that rely on experience and knowledge that is most effectively gained in the work environment or in apprenticeship programs that simulate the work environment.

- The motor carrier and railroad industries have been reporting labor shortages for many years, due to limited growth in earning potential, long and often irregular working hours, time away from home, and other factors.

- The median age of the workforce in these positions is quite high, suggesting retirements are and will continue to contribute to the attrition.

There are a number of workforce-related programs in Vermont that focus on freight-related occupations, including several training and continuing education programs for careers in manufacturing and/or logistics. In addition, the Vermont Department of Labor Workforce Development Division operates 12 regional offices (Career Resource Centers) which provide broader help for job-seekers across a number of industry areas. A formal apprenticeship program is also available with freight-related industries like advanced manufacturing and construction identified as promising career areas.[xxvi]

Consistent with the National Freight Strategic Plan strategic goals, **Vermont should prepare for the future by supporting the development of workforce capabilities that improve freight system performance.**[xxvii]

A policy initiative that includes **reinforcing connections between private sector industry, educational institutions across Vermont, and workforce organizations** can help to ensure Vermont has the workforce to meet future industry needs.

Climate Change and Resiliency

Emissions

The transition of truck and locomotive engines from diesel to electric or other alternative fuel power, could substantially reduce the GHG emissions associated with freight transportation. Such a transition would also support goals of:

- Vermont's **Climate Action Plan**[xxviii], including:
    - Reduce greenhouse gas emissions from the transportation, building, regulated utility, industrial, commercial, and agricultural sectors;
    - Achieve net zero emissions by 2050 across all sectors;
    - Build and encourage climate adaptation and resilience of Vermont communities and natural systems.

- Vermont's **Comprehensive Energy Plan**[xxix], which includes goals and strategies aimed at reducing energy consumption and increasing the proportion of renewable energy in the transportation sector.

The **Climate Action Plan** (CAP) includes the following freight-related strategies which are hereby incorporated in the Freight Plan:

- P. 70 and p.82 of the CAP detail a pathway to **lowering the carbon intensity of fuels in the heavy-duty vehicle sector** (mid-sized and heavy-duty trucks and busses). This pathway includes electrification and the charging infrastructure to support the electrification of medium-to-heavy duty vehicles, as well as development and future

deployment of hydrogen fuel-cell vehicle technology, which is viewed as another fuel-switching pathway for medium and heavy-duty vehicles.

- P.83 of the CAP includes a priority action to **Adopt California Air Resources Board Advanced Clean Trucks Rule** (an increasing percent Zero Emission Vehicle (ZEV) sales requirement for manufacturers), Low NOx Omnibus Rule (includes a more stringent NOx emission standard and lengthened useful life and warranty), and Phase II Greenhouse Gas (GHG) Rule for Truck Trailers beginning no later than Model Year 2025. Recommended future actions for consideration by the state include using federal or other ensuing program dollars to fund purchase incentives for medium to heavy duty vehicles. In 2020, Vermont joined 15 states and the District of Columbia in signing a memorandum of understanding (MOU) to accelerate electrification of the medium- and heavy- duty bus and truck market. The agreement calls for 100% of all new medium- and heavy-duty vehicle sales to be zero emission vehicles by 2050.[xxx]

- Finally, p.84 of the CAP includes a priority action **to fund programs that incentivize electric auxiliary systems**, such as (but not limited to) hybrid-electric bucket trucks and electric transport refrigeration units and programs that incentivize installation of electrified parking spaces in truck loading/unloading zones.

In addition, shifting electric power generation to more sustainable sources throughout the country (Vermont generates about 100% of its electricity from renewable sources, a larger share than any other state), is also an important step toward reducing freight-sourced emissions.

Deployment of electric and alternative-fuel heavy duty trucks is primarily limited to vehicle fleets that travel short-distances, such as government vehicles and delivery vehicles. Other short-distance moves, such as raw milk moving from farms to processing facilities could soon follow.[xxxi] These vehicles would be charged or refueled at their home location each night.

To transition longer-distance fleets to electric or other alternatives, an expansion of truck-accessible charging or fueling stations would be needed throughout Vermont, other states, and Canada.

Since 2016, the Federal Highway Administration (FHWA) has been gathering input to designate a national network of alternative fuels and electric charging infrastructure.[xxxii] While most of the infrastructure presently in the designated corridors primarily accommodate passenger automobiles, some of the infrastructure may be able to accommodate heavy duty trucks, **There are considerable gaps in heavy duty truck access nationwide, however, and additional efforts are necessary in order to build out a network of alternative fuel and electric charging stations to facilitate the transition of heavy duty truck fleets away from diesel.**

In the meantime, freight rail requires substantially less energy and emits fewer tons of greenhouse gases (GHGs) than trucks. **Freight trains can move a ton of freight more than 470 miles on one gallon of diesel fuel, which is 3-4 times as fuel-efficient as trucking.** [xxxiii]

Logistics practices to make product placement and distribution as efficient as possible, are actions that could bring the added benefit of reducing GHG emissions. Such practices include:

- Producing more goods domestically in order to mitigate risk in light of global logistics challenges observed during the COVID-19 pandemic; and

- Building tiered distribution systems, in which smaller distribution centers located closer to population centers are used to distribute shipments to consumers, instead of distributing from a small number of very large distribution facilities that may be located farther away. This trend primarily serves the delivery time and competitive interests of the shipper, but could potentially result in a delivery system that emits less GHG.

Consumers can also play a role in reducing freight emissions by researching the sources of products they buy, and by adjusting online shopping habits. As convenient as next-day shipping services may seem, placing multiple such orders over the course of a week or two results in multiple shipments and multiple delivery trips. Filling a "virtual shopping cart" over time, and placing an order when several items are gathered could result in more efficient packaging and fewer delivery trips, thus reducing the net GHG emissions effect of the purchase(s). Buying only the items the consumer intends to keep, instead of multiple items (different sizes, colors, etc.) with the intention of return-shipping items back to the seller also helps to reduce the number of vehicle trips and associated emissions.[xxxiv]

As Vermont implements strategies to reach **Climate Action Plan** and **Comprehehensive Energy Plan** goals, it will be important to develop freight-oriented performance measures to track progress in reducing freight transportation's impact on air quality, energy-use, and GHG emissions.

Resiliency

Vermont's multimodal freight transportation network is part of a larger regional and national system. Adding alternative routes and redundancy to the freight transportation network provides a resiliency benefit in the event that emergency conditions impact the availability of the roadway network or rail routes for travel, disaster response, or other immediate needs.

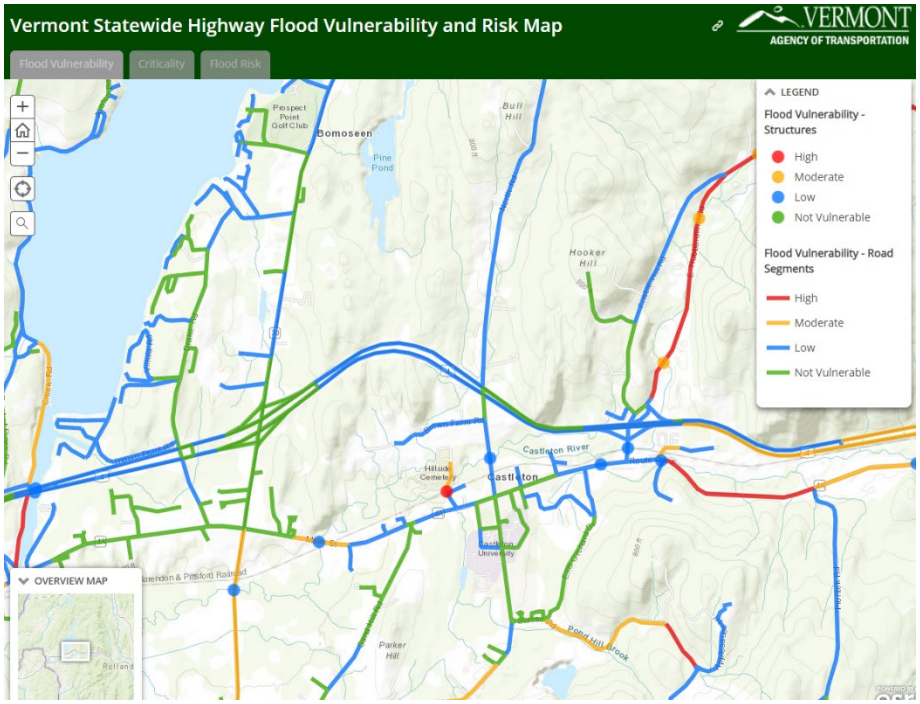
In the aftermath of disasters such as Tropical Storm Irene in 2011, the Vermont Roadmap to Resilience was created[xxxv] VTrans has also used the Moving Ahead for Progress in the 21st Century (MAP-21) Part 667 requirement as an opportunity to review data on roads and structures damaged in more than one major storm, establish strategic approaches, establish a Risk Management Leadership Team, and build partnerships with outside organizations such as the DEC Tactical Watershed Planners, Vermont Emergency Management (VEM), and regional planning commissions (RPCs).[xxxvi]

VTrans has also developed the Vermont Transportation Resilience Planning Tool (TRPT).[xxxvii] This online webtool quantifies the flood vulnerability and risk to transportation assets as well as considerations of how critical the road segment is to transportation based on relative travel time impact. Phase 3 work that is wrapping up in 2021 will complete analysis for the whole state. A recommendation of the 2021 State Rail Plan is to conduct similar analysis for the rail network within the next five years.

Based upon the data available in the TRPT in 2020, approximately 3% of the structures (bridges) in Vermont and 18% of Vermont's road miles are highly vulnerable to flooding.

VTrans should continue to work with ANR, railroads, emergency personnel, and other relevant stakeholders to identify and address threats to critical freight infrastructure, and to ensure adequate preparedness and response capabilities.

FIGURE 7.5 SCREEN CAPTURE – VERMONT STATEWIDE HIGHWAY FLOOD VULNERABILITY AND RISK MAP



Source: *https://vtrans.maps.arcgis.com/apps/MapSeries/index.html?appid=f8a6527cf53e45a8896b494848b21e4f*

Freight as a "Good Neighbor"

Moving freight, by all modes, is critical to supporting the State's economy and providing residents with necessary goods. However, freight movement often raises concerns in communities, including safety and security, noise and air pollution, and potential land use compatability issues. Working with representatives for the freight modes to encourage that they act as "good neighbors" can help alleviate some of these concerns and reduce tensions. The national exemption of rail from local control raises some particularly tricky elements of this issue.[xxxviii]

FIGURE 7.6 TRUCK TRAFFIC ON ROUTE 22A IN VERGENNES

Source: Google Maps

Nationally, efforts to help people concerned about freight impacts and representatives for freight businesses work together where they can have been grouped into an approach of "freight as a good neighbor."[xxxix] Outreach efforts for this Plan identified three particular areas where a "good neighbor" approach could help improve the acceptance of transport of freight:

- **Truck Routes and Community Impacts.** State highways and other routes used by trucks pass through many of Vermont's town centers, urban areas, and other communities. Implementing safety improvements; developing by-pass roadways; governing the hours of operation; prohibiting compression release engine braking (also known as "Jake braking"); and/or other traffic calming measures could address many concerns.

- **Construction Activities.** Staging and temporary storage of construction material to support maintenance and construction projects is also a concern in some Vermont communities**.** Railroads or rail customers, in some instances, and where feasible, may consider alternative storage or staging plans in order to alleviate community concerns as well as enhanced education and outreach.

- **Improving communication.** Often the public and public sector agencies and officials are unaware of the positive steps freight operators take to address community and environmental issues, Better communication tools could include website contents that provide explanations and insight, and potentially an annual update workshop on progress on the rail and freight plans.

- **Wildlife habitat preservation.** Much of Vermont is forested and the state is riddled with rivers and streams with bridge crossings throughout. VTrans biologists are responsible for determining potential impacts from transportation projects on regulated natural resources (wetlands and watercourses; fish and wildlife habitat; rare, threatened, and endangered species and agricultural soils). Biologists are required to assess projects impacts and suggest avoidance, minimization measures on these resources and propose compensation measures for adverse impacts. In addressing wildlife and wildlife habitat impacts, the Agency of Transportation Environmental Section is involved in project review at four touch points – resource ID during Scoping, NEPA at Conceptual Plans, Permitting at Preliminary Plans, and NEPA Re-evaluation when needed for scope changes or timing. Wildlife and other natural and cultural resources impacts are also considered in corridor planning. This allows for very early identification of important resources and allows the designers to be aware and incorporate resource avoidance, minimization, and mitigation considerations into designs most effectively and efficiently. The Agency also conducts research to understand and predict wildlife movements and patterns so that we can be most strategic with resources. Examples of design considerations include bridge and culvert sizing, wildlife shelves, stone infilling to provide walkable surfaces for larger mammals, turtle crossing features on rail tracks, amphibian and reptile funneling walls and crossings, and more. VTrans partners with the VT Agency of Natural Resources in considering these issues and in designing solutions. VTrans has adopted design standards such as creating wildlife shelves (filling in the crevices between boulders and dirt) under bridge overpasses. Aquatic organism passage assessments are conducted during culvert replacement projects. Strategies such as these have shown positive results in retaining wildlife connectivity while maintaining the freight transportation system.

- **Equity and Environmental Justice.** The Agency is currently developing a Transportation Equity Framework, through which all aspects of the transportation planning, project and program development, and implementation will be evaluated. This report will provide a strategic plan to move the Agency forward in coordination with and support of Executive Order 13985 and the Justice40 initiative. The findings and strategies identified in the Transportation Equity Framework will be incorporated into all work conducted by the Agency. Further supporting Vermont's efforts to create more equitable and just environment for all including the transportation system, the State of Vermont Legislature recently passed an Environmental Justice law. The law creates two advisory groups: one of staff from ten different state agencies including the Agency of Transportation to coordinate environmental justice work, and one of Vermonters from environmental justice communities to review and give feedback on policy decisions and climate solutions.

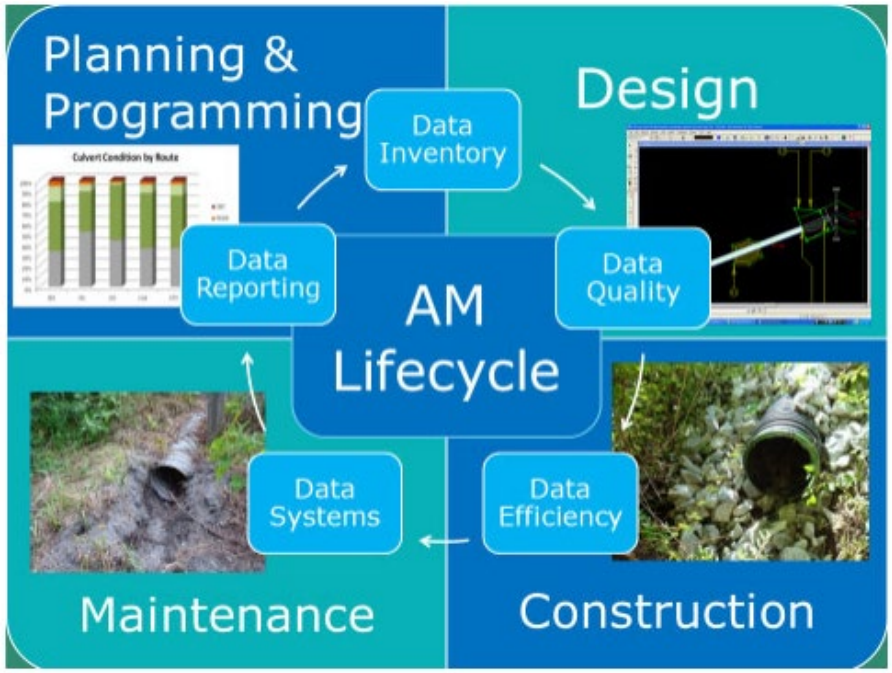
Asset Management

Asset management helps VTrans maintain its roads, bridges, and other transportation facilities in a cost-effective way by:

- Ensuring VTrans is making the right level of investment in the right asset at the right time;
- Making preventive maintenance a priority;
- Integrating efforts throughout VTrans, including communication, business practices, and projects; and
- Investing strategically toward an efficient, cost-effective, sustainable transportation system.

Vermont is continuing to improve its approach to managing data by implementing the Vermont Asset Management Information System (VAMIS) that will help store, analyze, and use data across highway, rail, aviation, transit modes.[xl]

FIGURE 7.7 ASSET MANAGEMENT LIFE-CYCLE CONCEPT



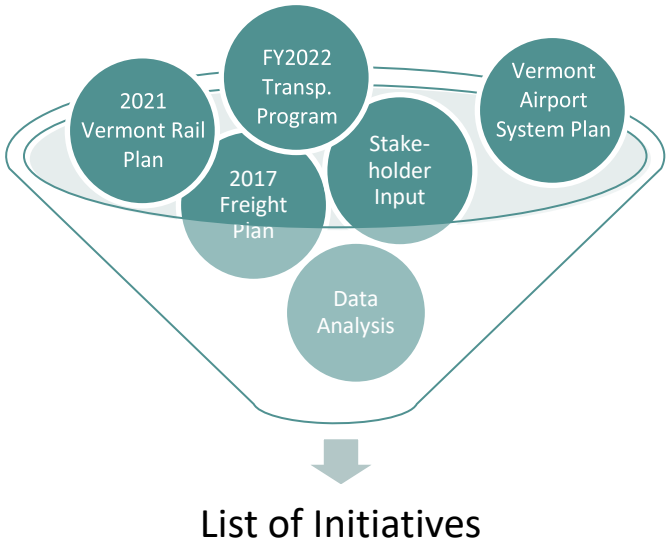
Source:
https://vtrans.vermont.gov/sites/aot/files/planning/documents/2018%20Final%20VTrans%20TAMP.pdf

7.3 List of Initiatives

A set of initiatives was developed to advance multimodal freight system vision and goals detailed in Chapter 3, and to address the needs and issues identified in sections 7.1 and 7.2.

As shown in Figure 7.8 , in addition to the analysis of needs and issues, initiatives were also drawn from outstanding recommendations from the 2017 update of the Vermont Freight Plan, 2021 Vermont Rail Plan, 2021 Vermont Airport System Plan, and relevant projects listed in the FY 2022 Vermont Transportation Program. Initiatives were also developed from or inspired by input from stakeholders gathered from the Freight Plan Advisory Committee, stakeholder interviews, Vermont Freight Forums, and a web map tool that allowed users to input comments on existing conditions or provide information on proposed initiatives.

FIGURE 7.8 SOURCES FOR FREIGHT PLAN INITIATIVES



The initiatives are the range of actions that would support and enhance multimodal freight transportation in Vermont. These initiatives would need to be advanced by a range of stakeholders in addition to VTrans.

There are 40 initiatives grouped into 7 thematic packages. Each package aims to achieve objectives that support the Vermont Freight Plan goals described in Chapter 3. The packages and the objectives of each are listed in Figure 7.9.

FIGURE 7.9 THEMATIC INITIATIVE PACKAGES AND OBJECTIVES

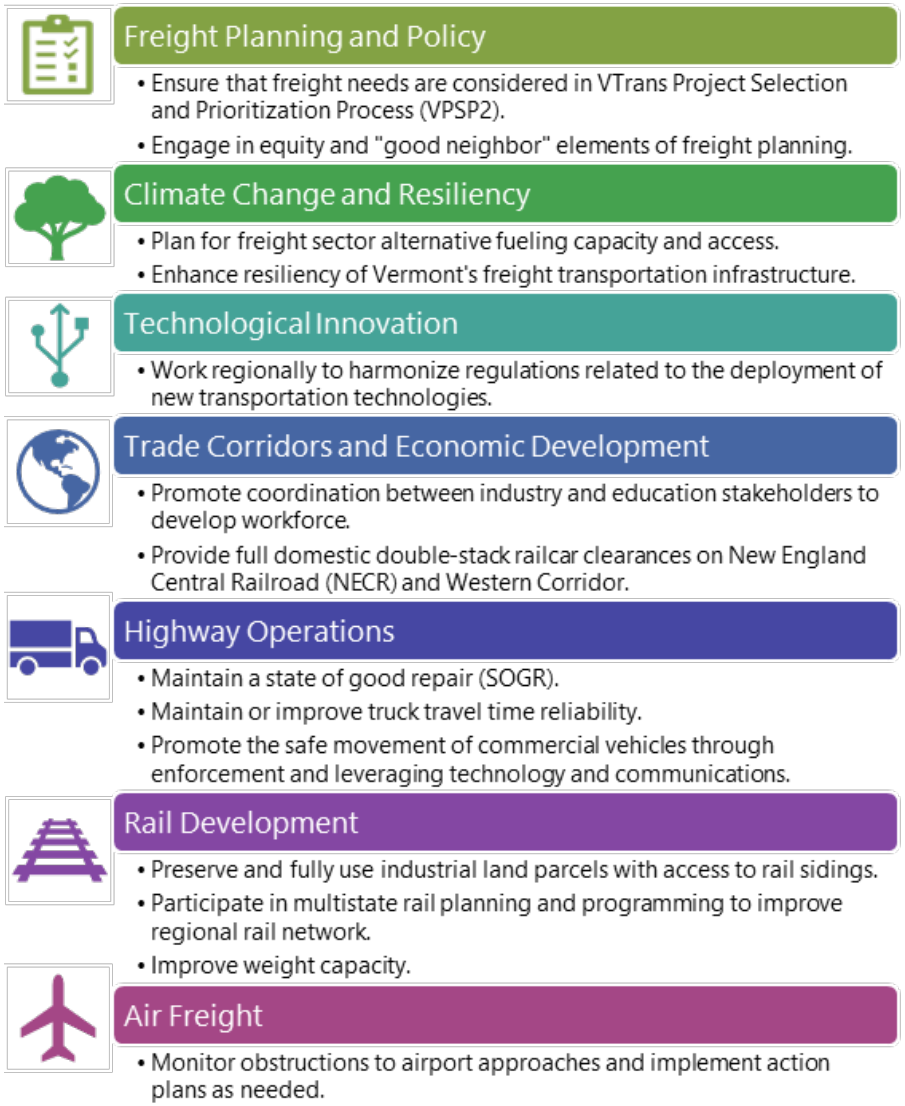
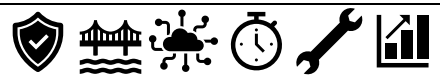


Table 7.3 lists and categorizes the initiatives by package, and indicates which of the six Vermont Freight Plan goal(s) each initiative supports. The following icons represent the Vermont Freight Plan goals in Table 7.3.

FIGURE 7.10 VERMONT FREIGHT PLAN GOALS INDICATED IN THE TABLE OF INITIATIVES

Each of the initiatives in Table 7.3 could be implemented by advancing one or more discrete capital projects, policy actions, or planning and coordination activities.

TABLE 7.3 LIST OF FREIGHT PLAN INITIATIVES

Package	Initiative	ID#	Freight Plan Goal(s) Supported by the Initiative
Freight Planning and Policy	Participate in VTrans Project Selection and Project Prioritization Process (VPSP2) working group to ensure that freight needs are taken into appropriate consideration.	3	
	Engage in equity and "good neighbor" elements of freight planning including evaluating impacts and benefits to communities; participate in the Vermont Section 41 Transportation Equity Framework study and Federal equity initiatives; build collaboration across freight planning and climate change/resilience planning.	4	
	Identify up to two freight performance measures per mode to track and incorporate into VTransparency dashboard as appropriate. Freight performance measures help to identify needed improvements and monitor their effectiveness.	50	
	Monitor the evolving freight rail corporate landscape and weigh in on industry activities as appropriate, including through Surface Transportation Board proceedings.	11	
	Assess post-COVID-19 recovery scenarios and provide analysis for decision-making. If resources allow, enhance travel demand modeling tools, develop freight forecasting and scenario planning tools, and/or other analytical datasets and models.	8	
	Continue to engage freight stakeholders in the public and private sectors through communications and occasional meetings or webinars. These efforts should focus on implementing the Freight Plan and Rail Plan initiatives and assessing progress.	55	
Climate Change and Resiliency	Support the recommendations and strategies within the Vermont Climate Action Plan and Vermont Comprehensive Energy Plan to slow climate change and its negative effects on freight movement. Pursue supportive grant opportunities such as to fund low- and zero-carbon fuel/propulsion technologies for all modes, and to promote increased use of freight rail. Additionally, promote and encourage the use of last-mile delivery strategies such as package delivery micro-hubs, and light electric vehicles or cargo-bikes in appropriate contexts such as compact developments.	12	
	Continue to coordinate with multistate organizations and Canadian counterparts to develop a strategic plan for expanding electric charging and other alternative fueling capacity in the region with attention to freight vehicle access and capacity needs.	13	

Package	Initiative	ID#	Freight Plan Goal(s) Supported by the Initiative
	Promote investments that enhance resiliency of Vermont's freight transportation infrastructure against flooding and other climate change effects, building upon Vermont's Transportation Resilience Planning Tool (TRPT) and MAP-21 Part 667 Reducing Repeat Damage efforts. Expand the road-focused TRPT to rail and use results to develop future initiatives.	14	
	Educate consumers about e-commerce purchasing behaviors that improve efficiency and reduce greenhouse gas (GHG) emissions, including ordering more goods less frequently and reducing return shipments. Promote the development and implementation of emerging technologies, including robots, drones, and/or curb parking management technologies to mitigate impacts of e-commerce delivery growth.	15	
Technological Innovation 	Support technological innovation in freight transportation and supply chain logistics by leveraging partnerships with research organizations such as Transportation and Climate Initiative, working with private sector innovators, and/or directing state and federal grants to support testing and/or implementing innovative technologies.	16	
	Implement virtual weigh stations (VWS)/ weigh-in-motion (WIM) system, as recommended in the VTrans Intelligent Transportation Systems (ITS) Plan.	17	
	Consider replacing portable Dynamic Message Signs (DMS) in key freight movement locations with permanent DMS as recommended in the VTrans ITS Plan.	53	
	Explore the possibility of a "trucker mode" or a trucking module for the New England 511 and/or subsequent versions of it. Include existing truck parking locations and technologies to communicate availability of open spaces.	18	
	Work with neighboring states and Canadian officials to harmonize regulations related to deployment of new technologies in transportation applications including but not limited to Connected and Autonomous Vehicle (CAV) technologies.	19	
	Complete computer/IT upgrade at Vermont DMV. Develop permitting technologies including online permit portal improvements and digitization of permit databases to support planning, enforcement, and safety activities. Build GIS maps from the database to serve ePermitting customers in their routing and travels.	54	
	Expand use of Closed Circuit Television (CCTV) cameras to monitor and more quickly respond to transportation system performance issues as recommended in the ITS Plan. CCTV cameras can be placed near critical infrastructure or near areas of recurring congestion to assist in systems operations.	56	

Package	Initiative	ID#	Freight Plan Goal(s) Supported by the Initiative
Trade Corridors and Economic Development 	Provide full domestic doublestack railcar clearances on New England Central Railroad (NECR) and Western Corridor as part of the international freight network that benefits Vermont.	20	
	Participate in cross-border working groups and related discussions of Quebec Autoroute 35 between I-89 in VT and Montreal and improvements to Highgate Springs POE, including coordination with officials in New York, Quebec, Canada Border Services Agency, General Services Administration, and U.S. Customs and Border Protection to mitigate upcoming construction impacts.	21	
	Work with US and Canadian border agencies to improve processing time for cross-border freight, including potential technological and pre-clearance solutions.	22	
	Address Oversized/Overweight truck permitting inconsistencies in the Northeast, including discussions regarding New York State joining the New England Transportation Consortium or other reciprocal permitting arrangements.	57	
	Promote coordination between industry and education/workforce development stakeholders (Agency of Commerce and Community Development [ACCD], educational institutions, etc.) to ensure an adequate-sized workforce that is prepared for current and future freight industry needs.	24	
	Maintain sufficient roadway access to logistics clusters (including industrial parks, distribution centers, and other substantial freight-generating facilities) through maintenance and upgrades where appropriate.	59	
Highway Operations 	Maintain a state of good repair (SOGR) of pavement, bridges, and other assets on highways across the state to support safe and efficient freight operations; consider freight needs in updates of the Transportation Asset Management Plan (TAMP) and related processes.	25	
	Make investments that maintain or improve truck travel time reliability on National Highway System routes and other key freight highway corridors, including managing the effects of winter weather events on truck travel time reliability.	26	

Package	Initiative	ID#	Freight Plan Goal(s) Supported by the Initiative
	Keep highways open and safe through prompt and effective snow removal consistent with AOT's "safe-roads-at-safe-speeds" policy, incident management and prompt clearance.	27	
	Continue to enhance how AOT minimizes travel delay associated with highway improvement and maintenance projects.	28	
	Promote the safe movement of commercial vehicles including through enforcement considerations consistent with Vermont's Commercial Vehicle Safety Plan and leveraging VTrans Operations and Safety Bureau capabilities to improve effectiveness and efficiency of these efforts.	31	
	Monitor Vermont's truck parking capacity and utilization, and develop strategies to ensure sufficient, safe truck parking is available across the state.	30	
	Promote communication of truck size and weight limits and permitting requirements to public and private entities, including the motor carrier industry; in particular communicate that heavy trucks (99,000 lbs. on 6 axles) are allowed on Vermont and Maine interstate as well as appropriate state highways with annual permit as part of the extended Federal Heavy Truck Pilot Program.	58	
Rail Development	Upgrade all State-owned freight rail lines to be able to efficiently carry the industry-standard railcar weight of 286,000 lbs. (286k).	32	
	Maintain trackage to allow freight travel speeds of 25 mph (FRA Track Class 2) or faster.	33	
	Preserve and fully use industrial land parcels with access to rail sidings in order to maintain a sustainable inventory for freight rail and transload uses.	34	
	Participate in multistate rail planning and programming to improve the regional rail network.	38	

Package	Initiative	ID#	Freight Plan Goal(s) Supported by the Initiative
	Maintain and modernize freight rail yards.	41	
Air Freight 	Maintain airport runway surfaces, approaches, and instrumentation in state of good repair.	42	
	Evaluate potential need for more advanced instrumentation at some state airports if/when opportunities to expand air traffic and cargo may arise.	43	
	Continuously evaluate the status of Runway Safety Areas (RSA) and Runway Protection Zones (RPZ) and develop action plans to remedy any deficiencies.	44	
	Continuously evaluate for obstructions to airport approaches; develop action plans to remedy any deficiencies and to avoid potential future obstructions. Prepare and distribute educational materials for use by municipalities in approach zones.	45	
	Seek federal funding to replace the aging weather observation stations at State-owned airports. Incorporate weather data gathered at airports into New England 511 to benefit freight movement by all modes.	46	

8.0 IMPLEMENTATION PLAN

Implementing the initiatives identified in the Vermont Freight Plan will require the participation of federal, state, regional, and local agencies as well as the private sector. Many of the initiatives also require participation from neighboring states and Canada. Participation could include eduction and outreach efforts, advocacy, coordination, and/or contributing funds to support the implementation of initiatives.

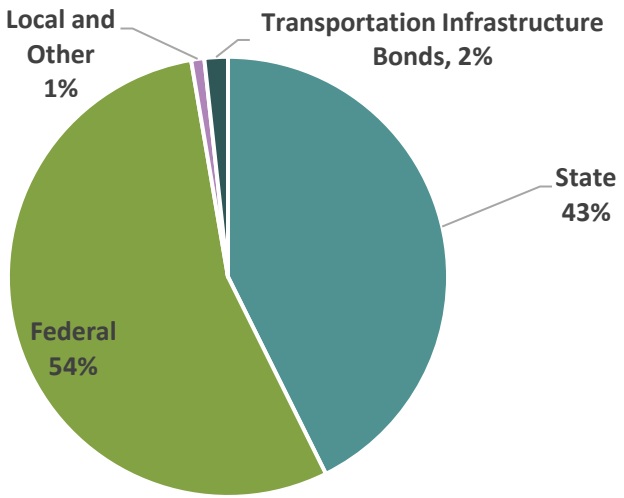
8.1 Funding Freight Transportation Improvements

Funding for freight transportation projects comes from a variety of federal, state, local, and private sources. While few funding programs are specifically reserved for freight, a variety of transportation funding programs can be applied to transportation projects that benefit all users, including freight.

Freight projects may be eligible for state and federal funding from a variety of programs, depending upon the scope of the project. As described under the "Federal Funding" heading below, the Infrastructure Investment and Jobs Act (IIJA) of 2021 has expanded the eligibility requirements in some funding programs, allowing states more flexibility in applying federal funds to various types of freight projects.

As Figure 8.1 shows, approximately 53% of Vermont's Fiscal Year 2022 Transportation Program is funded by federal aid and grants. About 41% is funded by the State, 1.6% is funded through Transportation Infrastructure Bonds, and about 1% is funded from local and other sources.

FIGURE 8.1 VERMONT'S FISCAL YEAR 2022 TRANSPORTATION PROGRAM BY FUNDING SOURCE



Source: VTrans Fiscal Year 2022 Transportation Program

Federal Funding

Federal Aid is allocated to VTrans from several Federal agencies. VTrans receives reimbursement on freight system projects from FHWA through several programs, including:

- The **National Highway Freight Program (NHFP)** can be applied to infrastructure and operations enhancement projects on the National Highway Freight Network (NHFN). Vermont's allotment from the NHFP is approximately $7.6M per year, on average. The FAST Act requires that state freight plans include an investment program for the NHFP funds over a five-year period. Vermont's NHFP Investment Program is in Section 8.4. The Infrastructure Investment and Jobs Act (IIJA) of

2021 allows states to spend a larger proportion of available funding (up to 30%) on multimodal projects.

- The **Railway-Highway Crossings Program (Section 130)** provides funds for the elimination of hazards at grade crossings.
- The **National Highway Performance Program (NHPP)** provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a State's asset management plan for the NHS.
- The **Surface Transportation Block Grant Program (STBG)** provides flexible funding to best address State and local transportation needs. It can be applied on most highway and rail facilities.
- **Off-System Bridge** funding is used for bridges that see less traffic, in order to expand high-quality system access.
- The **Highway Safety Improvement Program (HSIP)** is eligible for use on safety improvements.

Federal Discretionary Grant Programs

There are various federal discretionary grant programs that fund specific types of projects that relate to or support freight movement. These programs include:

The **Infrastructure for Rebuilding America (INFRA)** program is administered by USDOT. States, regional agencies, and local governments may apply for INFRA grants. Eligible projects include a variety of freight highway, rail, highway-rail grade crossing, or other intermodal freight projects, subject to eligibility requirements.[xli] USDOT issued $905 million in INFRA grants in 2021. The Infrastructure Investment and Jobs Act (IIJA) of 2021 increased the funding for the INFRA grants program to a total of $8 billion over the next five years, and increased the maximum proportion of funding available to non-highway projects from 11% to 30%.

Rebuilding American Infrastructure with Sustainability and Equity (RAISE) provides opportunity for the DOT to invest in road, rail, transit and port projects to achieve national objectives. This grant program replaces the Better Utilizing Investments to Leverage Development (BUILD) and Transportation Investment Generating Economic Recovery (TIGER) grants Congress has dedicated nearly $8.9 billion for twelve rounds of National Infrastructure Investments to fund projects that have a significant local or regional impact.[xlii] Vermont has been successful in securing TIGER and BUILD grants in the past.

The **Airport Improvement Program (AIP)** is administered by the FAA. The FAA provides funds to airport sponsors (cities, towns, counties, port authorities, states, etc.) for improvements that are part of the National Plan of Integrated Airport Systems. Twelve of Vermont's 16 airports qualify for that program.

The IIJA provides up to $845 million per year in a new competitive grant program, the **Railroad Crossing Elimination Program**, for projects that support passenger and freight mobility, efficiency, and safety.

State Funding

State funds are appropriated from the State Transportation Fund. The State Transportation revenues are derived primarily from three sources: the gas tax, the purchase and use tax, and Department of Motor Vehicle fees.

Vermont also used Transportation Infrastructure Bonds to fund some capital investments. Approximately $11.4 million in capital investments were funded by these bonds in the Fiscal Year 2022 Transportation Program.

State funds also support technical assistance and grants to municpalities, including the Vermont Better Roads Grant program, Municipal Highway and Stormwater Mitigation Program, and the Municipal Grants in Aid Program.[xliii]

Other Funding

Other sources of funding for freight transportation initiatives include, but are not limited to, private entities and local governments.

8.2 Implementing the Vermont Freight Plan Initiatives

The initiatives listed in Chapter 7 include capital investments, policies, and programmatic initiatives that will help Vermont to achieve its goals and advance National Freight Strategic Policy and National Highway Freight Program goals.

Implementing the initiatives will require the cooperation of other state agencies, Federal agency partners, local governments, agencies and organizations in neighboring states and Canada, and the private sector.

Progress on Freight Plan impementation for VTrans-led initiatives will in large-part be captured through annual work-program development and reporting, including the FHWA SP&R work program, and ultimately the next revision of the Freight Plan.

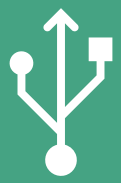
Table 8.1 lists the Freight Plan initiatives, and includes some guiding parameters for implementation. A description of the attributes of the table follows:

- **Key proponents** are agencies or other stakeholders who are proposing, recommending, or otherwise supportive of the advancement of the initiative.
- **Funding sources** include state, federal, or other potential sources of funding that could cover the expenses associated with implementing the initiative. Such expenses could include planning, engineering, construction, or staff time to manage policy initiatives.
- The **management** column lists the organizations that are most likely to lead the initiative through implementation;
- **Implementation Timeframe** is the approximate timing for when the initiative could be implemented. For many initiatives, preliminary steps (planning, engineering, stakeholder coordination, etc.) may begin in the near-term, but construction or other forms of implementation may take several years, or longer, to complete, depending upon the scope and complexity of the initiative. The timeframes listed in this column include:
    - "Short," which ranges from 0 to 5 years from the completion of this plan in 2021;
    - "Mid," which spans 5-10 years from the completion of this plan; and
    - "Long," which extends beyond 10 years.

TABLE 8.1 INITIATIVES IMPLEMENTATION TABLE

Package	Initiative	ID#	Key Proponents	Funding Sources	Management	Implementation Timeframe*
Freight Planning and Policy 	Participate in VTrans Project Selection and Project Prioritization Process (VPSP2) working group to ensure that freight needs are taken into appropriate consideration.	3	• VTrans	• VTrans staff time	• VTrans	Short (0-5 years)
	Engage in equity and "good neighbor" elements of freight planning including evaluating impacts and benefits to communities; participate in the Vermont Section 41 Transportation Equity Framework study and Federal equity initiatives; build collaboration across freight planning and climate change/resilience planning.	4	• VTrans; • Private sector; • RPCs and municipalities	• Private sector • State capital program; • Federal funds;	• Private sector; • VTrans; • RPCs and municipalities	Short (0-5 years)
	Identify up to two freight performance measures per mode to track and incorporate into VTransparency dashboard as appropriate. Freight performance measures help to identify needed improvements and monitor their effectiveness.	50	• VTrans	• VTrans staff time	• VTrans	Short (0-5 years)
	Monitor the evolving freight rail corporate landscape and weigh in on industry activities as appropriate, including through Surface Transportation Board proceedings.	11	• VTrans; • Private sector	• VTrans staff time	• VTrans; • Private sector	Short (0-5 years)
	Assess post-COVID-19 recovery scenarios and provide analysis for decision-making. If resources allow, enhance travel demand modeling tools, develop freight forecasting and scenario planning tools, and/or other analytical datasets and models.	8	• VTrans; • Private sector; • Federal agencies	• Federal funds; • Private sector; • VTrans staff time	• VTrans	Short (0-5 years)
	Continue to engage freight stakeholders in the public and private sectors through communications and occasional meetings or webinars. These efforts should focus on implementing the Freight Plan and Rail Plan initiatives and assessing progress.	55	• VTrans; • Private sector; • RPCs	• VTrans staff time	• VTrans	Short (0-5 years)

Package	Initiative	ID#	Key Proponents	Funding Sources	Management	Implementation Timeframe*
Climate Change and Resiliency 	Support the recommendations and strategies within the Vermont Climate Action Plan and Vermont Comprehensive Energy Plan to slow climate change and its negative effects on freight movement. Pursue supportive grant opportunities such as to fund low- and zero-carbon fuel/propulsion technologies for all modes, and to promote increased use of freight rail. Additionally, promote and encourage the use of last-mile delivery strategies such as package delivery micro-hubs, and light electric vehicles or cargo-bikes in appropriate contexts such as compact developments.	12	• VTrans; • VT Dept of Public Service; • VT ANR • Private sector	• Federal grant programs; • Staff time for VTrans, Dept of Public Service, ANR	• VTrans	Long (>10 years)
	Continue to coordinate with multistate organizations and Canadian counterparts to develop a strategic plan for expanding electric charging and other alternative fueling capacity in the region with attention to freight vehicle access and capacity needs.	13	• VTrans; • Neighboring states; • Multistate coalitions; • Canadian agencies	• VTrans staff time for coordination activities; Federal funds and private funds for development of fueling/charging infrastructure	• VTrans; • Neighboring states; • Multistate coalitions; • Canadian agencies	Mid (5-10 years)
	Promote investments that enhance resiliency of Vermont's freight transportation infrastructure against flooding and other climate change effects, building upon Vermont's Transportation Resilience Planning Tool (TRPT) and MAP-21 Part 667 Reducing Repeat Damage efforts. Expand the road-focused TRPT to rail and use results to develop future initiatives.	14	• VTrans	• Federal funds; • VT Capital Program; • VTrans staff time	• VTrans	Long (>10 years)
	Educate consumers about e-commerce purchasing behaviors that improve efficiency and reduce greenhouse gas (GHG) emissions, including ordering more goods less frequently and reducing return shipments. Promote the development and implementation of emerging technologies, including robots, drones, and/or curb parking	15	• VTrans; • VT Dept of Public Service; • VT ANR	• VTrans; • VT Dept of Public Service; • VT ANR	• VTrans; • VT Dept of Public Service; • VT ANR	Short (0-5 years)

Package	Initiative	ID#	Key Proponents	Funding Sources	Management	Implementation Timeframe*
	management technologies to mitigate impacts of e-commerce delivery growth.					
Technological Innovation 	Support technological innovation in freight transportation and supply chain logistics by leveraging partnerships with research organizations such as Transportation and Climate Initiative, working with private sector innovators, and/or directing state and federal grants to support testing and/or implementing innovative technologies.	16	• VTrans; • VT AoE; • Georgetown Univ.; • UVM(?); • Private sector	• Federal funds; • Private sector; • Research grants	• VTrans; • VT AoE	Mid (5-10 years)
	Implement virtual weigh stations (VWS)/ weigh-in-motion (WIM) system, as recommended in the VTrans Intelligent Transportation Systems (ITS) Plan.	17	• VTrans	• Federal funds; • VT Capital Program	• VTrans	Short (0-5 years)
	Consider replacing portable Dynamic Message Signs (DMS) in key freight movement locations with permanent DMS as recommended in the VTrans ITS Plan.	53	• VTrans	• Federal funds; • VT Capital Program	• VTrans	Mid (5-10 years)
	Explore the possibility of a "trucker mode" or a trucking module for the New England 511 and/or subsequent versions of it. Include existing truck parking locations and technologies to communicate availability of open spaces.	18	• VTrans; • Maine DOT; • New Hampshire DOT		• VTrans; • Maine DOT; • New Hampshire DOT	Short (0-5 years)
	Work with neighboring states and Canadian officials to harmonize regulations related to deployment of new technologies in transportation applications including but not limited to	19	• VTrans; • Neighboring state DOTs; • US & Canadian border agencies;	• VTrans staff time; • Staff time of other proponent agencies	• VTrans; • Neighboring state DOTs; • US & Canadian border agencies;	Mid (5-10 years)

Package	Initiative	ID#	Key Proponents	Funding Sources	Management	Implementation Timeframe*
	Connected and Autonomous Vehicle (CAV) technologies.		• Canadian transportation agencies		• Canadian transportation agencies	
	Complete computer/IT upgrade at Vermont DMV. Develop permitting technologies including online permit portal improvements and digitization of permit databases to support planning, enforcement, and safety activities. Build GIS maps from the database to serve ePermitting customers in their routing and travels.	54	• VT AOT-DMV	• VT AOT-DMV staff time	• VT AOT-DMV	Short (0-5 years)
	Expand use of Closed Circuit Television (CCTV) cameras to monitor and more quickly respond to transportation system performance issues as recommended in the ITS Plan. CCTV cameras can be placed near critical infrastructure or near areas of recurring congestion to assist in systems operations.	56	• VTrans;	• Federal funds; • State transportation funds	• VTrans;	Short (0-5 years)
Trade Corridors and Economic Development	Provide full domestic doublestack railcar clearances on New England Central Railroad (NECR) and Western Corridor as part of the international freight network that benefits Vermont.	20	• NECR/GW; • VTrans/VRS	• Federal funds; • Railroad funds	• Railroads; • VTrans	Long (>10 years)
	Participate in cross-border working groups and related discussions of Quebec Autoroute 35 between I-89 in VT and Montreal and improvements to Highgate Springs POE, including coordination with officials in New York, Quebec, Canada Border Services Agency, General Services Administration, and U.S. Customs and Border Protection to mitigate upcoming construction impacts.	21	• VTrans; • US & Canadian border agencies; • Canadian transportation agencies	• VTrans staff time; • Staff time of other proponent agencies	• VTrans; • US & Canadian border agencies; • Canadian transportation agencies	Short (0-5 years)

Package	Initiative	ID#	Key Proponents	Funding Sources	Management	Implementation Timeframe*
	Work with US and Canadian border agencies to improve processing time for cross-border freight, including potential technological and pre-clearance solutions.	57	• Motor carriers; • US & Canadian border agencies;	• Federal funds; • Motor carriers	• US & Canadian border agencies; • Motor carriers	Short (0-5 years)
	Address Oversized/Overweight truck permitting inconsistencies in the Northeast, including discussions regarding New York State joining the New England Transportation Consortium or other reciprocal permitting arrangements.	22	• New England Transportation Consortium; • New York State DOT	• Staff time of proponent agencies	• New England Transportation Consortium; • New York State DOT	Short (0-5 years)
	Promote coordination between industry and education/workforce development stakeholders (Agency of Commerce and Community Development [ACCD], educational institutions, etc.) to ensure an adequate-sized workforce that is prepared for current and future freight industry needs.	24	• VT ACCD; • VT AoE; • Higher ed and trade schools; • Private sector	• Private sector; • VT ACCD;	• VT ACCD; • VT AoE; • Higher ed and trade schools; • Private sector	Long (>10 years)
	Maintain sufficient roadway access to logistics clusters (including industrial parks, distribution centers, and other substantial freight-generating facilities) through maintenance and upgrades where appropriate.	59	• VTrans; • Municipalities; • Freight facility owners/operators	• VTrans; • Municipalities; • Freight facility owners/operators	• VTrans; • Municipalities; • Freight facility owners/operators	Long (>10 years)
Highway Operations 	Maintain a state of good repair (SOGR) of pavement, bridges, and other assets on highways across the state to support safe and efficient freight operations; consider freight needs in updates of the Transportation Asset Management Plan (TAMP) and related processes.	25	• VTrans	• Federal funds; • VT Capital Program	• VTrans	Long (>10 years)
	Make investments that maintain or improve truck travel time reliability on National Highway System routes and other key freight highway corridors,	26	• VTrans	• Federal funds; • VT Capital Program	• VTrans	Long (>10 years)

Package	Initiative	ID#	Key Proponents	Funding Sources	Management	Implementation Timeframe*
	including managing the effects of winter weather events on truck travel time reliability.					
	Keep highways open and safe through prompt and effective snow removal consistent with AOT's "safe-roads-at-safe-speeds" policy, incident management and prompt clearance.	27	• VTrans	• VTrans OM budget	• VTrans	Long (>10 years)
	Continue to enhance how AOT minimizes travel delay associated with highway improvement and maintenance projects.	28	• VTrans		• VTrans	Long (>10 years)
	Promote the safe movement of commercial vehicles including through enforcement considerations consistent with Vermont's Commercial Vehicle Safety Plan and leveraging VTrans Operations and Safety Bureau capabilities to improve effectiveness and efficiency of these efforts.	31	• VTrans; • State Police	• VTrans staff time; • State Police	• VTrans; • State Police	Long (>10 years)
	Monitor Vermont's truck parking capacity and utilization, and develop strategies to ensure sufficient, safe truck parking is available across the state.	30	• VTrans; • State Police	• VTrans staff time; • State Police	• VTrans; • State Police	Short (0-5 years)
	Promote communication of truck size and weight limits and permitting requirements to public and private entities, including the motor carrier industry; in particular communicate that heavy trucks (99,000 lbs. on 6 axles) are allowed on Vermont and Maine interstate as well as appropriate state highways with annual permit as part of the extended Federal Heavy Truck Pilot Program.	58	• VTrans/DMV; • Motor carrier industry	• VTrans/DMV; • Motor carrier industry; • Federal funds;	• VTrans/DMV; • Motor carrier industry	Short (0-5 years)
Rail Development	Upgrade all State-owned freight rail lines to be able to efficiently carry the industry-standard railcar weight of 286,000 lbs. (286k).	32	• VTrans; • VRS	• VT Capital Program; • Federal funds;	• VTrans; • VRS	Long (>10 years)

Package	Initiative	ID#	Key Proponents	Funding Sources	Management	Implementation Timeframe*
						
	Maintain trackage to allow freight travel speeds of 25 mph (FRA Track Class 2) or faster.	33	• VTrans; • Railroads	• Federal funds; • VT Capital Program; • Railroads	• VTrans; • Railroads	Long (>10 years)
	Preserve and fully use industrial land parcels with access to rail sidings in order to maintain a sustainable inventory for freight rail and transload uses.	34	• Businesses and rail operators Municipalities; • Economic development agencies; • RPCs • VTrans	• Staff time of proponent agencies; • VT Transportation Planning Initiative funding	• Municipalities; • Economic development agencies • RPCs	Long (>10 years)
	Participate in multistate rail planning and programming to improve the regional rail network.	38	• VTrans; • Neighboring state DOTs; • Multistate coalitions; • Railroads	• Staff time of proponent agencies	• VTrans; • Neighboring state DOTs; • Multistate coalitions; • Railroads	Long (>10 years)
	Maintain and modernize freight rail yards.	41	• Railroads; • VTrans	• Railroads; • Federal funds; • VT Capital Program	• Railroads; • VTrans	Long (>10 years)
Air Freight 	Maintain airport runway surfaces, approaches, and instrumentation in state of good repair.	42	• Airports	• Airport capital budgets • Federal funds; • VT Capital Program;	• Airports	Long (>10 years)
	Evaluate potential need for more advanced instrumentation at some state airports if/when opportunities to expand air traffic and cargo may arise.	43	• Airports; • VTrans	• Airport capital budgets • Federal funds; • VT Capital Program;	• Airports; • VTrans	Long (>10 years)

Package	Initiative	ID#	Key Proponents	Funding Sources	Management	Implementation Timeframe*
	Continuously evaluate the status of Runway Safety Areas (RSA) and Runway Protection Zones (RPZ) and develop action plans to remedy any deficiencies.	44	• Airports	• Airport capital budgets • Federal funds; • VT Capital Program;	• Airports	Long (>10 years)
	Continuously evaluate for obstructions to airport approaches; develop action plans to remedy any deficiencies and to avoid potential future obstructions. Prepare and distribute educational materials for use by municipalities in approach zones.	45	• Airports	• Airport capital budgets • Federal funds; • VT Capital Program;	• Airports	Long (>10 years)
	Seek federal funding to replace the aging weather observation stations at State-owned airports. Incorporate weather data gathered at airports into New England 511 to benefit freight movement by all modes.	46	• Airports; • VTrans; • Maine DOT; • New Hampshire DOT	• Federal funds; • VTrans staff time	• Airports; • VTrans	Long (>10 years)

*Implementation Timeframe is the approximate timing for when the initiative could be implemented. For many initiatives, preliminary steps (planning, engineering, stakeholder coordination, etc.) may begin in the near-term, but construction or other forms of implementation may take several years, or longer, to complete, depending upon the scope and complexity of the initiative.

8.3 National Highway Freight Program (NHFP) Investment Program

The National Highway Freight Program (NHFP) was established by the FAST Act, and is administered by FHWA. NHFP apportions funds to the states by formula, based upon the distribution of miles of the National Highway Freight Network (NHFN) that exists within each state. In Vermont, I-89 and I-91. Vermont's apportionment of NHFP funds is approximately $7.6 million per year, or just over $45 million over the six year period spanning 2021-2026.

States with less than 2% of total NHFN miles, including Vermont, can spend their funds on any of their NHFN miles. The FAST Act allowed up to 10% of NHFP funds to be spent on intermodal or freight rail projects. The IIJA raised the non-highway limit to 30% and extends eligibility to lock and dam rehabilitation and other marine projects.

The NHFP is a small portion of the federal and state funding sources that will be used to implement capital programs that support the goals of the Vermont Freight Plan. However, the FAST Act requires State Freight Plans to include an investment program that shows how the state intends to spend funds available through the NHFP.

Table 8.2 includes a list of highway and rail projects that have been identified as eligible recipients of NHFP funding. The highway projects are in the VTrans Capital Program. The rail projects are not presently in the State Transportation Improvement Program (STIP) but will be recommended as additions to the next STIP update.

The sum of expected federal funds for the projects listed in Table 8.2 exceeds the expected allotment of NHFP funds. The Royalton bridge project is included in the table as an illustrative project. Should additional funds be made available, or if NHFP funds cannot be exhausted on the other projects during the planned timeframe, the Royalton project would be next in line to receive NHFP funds.

TABLE 8.2 PROJECTS SELECTED TO RECEIVE NATIONAL HIGHWAY FREIGHT PROGRAM (NHFP) FUNDS, 2021-2026: REVISED DECEMBER 2022

Program	Project	Description	Funding		2023		2024		2025		2026**	Total
			NHFP Funds Available	**Phase**	**$7,035,736**	**Phase**	**$7,176,451**	**Phase**	**$7,319,980**	**Phase**	**$7,466,379**	**$43,472,966**
Rail	Coventry-Hartford WCRL(29)	Bridge improvements on the WACR Conn River Line railroad from Coventry to Hartford.	NHFP Funds	PE	$40,000	Const	$400,000					$440,000
			Non-Federal		$10,000		$100,000					$110,000
Rail	Hoosick-Bennington-Rutland, VTRY(59)	Rail track replacement on the VTR B&R and VTR Hoosick rail lines.	NHFP Funds	PE	$40,000	Const	$400,000					$440,000
			Non-Federal		$10,000		$100,000					$110,000
Rail	Cavendish, GMRC(24)	BRIDGE 132 REHAB, GREEN MTN RR CORP, MP: 24.31	NHFP Funds	Const	$400,000	Const	$2,400,000					$2,800,000
			Non-Federal		$100,000		$600,000					$700,000
Rail	Ferrisburgh, VTRY(53)	Rehab bridge 249 in Ferrisburgh on the VTR Northern. MP 102.41	NHFP Funds		$0	Const	$278,966					$278,966
			Non-Federal		$0		$69,742					$69,742
Rail	Montpelier, WACR(13)	Bridge 304 substructure rehabilitation, MP 1.25. WACR M&B Rail Line	NHFP Funds	Const	$120,000	Const	$908,000					$1,028,000
			Non-Federal		$30,000		$227,000					$257,000
Rail	Chester, GMRC(25)	BRIDGE 125 REHAB, GREEN MTN RR CORP, MP: 18.60.	NHFP Funds	Const	$160,000	Const	$1,200,000					$1,360,000
			Non-Federal		$40,000		$300,000					$340,000
Rail	Newbury, WCRL(20)	BRIDGE 520 REHAB, CONN RIVER MAIN LINE, MP: 5.65	NHFP Funds		$0	PE	$68,000					$68,000
			Non-Federal		$0		$17,000					$17,000
Rail	Rockingham-Rutland, GMRC(30)	Bridge improvements on the Green Mountain Railroad from Bellows Falls (Rockingham) to Rutland.	NHFP Funds	PE	$40,000	PE	$400,000					$440,000
			Non-Federal		$10,000		$100,000					$110,000
Rail	St. Johnsbury, WCRL(28)	Rehab bridge 540 in St. Johnsbury.	NHFP Funds	PE	$14,400	Const	$207,090					$221,490
			Non-Federal		$3,600		$51,773					$55,373
Rail	Statewide Rail Track & Structures Upgrade		NHFP Funds		$0		$0		$2,195,994		$2,239,914	$4,435,908
			Non-Federal		$0		$0		$548,999		$559,978	$1,108,977
Rail	**NHFP Available to Rail**				**$4,923,521**		**$6,262,056**		**$2,195,994**		**$2,239,914**	
Rail	**NHFP Usage by fiscal year**				**$814,400**		**$6,262,056**		**$2,195,994**		**$2,239,914**	**$11,512,364**
Rail	**Balance ramaining to carryover**				**$4,109,121**		**$0**		**$0**		**$0**	
Interstate Bridges	Exit 17, Colchester, NH 028-1(31) Engineering & Construction*	Project is for improvements to the US Route 2 and US Route 7 intersection and the US Route 2 and Interstate 89 Exit 17 intersections. Project also includes bridge replacement and corresponding roadway improvements.	NHFP Funds	Const	$600,000	Const	$4,000,000					$4,600,000
			NHPP/STBG Funds					Const	$16,800,000			$16,800,000
			Non-Federal									$0
Paving	Marshfield-Danville, NH PS19(1)	Resurfacing along US 2 from Marshfield MM 0.047 to Danville MM 1.755.	NHFP Funds					Const	$6,500,000			$6,500,000
			NHPP/STBG Funds	Const	$7,000,000	Const	$7,000,000					$14,000,000
			Non-Federal		$1,324,400		$1,324,400		$1,229,800		$0	$3,878,600
Interstate Bridges	Richmond, IM 089-2(52) Engineering & Construction	Replacement of Bridge no. 29 on US-2 in Richmond over I-89.	NHFP Funds	Const	$3,870,000	Const	$4,591,783		$0			$8,461,783
			NHPP/STBG Funds			Const	$745,433		$0			
			Non-Federal		$387,000		$533,722		$0		$0	$920,722
Interstate Bridges	Royalton, IM 089-1(63) Engineering & Construction	REHAB BR26 N&S ON I-89, OVER VT107, NECR AND THE WHITE RIVER.	NHFP Funds	Const	$270,000			Const	$1,000,000	Const	$5,296,500	$6,566,500
			NHPP/STBG Funds			Const	$5,281,425	Const	$6,110,000			
			Non-Federal		$27,000		$528,143		$711,000		$529,650	$1,795,793
Interstate Bridges	Westminster, IM 091-1(70) Engineering & Construction	REPLACE DECK AND BEARINGS ON BR21 N&S ON I-91 IN WESTMINSTER, OVER TH1 ("VT121").	NHFP Funds					Const	$5,659,467			$5,659,467
			NHPP/STBG Funds	Const	$4,275,000	Const	$5,805,000					
			Non-Federal		$427,500		$580,500		$565,947		$0	$1,573,947
	Accrued NFHP available* **				**$21,510,160**		**$23,132,211**		**$15,598,351**		**$7,709,270**	**$43,472,966**
	Budgeted NHFP				**$5,554,400**		**$14,853,839**		**$15,355,461**		**$7,536,414**	**$43,300,114**
	Remaining NHFP for carryover to next FFY				**$15,955,760**		**$8,278,372**		**$242,890**		**$172,856**	**$172,852**

NOTES:

*Project is eligible for 100% federal funding because the chosen alternative from the scoping effort included the bridge as a necessary feature.

**A remainder of FFY2026 NHFP funding is shown. This will either be allocated to one of the projects listed if necessary, or will be carried into FFY2027 for use on an eligible project.

*** Accrued Available funds in FY23 are made up of NHFP Z460 funds of $141,973.84, NHFP Fast Act extension Z46E of $7,434,670.21, FY22 NHFP Y460 IIJA funds of $6,897,780, and FY23 NHFP Y460 funds of $7,035,736

It has been assumed that NHFP funds available in years FY24 through FY26 will increase by 2% per year.

Funds available for rail freight projects were calculated at 10% of apportionment code Z46E and 30% of Y460 funds.

[i] https://vtrans.vermont.gov/rail/reports.

[ii] https://www.transportation.gov/freight/NFSP

[iii] https://vtrans.vermont.gov/about/capital-programs

[iv] Public Private Partnerships (P3) | Agency of Transportation (vermont.gov)

[v] https://www.transportation.gov/sites/dot.gov/files/2020-09/NFSP_fullplan_508_0.pdf

[vi] The previous freight plan was initially released in 2011, and substantially revised in 2012 to meet MAP-21 requirements. Subsequent revisions in 2015 and 2017 incorporated current project lists, but no other changes were made. Thus, the previous freight plan is referred to as the 2012 Freight Plan.

[vii] https://www.transportation.gov/sites/dot.gov/files/2020-09/NFSP_fullplan_508_0.pdf

[viii] https://vtrans.vermont.gov/planning/maps/stats

[ix] http://www.fhwa.dot.gov/planning/national_highway_system/.

[x] https://vtrans.vermont.gov/sites/aot/files/planning/documents/2018%20Final%20VTrans%20TAMP.pdf.

[xi] https://vtrans.vermont.gov/sites/aot/files/planning/documents/2018%20Final%20VTrans%20TAMP.pdf

[xii] https://vtrans.vermont.gov/sites/aot/files/portal/documents/aboutus/capprog/22a/5APAVING.pdf

[xiii] Ibid.

[xiv] https://geodata.vermont.gov/datasets/VTrans::vt-long-structures-bridges-and-culverts (2020)

[xv] https://geodata.vermont.gov/datasets/VTrans::vt-short-structures-bridges-and-culverts (2018)

[xvi] https://www.bts.gov/bridge-condition

[xvii] Interview with VRS, July 27, 2020.

[xviii] For a full inventory of airports in Vermont, see: https://vtrans.vermont.gov/sites/aot/files/aviation/documents/statepolicyplan/3-Inventory%20-%20Draft.pdf

[xix] 2017 AOT Fact Book and Annual Report

[xx] https://pvnpms.phmsa.dot.gov/PublicViewer/

[xxi] https://www.newenglandtransportationconsortium.org/.

[xxii] 20-4 New England Connected and Automated Vehicle Legal, Regulatory and Policy Assessment (newenglandtransportationconsortium.org)

[xxiii] https://legislature.vermont.gov/statutes/chapter/23/013.

[xxiv] https://ops.fhwa.dot.gov/freight/sw/reports/me_vt_pilot_2012/#s14; https://legislature.vermont.gov/bill/status/2010/S.93

[xxv] https://ops.fhwa.dot.gov/freight/policy/rpt_congress/truck_sw_laws/app_a.htm#ex58

[xxvi] https://labor.vermont.gov/apprenticeship

[xxvii] https://www.transportation.gov/sites/dot.gov/files/2020-09/NFSP_fullplan_508_0.pdf

[xxviii] https://climatechange.vermont.gov/about.

[xxix] https://publicservice.vermont.gov/publications-resources/publications/energy_plan.

[xxx] https://governor.vermont.gov/press-release/governor-phil-scott-signs-multi-state-agreement-electrify-trucks-and-buses.

[xxxi] Blakelock, Karen. (2021). Dairy Hauler EV Pilot Initial Research. VTrans Policy and Planning Section.

[xxxii] https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/

[xxxiii] https://www.aar.org/climate-change

[xxxiv] https://ctl.mit.edu/sites/default/files/library/public/Dimitri-Weideli-Environmental-Analysis-of-US-Online-Shopping_0.pdf; https://www.businesswire.com/news/home/20200127005508/en/The-Environmental-Impact-of-E-Commerce-2020---Special-Sales-like-Black-Friday-Cyber-Monday-Burden-the-Environment-Due-to-the-Intense-Amount-of-Packaging-Shipping-Delivery---ResearchAndMarkets.com.

[xxxv] https://anr.vermont.gov/about_us/faq/cr

[xxxvi] https://vtrans.vermont.gov/sites/aot/files/planning/documents/2019-01-09%20VTrans%20Part%20667%20Submission%20Revised%202019-12-16.pdf

[xxxvii] https://vtrans.vermont.gov/planning/transportation-resilience/statewide

[xxxviii] https://vtrans.vermont.gov/sites/aot/files/planning/documents/Tech%20Memo%20%231_DataCollection%26ExistingConditions_10282020_Finalclean.pdf

[xxxix] http://www.trb.org/Main/Blurbs/175482.aspx; https://ops.fhwa.dot.gov/publications/fhwahop12006/index.htm.

[xl] https://vtrans.vermont.gov/sites/aot/files/2020%20VAMIS%20FACT%20SHEET%20Final.pdf.

[xli] https://www.transportation.gov/buildamerica/financing/infra-grants/infra-grants-faqs

[xlii] https://www.transportation.gov/RAISEgrants

[xliii] https://vtrans.vermont.gov/highway/local-projects

2021 Vermont Freight Plan Addendum – Infrastructure Investment and Jobs Act (IIJA) of 2021 Freight Plan Requirements

New State Freight Plan requirements were included in the passage of the Infrastructure Investment and Jobs Act of 2021. The following table outlines how and where these elements are addressed in the Vermont Freight Plan.

New Required Element	How element was addressed by the development of the 2021 Freight Plan[1].	Location in Plan
''(10) the most recent commercial motor vehicle parking facilities assessment conducted by the State under subsection (f); ''(f) COMMERCIAL MOTOR VEHICLE PARKING FACILITIES ASSESSMENTS.—As part of the development or updating, as applicable, of a State freight plan under this section, each State that receives funding under section 167 of title 23, in consultation with relevant State motor carrier safety personnel, shall conduct an assessment of— ''(1) the capability of the State, together with the private sector in the State, to provide adequate parking facilities and rest facilities for commercial motor vehicles engaged in interstate transportation; '(2) the volume of commercial motor vehicle traffic in the State; and ''(3) whether there exist any areas within the State with a shortage of adequate commercial motor vehicle parking facilities, including an analysis (economic or otherwise, as the State determines to be appropriate) of the underlying causes of such a shortage.	Vermont Agency of Transportation Department of Motor Vehicles (DMV) Commercial Vehicle Enforcement Division personnel as well as a representative of the Vermont Truck and Bus Association (VTBA) each actively participated in the Freight Plan Advisory Committee guiding the development of the Plan. During the development of the Plan, we heard no comments on issues with truck parking related to shortage or other challenges. VTBA commented directly that truck parking in Vermont is sufficient. DMV cited no recurring enforcement issues related to availability of truck parking. A summary and statewide map of commercial vehicle volumes is included in the Freight Plan. There were no areas in the state identified as lacking in adequate commercial vehicle parking facilities during the development of the Freight Plan.	The general acknowledgment of the sufficiency of Vermont's truck parking facilities is documented in Freight Plan Advisory Committee meeting notes and meeting recordings. Commercial vehicle motor vehicle volumes are shown on P. 16.

[1] Some elements may have been addressed in the Freight Plan by reference to another related State Plan or initiative. Details are specified where applicable.

(11) the most recent supply chain cargo flows in the State, expressed by mode of transportation;	Freight Plan includes dollar value and tonnage statewide overview and details by mode. Primary data sources were Surface Transportation Board (STB) Waybill, FHWA FAF5, and commercial vehicle truck count data.	P. 25
(12) an inventory of commercial ports in the State;	A discussion of ports is included in the Freight Plan. Vermont's United States-Canada border has benefited from numerous port improvement project in recent years including Derby Line I-91, and extensive planning is underway for major upgrades at the Highgate Springs/Alburg, VT port of entry, which supports approximately half of Vermont's US-Canada trade using ports of entry in Vermont. Burlington International Airport also plays a significant role as does our rail system connections to the greater Northeast regional rail system including connections to Canada.	P. 28
(13) if applicable, consideration of the findings or recommendations made by any multi-State freight compact to which the State is a party under section 70204;	N/A	N/A
(14) the impacts of e-commerce on freight infrastructure in the State;	The Freight Plan includes a discussion of this subject and acknowledges the particularly significant impact the pandemic had on e-commerce during the development of the Freight Plan. Recommendations in the plan include the acquisition of data and analysis and forecasting to estimate the potential effects of e-commerce delivery on the performance of the highway system, as well as emissions and the economy.	P. 34
(15) considerations of military freight;	Numerous National Guard facilities are located throughout Vermont. The highest-profile installment is the Vermont Air National Guard base at Burlington International Airport in South Burlington. This location shares space and facilities with Vermont's largest	P. 23; Also considered as part of the overall maintenance

	commercial airport, providing the optimal Vermont base both for the operation of military aircraft and transport of military freight. National Guard military bases and armories are also located in Bradford, Colchester, Jericho, Lyndonville, Ludlow, Morrisville, Rutland, and St. Albans and additional recruitment offices are located throughout the state. The vast majority of these locations are on or close to Vermont's National Highway System network, with a focus near interstates and US routes, ensuring the highest level of service for land-transport of equipment and personnel. By way of the VTrans Project Selection and Project Prioritization Process (VPSP2), maintenance and improvement of these transportation facilities is a high priority as they are the backbone of our transportation system in many ways.	and improvement of Vermont's transportation system, including prioritization of NHS and commercial airport facilities.
(16) strategies and goals to decrease—		
(A) the severity of impacts of extreme weather and natural disasters on freight mobility;	The Freight Plan includes Climate Change and Resiliency section including initiatives leveraging the Transportation Resiliency Planning Tool (TRPT), identifying system weaknesses and prioritization long-term solutions. Targeted investments are also identified in the MAP-21 Part 667 Plan, Reducing Repeat Damage.	P. 39
(B) the impacts of freight movement on local air pollution;	The Freight Plan includes a Climate Change and Resiliency section including numerous initiatives around electrification of the transportation system and other alternative fuel technologies, system optimization through data purchase, analysis, and Intelligent Transportation Systems, as well as last-mile strategies across all freight modes. These initiative are coordinated with and support goals in the State	P. 35, 37-38, 40-41, 45-46, 54

	Climate Action Plan and the Comprehensive Energy Plan.	
(C) the impacts of freight movement on flooding and stormwater runoff; and	Freight movement, as a component of the overall movement of people and goods, is an integral part of Vermont's transportation system. Vermont has an extensive stormwater permitting framework and VTrans houses a team of experts serving as a technical resource within the agency to all those involved in the maintenance and improvement of the transportation system. The VTrans Stormwater Management Engineer, along with the Green Infrastructure Engineer, act as VTrans' primary contact for in-house staff, consultants, municipalities & others for engineering and regulatory support related to stormwater and drainage design, VT post-construction "operational" stormwater permitting, and related water quality management concerns. All of these practices work toward the goal of decreasing the impacts of transportation, including freight movement, on stormwater runoff and associated flooding.	P. 39-40, 46, 54
(D) the impacts of freight movement on wildlife habitat loss;	Much in the same way as the Stormwater engineering activities described above, VTrans biologists are responsible for determining potential impacts from transportation projects on regulated natural resources (wetlands and watercourses; fish and wildlife habitat; rare, threatened and endangered species and agricultural soils). Biologists are required to assess projects impacts and suggest avoidance, minimization measures on these resources and propose compensation measures for adverse impacts. All of these practices apply to Vermont's transportation system including the movement of freight.	P. 41
(g) PRIORITY. —Each State freight plan under this section shall include a requirement that the State, in carrying out activities under the State freight plan—		

(1) enhance reliability or redundancy of freight transportation; or	Reliability and redundancy of the freight system is cross cutting and supported by many initiatives including our MAP-21 requirement to monitoring of Truck Travel Time Reliability, our use of the Transportation Resiliency Planning Tool (TRPT), development and implementation of our Part 667 Plan, and infrastructure improvements to all modes of freight transport. Transportation System Management and Operations (TMSO) improvements including leveraging Intelligent Transportation Systems (ITS) also contribute to the reliability of Vermont's freight transportation system.	Several sections of the plan discuss the various ways Vermont is leveraging technology, data, and performance measures to increase freight reliability.
(2) incorporate the ability to rapidly restore access and reliability with respect to freight transportation.	Vermont has had the opportunity to prove its ability to restore access and function to our transportation system, in particular in the face of natural disaster, numerous times in the past decade. Vermont Agency of Transportation is partner in the 2019 State Emergency Management Plan which includes a transportation component. The restoration of transportation access, and therefore freight transportation access is an acknowledged priority in Vermont state government and as a matter of public safety is of the highest importance in emergency response.	This consideration is embedded in the Freight Plan through the prioritization of infrastructure upgrades ensuring durability and reliability across all modes.
(17) Consultation with a State Freight Committee if applicable.	Vermont convened a State Freight Plan Advisory Committee to guide the development of the Freight Plan.	P. 9

IIJA Table December 2022 FINAL.docx