VIRGINIA
STATEWIDE RAIL PLAN

CHAPTER 2

VIRGINIA'S EXISTING RAIL SYSTEM

December 6, 2017

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2 Virginia's Existing Rail System

As a baseline for planning and decision making, this chapter provides an inventory of existing rail infrastructure and services, describes rail trends impacting the Commonwealth, and identifies the needs and opportunities for passenger and freight rail service.

2.1 Existing Virginia Rail System: Description and Inventory

2.1.1 Virginia's Existing Rail Network

Today's major rail carriers are the result of the consolidation of several smaller predecessor trunk lines that served the state over the last 150 years. Virginia is now served by eleven freight railroads, eight Amtrak intercity passenger routes, and two VRE commuter routes.

Virginia's rail system includes 3,037 miles of rail lines operated by the 11 freight railroads – two Class I railroads and nine shortline railroads. At present, Virginia does not have any non-operating railroads. The passenger rail system is comprised of Amtrak long-distance intercity services, intercity services through Amtrak, and VRE commuter rail services. These passenger services operate on rail lines owned by the freight rail companies under negotiated service agreements.

Table 2-1 shows the characteristics of the railroads in the Commonwealth.

Table 2-1: Virginia Route Mileage by Railroad and Non-Operating Railroad Owner

Railroad	Standard Carrier Alpha Code	Railroad Class / Type	Total Miles Owned in Virginia	Percent of Total Virginia Rail Network Owned	Miles Leased / Operated Under Contract	Miles Operated Under Trackage Rights[1]	Total Miles Operated in Virginia
CSX Transportation[(a)]	CSX	Class I	958	31.54%	7	256	1,051
Norfolk Southern Railway	NS	Class I	1,883	62.00%	0	107	1,990
Subtotal (Class I)			***2,841***	***93.54%***			
Bay Coast Railroad	BCR	Shortline	58	1.91%	5	5	68
Buckingham Branch Railroad	BB	Shortline	17	0.56%	258	9	284
Chesapeake & Albemarle Railroad[(b)]	CA	Shortline	0	0.00%	18	0	18
Chesapeake Western Railway[(c)]	CHW	Shortline	43	1.42%	0	0	43
Commonwealth Railway[(b)]	CWRY	Shortline	17	0.56%	0	0	17
Norfolk & Portsmouth Belt Line Railroad[(d)]	NPB	Shortline	11	0.36%	0	15	26
North Carolina & Virginia Railroad[(b)]	NCVA	Shortline	3	0.10%	0	0	3
Shenandoah Valley Railroad[(e)]	SV	Shortline	20	0.66%	0	0	20
Winchester & Western Railroad	WW	Shortline	27	0.89%	0	0	27
Subtotal (Shortline)			***196***	***6.46%***			
Virginia Rail Network Total			***3,037***	***100%***	***288***	***392***	***3,547***

Sources: Class I Railroad Annual R-1 Reports to the Surface Transportation Board (2016); Virginia Class I and shortline railroads; Virginia DRPT

Notes:

a) Total Miles Owned for CSX includes the 758 miles reported by CSX to the STB in a 2016 R-1 Report filing, plus 200 miles owned by CSX and leased to shortline BB, which includes Richmond-Clifton Forge, Virginia (191 miles), and Gordonsville-Orange, Virginia (9 miles). In

[1] Trackage rights allow one railroad to operate over the infrastructure of another railroad.

the 2016 R-1 Report filing to the STB, CSX identifies these 200 miles as Miles Operated Under Trackage Rights, as CSX has trackage rights over the 200 miles of railroad it leases to BB. These 200 miles are included in the Total Miles Owned and Miles Operated Under Trackage Rights figures for CSX in the table and are only counted once for the Total Miles Operated figure in the table. The Total Miles Operated figure also includes 30 miles of line of proprietary companies, as indicated in the 2016 R-1 Report filing to the STB by CSX, and not identified specifically by CSX.

b) *Shortline railroad is owned by Genesee & Wyoming, Inc.*
c) *Chesapeake Western Railway is a subsidiary of NS.*
d) *Norfolk & Portsmouth Belt Line Railroad is owned jointly by CSX and NS.*
e) *Shenandoah Valley Railroad is currently operated under agreement by Durbin & Greenbrier Valley Railroad (DGVR).*

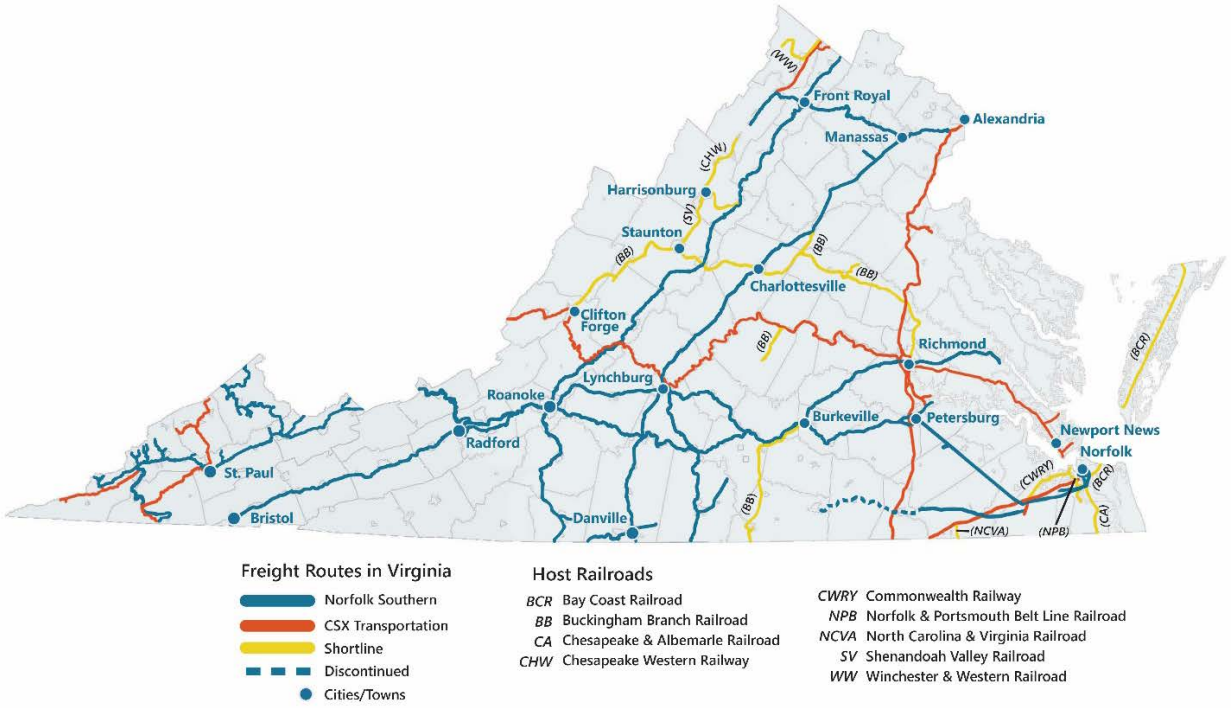
Freight Rail Network

Class I Railroads

Class I railroads are defined as those railroads that have an annual carrier operating revenue of $250 million or more (in 1991 dollars) according to the FRA. There are seven Class I railroads in the U.S. and Canada; some of which also have transportation linkages to Mexico.

The freight railroad routes in Virginia are mapped in **Figure 2-1.** Virginia is served by two Class I railroads: CSX and NS. A brief description of each railroad appears in the following chapters. Details of the railroads' existing conditions and operating characteristics appear in **Appendix A**.

Figure 2-1: Freight Railroad Routes in Virginia



Source: DRPT

CSX Transportation

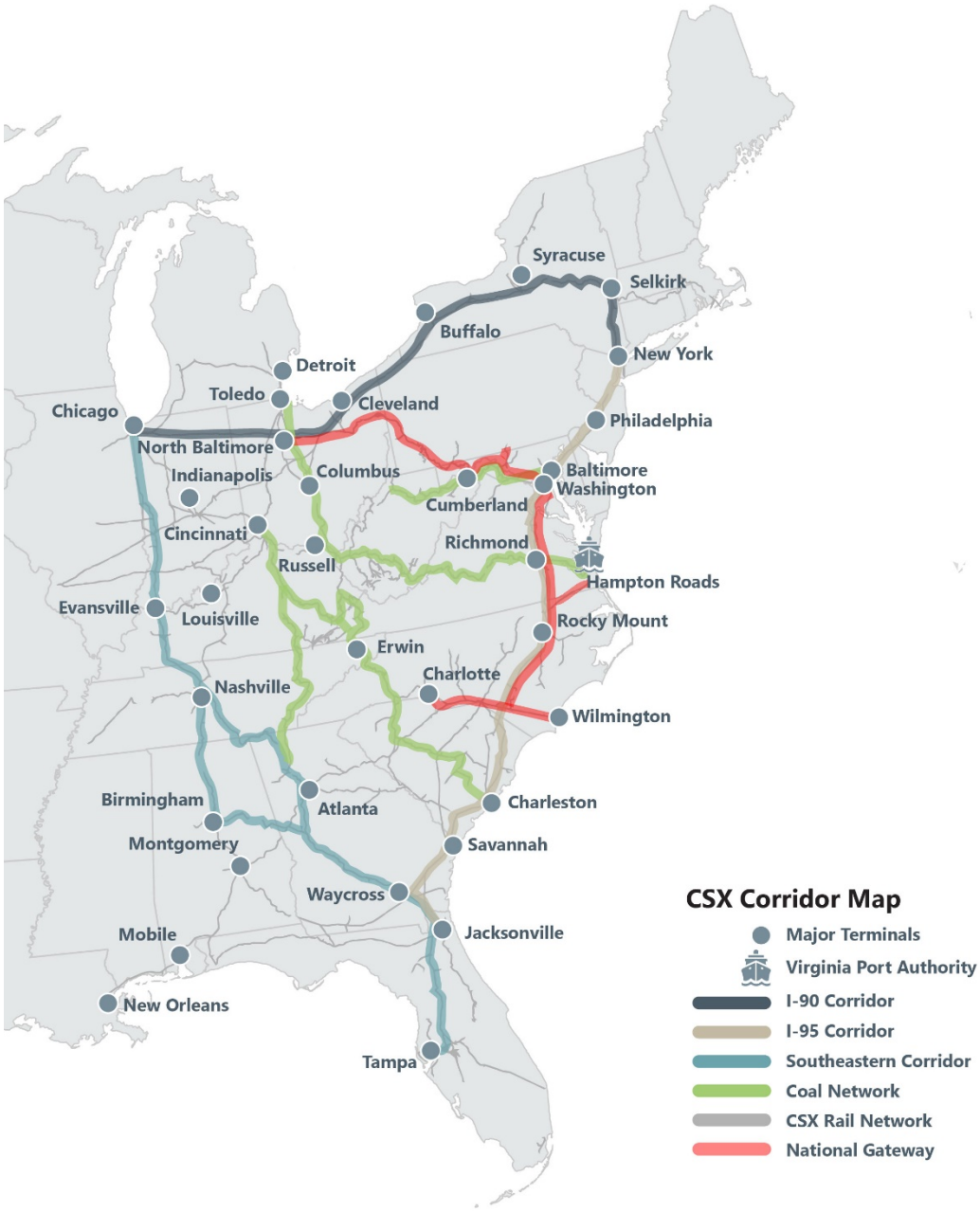
Based in Jacksonville, Florida, CSX owns companies providing rail, intermodal, and rail-to-truck transload, connecting more than 70 river, ocean, and lake ports, as well as more than 200 shortline railroads. CSX operates one of the largest railroads in the eastern U.S. with a 21,000-mile rail network linking commercial markets in 23 states, Washington, D.C., and two Canadian provinces. CSX owns 958 miles of track in Virginia. Including trackage rights, CSX operates over a total of 1,051 miles of rail lines in Virginia.

CSX operates three major corridors in the Commonwealth:

- The **I-95 Corridor** is CSX's primary north-south route through Virginia, generally paralleling Interstate 95 and providing intermodal and merchandise freight service between the Southeast and Northeast U.S. markets.
- The **National Gateway Corridor** is CSX's primary intermodal train corridor connecting the Port of Virginia and international markets to major markets in the U.S. Midwest. In Virginia, the National Gateway Corridor shares the same tracks with the I-95 Corridor, before the two corridors diverge at Washington D.C.
- The **CSX Coal Network Corridor** is CSX's primary east-west route across Virginia, running along the James River for most of its route, from the coalfields of West Virginia to Newport News.

CSX's major railroad corridors are identified in **Figure 2-2**.

Figure 2-2: CSX Corridor Map



Source: FRA

Norfolk Southern Railway

Norfolk Southern Railway, headquartered in Norfolk, Virginia, operates approximately 21,000 route-miles in 22 eastern states and Washington D.C. NS owns 1,883 miles of track in Virginia. Including trackage rights, NS operates on a total of 1,990 miles of track in Virginia.

NS operates two major corridors in the Commonwealth:

- The **Crescent Corridor** is the NS primary north-south route through Virginia, generally paralleling Interstate 81 and providing intermodal and merchandise freight service between the Southeast and Northeast U.S. markets, including service to Virginia's Inland Port at Front Royal.
- The **Heartland Corridor** is the NS primary east-west route, generally paralleling US-460, and is the primary east-west intermodal train corridor connecting the Port of Virginia and international markets to major markets in the U.S. Midwest.

The Crescent Corridor is identified in **Figure 2-3**, and the Heartland Corridor is mapped in **Figure 2-4.**

Figure 2-3: NS Crescent Corridor

Source: NS

Figure 2-4: NS Heartland Corridor

Source: NS

Class II Railroads

There are no Class II railroads currently operating in Virginia. Class II carriers, as defined by the FRA and STB, have revenues ranging from $37.4 million to under $467.0 million and are generally considered to be regional in character.

Shortline Railroads

There are nine shortline railroads, in Virginia. Shortline railroads are local railroads that primarily engage in freight haulage or line haul services or terminal switching services. The shortline railroads in Virginia typically operate on lines once owned and operated by the Class I railroads; when the Class I railroads discontinued service on a line, the shortline railroads assumed ownership and/or operation of the route.

A brief description of each operating shortline railroads in Virginia is included in **Table 2-2**. Details on the railroads' existing conditions and operating characteristics appear in **Appendix A**.

Table 2-2: Shortline Railroad Operational Areas, Interchanges, and Major Commodities

Shortline Railroad	Operational Area	Interchanges	Major Commodities
BCR	Norfolk to Virginia Beach and Cape Charles, Virginia to Pocomoke City, Maryland	NS and NPB in Norfolk; NS in Pocomoke City, Maryland	Chemicals, gas, grain, paper, aggregates, cement, and hi-wide shipments
BB	Dillwyn to Bremo Bluff and leases an additional 258 miles of track from CSX and NS	Virginia Southern division: NS in Burkeville; original BB line: CSX in Strathmore; leased R&A Division: CSX in Clifton Forge and Doswell, and NS in Charlottesville and Waynesboro *See Note (a) below*	Stone, lumber, chemicals, gases, food, beverages, beer, wine, and overhead empty cars
CA	Chesapeake, Virginia to Edenton, North Carolina	NS at Chesapeake; CSX at Portsmouth	Agricultural products, lumber, fertilizer, cement, concrete containers, plastic pellets, and stone
CHW	North-south line, which extends from Mt. Jackson to Pleasant Valley, and an east-west line which extends from Elkton to Harrisonburg	NS near Elkton; SV in Pleasant	Milled grain products for the poultry industry, lumber, and chemicals
CWRY	Dual Class I railroad access to the marine terminals and industries in Portsmouth, with rail connections to both NS and CSX near Suffolk. New rail marshalling yard near Suffolk	NS and CSX in Suffolk	Chemicals and intermodal
NPB	Terminal switching company that links commerce around the deep-water port from Sewells Point to Portsmouth Marine Terminal, including along the Southern Branch of the Elizabeth River	NS and CWRY in Norfolk; CSX in Portsmouth	Farm products, construction materials, cement, and chemicals
NVCA	Boykins to the North Carolina state line	CSX in Boykins	Plastic pellets, cement, chemicals, fertilizer, soybeans, and steel.

Shortline Railroad	Operational Area	Interchanges	Major Commodities
SV	Staunton to Pleasant Valley in Rockingham County	BB in Staunton; NS in Pleasant Valley	Agricultural products, industrial and municipal commodities, road salt, propane, fertilizer, wood products, and ink
WW	Gore to Winchester and from Winchester to the state line	CSX in Winchester, VA and Martinsburg, WV; NS in Hagerstown, MD	Coal, sand, scrap metal, aggregates, steal, flour, plastic resins, biodiesel, paper, corn syrup, and tallow

Sources: Virginia shortline railroads; DRPT

Notes:

a) Amtrak operates its long-distance Cardinal passenger train route over BB between Orange and Clifton Forge three days a week, providing local station service at Charlottesville, Staunton, and Clifton Forge. Partners with the National Railway Historic Society to offer seasonal excursion rides departing from Dillwyn.

Industrial Railroads

Industrial railroads in Virginia typically provide intraplant and interplant rail switching service to industrial and manufacturing customers and facilitate carload interchange with operating Class I or shortline railroads. These small privately owned switching railroads operate over private track. These operations can be owned and operated by the company they serve or can be operated under a contract agreement with an outside party. The mileage of privately-owned industrial track is not included in route-mile calculations of the Virginia rail network. Currently, there are no industrial railroads in Virginia.

Passenger Rail Network

Amtrak provides intercity passenger rail service throughout Virginia, and VRE provides commuter rail service in northern Virginia and Washington, D.C. DRPT funds both the Amtrak Northeast Regional intercity passenger services and VRE commuter rail services operating within the Commonwealth of Virginia.

Amtrak Services

Amtrak's current passenger rail network spans 21,300 route-miles, serving 46 states, Washington, D.C., and three Canadian provinces. Amtrak generally operates over the tracks of private freight railroads, with a few exceptions. In Virginia, all Amtrak service is provided on track owned by freight railroads.

Table 2-3 shows the current network of Amtrak routes in the East that serve Virginia. As of 2016, Amtrak was operating two types of service in the Commonwealth: Virginia regional service trains and

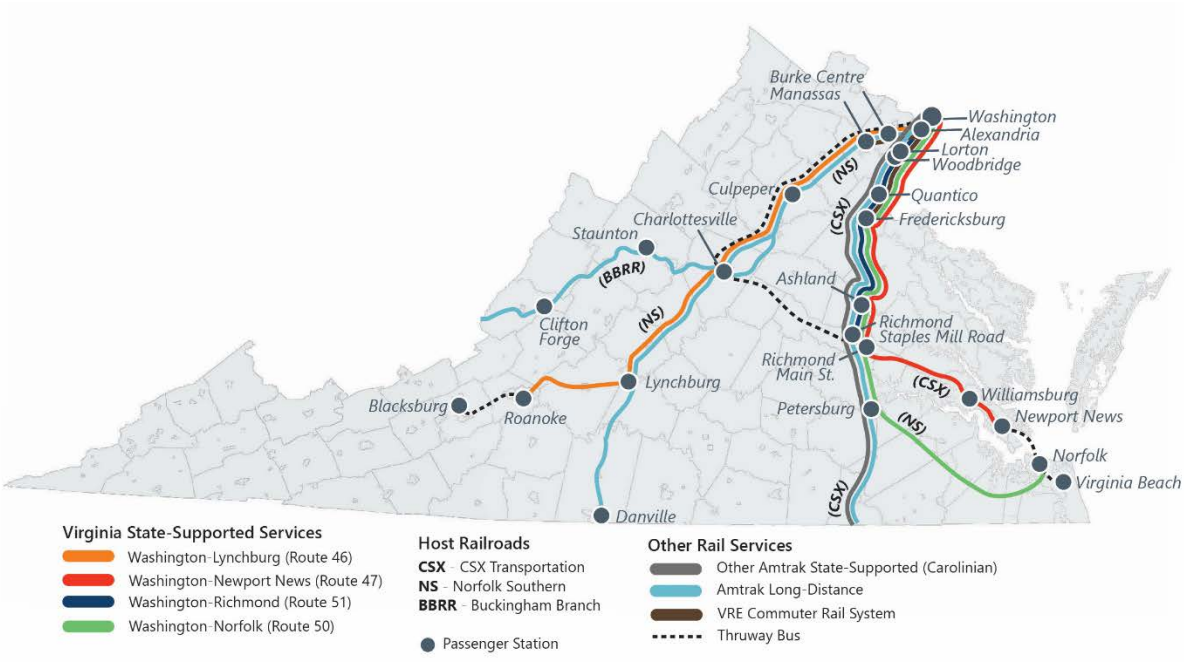
long-distance trains. One of the long-distance trains, the Carolinian, is supported by the State of North Carolina and is sometimes referred to as an interstate corridor train. Combined, Amtrak operates between 23 and 26 trains per day in the Commonwealth, serving 20 stations, using Amtrak-owned equipment. A map of Amtrak's routes and stations within Virginia is provided in **Figure 2-5**.

Table 2-3: Amtrak Routes in the East

Type of Service	Virginia Regional Service Route Number/Train Name	Description
Regional	46	Washington – Lynchburg
	47	Washington – Newport News
	50	Washington – Norfolk
	51	Washington – Richmond
Long Distance	Carolinian (supported by the State of North Carolina)	New York – Washington – Richmond – Raleigh – Charlotte
	Auto Train	Lorton, VA - Sanford, FL
	Cardinal	New York – Washington – Charlottesville – White Sulphur Springs – Charleston – Cincinnati – Indianapolis – Chicago
	Crescent	New York – Washington – Charlottesville – Greensboro – Charlotte – Atlanta – Birmingham – New Orleans
	Palmetto	New York – Washington – Richmond – Charleston – Savannah
	Silver Meteor	New York – Washington – Richmond – Charleston – Savannah – Jacksonville – Orlando – Miami
	Silver Star	New York – Washington – Richmond – Raleigh – Columbia – Savannah – Jacksonville – Tampa – Orlando – Miami

Source: Amtrak

Figure 2-5: Map of Amtrak Routes and Stations in Virginia



Virginia Regional Services

Virginia regional services are southward extensions of Amtrak owned/operated Northeast Regional trains operating on the Northeast Corridor between Boston, New York, and Washington, D.C. Amtrak Northeast Regional trains are extended south of Washington, D.C. on four different routes, providing passengers with a one-seat ride between 16 stations regional served train stations in Virginia and destinations along the Northeast Corridor.

DRPT provides operational support for these trains under a cost-sharing partnership with Amtrak. This partnership launched three new service expansions in Virginia by extending southward the routes of Northeast Corridor service that previously ended in Washington, D.C. They are:

1. A daily round trip between Lynchburg and the Northeast Corridor, begun in 2009.
2. A third daily round trip between Richmond and the Northeast Corridor, begun in 2010.
3. A daily round trip between Norfolk and the Northeast Corridor, begun in 2012.

Long-Distance Services

Long-Distance trains are trains that operate on routes greater than 750 miles and do not require state operating support under PRIIA. These trains are federally funded through discretionary grants to Amtrak made annually by the U.S. Congress. The one exception in Virginia is the Carolinian, which is

supported by the State of North Carolina. The following Long-Distance trains operated by Amtrak serve Virginia:

- Silver Meteor: One daily round trip between Miami and New York
- Silver Star: One daily round trip between Miami and New York
- Palmetto: One daily round trip between Savannah and New York
- Carolinian: One daily round trip between Charlotte and New York
- Crescent: One daily round trip between New Orleans and New York
- Cardinal: Three-times-weekly service between Chicago and New York via WV
- Auto Train: One daily round trip between Virginia (Lorton) and Florida (Sanford)

Intermodal Connections

Of the 20 Amtrak passenger rail stations in Virginia, connections to local and regional transportation networks (i.e. bus, subway, light rail, etc.) are available at 15 stations, as shown in **Appendix B**.

Virginia Railway Express Services

VRE has been providing commuter rail service to the residents of Northern Virginia since 1992. VRE's mission is to offer safe, cost-effective, accessible, reliable, convenient, customer-responsive, and commuter-oriented passenger rail service.

VRE is jointly owned and managed by the Northern Virginia Transportation Commission (NVTC) and the Potomac & Rappahannock Transportation Commission (PRTC). Members of both commissions sit on the VRE Operations Board, which is responsible for making recommendations to the commissions with respect to VRE's management, financing, and acquisition of property. Member jurisdictions include Spotsylvania County, City of Fredericksburg, Stafford County, Prince William County, City of Manassas, City of Manassas Park, Fairfax County, Arlington County, and City of Alexandria, as well as DRPT. The commuter agency's daily operations and capital projects are financed with a combination of federal, state, and local funds, and farebox revenue.

VRE commuter trains are operated under contract by Keolis Rail Services America, using Keolis train crews and VRE-owned equipment. In Virginia, all VRE services are operated over tracks owned by freight railroads. The agency currently operates 32 weekday trains on two lines with a total of 87 route-miles and 19 stations. The two lines join at Alexandria and share a 9-mile corridor northward across the Potomac River on the Long Bridge to Washington Union Station. **Figure 2-6** shows the current VRE commuter rail system. VRE's most recent system expansion was in 2015 when the system grew by 6 miles with the opening of a new station in Spotsylvania County. It was the first extension of VRE's system since its 1992 startup.

Figure 2-6: VRE Commuter Rail Network

VRE trains operate Monday-Friday only, with most trips timed to bring passengers to Washington, D.C. for work in the morning and from Washington, D.C. back home in the evening. Supplemental service is provided by Virginia's regional service through the Amtrak Northeast Regional trains under a cross-honor ticketing agreement. During the AM and PM rush hour, three Amtrak Northeast Regional trains make an additional stop traveling northbound and southbound at L'Enfant Station for VRE ticketholders.

Detailed information on VRE operations, fares, and equipment can be found at: http://www.vre.org/. Additional information about commuter rail stations in Virginia, including intermodal connections, can be found in **Appendix B.**

Railroad Abandonments and Railbanked Lines

Background

Abandonment and discontinuance of common carrier rail service is allowed by federal law. Prior to formally abandoning or discontinuing service on a line, the railroad must seek the permission of the Surface Transportation Board (STB). The Commonwealth, through DRPT, has no regulatory jurisdiction in matters regarding railroad operations or service in Virginia, but it does participate in the STB abandonment process when required.

Several hundred miles of Class I railroads were abandoned, sold, or leased to shortline railroads between 1970 and 2010 due to changing federal laws and economic conditions. None of the abandoned rail lines were acquired by DRPT during that timeframe.

Rail Abandonments and Discontinuances Since 2012

Table 2-4 identifies Virginia railroad abandonments and discontinuances approved by the STB since 2012, as well as cases that are still pending as of November 2016.

Table 2-4: Virginia Railroad Abandonments and Discontinuances: 2012-2017

Scope	Rail Carrier	Miles Abandoned/ Discontinued	Abandonment Dates	STB Docket Number
Approximately 1.55 miles of rail known as the James River Industrial Track between State Road 5 in the City of Richmond and Henrico County, Virginia	CSX / NS	1.55	Granted February 21, 2013	AB-55 (SUB-NO. 726X) for CSX; AB 290 (SUB-NO. 303X) for NS
Approximately 53.2 miles of rail extending from milepost FD 37.0 to FD 90.7 between Franklin and Edgerton, Virginia	NS	53.20	Notice of Exemption of Discontinuance of Service March 13, 2014	AB-290 (SUB-No. 359X)
Approximately 0.46 miles of rail extending from milepost CP 9.40 to milepost CP 9.86, in the City of Hopewell, Virginia	NS	0.46	Granted July 31, 2014	AB-290 (SUB-No. 364X)

Scope	Rail Carrier	Miles Abandoned/ Discontinued	Abandonment Dates	STB Docket Number
Approximately 1.40 miles of rail extending from milepost DW 45.8 (near Highway 220B) to milepost DW 47.2 (near Woodvale Ct.) in Henry County, Virginia	NS	1.40	Granted December 5, 2014	AB-290 (SUB-No. 363X)
Approximately 0.7 miles of rail extending from milepost N 133.4 to N 134.1 in Nottoway County, Virginia	NS	0.70	Granted October 16, 2015	AB-290 (SUB-No. 378X)
Approximately 15.5 miles of rail extending from milepost B 84.0 to B 99.5 between Broadway and Mt. Jackson, Virginia in Rockingham and Shenandoah Counties	NS (CW)	15.50	Notice of Exemption to Discontinue Service December 23, 2016	AB-290 (SUB-No. 391X)
Approximately 0.5 miles of rail extending from milepost R 4.0 to R 4.5 in Roanoke, Virginia	NS	0.50	Notice of Exemption to Abandon March 23, 2017	AB-290 (SUB-No. 389X)
Total rail line abandonments and discontinuances 2012 – 2017		**73.31**		

Source: DRPT and STB Website

Railbanked Lines and Interim Trail Use

Railbanking is a process established under federal law that allows public entities to preserve established railroad rights-of-way for future reactivation of rail service, to protect rail transportation corridors, and to provide for recreational uses such as hiking and bicycling. Many abandoned lines have been repurposed for interim recreational trail use in Virginia. When a line is railbanked, a private or public entity takes over use and maintenance of the corridor; however, the railroad maintains the right to reclaim the corridor for future rail use.

Rails-To-Trails

When an abandoned rail corridor is railbanked and a recreational use trail is established, that trail is referred to as a rail-trail. The Virginia Department of Conservation and Recreation (DCR), in consultation with DRPT, reviews all potential rail abandonments in the state for suitability as

recreational corridors under the Federal Rails to Trails legislation.[2] There are approximately 100 rail-trails within the Commonwealth, with additional rail-trails currently under development. [3,4] The TrailLink website currently lists all rail-trails in Virginia, and provides detailed information, such as location, surface type, and accessibility.

Rails-With-Trails

When a public or private organization establishes a recreational trail along and adjacent to an existing active rail line, it is referred to as a "rail-with-trail" project. DCR is the Commonwealth's primary agency responsible for coordinating rail-with-trail projects in Virginia. Currently, there are no rails-with-trails in Virginia. Although Virginia State Code provides indemnity for private property owners entering into an agreement with the Commonwealth that allows for public access to a property, host railroads continue to be wary of potential liability issues regarding recreation access in and around active rail lines.

2.1.2 Major Freight and Passenger Terminals and Stations

Freight Rail Yards and Facilities in Virginia

Virginia's freight railroads have multiple facilities to support railroad operations and maintenance and interface with freight shippers and receivers in the state. Major freight rail yards, terminals, and facilities of the Class I and shortline railroads in Virginia are identified and described in **Appendix A**. The most notable is the Port of Virginia that operates multiple terminals across the state and is a major contributor to rail traffic. The following freight rail facilities presently exist in Virginia:

- Switching yards and terminals
- Intermodal container transfer facilities
- Transload facilities
- Freight car repair facilities
- Locomotive repair and servicing facilities

Passenger Rail Stations in Virginia

There are currently 20 Amtrak and 17 VRE passenger rail stations in Virginia, serving a combined average daily boardings and alightings of approximately 26,522. Boardings and alightings for each

[2] http://www.dcr.virginia.gov/recreational-planning/document/grchpt04.pdf
[3] Rails-to-Trails Conservancy lists several trails in Virginia on its interactive mapping website: https://www.traillink.com/trailsearch/?mmloc=virginia&utm_source=railstotrails.org&utm_medium=experience-trails_search-tool&utm_campaign=RTCreferrals
[4] The Claudius Crozet Blue Ridge Tunnel Foundation is a public-private initiative to open an old rail tunnel to trail traffic underneath Afton Mountain. More information can be found at http://blueridgetunnel.org/

station are shown in **Table 2-5.** In addition to stations within the Commonwealth, many residents of Northern Virginia begin or end their passenger rail journeys at Washington Union Station. Amtrak's FY 2015 Virginia State Fact Sheet estimates that among the 5 million annual passengers using Washington Union Station, more than 1 million live in Northern Virginia. Details on the physical characteristics of the 20 Virginia station facilities served by Amtrak and the 17 VRE stations are found in **Appendix B**.

Table 2-5: Boardings and Alightings at Passenger Rail Stations in Virginia

Station Name (Amtrak Station Code)	Amtrak Daily Trains	Amtrak Average Daily Boardings and Alightings in 2015	VRE Daily Trains	VRE Average Weekday Boardings and Alightings in 2015	Major Corridors
Alexandria (ALX) (Amtrak/VRE)	21-24	512	30	1,990	Northern Virginia, Seminole, Washington, D.C. to North Carolina
Ashland (ASD) (Amtrak Only)	9-10	77	N/A	N/A	Washington, D.C. to North Carolina
Backlick Road (VRE Only)	N/A	N/A	16	509	Northern Virginia, Seminole
Broad Run (VRE Only)	N/A	N/A	16	2,198	Seminole
Brooke (VRE Only)	N/A	N/A	14	1,251	Washington to North Carolina
Burke Center (BCV) (Amtrak/VRE)	2	20	16	1,742	Northern Virginia, Seminole
Charlottesville (CVS) (Amtrak Only)	4-6	386	N/A	N/A	East-West, Seminole,
Clifton Forge (CLF) (Amtrak Only)	0-2	7	N/A	N/A	East-West
Culpeper (CLP) (Amtrak Only)	4-6	40	N/A	N/A	Seminole
Crystal City (VRE Only)	N/A	N/A	30	3,449	Northern Virginia, Seminole, Washington to North Carolina
Danville (DAN) (Amtrak Only)	2	21	N/A	N/A	Seminole

Station Name (Amtrak Station Code)	Amtrak Daily Trains	Amtrak Average Daily Boardings and Alightings in 2015	VRE Daily Trains	VRE Average Weekday Boardings and Alightings in 2015	Major Corridors
Franconia-Springfield (VRE Only)	N/A	N/A	14	656	Washington to North Carolina
Fredericksburg (FBG) (Amtrak/VRE)	13-14	N/A	14	2,536	Washington to North Carolina
Leeland Road (VRE Only)	N/A	N/A	14	1,971	Washington to North Carolina
Lorton (VRE Only)	N/A	N/A	14	1,392	Washington to North Carolina
Lorton (LOR) (Amtrak Auto Train Only)	2	744	N/A	N/A	Washington to North Carolina
Lynchburg (LYH) (Amtrak Only)	4	233	N/A	N/A	Northern Virginia, Seminole
Manassas (MSS) (Amtrak/VRE)	4-6	77	16	1,590	Northern Virginia, Seminole
Manassas Park (VRE Only)	N/A	N/A	16	1,426	Northern Virginia, Seminole
Newport News (NPN) (Amtrak Only)	4-5	316	N/A	N/A	East-West
Norfolk (NFK) (Amtrak Only)	2	123	N/A	N/A	Heartland
Petersburg (PTB) (Amtrak Only)	10	82	N/A	N/A	Washington to North Carolina
Quantico (QAN) (Amtrak/VRE)	11-12	90	14	1,052	Washington to North Carolina
Richmond – Main Street (RVM) (Amtrak Only)	4-5	123	N/A	N/A	East-West
Richmond – Staples Mill Road (RVR) (Amtrak Only)	17-18	992	N/A	N/A	Washington to North Carolina
Rippon (VRE Only)	N/A	N/A	14	1,164	Washington to North Carolina

Station Name (Amtrak Station Code)	Amtrak Daily Trains	Amtrak Average Daily Boardings and Alightings in 2015	VRE Daily Trains	VRE Average Weekday Boardings and Alightings in 2015	Major Corridors
Rolling Road (VRE Only)	N/A	N/A	16	809	Northern Virginia, Seminole
Spotsylvania (VRE Only)	N/A	N/A		Opened late 2015	Washington to North Carolina
Staunton (STA) (Amtrak Only)	0-2	22	N/A	N/A	East-West
Williamsburg (WBG) (Amtrak Only)	4-5	169	N/A	N/A	East-West
Woodbridge (WDB) (Amtrak/VRE)	4-5	66	14	1,189	Washington to North Carolina

2.1.3 Rail Service Objectives

Vision

Virginia's vision for its multimodal transportation network, described in VTrans2040, is to be *Good for Business, Good for Communities, and Good to Go*. Virginians will benefit from a sustainable and reliable transportation system that advances Virginia businesses, attracts a 21st century workforce, and promotes healthy communities where Virginians of all ages and abilities can thrive.

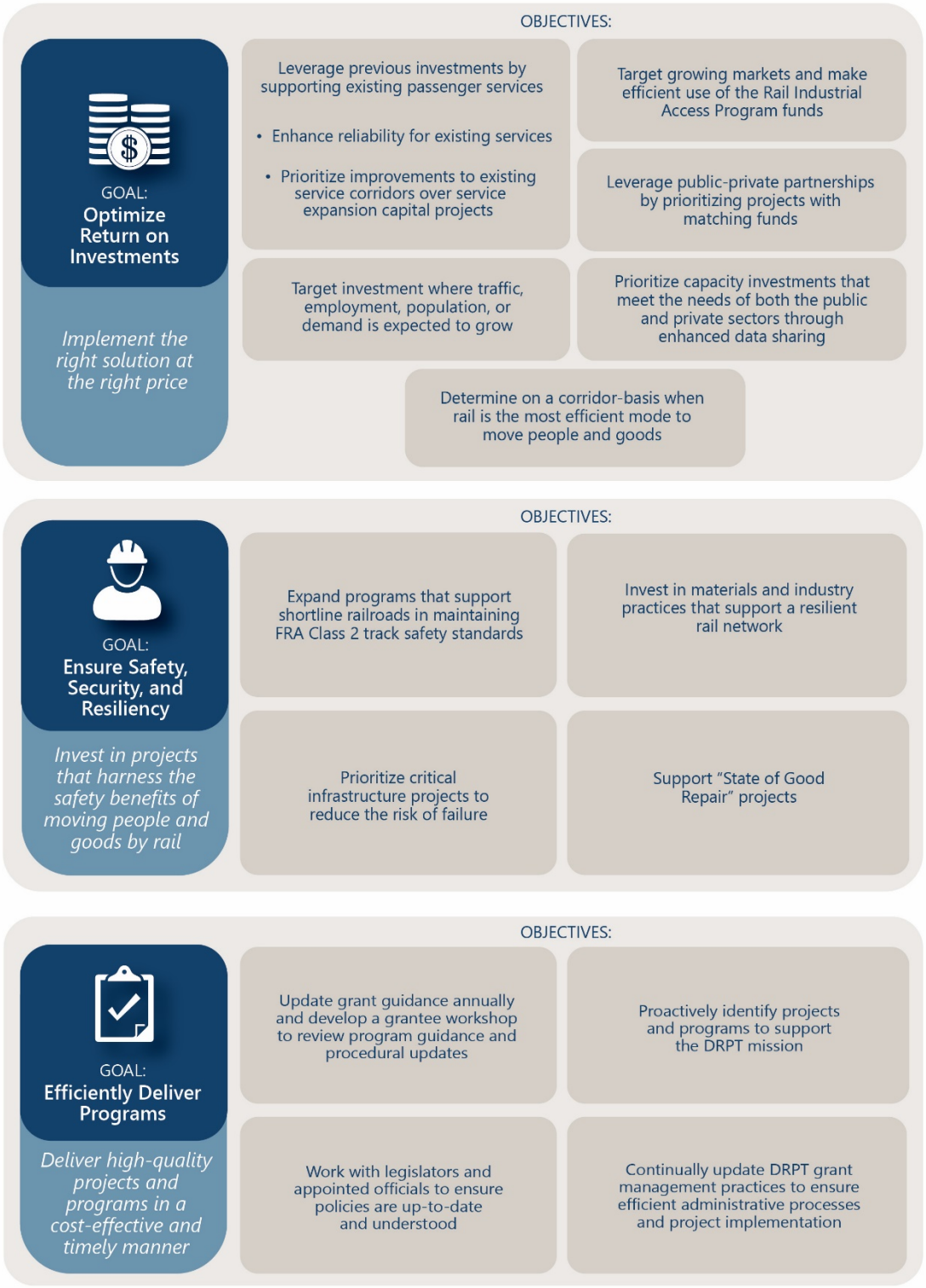
DRPT serves as Virginia's lead agency for rail and public transportation, with the mission to facilitate and improve the mobility of the citizens of Virginia and to promote the efficient transport of goods and people in a safe, reliable, and cost-effective manner. DRPT is also responsible for administering funds for rail investments and public transportation agency formula funds.

The Virginia State Rail Plan recognizes Virginia's vision and DRPT's mission and provides a framework for achieving both of these desired future outcomes through investments in Virginia's rail network as part of a multimodal transportation system supporting economic growth.

The Virginia Rail Plan goals are listed in blue and reflect the VTrans2040 Guiding Principles on the left side of **Figure 2-7**. Corresponding objectives for each goal are shown in tan on the right. The objectives show how DRPT can advance freight and passenger rail through planning efforts and funding programs under the DRPT's purview. Together the rail plan goals and objectives are tools to evaluate and prioritize short-term and long-term planning efforts and investments.

Virginia's rail network is a valuable asset that drives the economy, reduces congestion, improves safety, and saves taxpayer money. Continued investment in rail infrastructure will ensure the mission and vision for the Commonwealth's transportation network is achieved.

Figure 2-7: Goals and Objectives to meet Virginia's Vision for Multimodal Transportation



GOAL: Consider Operational Improvements and Demand Management First

Maximize capacity of the transportation network through increased use of technology and operational improvements before investing in major capacity expansions

OBJECTIVES:

- Encourage use of Intelligent Transportation Systems to improve operational efficiency
- Evaluate operations when considering investment in capacity to ensure the investment yields a lasting benefit
- Incorporate program criteria that prioritize low-cost improvements to relieve bottlenecks and provide capacity

GOAL: Ensure Transparency and Accountability, and Promote Performance Management

Work openly with partners and engage stakeholders in project development and implementation, and establish performance targets that consider the needs of all communities

OBJECTIVES:

- Publicize application evaluation metrics and project data for rail funding programs
- Implement passenger rail station stop policy
- Develop program scorecards to measure impact of rail investments
- Market economic impact of rail investment

GOAL: Improve Coordination between Transportation and Land Use

Encourage local governments to plan and manage transportation-efficient land development by providing incentives, technical support, and collaborative initiatives

OBJECTIVES:

- Encourage local governments to support state funding decisions by making compatible investments and zoning
- Educate localities on appropriate land uses around both freight and passenger rail infrastructure
- Encourage local governments to support rail services with multimodal last-mile connections
- Integrate with and expand upon other state, regional, and local planning efforts

GOAL: Ensure Efficient Intermodal Connections

Provide seamless connections between modes of transportation

OBJECTIVES:

- Prioritize rail projects that benefit the highway system and improve mode choice
- Enhance rail service to the Port
- Support " State of Good Repair" and capacity projects with shortlines

GOAL: Support Regional Economic Development

Encourage local and regional economic development through investment in the rail network

OBJECTIVES:

- Work closely with Virginia Economic Development Partnership to attract rail conducive industries in accordance with the Code of Virginia
- Promote the use of the Rail Industrial Access program through education and outreach with local economic development offices
- Include input from local and regional freight railroads in economic development planning and initiatives
- Expand transportation options between regional markets through enhancements to passenger rail service

Source: DRPT

2.1.4 Passenger Rail Performance Evaluation

This chapter provides an overview of performance metrics for Amtrak intercity passenger and VRE commuter rail operations in Virginia. The information presented here represents the extent of publicly available information and information that DRPT, Amtrak, and VRE have agreed to include in the State Rail Plan. Information identified as Confidential and Proprietary has not been included. Amtrak performance information is presented for Amtrak fiscal years, which begin on October 1 of the prior year and end on September 30 of the year identified. Detailed information is in **Appendix C**.

Ridership and Utilization of Amtrak Services

Table 2-6 depicts the changes in total ridership on Amtrak Virginia regional service and long-distance services serving Virginia. The table captures ridership information from Amtrak's FY 2012 to the end of FY 2016. Overall ridership on Virginia regional service trains increased from 808,771 passengers in FY 2012 to 838,329 passengers in FY 2016, with a high mark in FY 2013 with 887,850 passengers carried from, to, or through Virginia on four different Northeast Regional passenger routes.

Table 2-6: Total Ridership on Amtrak Trains that Operate in Virginia, FY 2012-2016

Service	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Washington-Lynchburg (Route 46)	184,907	186,125	189,723	189,598	184,868
Washington-Newport News (Route 47)	623,864	573,788	344,335	348,581	329,551
Washington-Norfolk (Route 50)	n/a	127,937	152,135	153,857	146,605
Washington-Richmond (Route 51)	n/a	n/a	190,833	186,268	177,305
All Virginia Regional Services	**808,771**	**887,850**	**877,026**	**878,304**	**838,329**
Carolinian	306,419	319,380	302,601	298,973	285,801
Cardinal	116,373	113,103	109,154	103,633	104,831
Crescent	304,266	306,733	294,306	281,777	268,344
Palmetto	198,260	207,915	203,168	208,645	380,815
Silver Meteor	375,164	373,162	348,581	346,097	339,407
Silver Star	425,794	414,077	405,695	383,347	364,271
Total Long-Distance Services in Virginia	**1,683,953**	**1,680,264**	**1,635,349**	**1,595,121**	**1,696,116**
Total Ridership on Amtrak Trains Operating in Virginia	**2,492,724**	**2,568,114**	**2,512,375**	**2,473,425**	**2,534,445**

Ridership for all trains serving Virginia increased 2% between FY 2012 and FY 2016. In addition to ridership increases on the Virginia regional service trains, the long-distance Palmetto also experienced significant ridership gains of 92% between FY 2012 and FY 2016, owing to the October 26, 2015, discontinuance and combination of the Palmetto with two other Northeast Regional trains between

New York and Washington, D.C. and the addition of several station stops including New Brunswick, NJ; Princeton, NJ; BWI Airport; and New Carrollton, MD, to the Palmetto's schedule.

Changes in Amtrak ridership reporting methodology affected the reported ridership of the two daily round trips between the Northeast Corridor, Washington, D.C. and Newport News. The reported decline in patronage is attributable to the fact that until FY 2014, Amtrak counted the two daily round trips that terminate in Richmond as a part of this service. After the two Richmond trains were given their own route classification, ridership figures on the Newport News trains decreased by approximately one-half.

Table 2-7 below shows boardings and alightings for each service type at each station in Virginia. Stations are ordered by their total boardings and alightings. Not counting the Auto Train station at Lorton, the top-five stations for boardings and alightings in FY 2016 were:

1. Richmond Staples Mill: 356,189
2. Alexandria: 190,185
3. Charlottesville: 141,827
4. Fredericksburg: 120,275
5. Newport News: 107,894

Table 2-7: Station Activity (boardings and alightings) at Amtrak Stations in Virginia, FY 2016

Station Code	Station Name	WAS-LYH (46)	WAS-NPN (47)	WAS-NFK (50)	WAS-RVR (51)	Carolinian	Auto Train	Cardinal	Crescent	Palmetto	Silver Meteor	Silver Star	Total
RVR	Richmond Staples Mill		88,926	51,675	83,285	35,771				42,188	20,405	33,939	**356,189**
LOR	Lorton (Auto Train)						238,448						**238,448**
ALX	Alexandria	22,184	51,625	22,143	28,196	20,743		4,164	8,655	15,442	6,990	10,043	**190,185**
CVS	Charlottes-ville	82,684						22,922	32,021				**141,827**
FBG	Fredericks-burg		27,134	27,246	52,089	10,153					3,653		**120,275**
NPN	Newport News		107,894										**107,894**
LYH	Lynchburg	68,385							14,401				**82,786**
WBG	Williams-burg		59,677										**59,677**
NFK	Norfolk			44,316									**44,316**
RVM	Richmond Main Street		42,702										**42,702**
PTB	Petersburg			7,386		5,213				7,374	3,628	6,459	**30,060**
ASD	Ashland		9,527	6,597	11,951								**28,075**
MSS	Manassas	17,701						2,883	7,013				**27,597**
QAN	Quantico		9,262	4,170	7,888	4,154							**25,474**

Station Code	Station Name	WAS-LYH (46)	WAS-NPN (47)	WAS-NFK (50)	WAS-RVR (51)	Carolinian	Auto Train	Cardinal	Crescent	Palmetto	Silver Meteor	Silver Star	Total
RVR	Richmond Staples Mill		88,926	51,675	83,285	35,771				42,188	20,405	33,939	**356,189**
LOR	Lorton (Auto Train)						238,448						**238,448**
ALX	Alexandria	22,184	51,625	22,143	28,196	20,743		4,164	8,655	15,442	6,990	10,043	**190,185**
CVS	Charlottes-ville	82,684						22,922	32,021				**141,827**
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NPN	Newport News		107,894										**107,894**
LYH	Lynchburg	68,385							14,401				**82,786**
WBG	Williams-burg		59,677										**59,677**
NFK	Norfolk			44,316									**44,316**
WDB	Wood-bridge		1,616	6,191	9,649								**17,456**
CLP	Culpeper	9,390						1,965	3,733				**15,088**
BCV	Burke Centre	9,101											**9,101**
DAN	Danville								7,209				**7,209**
STA	Staunton							6,250					**6,250**
CLF	Clifton Forge							2,401					**2,401**
	Total	**209,445**	**398,363**	**169,724**	**193,058**	**76,034**	**238,448**	**40,585**	**73,032**	**65,004**	**34,676**	**50,441**	**1,553,010**

Note: Charlottesville station count includes ridership of 4,200 that occurred as part of a special, one-time Amtrak train operation.
Source: Amtrak-provided data.

Roughly three-fourths of the boardings and alightings at Virginia's two busiest stations were attributed to Virginia regional service passengers in FY 2016. At Charlottesville, the station's only round trip Virginia regional service train accounted for roughly 60% of all boarding and alightings, despite it being only one-third of the total number of trains that stop there daily.[5] Of the top 10 stations, seven are located in dense, central locations with multimodal transit access. Despite poor transit access and limited parking facilities, Richmond's Staples Mill Station consistently leads the state in boardings and alightings.

[5] The thrice-weekly Cardinal does not stop in Charlottesville daily, but is assumed to be a once-daily train for this illustrative comparison.

Financial Performance of Amtrak Services

Virginia regional services have seen modest revenue increases over the past five years compared to other Amtrak regional services, though revenues declined greater than the nationwide state-supported percentage change in FY 2016 (-3.5 percent in Virginia versus +0.3 percent nationwide). In most years, Amtrak's East Coast long-distance trains had revenue increases less than the nationwide long-distance train average. As it has for many years, the Auto Train generated the highest revenue of any Amtrak long-distance service in FY 2016.

Virginia is responsible for supporting the costs of Northeast Regional passenger rail services in the Commonwealth. Annual costs levied by Amtrak for Virginia's regional services include annual revenues, farebox recovery, and payments to Amtrak made by Virginia for the services. Costs also include day-to-day operations and maintenance as well as capital costs for equipment. As shown in **Table 2-8**[6], between FY 2014 and FY 2016, total costs increased from approximately $41 million to $45 million, and revenues increased from $35 million to $37 million. As the increase in revenue did not match the increase costs, the resulting operating farebox recovery ratio[7] between FY 2014 and FY 2016 decreased from 0.96 to 0.94, effectively resulting in an increase in the amount of costs incurred by Virginia for regional passenger trains.

Table 2-8: Annual Allocated Costs, Revenues, Farebox Recovery, and Payments for Amtrak Regional Passenger Trains in Virginia, 2014-2016

Fiscal Year	2014	2015	2016
Overall Totals			
Total Capital Cost	$4,164,270	$4,997,124	$5,272,968
Total Operating Cost	$37,219,726	$37,451,002	$40,215,584
Total Costs	$41,383,996	$42,448,126	$45,488,552
Total Train Revenues	$35,691,282	$35,675,433	$37,695,934
Operating Farebox Recovery Ratio	0.96	0.95	0.94
Theoretical Amount Owed by DRPT to Amtrak	$2,796,165	$6,772,693	$7,792,618

[6] The amounts in Table 2-9 are exclusive of any previous credits DRPT had with Amtrak for operation of the Lynchburg and Norfolk services prior to the adoption of the formal PRIIA cost allocation methodology for Virginia regional service routes.

[7] Operating farebox recovery ratio is the fraction of operating expenses paid through fares by passengers. It is derived by dividing the total revenue by total expenses.

Fiscal Year	2014	2015	2016
Actual Payment Amount from DRPT to Amtrak[8]	$ 0	$5,601,100	$8,394,308
Washington to Lynchburg (Route 46)			
Capital Cost	$266,533	$976,464	$1,022,148
Operating Cost			
Fixed Costs (PRIIA)	$5,630,552	$5,830,637	$6,000,644
Host and Fuel Costs	$1,549,599	$1,165,254	$966,481
Total Operating	$7,180,151	$6,995,891	$6,967,125
Operating Farebox Ratio	1.16	1.15	1.10
Total Revenues	$8,298,969	$8,030,785	$7,686,322
Washington to Newport News (Route 47)			
Capital Cost	$563,431	$1,431,096	$1,541,040
Operating Cost			
Fixed Costs (PRIIA)	$14,282,212	$15,013,818	$15,569,489
Host and Fuel Costs	$2,586,645	$1,746,994	$ 1,367,782
Total Operating	$16,868,856	$16,760,812	$16,937,270
Operating Farebox Ratio	0.90	0.89	0.88
Total Revenues	$15,252,624	$14,988,873	$14,958,552
Washington to Norfolk (Route 50)			
Capital Cost	$226,713	$1,164,072	$1,219,512
Operating Cost			
Fixed Costs (PRIIA)	$5,389,791	$5,820,451	$5,802,673
Host and Fuel Costs	$1,448,166	$1,216,939	$1,118,601
Total Operating	$6,837,957	$7,037,390	$6,921,274
Operating Farebox Ratio	.85	.87	.92
Total Revenues	$5,827,387	$6,146,636	$6,353,461
Washington to Richmond (Route 51)			
Capital Cost	$211,045	$1,425,492	$1,490,268
Operating Cost			
Fixed Costs (PRIIA)	$4,996,644	$5,652,144	$8,186,156
Host and Fuel Costs	$1,336,118	$1,004,765	$1,203,759
Total Operating	$6,332,762	$6,656,909	$9,389,915

[8] Theoretical and actual amounts owed to Amtrak differ due to adjustments made in invoicing and bill credit accounting after the adoption of the formal PRIIA cost allocation methodology for Virginia regional service routes. Prior to 2015, there was no net outlay of funding for Virginia regional Amtrak service by DRPT due to operating credits.

Fiscal Year	2014	2015	2016
Operating Farebox Ratio	1.00	0.98	0.93
Total Revenues	$6,312,302.22	$6,509,139	$8,697,599

Source: DRPT

On-Time Performance and Customer Satisfaction of Amtrak Services

The following describes the on-time performance (OTP), causes of train delay, and customer satisfaction ratings for Virginia regional service and Amtrak long-distance trains operating in Virginia. Detailed information and data pertaining to on-time performance results, causes of train delay, and customer satisfaction are in **Appendix C**.

Endpoint On-Time Performance. Over the past five years, Virginia regional service trains' endpoint OTP declined through FY 2015 (71.5 percent) and has improved slightly to 81.4 percent for FY 2016. The Lynchburg service along the Seminole Corridor has maintained a higher endpoint OTP over the past five years than the combined Richmond/Norfolk/Newport News services along the Washington, D.C. to North Carolina Corridor. With the exception of the Auto Train, Amtrak's long-distance trains operating in Virginia do not have any endpoints in the state; however, Amtrak's system-wide average mirrored the Virginia trains pattern with a dip in endpoint OTP in FY 2014 of 50.4% and recovery to 63.1% in FY 2016. The Silver Meteor, Silver Star, and Carolinian that travel along the Washington, D.C. to North Carolina Corridor have seen significant declines in endpoint OTP in the past five years.

All Stations On-Time Performance. FY 2016 yielded an improved all-station OTP of 84.3% for all Virginia regional services. In FY 2016, only the Lynchburg service posted all-stations-OTP higher than the PRIIA standard for Northeast Regional services of 85%. All long-distance trains serving Virginia, except the Cardinal, experienced declines in all-station OTP over the last five years. This is likely one of the causes of reduced ridership and revenue for the long-distance services serving Virginia.

Causes of Train Delay. The primary causes of delay on all of the routes serving Virginia are train interference and track and signal problems. Virginia-bound trains may also be delayed by the high volume of train operations on the NEC between Boston, New York, and Washington, D.C. Operations are physically constrained by moveable bridges, tunnels and station platform requirements. In addition, trains serving Virginia must change locomotives from electric to diesel at Washington, D.C. and in some cases add or subtract cars, adding potential for delay.

Customer Service Indicator Scores. Amtrak's Customer Service Indicator (CSI) scores measure the satisfaction of passengers on particular aspects of their trip. Overall, Virginia's regional service trains have maintained CSI scores in the 80 range[9], despite not meeting Amtrak's standard of 90 for FY 2016. The data shows that for the past five years, both on-board comfort and on-board food service scored lowest among CSI metrics measured. On-board cleanliness for all Virginia services has greatly improved in the last five years.

Projects to Improve Service. Several projects and initiatives in recent years have been undertaken to improve service on Amtrak trains serving Virginia. **Table 2-9** details some of the major service improvement initiatives implemented in recent years. Future improvements planned to improve the performance of Virginia's regional service passenger trains are discussed in **Chapter 3**, including rail infrastructure projects to improve the frequency and reliability of Amtrak trains.

Table 2-9: Recent Service Initiatives on Amtrak Trains Serving Virginia

Improvement	Service
Amtrak Thruway bus connection from Charlottesville to Richmond Staples Mill Road and Richmond Main Street Station	Cardinal and Crescent (2014)
Additional stop in Fredericksburg and Roanoke	Silver Meteor (2015); Lynchburg-Roanoke (2017)
Checked bicycle service	Carolinian, Crescent, Palmetto, Silver Meteor, and Silver Star (2015); Washington-Newport News and Cardinal (2016)
Pets on Trains pilot program	Washington-Lynchburg / Newport News / Norfolk and Palmetto (2015); Carolinian, Silver Meteor, and Silver Star (2016)
Business Class service added	Auto Train, Cardinal, and Crescent (2016)

Source: Amtrak press releases announcing service initiatives

Virginia Railway Express Performance

Overall annual ridership on VRE commuter trains between 2011 and 2015 decreased from 4,698,798 annually in FY 2011 to 4,610,084 annually in FY 2015. In November 2015, VRE extended its Fredericksburg Line service south to a new station in Spotsylvania County, and soon after added an eighth round trip on the line. While the Manassas Line has seen a gradual decline in ridership over the

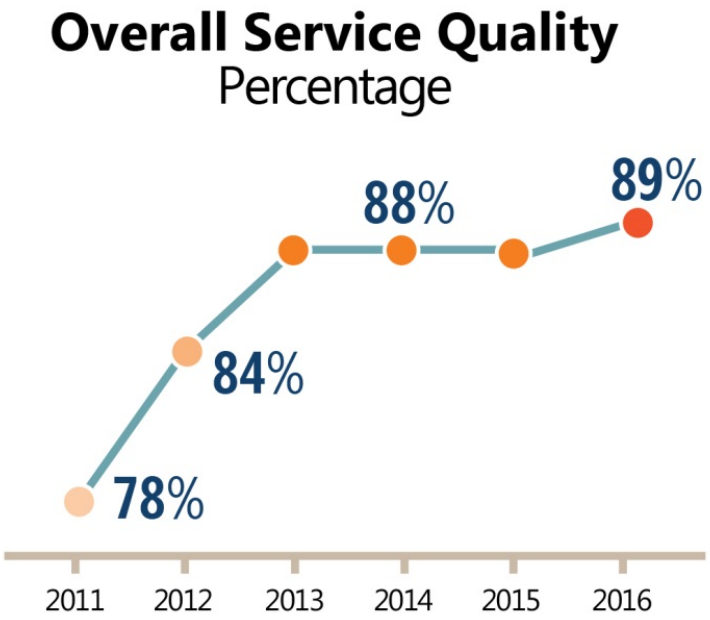
[9] A CSI score of 80, for example, means 80 percent of respondents rated the aspect of their trip in the top three of the 11 steps of the scale.

FY 2011to FY 2015 time period, the Fredericksburg Line has seen modest increases after a three-year period of ridership decline between FY 2011 and FY 2014.

VRE currently operates with an annual overall on-time performance of more than 92 percent. Although OTP has declined slightly since FY 2013, when it was almost 96 percent, OTP remains higher than FY 2011, when system performance was 87 percent. Some of the recent declines in reliability can be attributed to rail capacity improvement projects on the Fredericksburg Line. Rather than suspend service altogether during construction, VRE, DRPT, and CSX adopted construction methods that enabled rail service to continue while work was taking place, but with the potential for lower track speeds or delays at certain times.

VRE's improved performance can be attributed in part to key investments in track capacity to improve reliability, station parking and facility improvements to accommodate more riders, and new equipment for improved capacity and reliability. **Figure 2-8** shows the increase in overall service quality between FY 2011 and FY 2015, as rated by VRE passengers in the agency's 2016 Customer Service Survey. Riders in FY 2016 gave VRE a service quality score of 89 percent—an 11 percent increase from FY 2011—the system's highest ever score.

Figure 2-8: VRE Overall Service Quality Scores



2.1.5 Public Financing for Rail Projects and Services

DRPT, as well as a number of local public agencies in the state, has utilized federal and state transportation funding programs for rail infrastructure improvements. The following is a short summary of state and federal rail funding resources utilized for railroad improvements in Virginia in the recent past.

State-Sponsored Rail Investment Programs

In Virginia, state-sponsored rail investment programs are led by DRPT, with the CTB allocating state funds for the programs. Freight rail funding includes improvements for Virginia's Class I railroads (CSX and NS), nine shortline railroads, the Virginia Port Authority, and businesses expanding or locating on the railroad network. In addition to improving freight capacity, DRPT works to preserve existing freight capacity when accommodating new passenger rail services.[10] State sponsored rail investment programs are described in **Chapter 1.**

Federal Rail-Related Programs and Funding

Federal transportation funding to states is periodically authorized through Federal Surface Transportation Acts. The recently approved Federal Surface Transportation Act, the Fixing America's Surface Transportation (FAST) Act, is a five-year program to improve the nation's transportation infrastructure, including roads, bridges, transit systems, and the rail transportation network. The bill provides for a total of $305 billion in funding from FY 2016 through FY 2020.

The FAST Act places major emphasis on freight investments to be supported by the Highway Trust Fund by creating a new National Freight Program funded at an average of $1.2 billion per year, to be distributed to states by formula. Non-highway projects eligible to receive these funds include rail-highway grade separation and intermodal transfer and access projects.

Title XI of the FAST Act, also known as the Passenger Rail Reform and Investment Act of 2015 (PRIIA), provides for $5.5 billion to be spent on the national intercity rail network outside the NEC. Funding for this program, as well as another $2.2 billion for FRA grant programs, however, are dependent on annual Congressional budget appropriations. No passenger appropriations were passed for the first year of the program.

Appendix D provides details on each of the federal funding programs. **Table 2-10** denotes Virginia's participation in the rail related federal funding programs.

[10] http://www.drpt.virginia.gov/rail/rail-overview/

Table 2-10: Federal Rail-Related Funding Programs Awarded to Virginia

Grant / Fund	Awarded Funding for Virginia (DRPT and VRE)
PRIIA Capital Assistance Program	
PRIIA	No appropriations for high-speed rail grants were included in subsequent federal budgets, and PRIIA authorizations expired on September 30, 2013.
ARRA	A grant of $74.8 million (FY 2010) under the HSIPR Program for the Arkendale to Powells Creek Third Track project. This would fund the construction of a third mainline track near Quantico to improve capacity, schedule reliability, and service quality for freight, commuter and passenger trains on the CSX-owned railroad corridor between Washington, D.C. and Richmond.
High-Speed Intercity Passenger Rail (HSIPR)	A grant of $44.3 million (FY 2010) was awarded to DRPT for completion of the Washington, D.C. to Richmond Southeast High Speed Rail Tier 2 Environmental Impact Statement, preliminary engineering and Service Development Plan. This grant has an 80/20 percent federal/state match.
FASTLANE Program	A grant of $165 million (FY 2016) for the Atlantic Gateway project to unlock the economic potential of the Eastern Seaboard by accelerating key highway and rail projects to provide a long-term, multimodal network for freight and passenger transportation between the Northeast and Southeast.
Federal Surface Transportation Rail-Related Programs	
Rail Rehabilitation and Improvement Financing (RRIF)	VRE, received RRIF funding in FY 2006.

2.1.6 Ongoing Projects for Safety and Security Improvements

Rail safety affects the well-being of railway workers and the public. It also has a major impact on the efficiency of railroad operations. Increased attention has also focused on the safe movement of hazardous materials by rail, especially the movement of crude oil and other flammable liquids. Rail safety requirements are provided through a combination of federal and state laws, and operating procedures specific to each railroad. Most safety-related rules and regulations fall under the jurisdiction of the FRA, as outlined in the Rail Safety Act of 1970 and other legislation, such as the most recent Rail Safety Improvement Act of 2008. FRA's rail safety regulations can generally be found in Title 49 Code of Federal Regulations (CFR) Parts 100-299.[11]

[11] https://www.ecfr.gov/cgi-bin/text-idx?SID=64888b3a481b290ebbcc93726eb7f0c0&mc=true&tpl=/ecfrbrowse/Title49/49cfrv4_02.tpl#0

Rail security has seen increased attention due to the potential for disruption of the transportation system or acts that could place large numbers of citizens at risk. This chapter describes rail safety and security efforts in Virginia.

Rail Safety Programs in Virginia

Highway Safety Improvement Program

The Highway Safety Improvement Program (HSIP), also known as the Section 130 program, is administered by VDOT and goes towards improvement of railroad grade crossings. A complete list of major projects funded under the Section 130 program is included as **Appendix E.**

Virginia State Corporation Commission (SCC)

Virginia's SCC Division of Utility and Railroad Safety has held the authority since 1919 to regulate the safe operation of passenger and freight rail in the Commonwealth. The SCC also received authority under 49 CFR Part 212 to augment the FRA's safety inspection and regulation program.

The SCC supplements the FRA's roughly eight inspectors that cover various aspects of railroad safety, including track, motive power and equipment, operating practices, hazmat, and signal, with eight of its own inspection staff. In addition, the SCC handles complaints from citizens relating to noise, blocked crossings, crossing signal issues, and train speeding. The SCC also responds to and investigates rail accidents within the state, such as derailments, fatalities, crossing accidents, and chemical/hazmat spills. Virginia is the only state that currently uses a data-driven system to determine locations for upcoming inspections, and coordinates inspections with the FRA to lessen the burden on the freight railroads.

Operation Lifesaver, Inc.

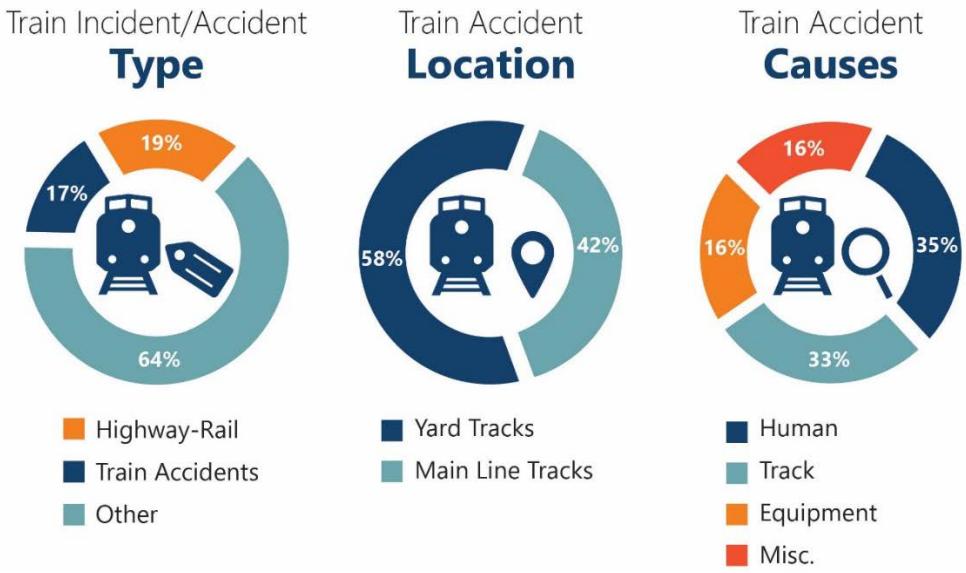
Operation Lifesaver, Inc. (OLI), established in 1972, is headquartered in Alexandria, Virginia. OLI is a non-profit, educational organization for highway-rail crossing safety and rail trespass prevention. This organization promotes safety through education of both drivers and pedestrians to make safe decisions at crossings and around tracks, promoting enforcement of traffic laws related to crossing signals and trespass, and by encouraging continued engineering research and innovation to improve the safety of railroad crossings. DRPT has a liaison that works with the statewide Operation Lifesaver coordinator.

Virginia Rail Accident Statistics

According to the FRA Office of Safety Analysis, in 2015, there were 201 train-related incidents in Virginia, with 19 resulting in fatalities. While total incidents have declined slightly since 2006, total fatalities have increased during this same time.

Figure 2-9 provides more detailed information regarding the type, location, and causes of the train accidents over the past decade. "Other" accidents are the dominant type of rail incident in the state over of the past 10 years. "Other" rail accidents are any death, injury, or occupational illness of a railroad employee that is not the result of a "train accident" or "highway-rail incident." [12] In addition, most rail accidents occurred on yard tracks as opposed to mainline tracks.

Figure 2-9: Train Accident Type/Locations/Causes in Virginia (2006-2015)



Source: FRA Office of Safety Analysis and HDR

Highway-Rail At-Grade Crossing Safety in Virginia

Crossing Protection in Virginia

According to FRA's inventory of at-grade crossings, there are approximately 1,891 public at-grade highway-rail crossings in Virginia. In addition, there are approximately 1,433 grade-separated crossings.[13] Public highway at-grade crossings in the state have various levels of grade crossing warning devices. **Figure 2-10** shows the type of warning equipment and the number of crossings equipped with each. The warning devices are shown in a decreasing order of warning effectiveness.

[12] Train accident is defined as, "collisions, derailments, fires, explosions, acts of God, or other events involving the operation of railroad on-track equipment (standing or moving) and causing reportable damages greater than the reporting threshold for the year in which the accident/incident occurred must be reported using Form FRA F 6180.54." The following link lists the reporting thresholds per year: https://safetydata.fra.dot.gov/OfficeofSafety/ProcessFile.aspx?doc=RAILROAD_REPORTING_THRESHOLD.doc

[13] FRA Crossing Inventory Data Query was run on October 27, 2016 for public, private, and grade separations.

Figure 2-10: Types of Warning Devices at Virginia Public At-Grade Crossings

Warning Device Type	Quad Gates	Gates	Flashing Lights	Bells	Special Warning	Stop Signs	Cross Bucks	Other	None
Number of Crossings	14	1,201	297	22	7	39	289	4	18

Source: FRA Office of Safety Analysis

These figures show that 81 percent of all public highway at-grade crossings in Virginia have some form of active warning devices, including special warning arrangements such as flagmen. The remaining 350 crossings, or 19 percent, have passive warnings, such as cross bucks or stop signs. Many of the crossings with passive warning systems have low volumes of roadway traffic and are rural in nature.

In addition to public at-grade crossings, there are approximately 2,751 private crossings in the state. Private crossings are outside the jurisdiction of VDOT and DRPT.

Positive Train Control

Positive Train Control (PTC) refers to technologies designed to automatically stop or slow a train before certain accidents can occur. PTC is designed to prevent collisions between trains, derailments caused by excessive speed, trains operating beyond their limits of authority, incursions by trains on tracks under repair, and by trains moving over switches left in the wrong position. PTC systems are designed to determine the location and speed of trains, warn train operators of potential problems, and take action if operators do not respond to a warning.

As required by the regulations, all rail operators hosting Amtrak service within Virginia, including any shortline railroad hosting Amtrak service, needs to be equipped with PTC. Class I railroads are currently developing PTC systems for their networks, which would include implementation of the technology on principal lines in Virginia.

Rail Security

The primary agencies responsible for security related to transportation modes in Virginia are the U.S. Department of Homeland Security, Office of the Secretary of Public Safety and Homeland Security, Virginia's Department of Emergency Management, Virginia Emergency Response Council, Railroad Safety and Security Task Force, county emergency management coordinators, and local emergency planning committees (LEPCs). These agencies, in coordination with federal and state transportation agencies, have addressed transportation security largely through identifying critical infrastructure

assets, developing protection strategies for these assets, and developing emergency management plans.

2.1.7 Economic Impacts and Socio-Environmental Benefits

Rail transportation provides low-cost, high-capacity and low environmental impact solutions for the movement of people and goods, particularly as the travel distance increases. According to Hofstra University, one rail car typically has a cargo capacity of approximately 100 tons, which equates to a total capacity of 10,000 tons for a 100 car train unit. As illustrated in **Figure 2-11**, it would take 340 semi-trailer trucks to carry the same amount of freight as a 100 car train. The benefits of moving passengers and freight on the rail system include less congestion on highways, efficient fuel consumption, low greenhouse gas emissions, and an excellent safety record.

Figure 2-11: Rail and Truck Capacity Comparison (Equivalent Freight Units)

Economic Impacts of Freight and Passenger Rail

Rail economic impacts to Virginia are estimated using multipliers from the IMPLAN® economic model with input data and assumptions from freight movement data (via the STB Waybill Sample and IHS TRANSEARCH [2012], which are described in **Chapter 2.2.2** of the Virginia State Rail Plan) and passenger rail operations and visitor characteristics. Impacts of rail service-related spending in Virginia emanate from firms providing freight and passenger transport services, industries using such services to trade goods (shippers/receivers), and expenditures from visitors who reach Virginia via rail. Of these activities, freight-users generate the most significant impact.

Impacts are calculated and presented by activity (service provision and rail users), type (direct, indirect, induced, and total), and measure (employment, income, value added, output, and tax revenue) for FY 2015 to provide a comprehensive perspective on how rail in Virginia impacts the economy and are shown in **Table 2-11**.

- **Employment** – Economic impacts of rail extend beyond the 6,762 directly employed in the provision of rail transport (both passenger and freight). When the freight and visitor impact activities and multiplier impacts are included, rail-related employment in Virginia amounts to 341,519 jobs, which represent 6.7 percent of the 5.1 million jobs statewide.
- **Income** – $19.8 billion earned by these total employees represent 6.4 percent of Virginia's total labor income. Labor income includes employee compensation and proprietary income. Employee compensation, in turn, consists of wage and salary payments as well as benefits (health, retirement, etc.) and employer paid payroll taxes (employer side of social security, unemployment taxes, etc.). Proprietary income consists of payments received by self-employed individuals and unincorporated business owners.
- **Value Added** – The combined value added impact of rail services is over $30 billion and represents 6.0 percent of the state's Gross State Product (GSP).
- **Output** – In terms of total revenue, the rail industry generated about $72.9 billion in output, which is 8.8 percent of Virginia's total output.
- **Tax Revenue** – Federal, state and local tax revenues generated by the rail industry totaled $1.9 billion.

Table 2-11: Rail Economic Impacts in Virginia

Measure and Type	Transport Services			Transport Users			Total Services and Users		
	Pass.	Freight	Total Services	Pass.	Freight	Total Users	Pass.	Freight	Total
Employment[a]									
Direct	914	5,848	**6,762**	438	163,674	**164,111**	1,352	169,522	**170,873**
Total	2,344	14,999	**17,343**	1,123	323,054	**324,176**	3,467	338,052	**341,519**
Income[b]									
Direct	84.9	543.0	**627.9**	40.6	9,417.3	**9,457.9**	125.5	9,960.3	**10,085.8**
Total	168.4	1,077.4	**1,245.8**	80.6	18,502.8	**18,583.5**	249.0	19,580.2	**19,829.2**
Value Added[b]									

Measure and Type	Transport Services			Transport Users			Total Services and Users		
	Pass.	Freight	Total Services	Pass.	Freight	Total Users	Pass.	Freight	Total
Direct	146.6	937.9	**1,084.5**	70.2	12,999.8	**13,070.0**	216.8	13,937.7	**14,154.5**
Total	280.3	1,793.6	**2,074.0**	134.3	27,948.1	**28,082.4**	414.6	29,741.8	**30,156.4**
Output[b]									
Direct	320.1	2,047.8	**2,367.9**	153.3	42,193.1	**42,346.3**	473.3	44,240.9	**44,714.2**
Total	553.1	3,538.8	**4,091.9**	264.9	68,529.0	**68,793.9**	818.0	72,067.9	**72,885.8**
Tax Revenue[b]									
Direct	2.8	18.2	**21.1**	1.4	629.0	**630.4**	4.2	647.2	**651.4**
Total	12.8	82.2	**95.0**	6.2	1,805.3	**1,811.5**	19.0	1,887.5	**1,906.5**

Source: Amtrak, VRE, WAYBILL, IHS TRANSEARCH and IMPLAN

a Employment rounded to the nearest 10 job-years; totals may not sum due to rounding

b In millions of 2016 Dollars

The full description of economic impacts can be found in **Appendix F** and **Appendix G**.

Social-Environmental Benefits

The value of freight and passenger rail infrastructure and service can also be observed in the extent of economic benefits that are derived from rail use. In particular, rail use as compared to shipping goods by truck or traveling by passenger vehicles reduces external social and environmental impacts (i.e., "externalities"). Externalities, such as roadway congestion, air pollutant emissions, road crashes, and pavement damage, can be measured in monetary terms using standard economic methods and parameters. The magnitude of these benefits is driven by the numbers of truck and passenger vehicle miles avoided because of the availability of rail. In addition, since shipping costs for freight rail are lower than trucks, cost savings from rail use would translate into lower product costs, assuming that markets for such goods are competitive – a common assumption. The discussion below documents the estimation of rail ton-miles and passenger vehicle miles, and specific assumptions for each of the benefit categories.

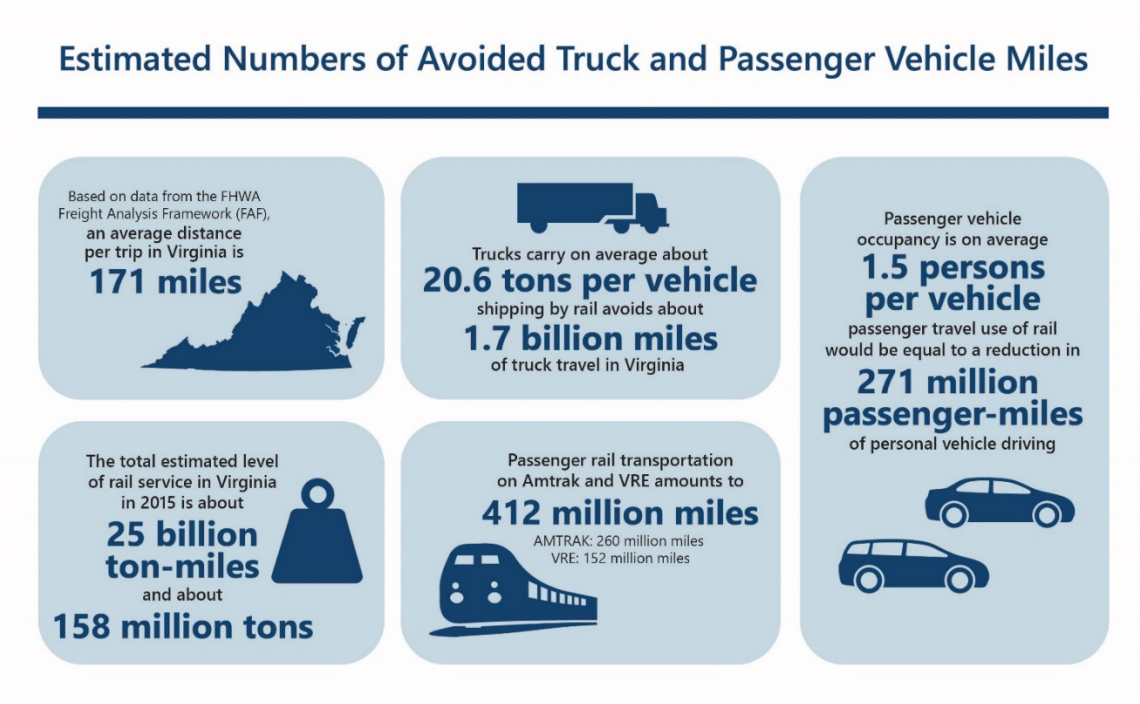
Estimated Numbers of Avoided Truck and Passenger Vehicle Miles

Benefits of freight and passenger rail use have been estimated for each of the major benefit categories based on the estimated number of miles of rail use that incurred in Virginia. Estimated freight rail miles are derived from IHS TRANSEARCH (2012) data, as provided by VDOT. These data include the origins and destinations of shipments that travel to, from, within, and through Virginia. From these data, DRPT

computed a total number of freight miles and freight-ton miles that occurred in Virginia. For trips that begin and end in Virginia, the estimated mileage is straightforward. For other trips including those that travel to, from and through Virginia, the portion of these trips that only occurs in Virginia must be estimated from existing data. The high-level approximation for estimating Virginia-only miles relies on an average distance per trip that is traveled in the Commonwealth, which is applied to all trips independent of actual origin, destination, or route through Virginia. Based on data from the FHWA Freight Analysis Framework (FAF), an average distance per trip in Virginia is 171 miles. Using these data, the total estimated level of rail service in Virginia in 2015 is about 25 billion ton-miles and about 158 million tons. Assuming that trucks carry on average about 20.6 tons per vehicle, shipping by rail avoids about 1.7 billion miles of truck travel in Virginia (**Figure 2-12**).

Passenger rail transportation on Amtrak and VRE amounts to 412 million passenger-miles. This sum includes about 260 million passenger-miles on Amtrak and another 152 million passenger-miles on VRE. Since passenger vehicle occupancy is on average about 1.5 persons per vehicle, passenger travel use of rail in Virginia is equivalent to a reduction in 271 million miles of personal vehicle driving (**Figure 2-12**).

Figure 2-12: Estimated Numbers of Avoided Truck and Passenger Vehicle Miles



Estimated benefits for freight and passenger services are presented in **Table 2-12.** Rail use benefits are largely derived from savings from diverting freight and passengers from highways to rail. The results

indicate that more than $2.2 billion (2016 dollars) in annual benefits are generated from freight service to, from, within and through the Commonwealth. The largest benefits are user (shipper) cost savings, at an estimated $1.6 billion (2016 dollars). This category represents over 70 percent of all benefits. Other sources of benefits generate a total of $0.6 billion annually. Altogether, freight service benefits amount to about $0.09 (9 cents) per ton-mile of rail use.

In addition, passenger services annually generate nearly $190 million (2016 dollars) in benefits of avoided passenger vehicle use. The largest of these benefits are user cost savings (e.g., savings resulting from diverting from automobile to rail). In addition, congestion savings and crash reduction benefits generate over $60 million and $28 million annually (2016 dollars), respectively. Overall, the Commonwealth gains about $0.46 (46 cents) in avoided vehicle use benefits for every mile of rail service used by passengers.

Table 2-12: Estimated Benefits of Freight and Passenger Use, by Benefit Category

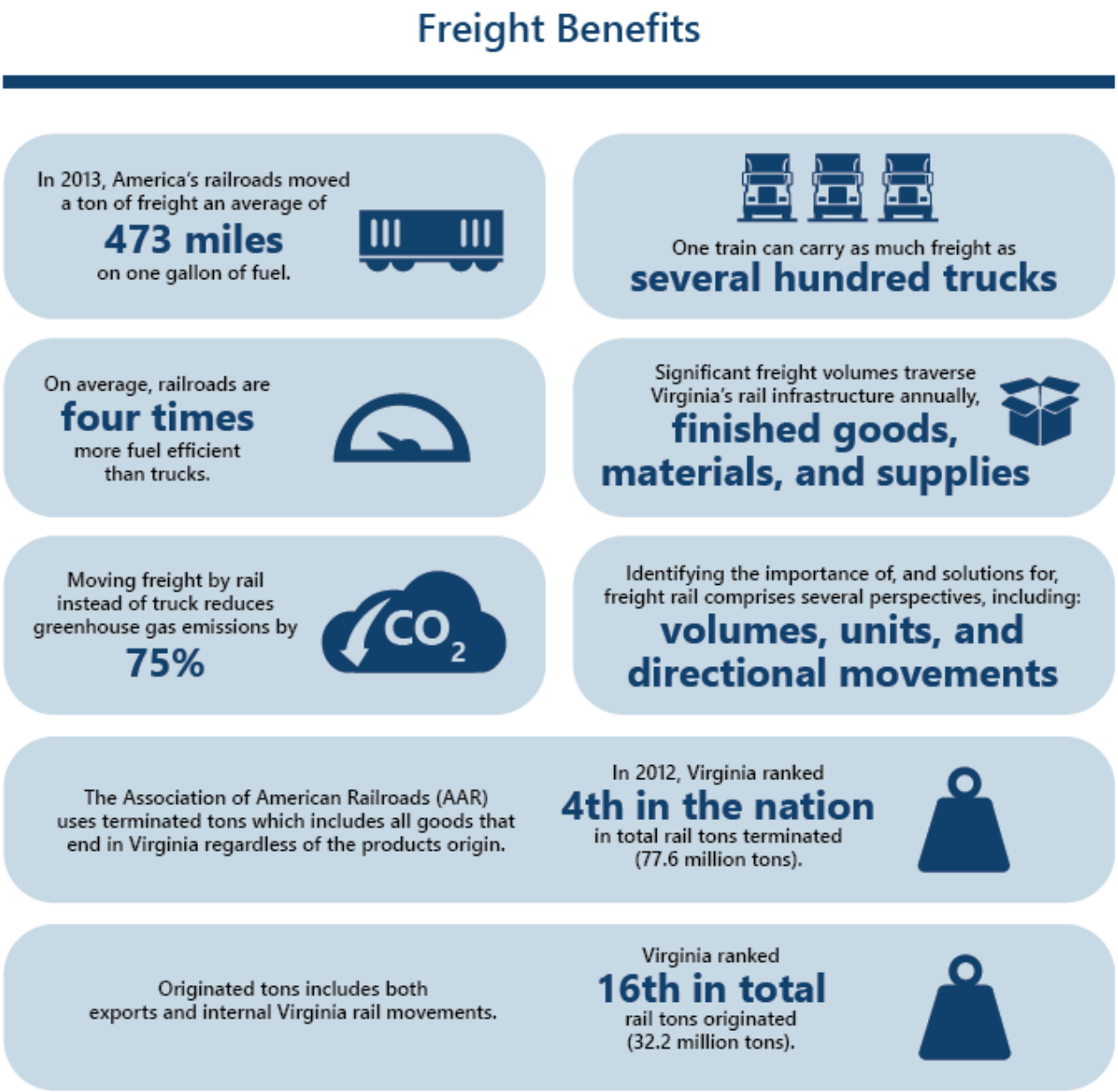
Freight Benefit Categories	Total Freight Service Benefits[a]	Freight Service Benefits per Thousand Ton Miles[b]
Millions of Rail Ton Miles in VA		25,107
User Cost Savings	$1,635.5	$65.2
Pavement Savings	$122.8	$4.9
Congestion Savings	$251.1	$10.0
Truck Emissions	$158.3	$6.3
Truck Crash Reduction	$71.2	$2.8
Total	**$2,239.0**	**$89.3**
Passenger Benefit Categories	**Total Passenger Service Benefits[a]**	**Passenger Service Benefits per Thousand Passenger Miles[b]**
Millions of Passenger Rail Miles in VA		411.9
User Cost Savings	$95.9	$232.9
Pavement Savings	$0.5	$1.2
Congestion Savings	$60.9	$147.9
Auto Emissions	$4.0	$9.7
Auto Safety	$28.4	$68.9
Total	**$189.7**	**$460.6**

Notes:
a In millions of 2016 Dollars
b In 2016 Dollars per 000 Passenger Miles

Additionally, the benefits of rail on freight movement are shown in **Figure 2-13**. In 2013, America's railroads moved a ton of freight an average of 473 miles on one gallon of fuel. That is the approximate distance between Richmond, Virginia, and Lexington, Kentucky. On average, railroads are four times more fuel efficient than trucks. Moving freight by rail instead of truck reduces greenhouse gas emissions by 75 percent. One train can carry as much freight as several hundred trucks. Significant freight volumes traverse Virginia's rail infrastructure annually. Such freight includes finished goods, materials, and supplies.

Methodology for calculating freight and passenger benefits is included as **Appendix H.**

Figure 2-13: Freight Benefits



2.2 Trends and Forecasts

Trends which impact both passenger and freight rail include factors such as demographic and economic growth, freight and passenger transportation changes, congestion to all transportation modes, and changes in future state land use. These factors all contribute to the projected demand and growth for both passenger and freight, although many of these factors are difficult to incorporate into demand forecasting. The following discussion provides a base for determining future rail service needs in Virginia and identifies areas of the state's future economy that will be transportation dependent.

2.2.1 Demographic and Economic Growth Factors

Population

The estimated population for Virginia in 2016 was 8,411,808, placing Virginia 12th among all states. Since the last U.S. Census population count in 2010, Virginia's estimated population has increased by 4.8 percent, which is just over the 4.4 percent population growth rate for the U.S. as a whole. Since 2000, Virginia grew by 18.8 percent, the 15th fastest rate in the country, reflecting the fact that the growth in the region has been somewhat faster when compared with other portions of the country. Virginia's growth was higher than the country's overall 14.8 percent growth in population, indicating that Virginia is adding slightly more population than other states in the country[14].

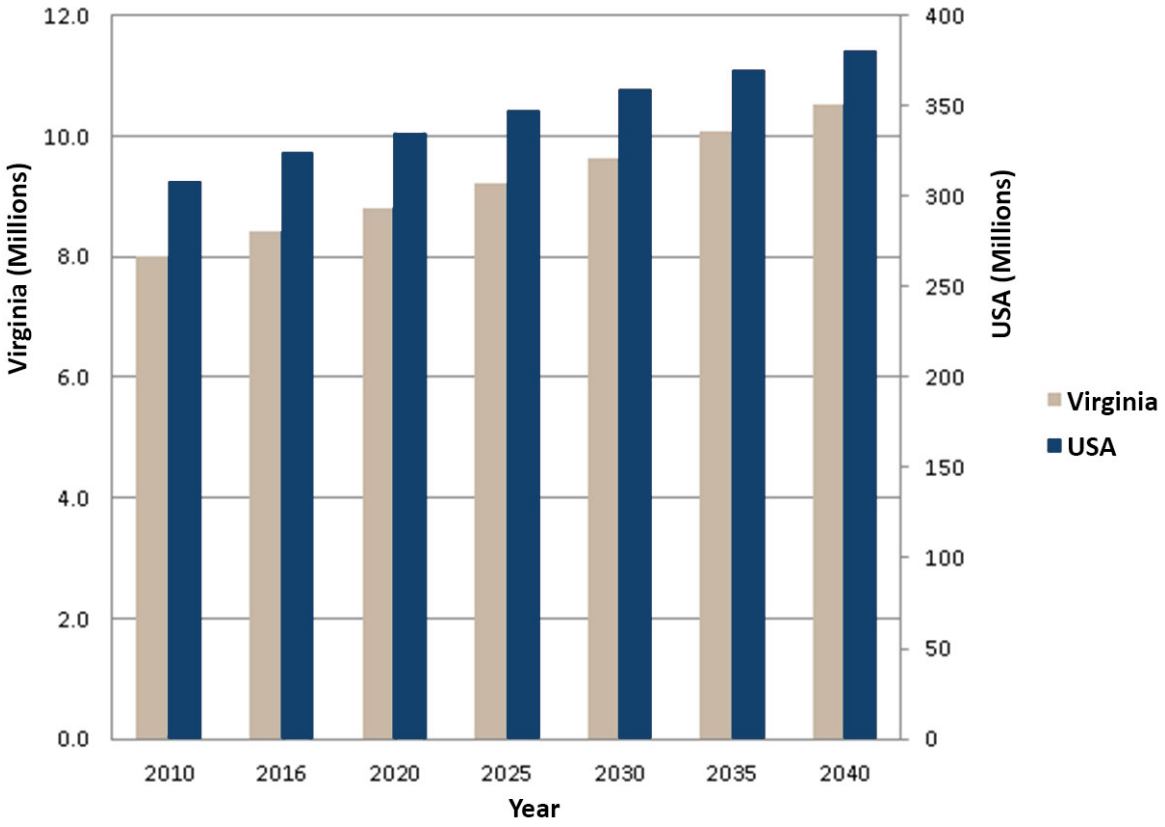
The primary areas of this growth are along the urban crescent, from Northern Virginia south along Interstate 95 to Richmond (the Washington, D.C. to North Carolina Corridor) and east along Interstate 64 (the East-West Corridor) to Hampton Roads. The growth in these areas is largely driven by millennials. While overall state growth has increased and is expected to continue to increase, the Eastern Shore and southwest Virginia have experienced a decrease in population growth as populations continue to move northward to the growing urban centers, with the exception of the cities of Roanoke, Charlottesville, and Lynchburg.

Population projections indicate that between 2010 and 2040, the state's population is projected to increase by more than 31 percent, reaching a total of nearly 10.5 million people. Compared to an estimated 23.1 percent growth for the U.S., Virginia's projected growth indicates that the state will stay ahead of most of the country in terms of attracting more people. **Figure 2-14** shows the projected

[14] Population data from the U.S. Census Bureau

population estimates for both Virginia and the U.S.[15] VTrans 2040 population trends report further details the forecasted changes in growth and population, and the factors influencing the changes.[16]

Figure 2-14: Virginia and U.S. Future Population Estimates



EMPLOYMENT

The most current wage and salary employment (i.e., base employment) figures from the Bureau of Economic Analysis (BEA) indicate that around 3.85 million people were employed in Virginia in 2015. This data excludes farm and nonfarm proprietors' employment information.

Virginia Labor Market Information produces employment growth projections based on 2014 employment estimates from the Current Population Survey. According to their long-term projections,

[15] Population forecast based on U.S. Census Bureau population estimates. Virginia population projections are provided by the University of Virginia, Weldon Cooper Center for Public Service. Virginia projections in years 2025 and 2035 are interpolated from other data points provided.

[16] *VTrans 2040 Trends Assessment Technical Report: How Will Virginia Age and Grow by 2040?* Updated March 15, 2015. http://vtrans.org/resources/VTransTrends_Demographic_Changes.pdf.

base employment will increase to about 4.3 million by 2024, an annual growth rate of 0.89 percent from the 2014 employment estimates[17]. Applying this growth rate to 2016 employment estimates from the Bureau of Labor Statistics (BLS), it is estimated that the state's base employment could reach about 5 million jobs in year 2040 (an increase of 28 percent)[18]. This employment growth will occur primarily in the public administration and professional and business services sectors, with education/health care and retail trade as the next largest industry employers. Employment growth will largely occur in the State's population growth centers of Richmond, Hampton Roads, and Northern Virginia along the East-West Corridor and Washington, D.C. to North Carolina Corridor.

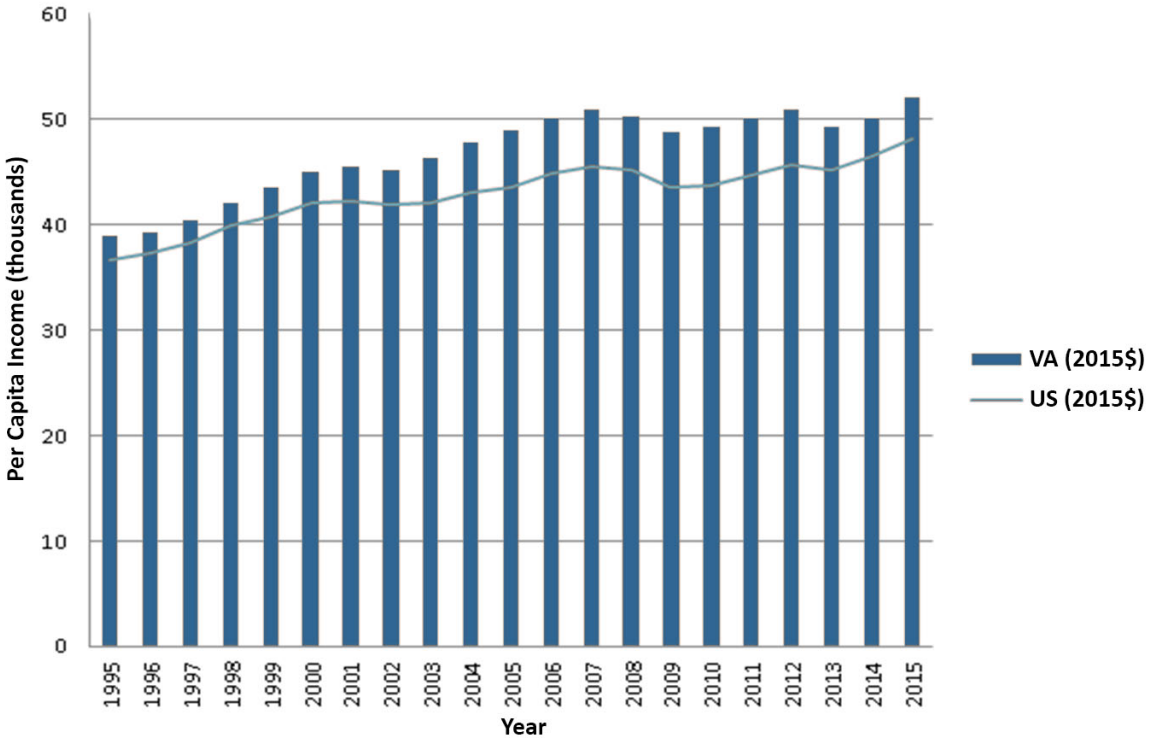
As of June 2016, Virginia is home to 21 Fortune 500 companies, including: Freddie Mac, a mortgage loan company; General Dynamics, a global aerospace and defense company; and Capital One Financial, a credit card service company. According to the BEA, Virginia's gross domestic product (GDP) has increased by 14.3 percent since 2010, which is the 38th highest rate in the country. Companies in Virginia have continued to increase economic development in the state both in the population centers as well as the state's ports.

PERSONAL INCOME

Virginia's per capita personal income in 2015 was $52,052, which ranks 11th within the U.S., and is 8 percent higher than the national average in that year ($48,112)[19]. In continuous 2015 dollars (adjusted for inflation using the Consumer Price Index from the BLS), the per capita personal income since 1995 has grown by 33.7 percent, just above the national income growth of 31.3 percent. Overall, Virginia's per capita income has remained above the national average since the 1970s. However, in terms of annual growth, Virginia tracks consistently with the nation, including declines in income levels experienced during and after the recent recession. The recent income growth in Virginia can probably be attributed to the local and national economy's recovery from the recession, demonstrated by the GSP gains since 2011 and steadily decreasing unemployment rate. Historical per capita personal income from 1995 to 2015 is shown in **Figure 2-15**[20].

[17] Virginia Labor Market Information (VA LMI), Long-term Industry Projections uses 2014 employment estimates from the Current Population Survey, which is produced by the BLS and the U.S. Census.
[18] Compound annual growth rate was calculated from VA LMI projections and applied to current BLS data. Base estimates are also taken from different surveys, thus the base and projection estimates vary from VA LMI data.
[19] Bureau of Economic Analysis
[20] Bureau of Economic Analysis, adjusted by the national CPI into 2015 U.S. dollars.

Figure 2-15: Historical Per Capita Personal Income (2015 U.S. $)



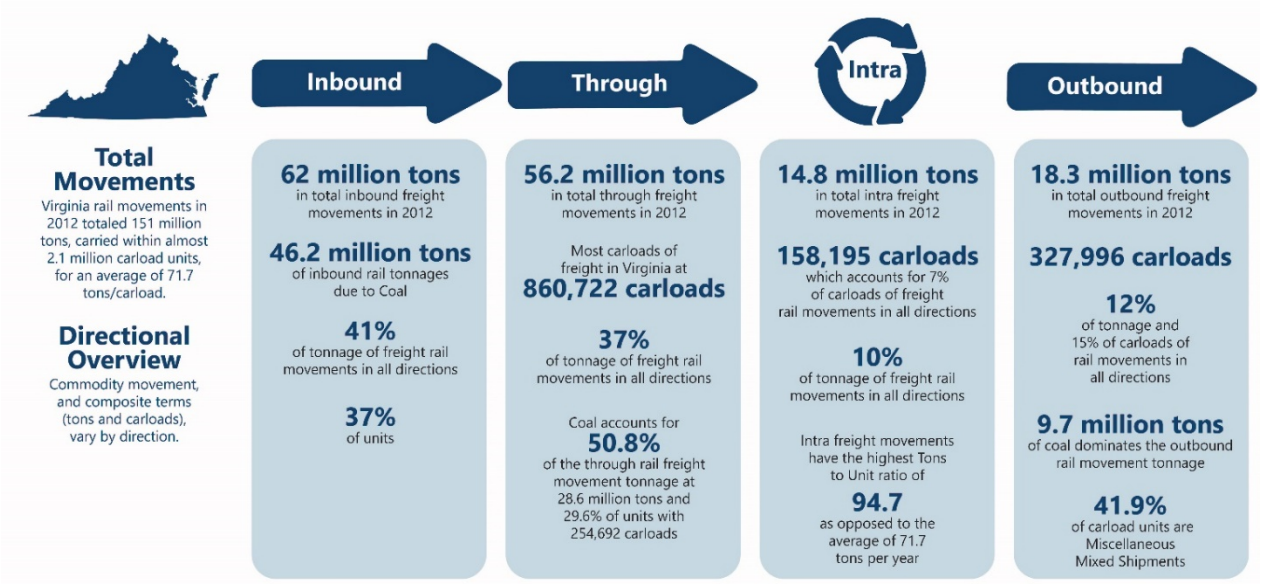
Industrial Outlook by Sector

The Mining and Extraction industry sector is expected to retain its current dominance, in terms of tonnage of freight carried on Virginia's network, particularly along the CSX Coal Corridor, NS Heartland Corridor and through the State's ports, but is not projected to grow between 2012 and 2040. The lack of growth in this sector, particularly coal, could result in a decrease in volumes of freight along the CSX Coal Corridor and NS Heartland Corridor. In contrast, the Agricultural and Manufacturing industry sectors are expected to nearly double their tonnage in all freight movements between 2012 and 2040. These issues are discussed in more depth in the next chapter of the report and **Appendix I**.

2.2.2 Freight Demand and Growth

Virginia freight rail flows move in different directions and have origins and destinations that vary by commodity shipped. **Figure 2-16** summarizes major commodity movements by direction. A detailed assessment of freight demand and growth is in **Appendix I**.

Figure 2-16: Major Commodity Movements by Direction



2.2.3 Passenger Travel Demand and Growth

Travel Demand – Highways

Projections for travel demand within and to/from Virginia will continue to grow in the future. The estimated growth in vehicular travel demand for Virginia, exhibited in Vehicle Miles Traveled (VMT), is shown in **Table 2-13**.

Table 2-13: Estimated VMT on VDOT Roadways by Classification

Functional Class#	Lane-Miles	Annual VMT (in thousands)^		Growth in VMT (in thousands)	% Growth
		2014	2035*		
Interstate	1,118	24,483,735	41,016,676	16,532,941	67.5%
Primary	8,444	33,852,829	56,712,365	22,859,536	67.5%
Secondary	48,305	22,648,072	37,941,459	15,293,387	67.5%
Total	**57,867**	**80,984,636**	**135,670,500**	**54,685,864**	**67.5%**

Source: VDOT Miles of Public Roads in Virginia by Functional Class

^ VMT describes the level of travel demand on a roadway system, and growth in VMT is a strong indicator of growth in travel demand. VMT is a weighted measure of travel, and it is calculated by multiplying the number of vehicles on a roadway segment by its length. Thus, an increase could be correlated to either increases in the number of vehicles or trip lengths, both of which are growth-related.

 # VMT is shown for years 2014 and 2035 by functional class. These classifications are used to define roadway types and their primary uses for roadway users.

** Virginia Transportation Research Council (VTRC) estimates a daily VMT of 371.7 million in 2035; however, it does not provide estimates by functional class. Estimates for 2035 by Functional Class were estimated using VMT proportion from 2014.*

Overall vehicle travel is forecasted to grow by 67.5 percent from around 221.8 million daily VMT (81 billion VMT annually) to around 371.7 million daily VMT (135.7 billion VMT annually) in the Commonwealth. In terms of a general trend, it can be expected that travel, particularly on state and federal highways, will increase as the population grows and overall economy expands. The increases in highway travel will align with population and economic growth centers in Northern Virginia, Richmond, and Hampton Roads and along the East-West Corridor and Washington, D.C. to North Carolina Corridor.

Travel Demand – Air Travel

The Virginia Air Transportation System Plan (VATSP) developed by the Virginia Department of Aviation and last revised in 2016 anticipates a total of approximately 35.0 million enplanements in 2030 and 40.8 million enplanements in 2037 for all commercial service airports. The study projects an average annual growth rate of 2.1 percent between 2012 and 2037 for total enplanements.

Forecasts from the Federal Aviation Administration (FAA) enplanements for Virginia are projected to be very similar, with an average annual growth rate of 2.2 percent for the same period. The FAA projects total enplanements in Virginia commercial service airports to be approximately 42.3 million in 2037, about 2 million more than the VATSP forecast, but roughly equivalent considering overall prediction uncertainties. VATSP projected that based aircraft[21] would rise from 3,828 in 2012 to 4,946 in 2037. More detail on air travel is included in **Chapter 2.2.6**.

Travel Demand – Intercity Rail

Station ridership changes are calculated based upon the growth rate of each county or independent city served by the station. [22] It is important to note that the actual future ridership performance will be based not only on population growth, but also by changes in income, changes in the number of train frequencies and train schedule times at the station (day vs. night), changes in Amtrak fares vs. other modes, and changes in the quality of Amtrak service (i.e., on-time performance).

Population around Virginia's Amtrak stations is anticipated to grow 20 percent from 2016 to 2040. The strongest growth is likely to occur near Woodbridge, Quantico, Fredericksburg, Culpeper, and Alexandria along the Washington, D.C. to North Carolina, Northern Virginia, and Seminole Corridors. A

[21] The FAA defines a "based aircraft" as an aircraft that is operational and air worthy, which is based at a specific facility for a majority of the year. Based aircraft estimates are combined for Virginia's Commercial Service and General Aviation Airports.
[22] County and independent city population projections are obtained from the Weldon Cooper Center for Public Service Demographics Research Group, University of Virginia website.

decline in usage is predicted for Clifton Forge (East-West Corridor), Danville (Seminole Corridor), and Petersburg (Washington, D.C. to North Carolina Corridor) as a result of projected negative population growth trends near these stations.

Table 2-14 shows FY 2016 boardings and alightings at Virginia's twenty intercity rail stations, as well as the forecasts for FY 2040. These projections are based on population growth rates in these cities between FY 2016 and FY 2040.

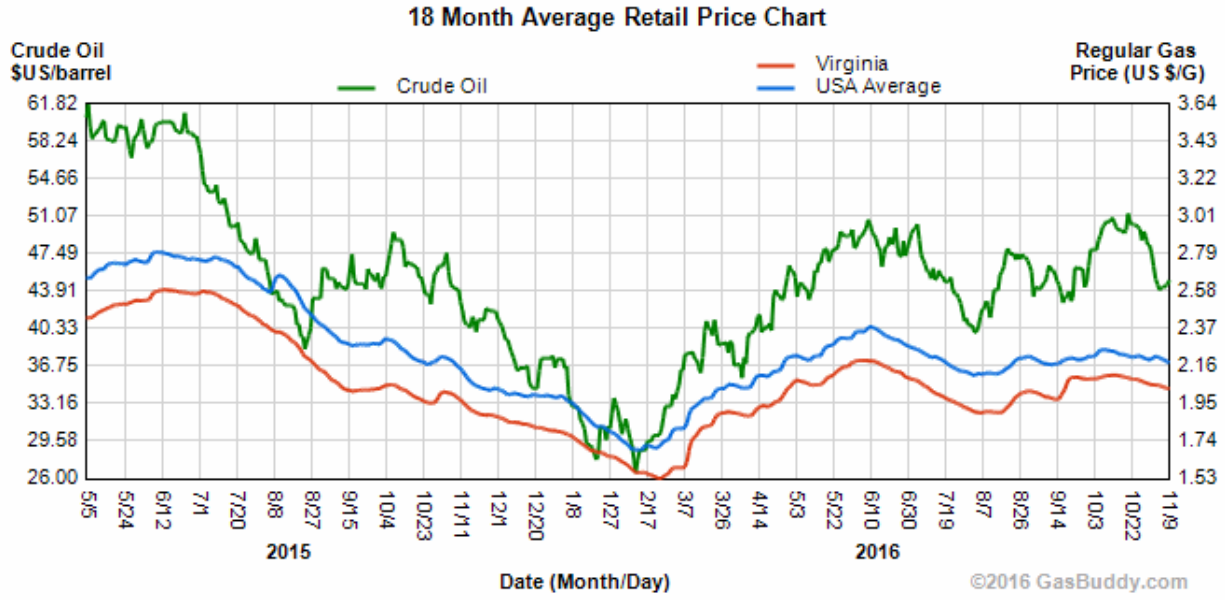
Table 2-14: Virginia's Intercity Rail Stations Boardings and Alightings

City	FY 2016	FY 2040	Change Over Period	Annual Change
Alexandria	190,185	253,345	34.81%	1.20%
Ashland	28,075	34,207	22.85%	0.83%
Burke Centre	9,101	10,783	19.32%	0.71%
Charlottesville	141,827	162,358	15.12%	0.56%
Clifton Forge	2,401	1,911	-21.17%	-0.95%
Culpeper	15,088	20,870	40.21%	1.36%
Danville	7,209	5,685	-21.92%	-0.98%
Fredericksburg	120,275	170,496	43.83%	1.46%
Lorton (Auto Train)	238,448	282,507	19.32%	0.71%
Lynchburg	82,786	100,869	22.85%	0.83%
Manassas	27,597	34,430	25.92%	0.93%
Newport News	107,894	108,665	0.74%	0.03%
Norfolk	44,316	46,606	5.39%	0.21%
Petersburg	30,060	26,953	-10.74%	-0.45%
Quantico	25,474	38,514	53.81%	1.74%
Richmond - Main Street	42,702	48,828	14.99%	0.56%
Richmond - Staples Mill	356,189	407,288	14.99%	0.56%
Staunton	6,250	6,470	3.67%	0.14%
Williamsburg	59,677	75,106	27.07%	0.96%
Woodbridge	17,456	26,391	53.81%	1.74%
Total Virginia Station Usage	**1,553,010**	**1,862,283**	**19.91%**	**0.76%**

2.2.4 Fuel Cost Trends

Fuel costs are a factor in the passenger rail ridership and movement of freight via rail lines. As fuel costs trend upwards, more people utilize passenger rail service and the movement of freight goods transitions from vehicular trucks to railcars. Trends in fuel costs (crude oil and regular gasoline) between May 2015 and November 2016 are shown in **Figure 2-17**. The average retail price of gasoline in Virginia has remained considerably lower than the U.S. average during this 18-month period.

Figure 2-17: Month Fuel Price Trends



Source: GasBuddy.com

Ultra-low sulfur diesel fuel costs over the past 7 years for the Lower Atlantic Petroleum Administration for Defense District (PADD 1C) have also not varied substantially from the nationwide average, according to the U.S. Energy Information Administration (EIA). The cost of diesel averaged $2.67 per gallon in FY 2015 in the Lower Atlantic region. The cost of diesel declined in FY 2016, averaging $2.21 per gallon from January through October of 2016, reaching a low point of $1.96 per gallon in February 2016.

2.2.5 Rail Congestion Trends

Congestion is often caused by bottlenecks, which exist throughout Virginia's railroad network. Bottlenecks constrain railroad operating capacity, efficiency, velocity, and safety, as well as freight mobility. Typical bottlenecks in the state include:

- Insufficient capacity on main tracks and in terminals and rail yards to accommodate present and future train volumes, interchange of traffic between railroads, commuter and passenger trains, and provision of rail switching;
- Operating delays at railroad junctions and at movable bridge spans over principal navigable waterways;
- Bridges and tunnels that constrain vertical and horizontal clearances and restrict the types of rail car equipment that can be accommodated; and,
- Potential effects on infrastructure and service for rail lines located in a major floodplain.

Virginia rail network bottlenecks, as identified and described by the Office of Intermodal Planning and Investment, through its 2015 VTrans Multimodal Transportation Plan (VMTP) 2025 Needs Assessment, as well as bottlenecks that were identified and described by Virginia's railroads during outreach conducted for the Virginia State Rail Plan, are identified and described in **Appendix J**. The bottlenecks include the Northern Virginia region, Crescent Corridor, East-West Corridor, Washington, D.C. to North Carolina Corridor, Richmond, Southside Corridor, and the North-South CSX lines and NS Heartland Corridor in the Tri-Cities region.

2.2.6 Highway and Airport Trends

Highway Congestion

According to VDOT, as of 2016, the State has 57,867 miles of state-maintained roadway. Of these, around 1.9 percent are interstate highways (four-to-ten lane highways that connect states and major cities), 14.6 percent are primary roads (two-to-six lane roads that connect cities and towns with each other and with interstates including 333 miles of frontage roads), and 83.5 percent are secondary roads (local connector or county roads). A separate roadway system includes 10,561 miles of urban streets that are maintained by cities and towns with the assistance of state funds. Additionally, Henrico County (1,279 miles) and Arlington County (359 miles) maintain their own roads with VDOT funds. There are an additional 39 miles of toll roads that are maintained by other entities.

The vast majority of non-interstates currently perform very well according to VDOT, balancing the economics of roadway design while continuing to maximize traffic flows. Only 173 miles, or 0.6 percent of identified roadways, fall into Level of Service (LOS) F within the Commonwealth, primarily in Northern Virginia. VDOT projected highway volumes and level of service to year 2025 for their roadways. A comparison between current and future 2025 conditions is presented in **Appendix K**. According to VDOT data, the 2025 roadway network is largely expected to remain the same, with only a limited amount of new roadway construction, for a network mileage total of 27,476 miles. Conditions in year 2025 are projected to worsen slightly, as an estimated 1,569 additional miles of Virginia highways and interstates would experience LOS D through F conditions.

Airport Congestion

There are nine commercial service airports and 59 general aviation airports in Virginia. According to the VATSP Update, "More than 97 percent of the Commonwealth's population has convenient access to one of Virginia's airports and provides the flying public with access to the global marketplace."

Virginia's nine commercial airports appear in **Table 2-15**, along with their known passengers and pounds of cargo enplaned and deplaned. Together, both Washington-Reagan and Washington-Dulles airports contribute the majority of passenger and freight movement in Virginia.

Table 2-15: Virginia Commercial Airport Activity

	2014	
Airport	**Passengers**	**Cargo (Pounds)**
Charlottesville	470,562	0
Lynchburg	78,876*	Unknown
Newport News	524,518	Unknown
Norfolk	2,965,306	55,637,623
Richmond	3,352,651	116,566,430
Roanoke	601,434	25,100,114
Shenandoah Valley	9,422*	Unknown
Washington – Dulles	21,572,233	592,510,700
Washington – Reagan	20,810,387	4,676,005
Total	**50,385,389****	**794,490,872*****

Source: Virginia Airport Websites – Traffic Summary Reports
Notes:
**Figure includes enplanement data only. Deplanement data not known.*
***Total does not include deplanements at Lynchburg and Shenandoah Valley airports.*
****Total does not include cargo (if any) at Lynchburg, Newport News, and Shenandoah Valley airports*

Historical data related to passenger and freight activity at Virginia's commercial airports for the last 10 years was not available for the development of the Virginia State Rail Plan.

2.2.7 Land Use Trends

Of all of the development that has occurred in Virginia over the past 400 years, more than a quarter of it has taken place just in the last 15 years.[23] Virginia lost over 112,100 acres of forest, farm, and other rural land to development between 2007 and 2012 alone. Many of the State's MPOs predict a population increase between now and 2040.

[23] Source: Virginia Performs http://vaperforms.virginia.gov/indicators/naturalResources/landPreservation.php

Virginia has been making a concerted effort to conserve land and support its past agrarian economy. Today, its top three agricultural farm products are leaf tobacco, tomatoes, and apples. Counting the combined efforts of private and public entities, an average of 67,413 acres per year were protected from development in Virginia between 2007 and 2016. Between 2007 and 2010 alone, 387,103 acres were placed under protection. As of August 2016, an additional 287,025 acres have been preserved.

In all, 8.2 million acres of Virginia's total land acreage of 25.3 million in 2016, or 32.4 percent, is rural farm land.[24]

2.3 Rail Service Needs and Opportunities

Virginia's passenger and freight rail network is an important asset for the Commonwealth, and a good investment for Virginia. Rail provides an efficient means of moving freight and passengers both within and through the state. By diverting traffic from road to rail, Virginia's rail network reduces congestion, saves lives, improves air quality, helps grow the economy, and complements the Virginia highway network while reducing capital and maintenance expenditures.

Passenger trips to, from, and within Virginia are growing and highways in Virginia are increasingly congested. Passenger rail service provides an alternative to congested highways, and the Commonwealth therefore invests in Amtrak intercity passenger routes, as well as VRE commuter service to improve mobility and meet the growing demand for travel. Projects and plans underway in CSX's RF&P subdivision and the Long Bridge across the Potomac to Washington, D.C. will alleviate existing rail bottlenecks to better connect the entire Southeast region with Amtrak's Northeast Corridor.

Since 2013 Virginia has provided dedicated funding to support and expand intercity passenger rail operations across the state. Virginia's busiest passenger rail routes parallel the heavily traveled I-95 corridor, where a growing number of Virginia regional service Amtrak trains serve Richmond, Newport News, and Norfolk. Additional Virginia regional Amtrak services extend southwest from Washington, D.C. to Lynchburg and Roanoke.

As the economy grows, so do the freight demands on Virginia's highways. The Commonwealth recognizes the public benefits and economic impact of investments in a multimodal freight transportation system. The freight rail network has a unique role supporting the Port of Virginia's target markets in the Midwest. Both CSX and NS have intermodal rail corridors that connect Virginia

[24] Source: http://www.vdacs.virginia.gov/markets-and-finance-agriculture-facts-and-figures.shtml

to the nation, providing a cost-effective way to bring needed raw materials and products to our ports, manufacturers, and consumers, and to carry Virginia-made products and materials to destinations throughout the nation.

Virginia's passenger and freight rail networks are affected by many external factors that drive demand for services. Freight rail corridors serving the Port of Virginia and the main north-south freight routes are experiencing growth in intermodal traffic, while changes in domestic energy production and use are reflected in a decrease in coal traffic. Population growth, an aging population and increasing highway congestion along the "urban crescent" between Washington, D.C. and Hampton Roads is helping drive demand for environmentally friendly and safe alternatives to automobile travel.

VTrans2040 provides a planning framework for all transportation modes in the state, including rail and public transit. Virginians will benefit from a sustainable reliable transportation system that advances Virginia businesses, attracts a 21st century workforce, and promotes healthy communities where Virginians of all ages and abilities can thrive.

To facilitate rail service needs and opportunities, the Commonwealth is prioritizing investments and improvements on the Crescent Corridor, East-West Corridor, Heartland Corridor, Washington to North Carolina Corridor, at the Port of Virginia, and on Virginia's shortline railroads. The significance of these routes, and the types of investments identified for them, are detailed below.

Crescent Corridor

Background – The 2,500-mile Crescent Corridor spans 11 states, from New York to Louisiana and Tennessee. In Virginia it includes NS track parallel to I-81 (Winchester-Roanoke-Bristol) and a second route parallel to U.S. 29 (Front Royal-Manassas-Lynchburg-Danville). The Crescent Corridor is a primary freight route for intermodal traffic moving through Virginia. The corridor also carries both Amtrak long distance trains (Crescent and Cardinal) and Virginia-supported regional passenger service connecting Roanoke, Lynchburg, and Charlottesville to Washington, D.C. and the Northeast Corridor. The corridor connects to NS's Heartland Corridor in Roanoke and Altavista.

Significance – The Crescent Corridor makes several vital connections to Virginia shortline railroads, including the W&W, CHW, BB, and SV railroads. In addition, the corridor connects to the VIP. Maintaining a seamless connection between this mainline freight route and these critical elements of the regional freight network is vital to the success of this corridor and regional economic development. NS estimates the Crescent Corridor keeps 1.3 million long distance trucks off the highways.

Projects – Priority projects include expanded passenger service to Lynchburg and Roanoke, and improving capacity and connectivity with shortline railroads and the VIP. Longer term considerations for this corridor include adding passenger service to southwest Virginia.

East-West Corridor

Background – The East-West Corridor parallels I-64 from Hampton Roads through Richmond to Clifton Forge. It serves as CSX's primary coal route from Appalachian coalfields to U.S. power plants and export terminals in Newport News. Loaded coal trains travel east on CSX's James River line, while empty trains return on the Buckingham Branch. The corridor handles Virginia-supported regional passenger service from Newport News, ultimately making connections to Washington, D.C. and Amtrak's NEC. Additionally, the Buckingham Branch carries the Amtrak long distance Cardinal route with connections to the Midwest and NEC.

Significance – The East-West Corridor serves primarily as a coal route, however, coal traffic has significantly dropped in response to recent changes in energy trends and a decline in demand for Appalachian coal. As a result, one of the primary drivers of investment is to maintain operability of the multiple passenger rail services.

Projects – Priority projects includes maintaining a state of good repair, particularly on the BB, and supporting existing passenger services, including a new station in Newport News and bottleneck relief in Richmond. Longer term considerations include expansion of passenger services between Richmond and Charlottesville.

Heartland Corridor

Background – The Heartland Corridor is a primary freight route for intermodal traffic traveling between the Port of Virginia terminals in Norfolk and midwestern markets, including Columbus and Chicago. The Heartland Corridor also carries Virginia-supported passenger trains between Norfolk and Petersburg, as well as a new service extension between Lynchburg and Roanoke. Both services ultimately connect to Washington, D.C. and the Northeast Corridor. The Heartland Corridor connects to the Crescent Corridor in Roanoke and Altavista.

Significance – Through significant previous investment, the corridor is cleared for double-stack container service from the Port, through Virginia, to Chicago. Tight timetables and high demand for on-time performance are critical needs to adequately serve intermodal customers. It is critical to eliminate any congestion points, particularly conflicts with passenger services, on this dense intermodal corridor.

Projects – Priority improvements include adding two additional round-trip passenger trains to Norfolk by extending two existing trains from Richmond. Longer term initiatives include the study of additional and/or higher speed passenger services to Hampton Roads and making critical east-west multimodal connections.

Washington to North Carolina Corridor

Background – Virginia's Washington to North Carolina Corridor is served by two CSX rail corridors: CSX's I-95 Corridor between New York and Jacksonville, and CSX's National Gateway Corridor linking mid-Atlantic ports with the Midwest. The two rail corridors share one alignment that parallels I-95 from Washington, D.C., through Richmond to Petersburg and the south. This corridor also serves as a primary passenger rail route. Amtrak Virginia-supported regional trains from the NEC and Washington, D.C. operate on the line to reach terminals in Richmond, Newport News, and Norfolk, while Amtrak long-distance trains from New York and Lorton, Virginia, continue farther south to Savannah, Sanford, Florida, and Miami. VRE Fredericksburg Line commuter trains also use the corridor from Spotsylvania County north to Washington, joined at Alexandria by Manassas Line commuter trains.

Significance – The Washington to North Carolina Corridor is the most heavily used corridor in Virginia, with increasing freight, regional and long distance passenger rail, and commuter rail services. The corridor also provides another rail link between the Port of Virginia and the Midwest, which previous Commonwealth investments have helped to clear for double-stack container service. The corridor has the most severe bottlenecks on the freight rail network, specifically across the Potomac River, where a four track system merges to just two tracks (the Long Bridge) to cross from Virginia into Washington, D.C.

Similarly, the parallel highway facilities, I-95 and US 1, are the most heavily used highway facilities with the most severe congestion in Virginia. As a result, capacity on the Washington to North Carolina Corridor must be preserved and improved in order to provide adequate access and multimodal options to both the residents and businesses along this dense and thriving corridor. The passenger rail, commuter rail, and intermodal freight services that use this corridor, including shipments serving the Port of Virginia, require high on-time performance.

Projects – Priority projects include adding capacity to the Long Bridge, a major chokepoint affecting CSX, Amtrak, and VRE service, and implementing additional capacity improvements to the corridor in Northern Virginia via the Atlantic Gateway improvement program. Longer term, additional improvements will be necessary to support improved passenger service.

Port of Virginia

Background – The Port of Virginia is the 5th largest container port in the nation. Port facilities include four deepwater marine terminals (Hampton Roads), an upriver terminal (Richmond), and an inland intermodal terminal (Front Royal). The Port is served by more than 30 international shipping lines, serving more than 200 countries. More than 33 percent of the Port's freight arrives and departs by rail, carried by NS, CSX, and two shortlines, the Norfolk Portsmouth Belt Line and the Commonwealth Railway.

The Port primarily ships to customers in Virginia, North Carolina, Maryland, and West Virginia via truck, and to Ohio, Indiana, Illinois, Tennessee, Kentucky, and beyond via NS and CSX.

Significance – The Port is one of the most significant drivers of freight rail traffic in the Commonwealth. Due to changes in energy demand and production, intermodal traffic is the most dominant growth sector in freight rail traffic, and the Port is well poised to contribute heavily to that growth market. Ensuring efficient loading and unloading of trains, and last mile connectivity to the freight rail network, are vital to ensuring that business at the Port continues to run smoothly and drive the Virginia economy forward.

Projects – Priority projects includes multiple terminal expansions, including at the VIG, VIP, and NIT, with additional rail capacity, and ensuring shortline and switch operators outside the Port gates have the needed capacity to handle the additional growth in rail traffic. Additional priority projects include expanding the inland port at Front Royal and improving rail infrastructure, including grade crossings on tracks serving the Ports.

Shortlines

Background – Virginia's shortline railroads operate at the regional and local level to connect individual customers to the larger freight rail network and make last mile connections to the Port of Virginia. Shortline railroads often serve as either the point of origin or termination for freight carried in and out of Virginia by NS or CSX. Virginia supports shortlines through the Rail Preservation Program, which funds both capacity and state of good repair projects.

Significance – Shortlines provide a critical link to local and regional customers—including the Port—loading, unloading, and building trains that eventually traverse the national rail network through Class I freight service. Many of the shortlines inherited track with years of deferred maintenance, requiring additional resources to maintain a state of good repair. Shortlines are better positioned to accommodate smaller businesses with lower traffic volumes. Virginia supports shortlines as both a

partner in economic development opportunities at the port facilities and in rural areas, and as a means to divert trucks from congested highways.

Projects – Priority projects include improving track to FRA Class 2 safety standards; improving signal systems and technology for more efficient operations; and upgrading bridges and track to accommodate heavier railcars that have become the industry standard. Longer term priority projects include critical infrastructure rehabilitation such as bridges and tunnels, which, if allowed to fail, would create significant safety hazards and may make entire lines inoperable.