
2009 Infrastructure Report Card

Commonwealth of Virginia

The following Report Card has been prepared by the Virginia Section of ASCE in accordance with ASCE's national report card program to highlight the condition of vital infrastructure around the Commonwealth. This assessment will be updated at three year intervals to help track trends in managing Virginia's Infrastructure, this is the first Report Card prepared for all of Virginia.

Virginia Section of the American Society of Civil Engineers

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PORTS/NAVIGABLE WATERWAYS

OVERVIEW

"The total Virginia economic activity produced or facilitated by the FY 2006 Virginia Port Authority (VPA) operations was revenues of \$41.1 billion, with Virginia employee compensation of \$13.5 billion to 343,001 employees. This economic activity generated state and local income, sales, and real property taxes amounting to an estimated \$1.2 billion, plus other government fees and taxes."

Virginia enjoys significant competitive and economic advantages as a major transportation hub of the eastern U.S. with its extensive multi-modal system and its waterways. That advantage is threatened by increasing traffic congestion and the inability of the state to fund needed transportation infrastructure improvements as evidenced by the \$74.2 billion 2025 Roadway funding shortfall and \$30.7 billion 2025 Transit/Rail funding shortfall. As Ports are generally self-sustaining (VPA has invested millions of dollars) they have a relatively modest \$400 million 2025 funding shortfall but the supporting roadway network must be adequately funded. Virginia needs to continue to heavily invest in its port infrastructure to pace itself with forecasted cargo demand. Demand forecasts predict by 2020 VPA's capacity will exceed demand.

The infrastructure report card for the commonwealth of Virginia's ports and inland waterways is a gradual **C+**. While the waterside access and cargo capacity are strengths, the road access and facility conditions require attention. The VPA and POR have begun the process of improving these key areas of concern.

To maintain and expand the capabilities and benefits of the Commonwealth's ports and waterway system, the following initiatives are required:

- Finalize the development of the Heartland Corridor and its connection to the public and private port facilities.
- Develop the new Craney Island Marine Terminal to enhance capacity and facility conditions while expanding the competitive position of the Virginia Ports by developing a state of the art new container facility.
- Implement the 55' channel deepening project to maintain the current waterside access advantage over competing east coast ports.
- Improve the interstate roadway access for Norfolk International Terminal (NIT), Portsmouth marine Terminal (PMT) and the new Craney Island Marine Terminal (CMT).
- Significantly improve the inland roadway network to provide greater truck access from the marine terminals to regional trucking destinations.

INTRODUCTION AND BACKGROUND

Virginia's Ports consist of two primary public agencies, the Virginia Port Authority (VPA) and the Port of Richmond (POR), a wide variety of private terminals, inland and intra-coastal waterway systems and the

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largest Navy Base in the world along with several other military and federal government waterfront facilities. The VPA is comprised of Norfolk International Terminals (NIT), Portsmouth Marine Terminal (PMT), Newport News Marine Terminal (NNMT), and the Virginia Inland Port (VIP) in Front Royal. The POR consists of one common user terminal.

As these two public port authorities are the primary contributors of economic benefits to the commonwealth, they are responsible for handling 28% of the water born cargo (in tons). Norfolk Southern, Dominion Terminals, and Kinder Morgan handle 55-60% of the water born tonnage through their coal terminals in Hampton Roads while the remaining 12%-17% is handled by private terminals located throughout the Commonwealth.

The primary access point to Virginia's waterways is the mouth of the Chesapeake Bay located between the City of Virginia Beach and the Eastern Shore of the state. The largest concentration of public and private port facilities are located in the Hampton Roads area (Norfolk, Newport News, Hampton and Chesapeake). The largest military base is the Naval Station Norfolk (NAS) located in the City of Norfolk. Other military and federal government facilities use the waterways for maritime access.

The James River provides inland waterway access to the City of Richmond, Virginia while the Potomac River provides similar access to Washington DC. The York and Rappahannock Rivers also provide inland waterway access into the commonwealth. The north end of the Chesapeake Bay provides access to the Maryland State Port Authority (MPSA) facilities in Baltimore, MD.

The Chesapeake Bay, Elizabeth River, Albemarle Chesapeake Canal, Elk River and Chesapeake and Delaware Canal comprise the intra-coastal waterway system in Virginia. Access to the Chesapeake Bay from the north is provided along the Chesapeake and Delaware Canal that connects the bay to the Delaware River approximately 10 miles south of Wilmington, Delaware. At the southern end of the Chesapeake Bay, the Elizabeth River connects to the Albemarle Chesapeake Canal which connects to the Currituck Sound and ultimately the Albemarle Sound in North Carolina.

Public terminals managed by the VPA and POR were the primary focus for this report card evaluation process. Most of the private terminals do not use city, state or federal fund to maintain and/or expand their facilities. A list of the primary public marine terminals and their locations are shown in Figure 1.

INDUSTRIAL PORTS

NIT and PMT predominantly handle containerized cargo, NNMT handles break-bulk cargo, and VIP is an inland intermodal facility. The three waterfront terminals have drafts of 50 feet, no obstructions, and the necessary equipment to handle large oceangoing vessels. In 2008 the Port of Virginia handled 17.8 million tons of cargo and 2.1 million Twenty Foot Equivalent Units (TEU). It carries a 15% market share for U.S. East Coast container ports.

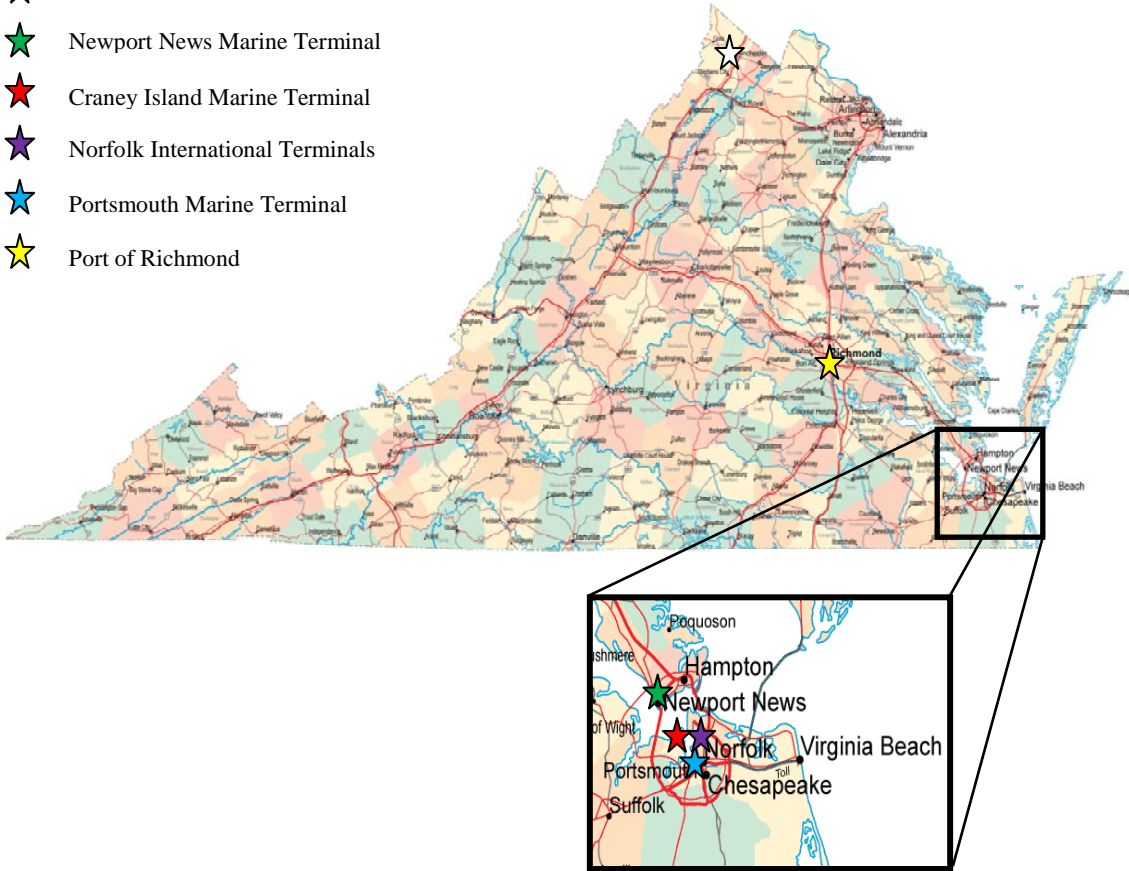
The POR is owned by the city of Richmond and handles containerized and break-bulk cargo. POR is located on the James River 78 miles upriver from NNMT which restricts a vessel's draft to 22 feet. In 2008 POR handled 466,712 tons of cargo and 49,530 TEU of containers.

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FIGURE 1: VIRGINIA'S PUBLIC PORT FACILITY LOCATIONS

- ☆ Virginia Inland Port – Winchester, VA
- ★ Newport News Marine Terminal
- ★ Craney Island Marine Terminal
- ★ Norfolk International Terminals
- ★ Portsmouth Marine Terminal
- ★ Port of Richmond

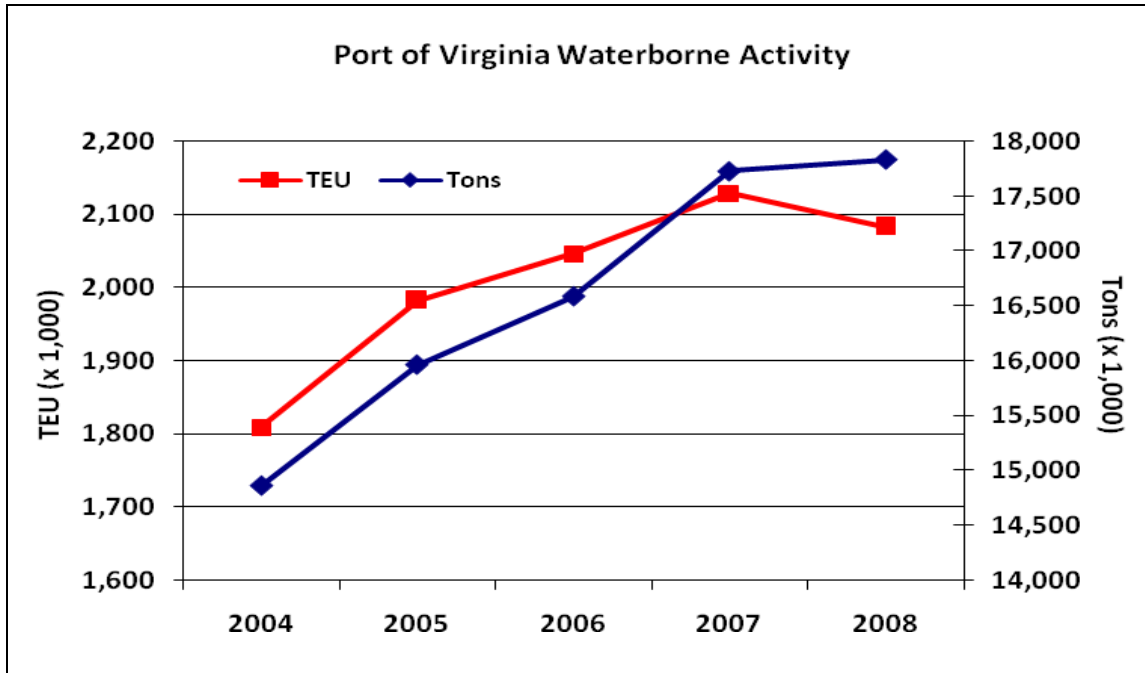


Figures 2 and 3 illustrate VPA's and POR's historical cargo volumes from 2004 to 2008. VPA's annual growth rate during the period is 3.6% for TEU and 4.7% for tonnage. POR's growth rate during the period is 3.3% for TEU and 1.3% for tonnage.

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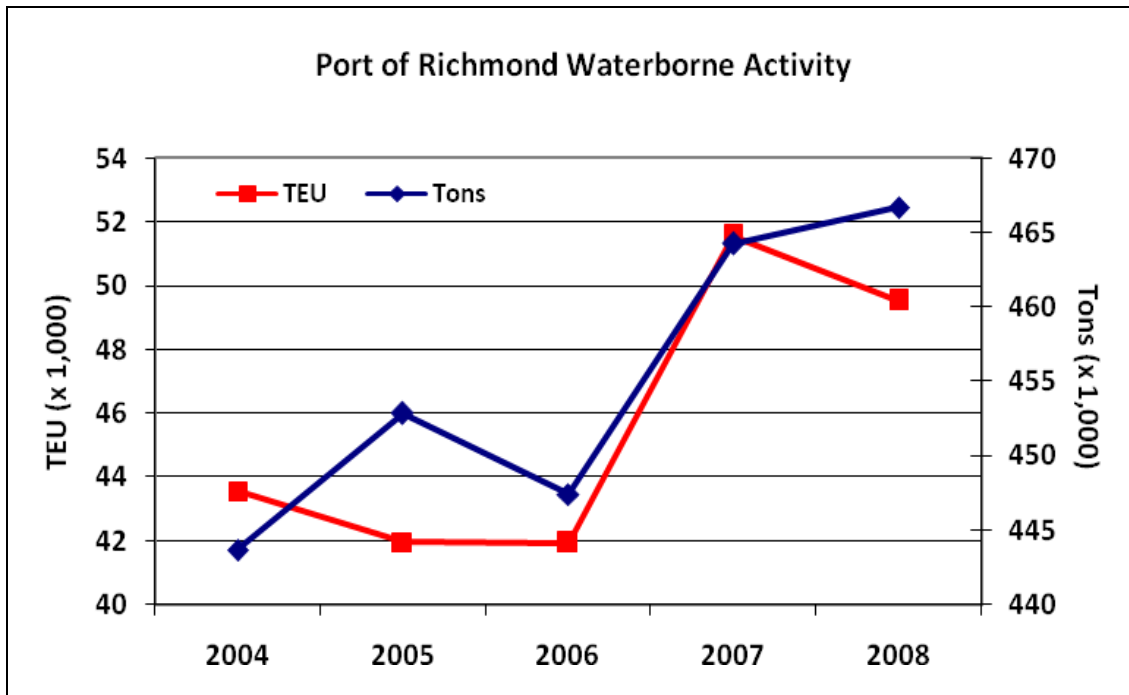
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FIGURE 1: HISTORICAL CARGO VOLUMES FOR PORT OF VIRGINIA



Source: Virginia Port Authority

FIGURE 2: HISTORICAL CARGO VOLUMES FOR PORT OF RICHMOND



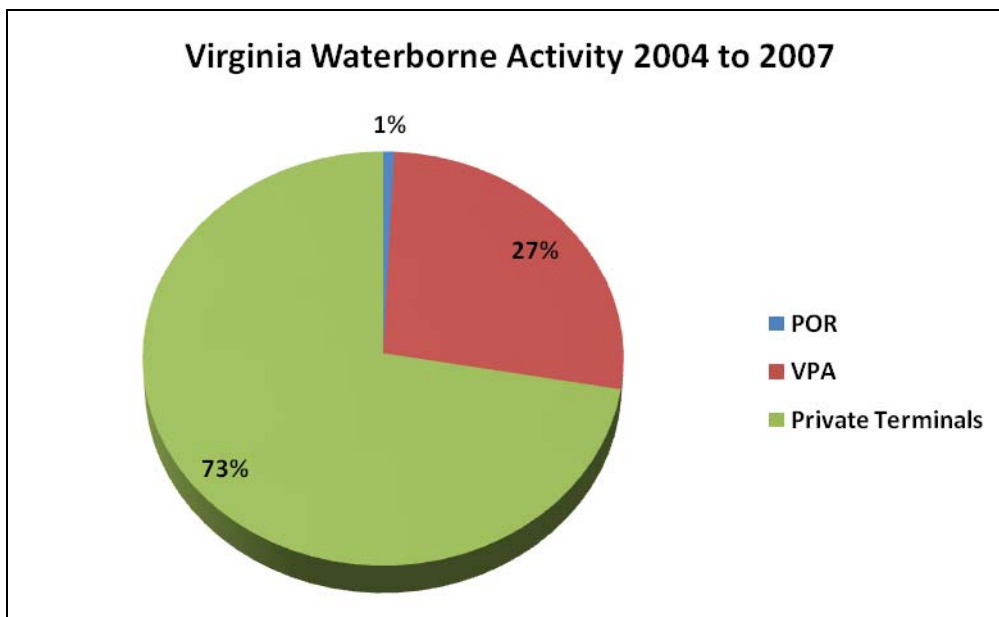
Source: Port of Richmond

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The Commonwealth of Virginia has many private terminals shipping various types of cargo that contribute to the state's total waterborne volumes. Figure 4 illustrates the average of Virginia's total waterborne activity from 2004 to 2007 broken down by state-owned and privately owned facilities. Specifically, the Hampton Roads Harbor is home to three private coal terminals (Norfolk Southern, Dominion Terminals, and Kinder Morgan) that comprised approximately 55% to 60% of the private terminals' tonnage from 2004 to 2007. In 1998 AP Moeller Terminals (APMT) completed the development of and began operations at the most technologically advanced container terminal in the US located in Portsmouth, VA. This new terminal includes state of the art gate, operating and cargo transfer systems as well as semi automated storage operations.

FIGURE 3: HISTORICAL CARGO VOLUMES FOR THE COMMONWEALTH OF VIRGINIA



Source: U.S. Army Corp of Engineers Navigation Data Center

INTERMODAL CONNECTIONS

An intermodal connection is a facility with infrastructure capable of transferring a container between three different modes of transportation (rail, truck, and ship). The state's public intermodal connections are located at NIT and PMT, and VIP. In 2008 the Port of Virginia shipped 31% via rail, 70% via truck, and 5% via barge¹.

CRUISE

Virginia's cruise industry is based in downtown Norfolk home to the state's lone deep-water cruise terminal, Half Moone. The city of Norfolk began its cruise operations in 2001 and has seen hundreds of thousands of passengers visit the city. Currently Royal Caribbean and Carnival Cruise Lines offer multiple sailings from Norfolk and Princess Cruise Lines has Norfolk as a port-of-call. Figure 5 is an aerial photograph of the cruise terminal denoted by the blue roof.

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FIGURE 4: AERIAL OF HALF MOONE CRUISE TERMINAL



Source: Microsoft Virtual Earth

COMMERCIAL FISHING AND RECREATION

Virginia's 3,315 miles of coastline² provides an abundant area for commercial fishing and recreation activities. The commercial fishing industry is one of Virginia's largest with an annual economic impact of over \$500 million³.

NAVIGABLE WATERWAYS

The Chesapeake Bay, James River, York River, Elizabeth River, Potomac River and Atlantic Intra-coastal Waterway are home to the majority of commercial, recreational and military vessel traffic. The U.S. Army Corp of Engineers awards and administers dredging contracts for waterway maintenance. \$35.4 million or 68 percent of maintenance funds over the past four years have been allocated towards the Atlantic and Newport News channels, Craney Island, James River, and the Norfolk Harbor.

CONDITION AND ADEQUACY

INDUSTRIAL PORTS

The VPA has invested millions of dollars since 2001 for capital improvement projects at NIT, PMT and NNMT. Each project upgraded terminal infrastructure to ultimately increase throughput capacity and efficiency to meet future demand. Each terminal has finite acreage and VPA's strategic goal is to maximize land use to accommodate higher revenue generating cargo. VPA is required under its Bond Covenants to maintain its facilities and regularly performs inspections to ascertain their conditions. VPA's facilities are adequately maintained.

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NIT's existing capacity of approximately 2 million TEU per year was achieved by the completion of several key projects including reconstructing the South Container Wharf, renovating the NIT South's backlands, expanding the North Container Wharf by 900 feet and the adjacent container storage yard, and acquiring 11 100-foot gage ship-to-shore cranes.

PMT has an existing throughput capacity of 980,000 TEU per year. PMT's past and present capital projects involve maximizing land utilization for container storage and the implementation of a new gate system to improve traffic flows and overall terminal efficiency.

NNMT is phasing out container operations and will handle the majority of VPA's break-bulk cargo, project cargo, and Ro/Ro cargo. Recent capital improvements to NNMT include upgrading equipment to enhance operations and the construction of a 200,000 square foot bulk warehouse in 2008.

The POR handles container and break-bulk cargo on 121 acres with 34 acres dedicated to open storage and a 300,000 square foot warehouse. Since 2000, POR has allocated approximately \$4 million towards capital improvement projects⁴. Presently, the POR is engaged in the Deepwater Terminal Turning Basin Expansion Project with dredging to begin in July of 2009. Future projects could involve the advertised 10+ acres of port property for terminal expansion or private investment.

INTERMODAL CONNECTIONS

VIP plays a critical role in VPA's growth by acting as an off-site container intermediary area for NIT and PMT. Recent capital improvements include installing a perimeter security fence, expanding container storage by paving 7.5 acres, and constructing a 1,200 square foot addition to the administration building.

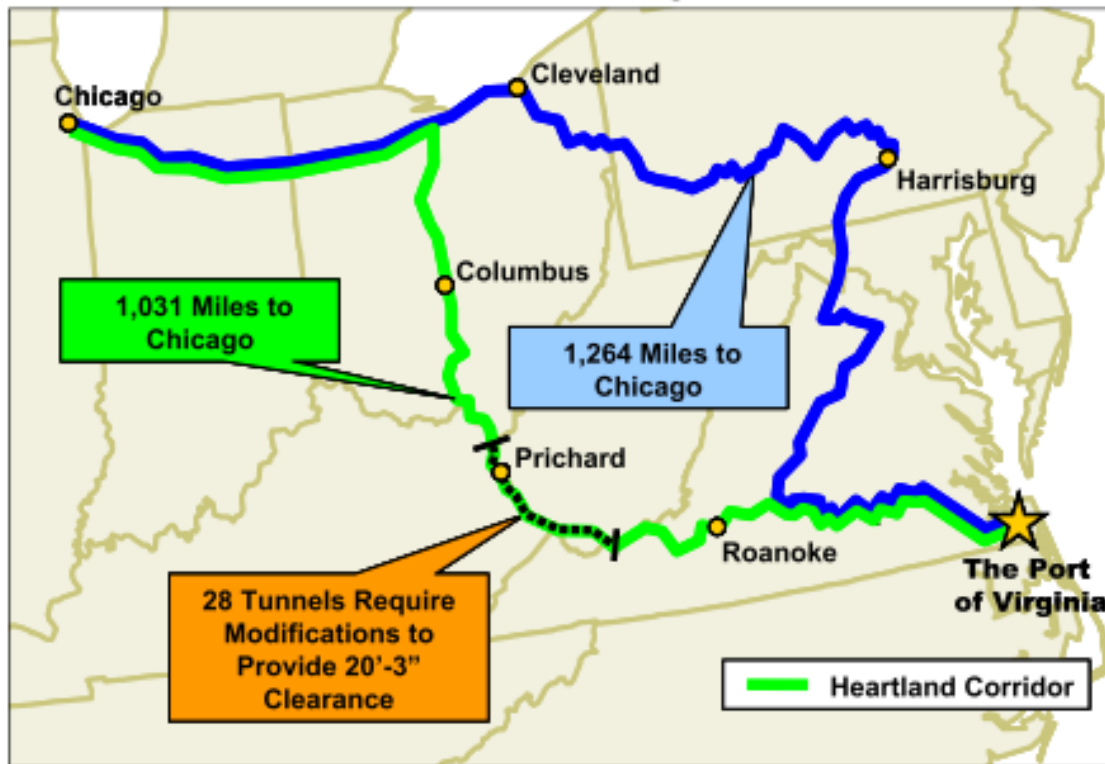
Virginia's rail connections at the port facilities are served by two Class I railroads, CSX (PMT) and Norfolk Southern (NIT). This creates an advantage for shippers and terminal operators by direct competition and access to multiple markets.

The Heartland Corridor is a \$150 million rail infrastructure project with an estimated completion date of 2010⁵. Its design provides a more direct route from Norfolk to Chicago for double-stacked containers by raising vertical clearances in 28 tunnels. This project will increase intermodal capacity, reduce emissions by 75%, and increase efficiency by shaving off approximately one day of transit time. Figure 6 illustrates the existing rail route and the mileage saved by the implementation of the Heartland Corridor.

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FIGURE 5: HEARTLAND CORRIDOR



Source: VPA 2040 Master Plan Executive Summary

NIT completed Phase I of its Central Rail Yard project in March of 2009. The \$34 million intermodal yard upgrade doubled the yard's capacity to 1 million containers annually⁶. Phase II will replace the old rail yard and increase capacity to 1.5 million containers. It has an estimated completion date of 2010 depending on funding.

Currently POR is initiating a \$4.6 million project to expand and improve its existing rail line with direct connection to NS and CSX. The project would enable POR to expand its services and market by implementing a new rail service with double-stack container capabilities.

Virginia's intermodal connection via barge or short-seas shipping system employs a container-on-barge operation for shipping cargo on Virginia's inland waterways. This method is a greener alternative to shipping containers via trucks because it reduces congestion and emissions. Currently Norfolk Tug offers a weekly service from Norfolk to Richmond, and Columbia Coastal offers a weekly service from Norfolk to Baltimore.

CRUISE

Half Moone Cruise Terminal's infrastructure is comprised of a single deep-draft pier adjacent to the Half Moone Cruise and Celebration Center. The pier is approximately 650 feet long with three mooring dolphins providing accommodation to a variety of vessels. The Celebration Center is an 80,000 square-

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foot state-of-the-art facility that opened in 2006. It houses all of the terminal's passenger operations services.

A state of the industry release from the Cruise Lines International Association indicated average annual growth since 1980 for the North American market is 7.4%. Virginia's passenger count for 2008 was 91,218, down 13% from 2007. Half Moone's single berth facility inevitably creates a capacity constraint if cruise passenger growth continues to be significant.

COMMERCIAL FISHING AND RECREATION

Virginia was the East Coast's leading producer of marine products based on volume in 2007 with 484 million pounds of commercial landings (third in U.S). Newport News Seafood Industrial Park is one of the nation's premier seafood harbors, and in 2005 it ranked seventh in the U.S. with \$53.7 million based on the value of commercial landings.

The Port of Virginia's Aid to Local Ports program provides approximately \$1 million in grants annually to various coastal localities for port infrastructure improvement projects. The majority of these projects have positive benefits to the commercial fishing industry and recreational waterway users.

SAFETY AND SECURITY

Safety and security measures are enforced through VPA's police department and POR's security personnel. NIT and PMT installed Radiation Portal Monitors to comply with the U.S.'s security 2012 mandate. Port security is tightened further through the newly implemented TWIC program for NNMT, NI, PMT, and POT. VIP is not required to comply with the federally mandated program.

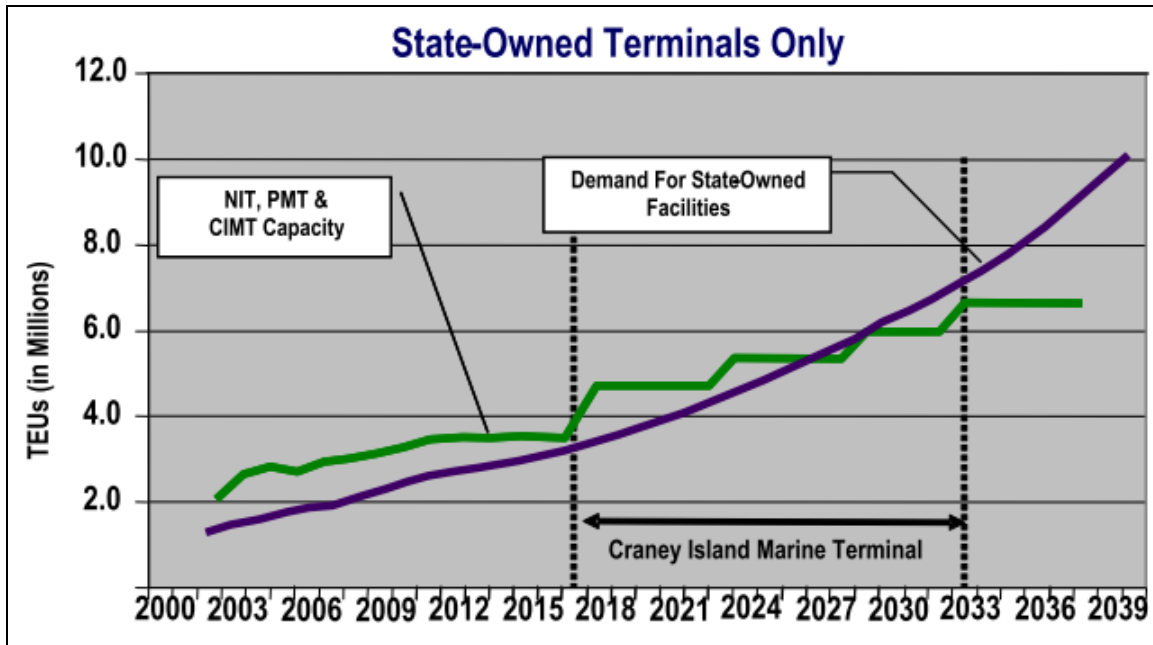
INVESTMENT NEEDS AND FUNDING DEDICATED

Virginia needs to continue to heavily invest in its port infrastructure to pace itself with forecasted cargo demand. Figure 7 illustrates the VPA's aggregated terminal capacity versus demand over a 40 year horizon. Demand forecasts predict by 2020 VPA's capacity will exceed demand. VPA has planned its fourth container terminal, Craney Island Marine Terminal (CIMT) to allow VPA to grow and benefit from the global container market. Craney Island Marine Terminal (CIMT) is a state-of-the-art facility beginning construction in 2010 and upon full build-out (2034) will double VPA's throughput capacity to 5 million TEU.

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FIGURE 6: STATE-OWNED TERMINALS CARGO CAPACITY VERSUS NEED



Source: VPA 2040 Master Plan Executive Summary

Table 1 lists The Virginia Port's past and future aggregate costs associated with each marine terminal. By 2034 VPA will invest approximately \$3.2 billion in port infrastructure projects.

TABLE 1: STATE-OWNED PORTS' CAPITAL INVESTMENT COSTS

Terminal	Capital Investment (millions)	Time Span
NIT	\$548	2001 – 2021
PMT	\$179.2	2002 – 2015
NNMT	\$15.9	2004 – 2015
VIP	\$6.2	2005 – 2020
CIMT	\$2,434.3	2009 – 2034
POR	\$4.0	2000 – 2009
TOTAL	\$3,183.6	

Source: Transportation Initiatives, Presented by: Kevin Abt, Dept. Chief Engineer, VPA 11/2006.

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BASIS OF GRADE

The infrastructure report card for the commonwealth of Virginia's ports and inland waterways is a **C+**. While the waterside access and cargo capacity are strengths, the road access and facility conditions require attention. The VPA and POR have begun the process of improving these key areas of concern.

TABLE 2:

Criteria	Grade	Comments
Capacity	B	Virginia's ports have historically maintained capacity above expected demand through an effective approach of future planning. With the planned development of Craney Island Marine Terminal, the VPA will be able to accommodate the forecasted container cargo through 2025. Additional facility improvements/expansions need to be considered for implementation in the next 15 years.
Facilities	C+	The VPA's and POR's terminals are in relatively good operating condition however the most technologically advanced container terminal in the US (a private terminal) is located across the river from the commonwealth's primary container terminals (NIT & NNMT). The VPA's plans to develop Craney Island Marine Terminal in a similar way and the project is currently in the planning and design phase.
Waterside Access	A-	The entrance channels to the Virginia Port Authority terminals provide the deepest water draft of all east coast US ports with a -50' depth. This channel depth is planned to be increased to -55' to accommodate the larger coal and container vessels in the North Atlantic. Because all water crossings between the entrance channel and the terminals are provided by tunnels, there are no air draft restrictions.
Landside Access – Roads	C-	The POR, VIT and NNMT have effective roadway access to interstate highways. The interstate access from NIT and PMT are limited and pass through residential and commercial areas. Significant inland transportation challenges are caused by the condition of the Commonwealth's roadway network. Refer to the Roadway report card section of this report for more detail regarding these limitations.
Landside Access – Rail	B-	Virginia's ports are connected to an extensive rail network that serves local, commonwealth, regional and national US markets. The ports are in the process of developing the Hartland Corridor project to provide double stack clearance with minimal at-grade crossings between the terminals in Hampton Roads and the nation's heartland. After completion of this new corridor, NIT will still have some rail access limitations. The three primary coal terminals all services by direct rail access.

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CONCLUSIONS & RECOMMENDATIONS

The ports and waterways infrastructure in the Commonwealth of Virginia is performing at a significant grade and is a significant economic generator. To maintain and improve the infrastructure report card grade, the following recommendations are provided:

- Finalize the development of the Heartland Corridor and its connection to the public and private port facilities.
- Develop the new Craney Island Marine Terminal to enhance capacity and facility conditions while expanding the competitive position of the Virginia Ports by developing a state of the art new container facility.
- Implement the 55' channel deepening project to maintain the current waterside access advantage over competing east coast ports.
- Improve the interstate roadway access for NIT, PMT and the new Craney Island Marine Terminal.
- Significantly improve the inland roadway network to provide greater truck access from the marine terminals to regional trucking destinations.

REFERENCES

¹ THE FISCAL YEAR 2006 VIRGINIA ECONOMIC AND FISCAL IMPACTS OF VIRGINIA PORT AUTHORITY OPERATIONS, Roy L. Pearson, Ph.D., James R Bradley, Ph.D., K Scott Swan, Ph.D. and Hector H. Guerrero, Ph.D., January 8, 2008, The Mason School of Business Compete Center, College of William & Mary, Williamsburg, VA 23187

²<http://www.portofvirginia.com/development/port-stats.aspx>

³ <http://www.infoplease.com/ipa/A0001801.html>

⁴ http://www.virginiaseafood.org/news/newsrelease_8.htm

⁵<http://www.richmondregional.org/Publications/Reports%20and%20Documents/2026LRTP-Final/Chapter%2011%20Intermodal%20System.pdf>

⁶ <http://www.nscorp.com/nscportal/nscorp/Media/Photo%20Gallery/heartland-gallery.html>

⁷ http://hamptonroads.com/2009/02/new-norfolk-rail-yard-ready-help-carry-load#primary_tabs