



DRAFT

CONSULTING ENGINEER'S REPORT

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moffatt & nichol

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1. Introduction

The Virginia Port Authority (VPA), through its 2065 Master Plan (dated January 15, 2016), has established a comprehensive plan for how its principal facilities will be aligned and/or adapted to meet current and forecasted cargo demands. The objective of this strategy is to support unconstrained cargo growth and provide economic benefits to the Commonwealth of Virginia through maritime trade.

This Consulting Engineer's Report (the Report) for VPA was prepared by Moffatt & Nichol and submitted to describe the expected effect of this plan and the anticipated future conditions on which the plan is based upon a forecast period through FY 2030. Specific topics addressed by the Report include:

- Status of VPA's owned and leased facilities
- Context of VPA's operations within the region and its market area
- Projected demand for container throughput at the facilities
- Economic trends and impacts considered during the development of the demand forecast
- Projected operating revenue and expenses
- Assumptions used to formulate the projected revenues and expenses
- VPA's Capital Investment Plan (CIP)
- Changes in the CIP since the previous Consulting Engineer's Report was published in 2015
- Other planned changes to Port of Virginia operations

The CIP documented in this report reflects VPA's updated strategy for maintaining capacity ahead of projected demand growth in consideration of the level of capital expenditures that can be supported by the Port facilities' forecasted revenues and other known funding sources. The updated strategy is driven by 1) an agreement between the VPA and the owners of its Virginia International Gateway (VIG) terminal to expand VIG under the terms of a newly executed lease that extends through 2065, and 2) an infusion of \$350 million of state funding to support modernization of Norfolk International Terminals (NIT) to increase throughput capacity.

VPA's CIP strategies are designed to maximize land use in order to generate higher revenues from containerized cargo. Additional purchases of container handling equipment and renovations at existing terminals, as well as projections for revenue and expenses, are provided for the Report's forecast period. The CIP also includes substantial investments in the construction of the Craney Island Eastward Expansion, which will be the site of the future Craney Island Marine Terminal. This terminal will substantially increase the capacity of The Port of Virginia (the Port) when and if it becomes operational in 2040.

Finally, this Report provides revenue and expense forecasts, as well as other information that can be used to demonstrate the feasibility of VPA's capability for funding capital projects and associated equipment acquisitions through the term of the projections. The revenue and expense forecasts extend from monthly actual data provided by VPA through February 2016 (financial data) and April 2016 (container volumes). The forecasts exclude consideration of 1) the long-term impacts of a United Kingdom exit from the European Union after a referendum to do so passed on June 23rd, 2016; and 2) the impact of the August 31st filing for bankruptcy by Hanjin Shipping Company, which has led to immediate actions by terminal operators, including VPA, to accommodate impacted cargo owners while minimizing exposure to Hanjin.

Moffatt & Nichol has consented to the publication of this Report in VPA's offering statement for the Terminal Revenue Bonds, Series 2016A (Taxable) and Series 2016B (AMT).

2. Existing Conditions

VPA owns three marine terminals and one inland intermodal facility, as described below. In addition, VPA has a lease to operate VIG in Portsmouth through 2065, and a lease to operate the City of Richmond-owned Richmond Marine Terminal on the James River through January 31st, 2056. VPA terminals have the capability to handle many different types of cargo, including containers, break-bulk and project cargo, and roll-on-roll-off (Ro/Ro) cargo such as automobiles. The Port's strategy primarily focuses on containerized cargo, which is the largest percentage of direct and indirect revenues (over 95%), generates the highest revenues and retained earnings for reinvestment, and is the main cargo type that is generating demand growth for most U.S. ports. The terminals owned and/or operated by VPA are described in Table 1.

Table 1 – Summary of VPA Terminals

Terminal	Description
Norfolk International Terminals (NIT)	567-acre container terminal with six 50' deep berths and 14 Super Post Panamax ship-to-shore cranes. Operations using straddle carriers support an annual capacity of ~820,000 containers/year. Also includes an on-dock rail yard with 18,000 feet of working track.
Virginia International Gateway (VIG)	231-acre container terminal with three 50' deep berths and 8 Super Post Panamax ship-to-shore cranes. 15 pairs of semi-automated stacking cranes support an annual capacity of ~680,000 containers. Also includes an on-dock rail yard with 13,200 feet of working track.
Portsmouth Marine Terminal (PMT)	285-acre mixed use terminal with approximately 44-acres and one 43' deep berth and 6 Post Panamax ship-to-shore cranes currently allocated to container operations. Wheeled and grounded container operations can support an annual capacity of ~200,000 containers.
Newport News Marine Terminal (NNMT)	165-acre general cargo terminal supporting Ro/Ro, break-bulk, and warehouse operations.
Virginia Inland Port (VIP)	161-acre intermodal container transfer facility in Front Royal (approx. 60 miles west of Washington D.C.) with container rail service to/from NIT and VIG.
Richmond Marine Terminal (RMT)	Formerly referred to as the Port of Richmond (POR). 80-acre general cargo terminal on the James River that supports a container barge service to NIT and VIG, as well as bulk agriculture exports, transloading, warehouse, and break-bulk operations. Also includes on-dock rail service.

Overall, the FY 2016 container demand is projected to reach approximately 86% of the estimated capacity of VPA's existing container terminals (NIT, VIG, and PMT), based on current terminal operations and market demand conditions (e.g. dwell time, seasonal demand fluctuations, etc.).

2.1. Port Organization

The Port of Virginia is comprised of VPA, Virginia International Terminals, LLC (VIT), and Hampton Roads Chassis Pool II (HRCPII). The three organizations (VPA, VIT, HRCPII) are legally separate, but function collaboratively under a single leadership team, brand name, set of values, and common mission statement in accordance with a master payment agreement.

The VPA is a political subdivision of the Commonwealth of Virginia. The VPA owns, and through its private operating subsidiary, VIT, operates NIT, PMT, NNMT, and VIP. The VPA further leases VIG and RMT. Human Resources, Finance, Legal Affairs, and Innovation functions are part of the VPA organization, and the related costs are shared back to VIT and HRCPII.

VIT is a single-member limited liability company with the VPA as the sole member of the company. It operates all of VPA's terminals except the Richmond Marine Terminal, which is currently operated by Port Contractors, Inc. (PCI) until October 2016, after which VIT will take over operations. Operations and Sales functions are performed by VIT.

HRCPII, L.L.C. is a subsidiary of VIT and provides management services for the combined chassis pool used by over-the-road trucking companies, and for the off-terminal empty container yard operations. Net cash flow from these operations is transferred to VIT.

The Port of Virginia organization is atypical in U.S. ports. This combined organization with a single operator allows The Port of Virginia to better align cargo demand with the terminal resources best positioned to meet that demand, including relocation of ship lines if needed. At many other U.S. ports, port authorities typically function as landlords and lease their terminals to a variety of private terminal operators that compete for ship lines.

2.2. Norfolk International Terminals (NIT)

NIT is a marine container terminal located along the Elizabeth River in Norfolk, Virginia. NIT is the VPA's largest container terminal by area and current throughput capacity, with approximately 567 acres of land, two 1,320-foot cargo piers, an 875-foot Ro/Ro berth and approximately 6,630 feet of wharf. The terminal is currently served by 14 ship-to-shore cranes that can reach across 22 to 26 containers, with channel depths up to 50 feet.

NIT is divided into two interconnected terminals, north and south, by its Central Rail Yard and non-VPA facilities (the latter are remnants of the facility's long history and chain of ownership). Both terminals are primarily operated with straddle carriers to move containers between the ship-to-shore cranes, container yards, over-the-road trucks, and the hustler-based, on-dock rail operations. All truck traffic accesses the terminal via the main gate, which is located at the south terminal; a second truck gate facility at the north end is currently under construction.

Adjacent to the terminal at the north end, VPA owns an external rail yard that provides additional staging capacity for trains. A second rail lead accesses the south terminal and connects within the terminal to provide

a loop for efficient arrival and departure operations. Norfolk Southern and Norfolk Portsmouth Beltline Railroad (which provides connection to CSX) provide rail service to the terminal.

The current overall capacity¹ at NIT is approximately 820,000 containers/year (approximately 1.4 million TEUs). NIT is projected to have operated at approximately 88% of capacity in FY 2016.



Figure 1 – Norfolk International Terminals

2.3. Virginia International Gateway (VIG)

VIG (formerly the APM Terminal) is a marine container terminal located along the Elizabeth River in Portsmouth, Virginia. The facility was developed and commissioned in September 2007 by APM, the terminal operating arm of Maersk, and leased by the VPA in 2010. In 2014, the terminal was sold to Alinda Capital Partners and Universities Superannuation Scheme Limited and renamed VIG at that time. A new agreement has been reached between the VPA and the owners to:

¹ Refer to Section 3.4.2 for additional discussion regarding capacity. As a terminal's estimated capacity is approached, terminal activities increasingly rely on evenings and weekend shifts to process cargo and typically incurs premium labor rates. This results in higher incremental operating costs as volumes approach the estimated overall terminal capacity. This condition also impacts the terminal's ability to recover from operational disruptions such as delayed ship arrivals or unanticipated volume surges.

- Expand the terminal to its full build out condition with capital funding provided by the owners/lessors of VIG
- Extend the lease [REDACTED]
- Revise the lease including the payment terms

The terminal is designed to serve post-Panamax class vessels, and is accessible by a 50-foot navigation channel, the interstate highway system, and double-stack intermodal service. VIG is equipped with a six-track, on-dock intermodal yard served by Commonwealth Railway, a short-line railroad that has rail access to both CSX and Norfolk Southern railroads, which both have near-daily scheduled intermodal service to the terminal.

The terminal is constructed as a semi-automated operation, with a mix of manual and automated container handling equipment. Many of the terminal's operations, including truck gate service and transfer of containers between the trucks and the container stacks, are performed remotely from a centralized terminal operations center, promoting efficiency, accuracy, and worker safety.

The container wharf provides 3,225 feet of effective berth capacity. The 231-acre terminal (developed area) is equipped with a fleet of eight super post-Panamax class ship-to-shore gantry cranes, capable of handling container vessels with up to 22 rows of containers. Backlands consist of an approximately 65 acre semi-automated rail mounted gantry (RMG) stacked container storage yard, as well as approximately 50 acres of dedicated storage space for stacked empty containers, wheeled refrigerated containers, wheeled intermodal staging, chassis storage, and wheeled oversized loads. The terminal has an additional 60 acres of planned expansion areas for additional container stacks, working tracks for intermodal operations, truck gate lanes, and an extended container wharf. Currently, the terminal is operating at approximately 96% of its estimated 680,000 container/year capacity (approximately 1.2 million TEUs).



Figure 2 – Virginia International Gateway

2.4. Portsmouth Marine Terminal (PMT)

PMT occupies approximately 285 acres of land and is located on the west bank of the Elizabeth River. The terminal has 4,530 feet of wharf. The terminal has access to both CSX and Norfolk Southern (via the Norfolk Portsmouth Belt Line Railroad).

PMT operated as a container terminal until VPA began leasing VIG in 2010. As part of the lease agreement, as well as to take advantage of VIG's automated facility, existing PMT customers were transferred to VIG and terminal operations ceased in early 2011. The terminal was reactivated for container and other cargo operations in September 2014 to increase Port of Virginia's overall capacity and level of service as demand continued to increase. In conjunction with the reactivation, services were realigned to sharpen NIT's and VIG's operational focus on efficiently supporting larger container-only services and use PMT for lower volume and specialized cargo services. 44 acres are currently used for this operation and provide an estimated capacity of approximately 200,000 containers/year (approximately 346,000 TEUs) based on a "grounded" operation (i.e. containers are stored in stacks using rubber-tired gantry cranes and top picks). The terminal is estimated to be operating at approximately 55% of its capacity in FY2016.

45 acres in the northeast corner of the facility are being leased to a joint venture headed by Skanska Infrastructure Development for construction of a second Midtown Tunnel, scheduled to be completed in 2017. A 44 acre area south of U.S. Route 58 is in service for storing empty containers, and the warehouse adjacent to the VIT operations building is currently being leased.

The remaining areas (~139 acres) on terminal are available for general cargo, Ro/Ro, and other cargo or services.

2.5. Newport News Marine Terminal (NNMT)

NNMT is VPA's main break-bulk and Ro/Ro facility. The terminal occupies approximately 165 acres on the north bank of the James River. NNMT contains two piers with four vessel berths, approximately 968,000 square feet of covered storage, and on-dock rail served by CSX. The terminal also has Ro/Ro ramps for transfers to both vessels and rail.

2.6. Virginia Inland Port (VIP)

VIP is an intermodal container transfer facility in Front Royal, Virginia (Warren County) owned by VPA. VIP occupies 161 acres of land and is approximately 60 miles west of Washington, D.C. The terminal brings the Port 220 miles closer to inland markets and enhances service to the Washington D.C./Baltimore Metro region via rail service between VIP and the terminals in Hampton Roads. VIP also consolidates and containerizes local cargo for export.

The terminal is serviced by 17,820 feet of rail track located adjacent to Norfolk Southern's Crescent Corridor. Norfolk Southern transfers containers between VIP and the Hampton Roads marine terminals via regularly scheduled rail service. Containerized rail service is provided five days a week to VIP from both NIT and VIG. Well-known companies such as Home Depot, Kohl's, Rite Aid and Red Bull have distribution centers in the Front Royal area to utilize VIP, bringing jobs and economic benefits to the region.

2.7. Richmond Marine Terminal (RMT)

The Richmond Marine Terminal (formerly Port of Richmond) is located on approximately 121 acres along the west bank of the James River, with 80 of those acres within the secure terminal. The facility is owned by the City of Richmond and leased by VPA, under an agreement that runs until January 31st, 2056. The terminal is currently operated by a private operator (PCI) under an agreement between PCI and VPA which expires in October 2016, after which VIT will operate the facility.

The facility has a 1,570 foot long wharf available for berthing, and handles containers, break-bulk, and bulk cargo. The terminal has approximately 280,000 square feet of warehouse storage, primarily from World War II-era concrete buildings. 80,000 square feet are provided by a more modern structure. VPA completed acquisition of a new mobile harbor crane (Liebherr LHM 420 model) in January 2016 to support container and other cargo operations.

The terminal has on-dock rail infrastructure that was refurbished in 2014. The city-owned rail lead connecting to CSX's South Yard has also recently undergone renovation efforts. A rail scale and unloading pit were constructed in 2013 to support a bulk grain export operation. The terminal also supports a truck-to-container transloading operation. Other container-stuffing operations are also accommodated onsite.

James River Barge Service, a regularly scheduled container-on-barge service from Hampton Roads to Richmond, provides a maritime alternative to the frequently congested I-64 corridor by transporting goods on the James River via barge, removing container traffic off local roads and highways.

3. Market Position

The combined operational revenue of the Port's facilities operated by VIT is anticipated to surpass \$437 million in FY 2016, primarily through increased container throughput.

3.1. Quality of Service Area

The Port of Virginia, like all national gateway port facilities, serves both a "local" market of base industries/sectors in which the port is the natural dominant service provider, and a discretionary hinterland market, connected via long-haul truck and rail, for which other ports compete aggressively.

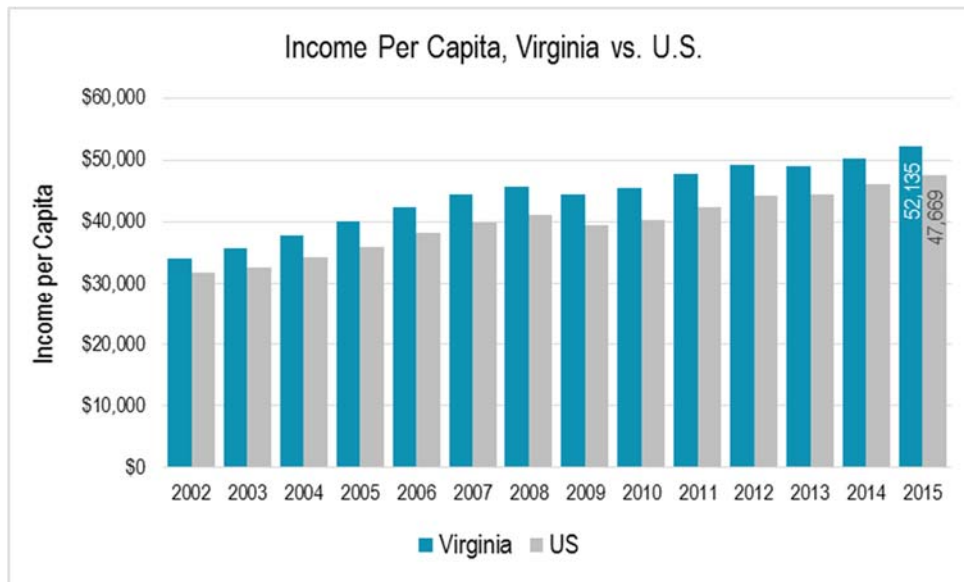
3.1.1. Local Market

With a population of roughly 9.7 million people projected by 2030 (Table 3), Virginia is set to become one of the most populous states in the U.S., suggesting a large consumer base to help drive demand for import commodities. Additionally, the Virginia consumer is one of the wealthiest in the nation. With an average per capita annual income of \$48,800, it is almost 10% above the national average of \$44,700 as presented below in Figure 3. Approximately 40% of the U.S. population is located within 700 miles.² The Port of Virginia's primary local market includes Virginia, Maryland, North Carolina, and West Virginia.

The greater Virginia, Maryland, DC area is estimated to remain one of the wealthiest regions in the U.S., and therefore should continue to be a strong source of consumer-related import products. The role of the government sector will continue to underpin the overall strength of the regional economy, particularly in Northern Virginia where the population is becoming increasingly concentrated. Virginia's healthcare industry is also playing an increasingly more prominent role in the Commonwealth's total economy, and therefore given the growing population share of the nation as a whole, Virginia-based healthcare and service providers should continue to support overall growth.

² 700 miles is one approximation of the threshold between over-the-road truck service and rail service areas and is provided as an order-of-magnitude illustration of the port's access to potential local markets. Other ports also serve this same area.

Figure 3 – Income Per Capita Virginia vs. U.S.



Source: Bureau of Economic Analysis; Moffatt & Nichol

The strength of Virginia's consumer sector is in part reflective of the local industry base of Virginia. Compared to the rest of the U.S., Virginia's gross domestic product (GDP) is driven more from the service sectors including professional services (lawyers, administrators, etc.) at 52.7% in Virginia, compared to 50.0% nationally, and government, 19.3% in Virginia compared to 12.8% nationally, as presented in Table 2.

The comparative role the U.S. government sector plays in local economics makes it a "base" industry regionally. Therefore, the relative strength of the government, particularly in terms of employment, can have a significant impact on the demand for consumer-related goods destined to the greater Virginia market. The procurement of military and civilian/construction related goods can also have a direct impact on the volume of trade destined into the region. Also noted in Table 2 is the smaller relative share that the goods producing/consuming industries play in Virginia compared to the rest of the U.S. This is again reflective of the dominance the government plays in the "local" region served by VPA. Manufacturing, which accounts for approximately 12.4% of national output, represents only 9.6% of the Commonwealth's total.

Table 2 – Composition of GDP - 2015

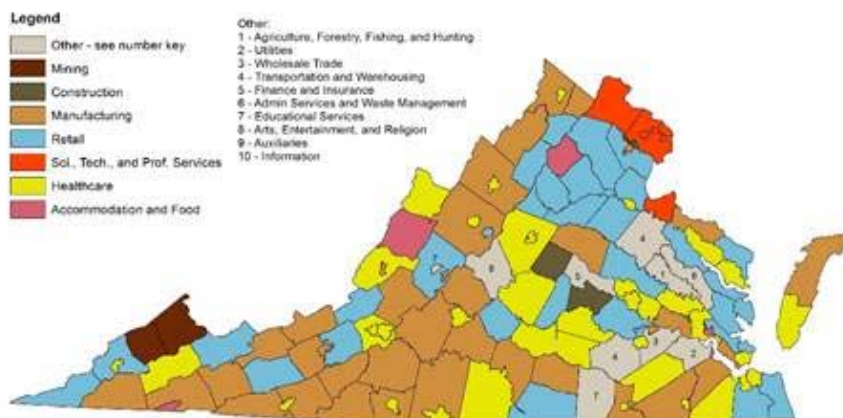
Broad	Sector	US %	Virginia %	Location Quotient ¹
Goods		22.0%	15.8%	0.7
	Agriculture, forestry, fishing, and hunting	1.3%	0.4%	0.3
	Mining	2.7%	0.5%	0.2
	Utilities	1.7%	1.4%	0.8
	Construction	3.9%	3.9%	1.0
	Manufacturing	12.4%	9.6%	0.8
Blend		15.1%	12.2%	0.8
	Wholesale trade	6.2%	4.2%	0.7
	Retail trade	5.9%	5.4%	0.9
	Transportation and warehousing	3.0%	2.5%	0.8
Service		50.0%	52.7%	1.1
	Information	4.9%	4.1%	0.8
	Finance, insurance, real estate, rental, and leasing	20.6%	20.0%	1.0
	Professional and business services	12.2%	18.5%	1.5
	Educational services, health care, and social assistance	8.4%	7.1%	0.8
	Arts, entertainment, recreation, accommodation, and food services	3.9%	3.1%	0.8
Government		12.8%	19.3%	1.5

¹The location quotient is an analytical tool to support comparison of industry concentration between a specific location and a broader region. A value greater than 1 indicates the local concentration of the associated industry is greater than the region, and vice versa for values less than 1.

Source: Bureau of Economic Analysis; Moffatt & Nichol

In general, the retail sector (denoted in blue in Figure 4) remains the largest source of employment in the more populous northern and coastal regions of the Commonwealth, while manufacturing (denoted in brown in Figure 4) is the largest in the interior counties. Manufacturing industries include wood products, including pulp, auto parts including tires (for other transport as well), and textile producers. This suggests that while the local Virginia-based manufacturing sector provides some level of support for import and export volumes through the Port, it is the Port's ability to connect and compete for discretionary markets inland which also allow export volumes to be the traditional larger flows through the Port.

Figure 4 – Industry Sector with Largest Employment – 2012 (Most Recent Year Available)



Source: University of Virginia

3.1.2. Regional Outlook

Within the U.S., not all regional economies are forecasted to perform equally. The long-term implications of population demographics (number of people as well as age profiles) are expected to support higher economic growth in the U.S. South Atlantic (which includes Virginia), the broader U.S. South/Gulf regions as well as the Mountain and Pacific regions. This suggests that the ports which actively serve these higher growth regions should outperform their regional counterparts (Port volumes are discussed in Section 3.1.3).

The states which collectively make up the South Atlantic region, presented in Figure 5, are projected to have population growth of an average 1.1% annually between 2015 and 2030, roughly 0.3% above that of the 0.8% national estimated average according to population projections produced by University of Virginia's Weldon Cooper Center for Public Service Demographics Research Group. The states with the strongest population growth forecasts in the region include Florida, Georgia, North Carolina and Virginia. Virginia will remain one of the largest states both regionally and nationally with a projected population of over 9.8 million in 2030, as shown in Table 3.

These higher population forecasts imply that there will be stronger demand growth for consumer and construction/housing related commodities destined to these markets. Additionally, as service employers (e.g. healthcare) and goods producing employers (e.g. auto plants) continue to shift to the southern states, this should support levels of exportable commodities produced regionally.

Figure 5 – U.S. Census Regions

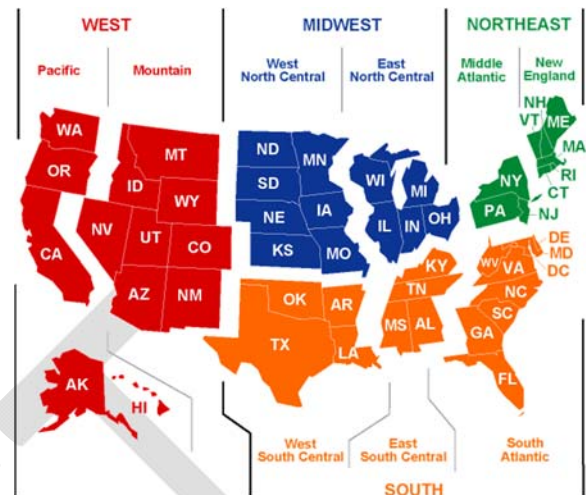


Table 3 – South Atlantic Population Forecasts

	2015	2030	CAGR
Delaware	945,934	1,092,562	1.0%
Maryland	6,006,401	6,763,178	0.8%
West Virginia	1,844,128	1,775,932	-0.3%
Virginia	8,382,993	9,701,508	1.0%
North Carolina	10,042,802	11,886,768	1.1%
South Carolina	4,896,146	5,587,991	0.9%
Georgia	10,214,860	12,415,730	1.3%
Florida	20,271,272	24,662,590	1.3%
South Atlantic Total	62,604,536	73,886,259	1.1%
US	321,418,820	360,978,449	0.8%

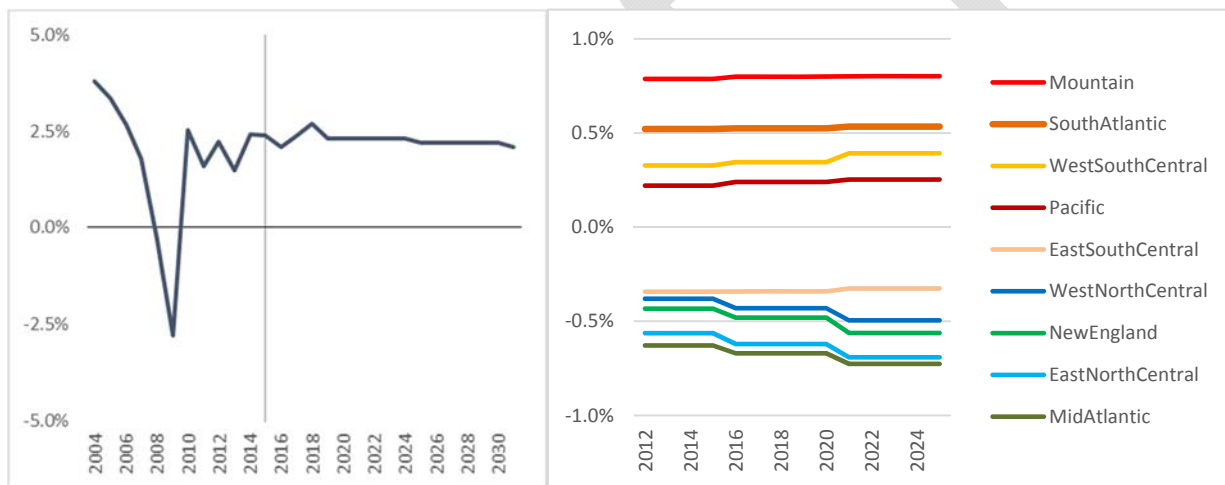
Source: University of Virginia Weldon Cooper Center for Public Service, U.S. Census, Moffatt & Nichol

In order to incorporate these regionally sensitive outlooks into the projected overall performance of the U.S. economy, Moffatt & Nichol builds in a differential for the respective regions, which is applied to the total U.S. real GDP forecasts, as presented on the left in Figure 6.

U.S. GDP over the projected forecast horizon (2016-2030) is estimated to average 2.2% annual growth. The economy has rebounded soundly from the global financial crisis, and is now approaching a period of projected stable, albeit slightly lower growth. The Federal Reserve has cautiously begun a rate tightening cycle, and with commodity prices appearing to have bottomed, including energy and food, and the dollar appreciation also slowing, inflation may begin to rise in the near-term which will likely provide more confidence to continue to raise rates.

In the long-term, demographics continue to favor the Port's local market, whereby applying the aforementioned differential to this growth outlook would suggest GDP growth in the South Atlantic region of approximately 2.7% over the coming decade.

Figure 6 – U.S. GDP Forecasts (Left) & Regional Differential (Right)



Source: International Monetary Fund; U.S. Census; EIA; Moffatt & Nichol

The states which comprise the U.S. Northeast and Midwest regions face headwinds given the U.S. Census forecasts for population growth which suggest that these regions will lose share of total population in the future. In general, these regions' economies are projected to underperform the national average in the long-run by an estimated 0.5 - 0.75%.

Nevertheless, the U.S. Northeast and East North Central regions are home to some of the most populous urban centers in the nation, and will continue to attract sizable volumes of consumer and industrial related imports, and act as dominant sources for manufactured exported commodities (including scrap products).

In terms of trade, the outlooks for the U.S. economy, and its respective global trading partners, suggest that in the near-term demand for consumer related import commodities will continue to outpace that of export volumes; which should continue to support import volume growth at the Port given its proximate location to the high growth markets in the U.S. South Atlantic region, and the its ability to connect into the large urban and distribution centers throughout the U.S. Midwest (discussed in more detail in Section 3.3).

Moffatt & Nichol notes, however, that the U.S. South Atlantic in particular is a highly competitive port environment with a number of large container and general cargo ports competing for share within this growing market place. The Port's share of regional trade is discussed below.

3.1.3. Competitive Performance

Export share through The Port of Virginia held steady at approximately 22.1%. Despite a 6.4% rise in loaded import volumes in 2015, Norfolk's share of regional import volumes fell from approximately 15.9% in 2014 to 15.0% in 2015. This was a result of the redirected cargo from the West Coast at the onset of 2015 favoring the Southeast and Florida ports, which helped imports grow to a higher degree than the mid-Atlantic and Northeast ports. Consequently, total volume share slipped from 17.0% to 16.4% in 2015.

Figure 7 – Total TEU Volumes (Left) & Share by Port (Right)

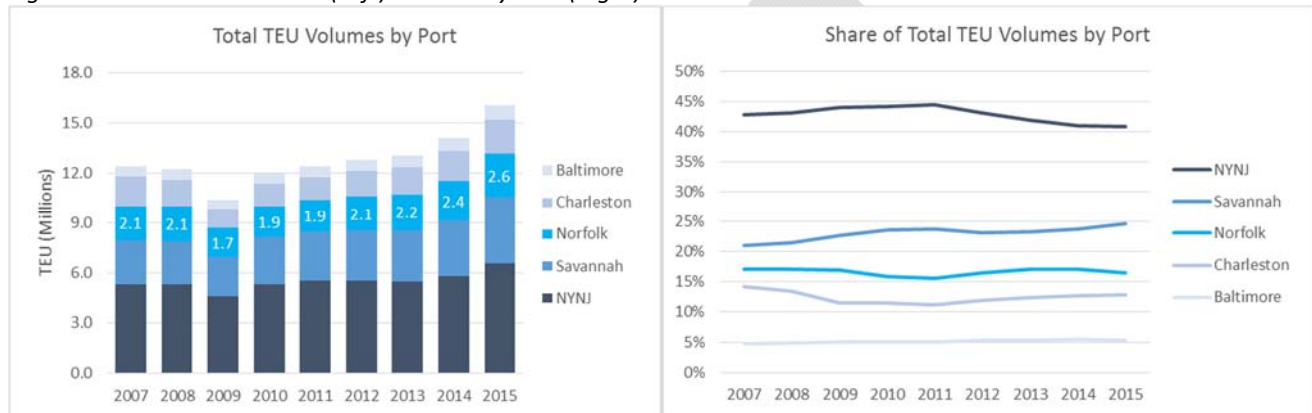


Figure 8 – Loaded Import TEU Volumes (Left) & Share by Port (Right)

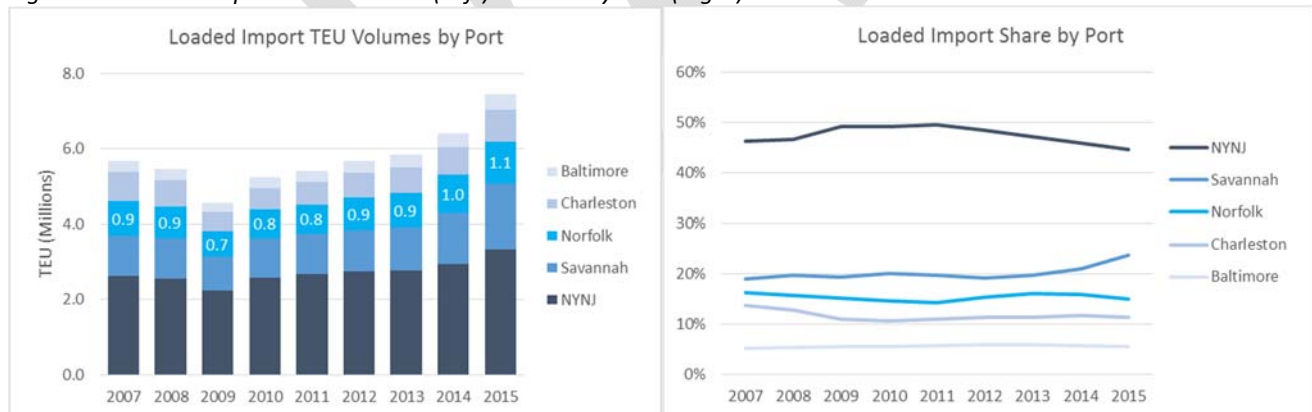
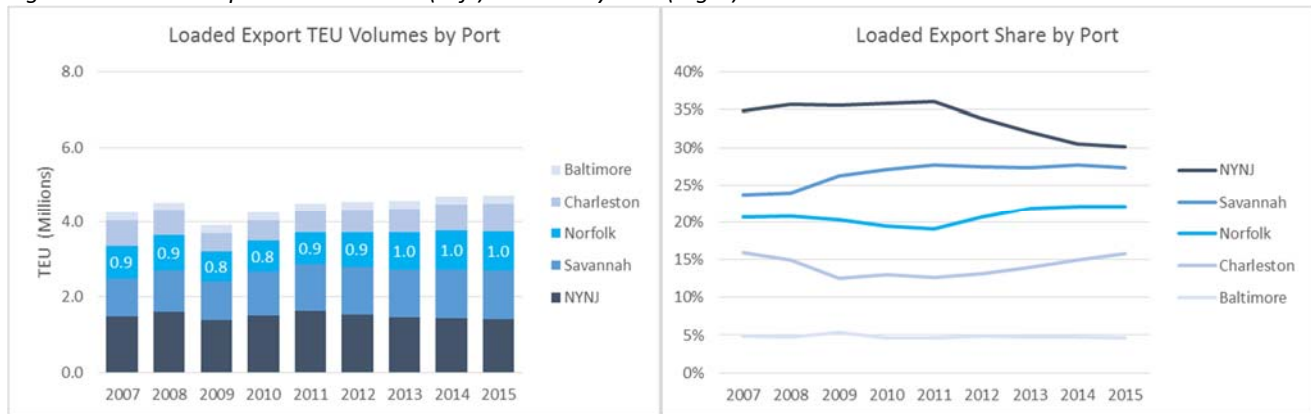


Figure 9 – Loaded Export TEU Volumes (Left) & Share by Port (Right)



3.1.4. Shipping Lanes

The expansion of the Panama Canal will require U.S. ports to deepen their channels to 50 ft. in order to accommodate Post-Panamax vessels. The Port of Virginia can currently accommodate the larger Post-Panamax vessels at its two major container terminals and is therefore well-positioned for continued access to the major container services. However, East Coast ports are at different levels of readiness for these larger vessels, which contributes to uncertainty of how quickly the transition to larger vessels will occur, particularly as many services have multiple port calls. Among the major U.S. East Coast/Gulf container ports:

- The Port of Virginia (7th)³ is ready for Post-Panamax sized ships at 50 feet, and is in the early stages of permitting to deepen to 55 ft., as already authorized by the US Army Corps of Engineers.
- Baltimore (15th)³ is currently Post-Panamax ready at 50 feet at its Seagirt Terminal.
- Miami (14th)³ is Post-Panamax ready.
- New York/New Jersey (3rd)² has dredged to 50 feet and is in the process of raising the Bayonne Bridge to relieve an air draft constraint to Post-Panamax ships by the end of 2017 (per port authority's website).
- Charleston (9th)³ is at 45 feet and has secured permits to dredge to 52 feet. Engineering and design is anticipated to be substantially complete by the end of 2016, with deeper access being available as early as 2019 (per port authority's website).
- Savannah (5th)³ is at 42 feet and is approved to dredge to 47 feet. Construction is underway and is expected to take approximately four years to complete (estimated to be completed as early as 2019 per port authority website).
- Jacksonville (13th)³ is currently at 40 feet and has received authorization to deepen its channels to 47 feet. Engineering and design is currently underway but federal construction funding has not yet been secured per the Jacksonville Business Journal⁴.

³ 2014 U.S. container port (East and West coast) ranking by TEU volume, AAPA website (www.aapa-ports.org)

⁴ Werley, Jensen (March 15, 2016), Construction to start on dredging the St. Johns River as early as next year. *Jacksonville Business Journal*

The Panama Canal competes predominantly with intermodal rail service from West Coast ports to the East Coast, and to a lesser degree with the Suez Canal. The canal expansion to accommodate larger vessels (with capacities exceeding 14,000 TEU) became operational on June 26th, 2016, with the first Neo-Panamax vessel (MOL Benefactor with a capacity of 10,100 TEU) arriving at the Port of Virginia on July 11th.

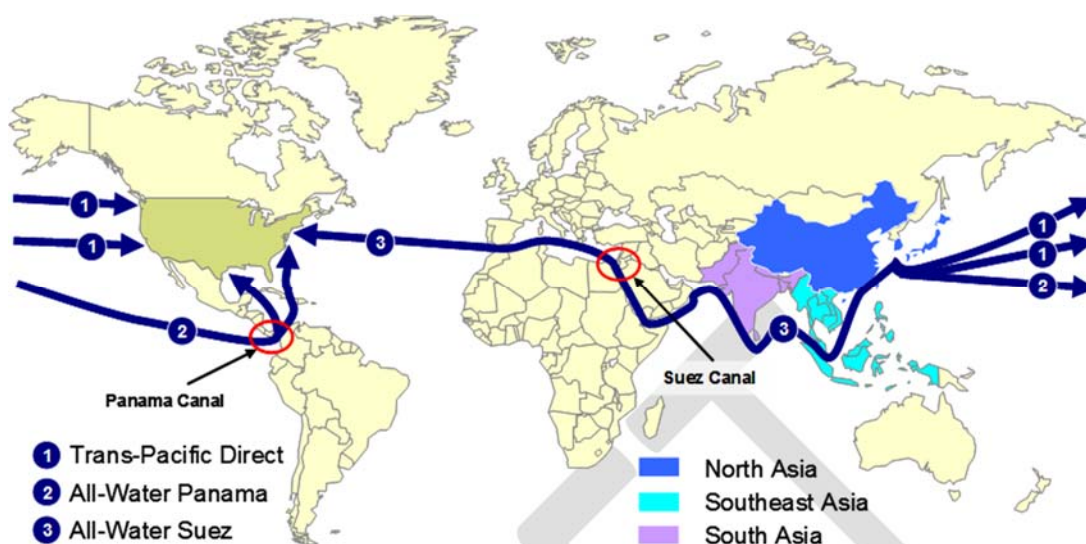
The rate at which traffic will increase is debatable in part because of competition between the Panama Canal, Suez Canal, and capacity for West Coast logistics networks to respond to competition. The expanded Panama Canal now provides the opportunity for carriers to make economy of scale gains through the use of larger capacity vessels.

Another route to the U.S. East Coast is the Suez Canal, shown in Figure 10. A growing market for goods produced in India and parts of Southeast Asia has created more opportunities for carriers to increase services and deploy larger vessels on Suez routings, thus presenting shippers with greater possibilities for competitive rates on those services. This would be reinforced by macroeconomic trends showing that some manufacturing is shifting from China to South Asia, which has recently seen imported volumes to the U.S. from the latter increase at a faster pace and gain market share in the U.S. import market.

The Panama Canal Authority (PCA) believes lower unit costs from larger ships transiting the expanded canal will allow them to increase their 38% market share for Asian cargo destined for the East Coast. M&N does not foresee the Panama Canal Expansion resulting in a significant “step-up” of containerized cargo destined to the East Coast ports, as the carriers have been using Suez Canal routes to access the East Coast. M&N believes PCA’s increased market share will largely be the result of improved competitiveness of the Panama Canal over the Suez Canal in conjunction with transition to larger vessels, rather than a diversion of container traffic moving through West Coast ports. Transit from Asia to Midwest markets via West Coast ports average about 18 days; reaching the same markets via East Coast ports increase the average transit time to approximately 35 days.

Planned terminal expansions coupled with inland road and rail transportation improvements that are already in progress place The Port of Virginia in a strong position to support an industry shift to larger vessels and continued capture of overall demand growth, regardless of the transit route.

Figure 10 – North America to Asia Service Patterns



Source: Moffatt & Nichol

A controversial Nicaraguan canal to compete with the Panama Canal was proposed by a Chinese venture and a concession approved by Nicaragua's National Assembly in 2013. Initial surveying efforts and a groundbreaking ceremony have been observed, but it is unclear what the current status of the project is, as there has been very little visible progress since it was announced and many industry observers appear highly skeptical that it will ever come to fruition.⁵

3.1.5. Competitive Opportunities

A Least Cost Market Areas (LCMA's) assessment was performed for locations, as defined by the Bureau of Economic Analysis (BEA) that are served by The Port of Virginia. The results indicate that the Port provides the lowest cost to some locations where it does not currently have a dominant position. This cargo was found to often use its current routing for historical reasons that have not been re-evaluated by shippers. Often times this cargo is not using the Port because the decision makers who control the distribution of this cargo have not been made aware that lower cost and increased service differences have materialized as a result of infrastructure investments by VPA, the Virginia Department of Transportation (VDOT), and the railroads. VPA actively communicates these cost and service differentiators to businesses within its market area as part of its marketing strategy. Acquiring this cargo through customer by customer contact presents an opportunity to grow demand above the curve developed for the CIP.

⁵ Daley, Suzanne (2016, April 3rd). Lost in Nicaragua, a Chinese Tycoon's Canal Project. *The New York Times*

Shifts in global economic strength can present VPA with opportunities to increase containerized cargo demand at its marine terminals at rates higher than forecast averages for the U.S. and East Coast. The VPA is positioned to benefit if and when:

- U.S. imports originating from India and their surrounding region increases. This occurrence would generate economies of scale for Suez Canal routings. Suez Canal routings benefit U.S. East Coast ports over U.S. West Coast ports.
- Demand for U.S.-manufactured goods increases through above average economic growth and/or increased purchasing power abroad.
- CSX completes an initial phase of Virginia Avenue Tunnel project (est. late 2016) that will permit doublestack CSX rail service to Hampton Roads and allow CSX to better compete with Norfolk Southern's existing doublestack service.
- Inland rail networks such as the Heartland Corridor and National Gateway accessing VPA terminals make Virginia a preferred global gateway for cargo movement to Midwest markets.

3.2. Cargo Demand Growth

3.2.1. Container Cargo Demand

VPA's FY 2016 container forecasted demand is 1.455 million containers (approximately 2.53 million TEU), not including volumes at Virginia Inland Port (VIP). Year to date FY 2016 (April 2016) volume is 1,211,979 containers (approx. 2.11 million TEUs), which is approximately 2.2% over the same FY 2015 period volume.

The demand forecast was independently developed by Moffatt & Nichol using a two-step effort. First, an estimate of the underlying market demand was developed, from which an estimate of the Port's ability to capture share of that demand within the market was derived. Market demand estimates were developed through projecting the growth of commodity trade within the Federal Highway Administration's Freight Analysis Framework (FAF) regions. Import volumes reflect the historical relationship between U.S. GDP growth, regional GDP (nine U.S. Census regions), and industry and consumer composition of each FAF region. Export volumes are driven by GDP growth outlooks for the U.S.'s trade partners and the domestic logistics chains through which export goods are travelling.

The estimate of the Port's ability to capture volumes is derived through analysis of the cost competitive position the Port maintains against competing facilities. These cost estimates are produced for each port-FAF region combination to assess if a) the port does in fact maintain a competitive cost advantage in a particular region, and b) if so by how much? Future share capture estimates are determined by the relative cost advantage over the next least-cost provider.

The forecasts incorporate the recent trends in market share capture made by the Port. Until 2015, the Port had realized gains in share of both loaded import and export commodities, resulting from a number of factors including increased usage of the Heartland Corridor, labor and weather disruptions in the U.S. Northeast, and an increasing share of exports leaving through the U.S. East Coast. In 2015, despite Port of Virginia volumes being 9.34% over 2014 volumes, the Port's share of East Coast volume fell. This resulted from the out performance of the Port of Savannah, which was the primary East Coast beneficiary of the redirected cargo from the West Coast in the early months of 2015. Nevertheless the Port of Virginia continues to serve as one of the largest gateways on the East Coast, with a healthy balance of loaded import and export cargo. Continued

development of trade with hinterland markets throughout the Midwest, particularly of agriculture and manufacturing related goods, as well as strong regional demographics should support volume growth in the future in-line with, if not higher than the national and East Coast averages.

The macro economic outlook, suggests that the strong growth in imports over recent years will likely slow as the US economic growth cycle also slows. The U.S. employment situation remains comparatively strong, and income measures have also shown steady gains. The U.S. Dollar has depreciated from recent peaks giving the hope that this will open the door for increased demand of U.S. exports, however with the likelihood of future rate increases, strong \$US depreciation isn't likely in the near term (barring an unforeseen crisis). As a result M&N expects that the import volumes continue to be the leaders of growth between 2016 and 2017, with exports gaining traction in subsequent years.

Some continued market share gain of total trade is expected, but the rate of gain is expected to slow to marginal levels by 2020. The rapid rise of VPA container volumes between 2010 and 2014 included several key events such as the opening of Norfolk Southern's Heartland Corridor and weather disruptions; no such future events were considered in the forecast.

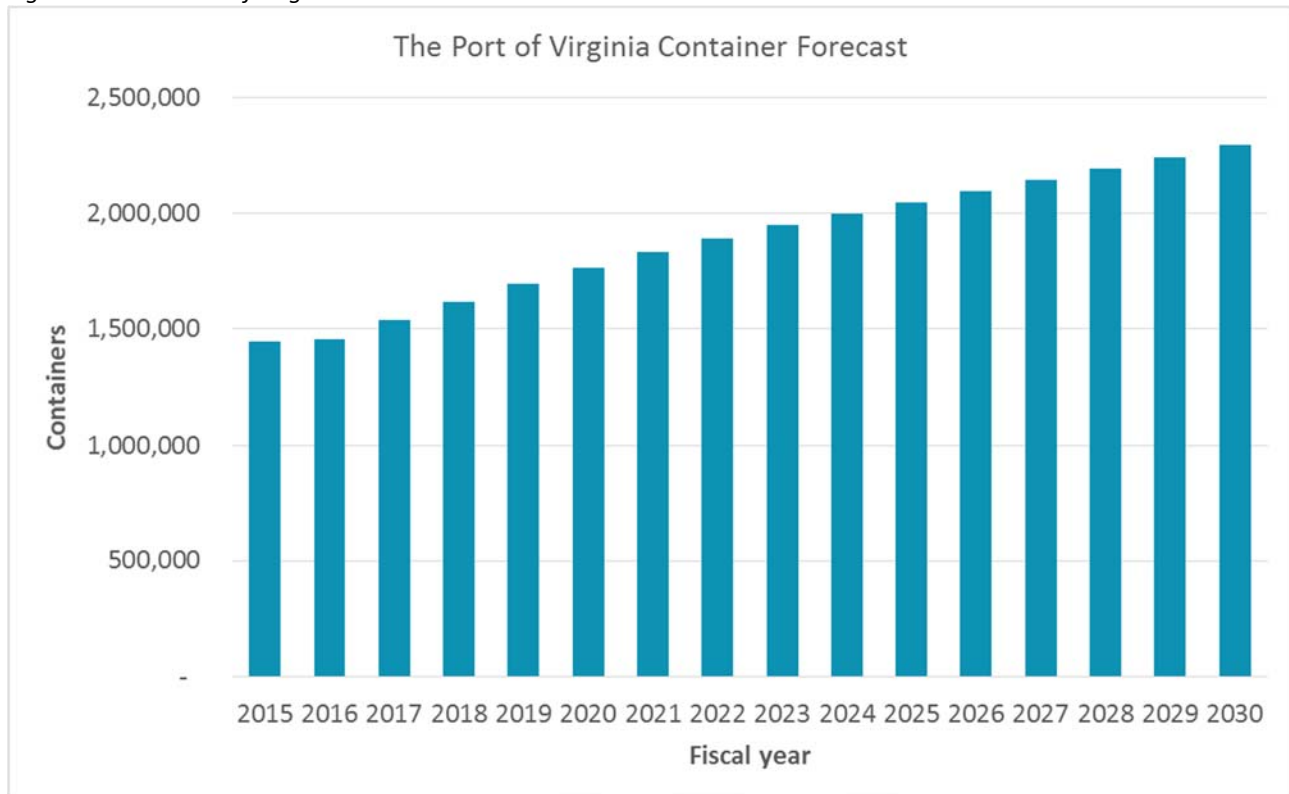
The forecast generated above was further combined with port data to establish a month-to-month forecast reflective of the seasonal behavior of container traffic. Actual container throughput data was used through October 2014, after which the month-to-month forecast was used to project container demand within the planning horizon. Forecasted demand through FY 2030 is shown in Table 4 and Figure 11.

Table 4 – The Port of Virginia Containerized Cargo Demand Forecast

Fiscal Year	Containers	Growth Rate over Previous Fiscal Year
2013	1,242,777 (actual)	9.88%
2014	1,319,514 (actual)	6.17%
2015	1,442,733 (actual)	9.34%
2016	1,455,000	0.85%
2017	1,535,424	5.53%
2018	1,616,167	5.26%
2019	1,692,933	4.75%
2020	1,767,439	4.40%
2021	1,833,012	3.71%
2022	1,893,572	3.30%
2023	1,948,965	2.93%
2024	1,999,617	2.60%
2025	2,047,882	2.41%
2026	2,096,015	2.35%
2027	2,144,391	2.31%
2028	2,193,393	2.29%
2029	2,243,423	2.28%
2030	2,295,092	2.30%

Source: Moffatt & Nichol, Virginia Port Authority

Figure 11 – The Port of Virginia Demand Growth



Source: Moffatt & Nichol

3.2.2. Break-bulk/Project Cargo Demand

Non-containerized cargo generates a very small portion (<5%) of operational revenue and retains a conservative revenue forecast that grows with CPI only. The net margins on this cargo are low, and range between small gains, losses and break-even positions.

3.2.3. Brexit Effects

An unknown facing the global economy is the prospect of change arising from United Kingdom's referendum to leave the European Union (commonly referred to as the Brexit). There has been widespread and ongoing discussions about the possible implications this has not only on UK GDP growth, but European and global growth as well. With the potential for other member nations to hold similar referendums in the coming months and years, M&N believes it is too early to establish a formal outlook. Nevertheless, conventional wisdom holds that in periods of uncertainty such as this, economic activity slows. The threat of global contagion, and a resulting financial crisis similar to that of 2008/2009 does not appear likely at this point. The Euro continues to trade relatively stable to the \$US and therefore there is not an indication of a near-term currency impact which could shift sway the attractiveness of imports and exports.

The impact on VPA may materialize in lower trade volumes to/from the broader European market in the near-term, which account for approximately 30% of the port's total container trade. This had generally been a well-established, slower-growth trade route for VPA, in comparison to developing Asian, African, and Latin American trade, and therefore without an outright sharp decline, lower growth on this route may not result in

a significant impact on the VPA's overall container growth. A sharp contraction in trade to/from Europe would however, have a material impact on VPA's container totals.

3.3. Intermodal Connections to Service Area

Connections between The Port of Virginia and destinations across the country rely on efficient transportation corridors that are maintained and improved as demand grows. Virginia's transportation infrastructure is inexorably linked to the benefits generated by port activity.

The opportunity for the Port to continue generating economic benefits for the Commonwealth can be enhanced through the development of efficient transportation infrastructure. Although it is not VPA's responsibility to fund and construct these projects, VPA collaborates with the Hampton Roads Transportation Planning Organization (HRTPO), the Hampton Roads Transportation Accountability Commission (HRTAC), VDOT, and Department of Rail and Public Transportation (DRPT) to coordinate and prioritize the Port's interests within the Commonwealth's transportation plans. The VPA has likewise supported collaboration efforts between Virginia and North Carolina to establish a direct interstate connection between Hampton Roads and the Raleigh-Durham metropolitan areas.

When ocean carriers, freight-forwarders, and owners of cargo decide which port-of-call matches their needs, they are most often concerned about the total experience, including cost, transit time, and consistency. Traffic congestion and chokepoints within the transportation system increase transit times and cost while decreasing the reliability that shipments will arrive at consistent rates. VPA's cargo predominately moves along key east-west and north-south corridors. VPA's collaboration with HRTPO, HRTAC, VDOT, and DRPT aims to identify which corridors and projects best support the flow of freight through Virginia to existing customers and where opportunities exist to access new markets, one example of which is the new Rickenbacker industrial park in Columbus, Ohio.

3.3.1. Rail

Railroad transportation availability and service play an important role in meeting the needs of shippers that use the Port. Growth in volumes, increased all-water East Coast cargo options, and the availability of VPA facilities as an alternative for shippers dealing with congestion at other ports have reinforced the value of investments in terminal, rail, and other freight movement infrastructure over the past decades.

3.3.1.1. *Heartland Corridor and Crescent Corridor*

Norfolk Southern's Heartland Corridor, completed in 2010, allows double-stack trains to run on a more direct route to Chicago and the Midwest from Hampton Roads. Compared to the previous single-stack route, the Heartland Corridor reduces average travel time from Norfolk to Chicago by one and a half days and nearly doubles the capacity of the trains.

The Heartland Corridor intersects with Norfolk Southern's Crescent Corridor, a North-South route paralleling I-81 and runs from the Canadian border to Tennessee, further improving the Port's access to other inland markets.

3.3.1.2. *National Gateway*

CSX's "National Gateway" initiative to establish double-stack clearances to CSX's Midwest rail ramps is also underway. One of the key remaining projects, reconstruction of the Virginia Avenue Tunnel in Washington D.C., began in May 2015 and is anticipated to be complete by late 2018. Completion of this project will enable CSX to accommodate double-stack trains between Norfolk and the Midwest. The project will also construct a second track through the tunnel to reduce rail congestion through Washington D.C. Additional mainline improvements are also planned or in progress to improve rail transit efficiency between Richmond and Washington D.C.

3.3.1.3. Greensboro

In 2011, VPA and Norfolk Southern added regular double stack rail service between VPA terminals and the regional concentration of textile, chemical, furniture, retail, and agriculture businesses near Greensboro, NC. This initiative was made to further diversify the Port's customer base and capture "discretionary" cargo that might otherwise use a different port.

3.3.2. Regional Transportation Projects

House Bill 1253, passed in March 2014, established the Hampton Roads Transportation Accountability Commission (HRTAC) to manage the Hampton Roads Transportation Fund revenues, which is a dedicated funding stream for Hampton Roads transportation projects that was established by 2013 legislation (HB2313).

HRTAC has identified several projects that will improve overall access to VPA's marine terminals, including:

- **I-64 Peninsula Widening** (under phased construction with final completion in 2021) between Newport News to Williamsburg that increases highway capacity and relieves traffic congestion between Hampton Roads and Richmond
- **Patriot's Crossing (Proposed Hampton Roads Third Harbor Crossing)** (Supplemental EIS in progress) to provide a new east-west interstate crossing between Norfolk at NIT to the Monitor-Merrimac Memorial Bridge Tunnel that connects to Portsmouth and I-64 in Newport News.
- **Craney Island Connector** (included in the Third Harbor Crossing supplemental EIS) to provide highway access between SR-164 at VIG to Patriot's Crossing (and the future Craney Island Marine Terminal).
- **I-664 Widening** to improve capacity of a major connector between Norfolk and Portsmouth, and destinations to the northeast (Richmond, VA) and southeast (Raleigh, NC).
- **I-64 Southside Widening** to increase capacity and remove bottlenecks encountered by traffic moving through Norfolk, Virginia Beach, and Chesapeake. This project will improve access from NIT to northeast and southeast destinations.

VDOT's **I-564 Intermodal Connector** project is also under construction, which continues builds on the Hampton Boulevard Grade Separation (completed in 2015) to provide direct interstate access to NIT and is estimated to be complete in mid-2017.

Additionally, Congress designated the proposed I-44 as a high priority corridor in 2015 indicating progress toward establishing direct interstate-level access between Hampton Roads and Raleigh, NC.

Construction of these projects will provide improved access to the VPA's terminals and support their ongoing growth.

Source: Virginia Port Authority

An increased growth of distribution centers provides two opportunities for VPA:

- The continued development of distribution facilities near the Port and throughout Virginia that generate economic benefits.
- The development of strong network connections to major areas of consumption that boast their own growing distribution sectors helps position VPA to be a preferred port of choice to participate in the distribution network. These areas include locations that are in or serve the major population centers, such as Chicago, Columbus, OH and Harrisburg, PA.

Isle of Wight County and the City of Suffolk, which are both located within 30 miles of the Port, continue to support development of distribution centers and are heavily promoting the area as a major distribution center destination. Southampton County, James City County, the I-81 corridor and other jurisdictions also leverage the Port of Virginia in promoting the development of industrial sites. The Virginia Inland Port in Front Royal, Virginia has likewise continued to spur development of distribution centers and other Port-served industries. Recent economic development activity directly citing access to Port of Virginia includes a new custom office furniture manufacturing facility, expansion of Target Corporation's existing distribution center in Suffolk, and a new distribution center for a tile manufacturer (announced in early 2016).

3.4. Capacity to Serve the Market

The Port of Virginia is able to sufficiently serve the existing market while its Capital Investment Plan (described in a subsequent section) addresses pending needs and anticipated trends in market demand and service levels.

3.4.1. Vessel Access

As stated previously, the Port has the 50-ft channel depths and berthing facilities to accommodate the sustained industry trend towards larger container vessels. Efforts are likewise underway to further deepen the harbor channels to 55 feet in anticipation of the future vessels (as well as support other private maritime commerce such as coal exports). There are no bridges between the Port's principal container terminals and the open ocean, thus there are no air draft concerns for these larger vessels.

The ship-to-shore cranes at both NIT and VIG are capable of serving vessels between 22 to 26 containers across; the largest container ships, existing and announced, are typically up to 23 containers wide.

3.4.2. Terminal Throughput Capacity

Marine terminal throughput is considered as the total cargo that crosses the "bull-rail" (wharf interface between the ship and the terminal) over a given period of time. For containerized cargo, this throughput is typically expressed as either the number of containers or the number of twenty-foot equivalent units (TEU).

Containers that are twenty feet long are considered to be one twenty-foot equivalent unit (TEU). Containers forty feet or more in length are considered to be two TEU, regardless of their actual length. Few containers fall between these two ranges and they do not impact long-term throughput for planning purposes. High-cube containers are considered to be equivalent to standard sized containers. Containers which are "re-stows"

(offloaded for access to lower containers and then re-loaded on the same ship) are not considered part of terminal throughput.

The conversion between containers and TEUs is unique to the cargo mix at a given terminal. For VPA terminals, the ratio typically ranges from approximately 1.63 TEUs per container for rail containers to approximately 1.74 TEUs per container for overall terminal throughput (truck and rail traffic). The Port's rate structure does not typically differentiate between container sizes and therefore generates revenue and incurs expenses based on the quantity of containers it handles, not the number of TEUs. Throughput volume within this report and the associated outputs are therefore expressed in containers.

Marine terminal throughput capacity is a measure of cargo throughput that a particular terminal is capable of handling over a period of one year under a specific set of conditions. These conditions include, but are not limited to:

- Physical conditions such as storage capacity, number of berths, size and type of the container handling fleet, on-dock rail yard size, and gate facilities
- Policies and resultant industry responses that affect characteristics such as container dwell times, empty container volumes, and demand patterns (i.e. peak traffic).
- External transit/transportation conditions such as vessel schedules, train schedules, and highway congestion
- Financial objectives of the Port in that level of service may need to be balanced with financial sustainability. While a terminal may be physically able to handle a higher volume of containers by extending operating hours, the rate structures established by associated labor contracts may not provide the revenue needed to offset premium labor rates, particularly during sustained periods of higher volumes.

Stated capacities within this document reflect an assessment of current conditions under which the VPA terminals are operating. These conditions are subject to change.

Industry trends towards larger vessels, fewer port calls, and subsequently larger container transfers have placed stress on not only VPA terminals, but all U.S. terminals. Customer expectations with regard to transit times between inland markets and the ports have not changed, thus there is pressure on ports to maintain on-terminal levels of service despite the higher weekly peaks in container throughput. There is likewise a greater accumulation of containers within the container yard ahead of the ship arrivals.

Stated 2016 capacities within this document reflect VPA's assessment of current conditions under which its terminals are operating. Moffatt & Nichol has evaluated these capacities and find them to be a generally reasonable assessment of existing capacity. The 2016 capacities for NIT, VIG, and PMT are shown in Table 5.

Table 5 – The Port of Virginia Terminal Capacity

Terminal	CY 2016 Capacity (Containers per Year)
Norfolk International Terminals (NIT)	820,000
Virginia International Gateway (VIG)	680,000
Portsmouth Marine Terminal (PMT)	200,000
Total	1,700,000

Source: Virginia Port Authority

The FY 2016 demand forecast of 1,455,000 containers will consume approximately 85.5% of the stated 1.7 million containers per year of the total capacity at NIT, VIG, and PMT.

4. Diversity

Diversity of the Port's market area is described in Section 3.1.1 Local Market. This diversity is further bolstered by the Port's capture of discretionary cargo to or from 16 inland markets via its rail connections.

Based on information provided by the Port, the terminals are currently called on by approximately 30 shipping lines to reach overseas markets, with 13 shipping lines generating over 80% of the direct container revenue.

5. Capital Investment Plan (CIP)

In order to meet the increased demand for capacity, VPA has developed its 2065 Master Plan, from which the Capital Investment Plan (CIP) for the period FY 2016 to FY 2030 below was developed. VPA-funded capital investments costing approximately \$1.52 billion in future dollars (adjusted for inflation at 2.0% over the period) are planned between the current fiscal year and 2030. This period includes capacity improvements at both NIT and VIG, as well as substantial investments in land reclamation efforts that will support construction of the future Craney Island Marine Terminal, which is anticipated to begin operations in 2040.

Major construction projects have an additional construction cost contingency in the estimates. Each terminal's CIP is provided in Table 6. Several major projects that have been completed are noted, which have increased VPA's capacity to date, and future work in progress or planning is also identified.

5.1. NIT

Major expansion of the container yard and intermodal yard were completed over the last 15 years to increase both overall and rail capacity of the terminal, as well as to prepare the terminal to receive larger vessels, including:

- Reconstruction and expansion of the North and South terminals
- Construction of the Central Rail Yard
- Achieving a 50-ft deep navigation channel
- Acquisition of an adjacent rail yard to improve flexibility of rail operations
- Modernization of its Main Gate complex to reduce processing times and costs
- Renovation and modernization of the rail portals to reduce costs and improve productivity

Going forward, the CIP is now focused on increasing the utilization of the facility through new container handling equipment, technology enhancements, operational enhancements, and access projects intended to further increase both capacity and efficiency. Total CIP projects, including construction and equipment acquisition, at NIT are estimated at \$976 million, of which approximately \$365 million has been secured from state and federal grant programs. NIT's straddle carriers will largely reach the end of their useful service lives within the planning horizon and need to be replaced; demand conditions now warrant the use of other container handling equipment that supports increased static storage capacity and higher throughput. Specific planned improvements include:

- Phased replacement of its existing straddle carrier fleet with rail mounted gantry cranes to increase terminal capacity (see below). Such equipment supports higher container storage within the container yards, which in turn can support higher overall throughput.
- Construction of a second truck gate (the North Gate Complex described in Section 3.3.4) that will provide direct access to the Interstate system via the I-564 Intermodal Connector project.
- 12-acre expansion of the North Terminal container yard to further increase capacity.
- Demolition of warehouses at the end of their service lives to support expanded container operations
- Other planned improvements and replacement of infrastructure (e.g. dredging, scale replacements, fender maintenance, etc.) as part of maintaining an overall state of good repair.
- Acquisition of additional ship-to-shore cranes to support increased vessel throughput.

The major focus at NIT will be modernizing its container operations at NIT by deploying rail-mounted gantry cranes (RMGs) based on their performance at VIG. While implementation of this container operation strategy necessitates a greater capital investment than what was reflected in the previous CIP, which was based on deployment of rubber-tired gantry cranes (RTGs), it offers substantial long-term operational cost savings through its use of electrified equipment and semi-automated operations while still providing the increased storage capacities that are being sought. As this system is planned to support remote crane operations, as is already in place at VIG, it will provide the opportunity to more efficiently and safely use terminal labor to process greater container volumes (See Table 7 in Section 6 for a summary of projected throughput capacity increases).

Container Handling Equipment Replacement Phase 1 (2017 – 2020): NIT South

Initial capacity improvements at NIT will be achieved through the use of RTGs (acquired in December 2015) to provide denser storage capacity of selected containers such as on-terminal empties and large customer blocks (e.g. a retailer that will have a larger number of containers on a single vessel).

Construction of infrastructure to support RMG operations are tentatively scheduled to begin in 2017 and include upgrades to the terminal's electrical distribution and data systems, installation of crane rails, and modification of utility and lighting systems. The need for other improvements, such as modifying site grading and drainage, are currently being evaluated as part of the ongoing design process.

Upon activation, NIT South will operate very similarly to VIG. Shuttle carriers will be used to transfer containers between the ships and container stacks. RMGs will be automated to perform moves within the container stacks with a remotely-stationed operator controlling container transfers to over-the-road trucks at a landside transfer area. The existing rail operations, which use hustlers and bombcarts to transfer containers between the container yard and rail yard, are compatible with the proposed RMG operations.

The Commonwealth is providing \$350 million to fund Phase 1, which will convert NIT South to the RMG operations while retaining the existing straddle carrier operations at NIT North until additional capacity is needed.

Container Handling Equipment Replacement Phase 2 (2023 – 2025): NIT North

Phase 2 will convert NIT North from straddle carrier operations to RMG operations similar to those developed in Phase 1. The remaining straddle carriers will be replaced with more efficient shuttle carriers as they reach the end of their service lives.

Container Handling Equipment Replacement Phase 3 (est. 2035): NIT Central

Very early concepts have been developed to develop additional container throughput capacity in the central portion of NIT currently occupied by legacy warehouses, central rail yard, and piers when additional capacity becomes necessary in approximately 2035. The current concept, if undertaken, will include relocating the existing central rail yard and extending the NIT south container wharf northward.

To accommodate the longer development cycle associated with the proposed modernization, VPA is moving forward with the concurrent expansion of VIG (discussed in the next section) and increased use of PMT to provide the overall capacity increases needed to address forecasted demand growth.

5.2. VIG

VPA has reached an agreement with VIG's owners, Alinda Capital Partners and Universities Superannuation Scheme Limited, to expand VIG to its full build out condition, including an expanded container yard, intermodal yard, gate facility, and container wharf. These improvements were generally planned for during the original development of the terminal, though VPA is exploring alternatives to increase the capacity of the intermodal yard. Originally developed as a private terminal, the basis of design anticipated a lower proportion of rail than what is currently demanded by VPA's customers. Individual elements of the expansion will be brought online as they are completed, providing incremental capacity improvements over the course of the three year project schedule.

Other planned capital investments for VIG are generally focused on projects such as replacing end-of-life technology components and maintenance dredging as part of maintaining a state of good repair. Total estimated investment through the planning horizon is approximately \$427M, of which approximately \$321.3M will be funded through the renegotiated lease.

5.3. CIMT

VPA and the U.S. Army Corps of Engineers have partnered to construct the Craney Island Eastward Expansion and Craney Island Marine Terminal (CIEE and CIMT). This dual-purpose project will extend the life of Craney Island Dredged Material Management Area (CIDMMA) and provide land for the construction of a new VPA marine terminal. CIEE and CIMT will be built in phases, with Phase 1 of the marine terminal estimated to open in 2040. Within the planning horizon of this report, approximately \$983 million is anticipated to be invested, primarily for the construction of the CIEE. Approximately \$370 million of this total is anticipated to be funded through state and federal programs.

The terminal will be incrementally constructed thereafter to keep pace with demand. At full build-out, CIMT will have the following:

- 522 acre state-of-the-art container terminal
- 8,400-feet of wharf; 7 berths
- 28 Suez class container cranes
- On-dock intermodal container transfer facility
- 5 million TEU capacity

Eastward Expansion Construction: 2010 to 2049

During this period, the containment dikes will be constructed and environmental mitigation projects will be completed to fulfill the permitting requirements of the project. This phase also includes filling the site created by the containment dikes with dredged material from routine harbor dredging projects and mined from CIDMMA.

Construction of the CIEE is in progress and is actively managed by the Port based on availability of Commonwealth and federal funding and in coordination with federal dredging projects, which provide much of the material for dikes and infill. As such, the schedule for specific capital expenditures is subject to change while still supporting the overall project schedule. The VPA further supports this effort through ongoing federal outreach efforts to secure and maintain the planned federal funding components.

Since construction began in December 2010, the South and Division Cross Dikes have been built up to more than five feet above water. Wetland planting has also been completed at Paradise Creek as part of the project's mitigation plan to clean up portions of the Elizabeth River previously contaminated by waterfront industries.

The project is further organized into two cells to support construction of the first phase of the terminal by 2040.

Craney Island Marine Terminal Construction: 2037 to 2065+

The completion of Phase I (planned for 2040) will provide 3,000 linear feet of wharf, eight cranes, approximately 100 acres of container yard and an intermodal yard with rail access to NS and CSX. Phase II and III will each provide an additional 1,800 linear feet of wharf, six cranes and 100 acres of container yard. Phase IV will provide an additional 1,800 linear feet of wharf, eight cranes and 120 acres of container yard. Current terminal concepts are based on using RMGs and shuttle carriers to handle containers.

5.4. PMT

Container operations at PMT were reactivated in September 2014 to provide additional capacity and berth space for selected ship lines. The terminal will also be used to support short term displacements from VIG and NIT during construction activities on those terminals. Long-term, the terminal will serve as an additional general cargo terminal with some container operations (e.g. Roll-on/Lift-off services). To support these activities, the Port made improvements to portions of the container yard pavement and reactivated six ship-to-shore cranes and have made on-dock rail improvements to support intermodal operations. Additional projects totaling \$11.9 million are included in the CIP for PMT. Those projects include additional repairs to the wharf structure and fender to support ongoing growth in activity at the terminal, as well as dredging to maintain the published basin depth.

The east end of the terminal is the construction laydown site for the second Midtown Tunnel, which is scheduled to be completed in 2017, at which time the terminal areas will again be available to support port activities.

5.5. NNMT

VPA intends to continue using NNMT for break-bulk, Ro/Ro, and project cargo operations. Planned improvements to the terminal are generally limited to maintenance of railroad track, pavement, buildings, and mooring equipment and constitute approximately \$9.8 million in expenditures.

5.6. VIP

VIP provides additional access to the marine terminals by providing an inland terminal near the Washington D.C. Metro region and other freight corridors along I-81. Planned improvements costing approximately \$32.8 million are focused on modernizing the intermodal yard to improve efficiency and capacity.

5.7. RMT

Investments to rehabilitate the terminal's infrastructure are planned as cargo throughput continues to increase. These improvements primarily consist of pavement replacement, rail improvements, structural repairs, and additional rail improvements, but also includes removing obsolete and deteriorated structures that will support improved utilization of the terminal for modern cargo operations.

Other improvements at the Port of Richmond will be initiated as necessary to accommodate specific cargo operations and services. These improvements, if/when initiated, are intended to be revenue-neutral or phased to be accomplished within VPA's general maintenance budget.

Total planned investments through the planning horizon are \$12.3 million.

5.8. Port-Wide Improvements

The CIP includes over \$128 million in other capital expenditures, generally relating to maintenance of technology (computer servers, communications systems, etc.), increased collection, analysis, and utilization of data to drive business decisions, and infrastructure (security fences, pavement, stormwater, etc.). These improvements maintain a state of good repair, and improve the resiliency of terminal operations against equipment failures.

Approximately \$811 million are also planned through 2030 for equipment acquisition and replacement. Table 6 on the following page provides details of the CIP.

Table 6 – CIP FY 2016 to FY 2030 Summary

Terminal	Project Description	Start Period FY	End Period FY	Total Estimated Investment (VPA and Other Sources) (Future \$)	Non-VPA Funding (FY2016-FY2030) (Federal, State, Private)	VPA Estimated Investment (Future \$)
NIT	Phase 1A Optimization (NIT S RMGs I)	2018	2018	72,374,386	72,374,386	-
NIT	Phase 1B Optimization (NIT S RMGs II)	2019	2019	110,408,080	110,408,080	-
NIT	Phase 2A Optimizaiton (NIT N RMGs I)	2024	2024	72,900,647	-	72,900,647
NIT	Phase 2B Optimization (NIT N RMGs II)	2025	2025	74,358,660	-	74,358,660
NIT	North Gate	2016	2017	31,936,200	15,000,000	16,936,200
NIT	North Gate IT Components	2017	2017	6,062,200	-	6,062,200
NIT	Maintenance Dredging (4-yr cycle)	2016	2030	13,838,340	-	13,838,340
NIT	North Container Wharf Strengthening	2024	2024	10,755,833	-	10,755,833
NIT	Total NIT Investment			392,634,345	197,782,466	194,851,879
VIG	Phase 2 Expansion (Note 1)	2016	2019	199,009,061	199,009,061	-
VIG	Intermodal Yard Expansion (Note 1)	2017	2017	14,400,000	10,900,000.00	3,500,000
VIG	Phase 1 RMG Repairs	2017	2017	7,000,000	-	7,000,000
VIG	Maintenance Dredging (4-yr cycle)	2018	2030	9,433,318	-	9,433,318
VIG	NAVIS N4 Upgrades	2017	2017	6,000,000	-	6,000,000
VIG	Phase 2 IT Components	2017	2017	3,000,000	-	3,000,000
VIG	Mobile Data Center	2017	2017	1,100,000	-	1,100,000
VIG	VIG Total Investment			239,942,379	209,909,061	30,033,318
CIMT	Mitigation through SE Cell	2017	2022	18,761,080	-	18,761,080
CIMT	SE Cell Acquisition	2017	2023	143,927,277	-	143,927,277
CIMT	USACE SE Cell & Mitigation Share	2018	2023	200,136,966	200,136,965.75	-
CIMT	SE Ground Improvements and Fill	2026	2030	332,416,341	-	332,416,341
CIMT	Mitigation through NE Cell	2028	2030	8,764,134	-	8,764,134
CIMT	NE Cell Acquisition	2028	2030	108,844,812	-	108,844,812
CIMT	USACE NE Cell & Mitigation Share - Acquisition Cost	2028	2030	117,608,946	117,608,945.58	-
CIMT	Road & Rail Right of Way Acquisition	2025	2025	52,584,073	52,584,073.02	-
CIMT	CIMT Total Investment			983,043,627	370,329,984	612,713,643
NNMT	Maintenance Dredging (4-yr cycle)	2017	2030	9,044,667	-	9,044,667
NNMT	Warehouse Roof Leak Repairs	2017	2017	250,000	-	250,000
NNMT	Crane Repairs	2017	2017	500,000	-	500,000
NNMT	NNMT Total Investment			9,794,667	-	9,794,667
VIP	Rail Expansion	2017	2017	32,790,339	28,505,000.00	4,285,339
VIP	VIP Total Investment			32,790,339	28,505,000	4,285,339
PMT	Wharf Repair	2016	2016	2,856,000	-	2,856,000
PMT	Maintenance Dredging (5-yr cycle)	2021	2030	9,067,011	-	9,067,011
PMT	PMT Total Investment			11,923,011	-	11,923,011
RMT	Facility Renovations Program	2018	2030	9,657,187	-	9,657,187
RMT	Maintenance Dredging (4-yr cycle)	2018	2030	1,919,655	-	1,919,655
RMT	Gate Improvements	2018	2018	742,846	-	742,846
RMT	RMT Total Investment			12,319,687	-	12,319,687
VPA	Misc. Capital Projects (All Terminals)	2016	2030	128,550,239	-	128,550,239
VPA	VPA Total Investment			128,550,239	-	128,550,239
TOTAL CAPITAL IMPROVEMENT PROGRAM				1,810,998,294	806,526,511	1,004,471,783
NIT	Shuttle Carriers	2018	2030	82,591,375	-	82,591,375
NIT	RMG	2018	2025	324,434,416	167,217,534	157,216,882
NIT	STS Cranes	2025	2030	161,701,464	-	161,701,464
NIT	Other (Reachstackers, trucks, etc)	2017	2030	14,361,773	-	14,361,773
VIG	Shuttle Carriers	2016	2030	64,548,110	-	64,548,110
VIG	RMG (Note 1)	2017	2019	82,532,019	82,532,019	-
VIG	STS Cranes (Note 1)	2019	2019	39,746,909	39,746,909	-
VPA	Future Allowance	2018	2030	38,947,213	-	38,947,213
VPA	Mobile Truck Crane, Manlift	2017	2017	2,100,000	-	2,100,000
Equipment Total Investment				810,963,279	289,496,462	521,466,817
CIP Total				2,621,961,573	1,096,022,973	1,525,938,600

Note 1: VIG Expansion improvements and equipment funded through lease agreement with VIG owners

5.9. Maintenance and Facility Conditions

VPA is required under its Bond Resolution to maintain asset lifecycles on its facilities and equipment, which are regularly inspected to ascertain their condition. Standing maintenance programs are in place for pavement, fencing and fenders repairs to protect the berths. Investing in and maintaining equipment as well as facility infrastructure is crucial to extending the life of the terminals.

VPA retains independent consulting engineers to conduct inspections of its facilities and equipment. In the opinion of Moffatt & Nichol consulting engineers, VPA facilities are satisfactorily maintained and no undue risk to its cargo operations is present from a lack of adequate maintenance. Additionally, during the course of executing the projects in the CIP, the condition of the facilities and equipment will be continually reviewed.

NIT is essentially a fully renovated terminal, since the backlands and Central Rail Yard projects were completed in 2011. VIG opened in 2007. The CIP includes projects to renovate or replace infrastructure reaching the end of its service life.

6. Assumptions

VPA's mission is to foster and stimulate the commerce of the ports of the Commonwealth, to promote the shipment of goods and cargoes through the ports, to seek to secure necessary improvements to navigable tidal waters within the Commonwealth, and in general perform any act or function which may be useful in developing, improving, or increasing commerce, both foreign and domestic, of the ports of the Commonwealth while conducting those activities in an environmentally sensitive and sound manner.

The 2065 Master Plan supports that mission and is structured to provide infrastructure for cargo growth through the Port in order to serve businesses, provide employment opportunities, and generate tax revenue for the Commonwealth.

Based on economic development and growth for the Commonwealth, these plans include leveraging assets such as VIP and the Port of Richmond, whose benefits are measured by their economic contribution to the Commonwealth, not just their contribution to VPA net revenue. Earnings generated by these operations are then reinvested in infrastructure that expands the Port's capabilities.

VPA provides the Capital Investment Plan (CIP) needed to support the Port's strategic plans and handle future demand, balanced with the financial wherewithal to make those investments. The core of the CIP results from estimating the following business drivers over the planning horizon:

- Cargo demand growth
- Existing and needed terminal capacity to handle forecasted cargo demand
- Port revenues and sources of funds
- Port expenses
- Capital Investment Plan (CIP)
- Average annual consumer price index (CPI)

As stated in Section 3.4, marine terminal throughput capacity is a measure of cargo throughput that a particular terminal is capable of handling over a period of one year under a specific set of conditions. These conditions are subject to change.

Going forward, the Port has planned efforts and projects to improve capacity through operational changes to increase utilization of the existing infrastructure as well as investment in additional infrastructure. Specifically:

- Expansion of the VIG terminal's container yard, intermodal yard, gates, and wharf to its fully built-out configuration.
- Expansion of the NIT North Container Yard to provide additional container storage capacity, coupled with construction of a second truck gate that will provide direct access to the interstate highway system. This project was the recipient of a federal TIGER grant that provided \$15 million towards the total \$31 million projected cost and is currently under construction.
- Transition from straddle carrier operations at NIT to new container handling equipment that supports higher storage capacity and reduced operational costs.

The CIP and operational cash flow model assume that demand in total and by mode will be able to be met by the Port through strategic allocation of ship services between its terminals, and cargo will not be diverted to competing ports.

The following containerized cargo capacity for VPA facilities is projected through FY 2030, based on projects included in the CIP. These estimated capacities account for peak seasonal conditions and limits to the extent at which static capacity can ever be fully utilized.

Table 7 – The Port of Virginia Planned Terminal Capacity (Containers/Year)

Timeline & Milestones (FY)	NIT (Containers/Yr)	VIG (Containers/Yr)	PMT (Containers/Yr)	Total VPA Capacity (Containers/Yr)	Cargo Forecast (Containers)
2015	820,000	650,000	100,000	1,570,000	1,442,733 (Actual)
2016	820,000	680,000	200,000	1,700,000	1,455,000
2017 Selective implementation of RTG operations at NIT	900,000	680,000	200,000	1,780,000	1,535,424
2019 Partial implementation of NIT phase 1 and partial implementation of VIG phase 2	980,000	940,000	200,000	2,120,000	1,767,439
2020 Completion of NIT phase 1 and completion of VIG phase 2	1,220,000	1,200,000	200,000	2,620,000	1,833,012
2021 Begin contraction of PMT container operations	1,220,000	1,200,000	150,000	2,570,000	1,893,572
2025 Partial completion of NIT phase 2, reduced PMT container operations to target capacity	1,500,000	1,200,000	100,000	2,800,000	2,096,015
2026 Completion of NIT phase 2	1,670,000	1,200,000	100,000	2,970,000	2,144,391
2030 End of Planning Horizon	1,670,000	1,200,000	100,000	2,970,000	2,295,092

6.1. Port Revenues

VIT generates Port revenues from handling containers, charges for containers left on terminal that exceed allowed dwell time, non-containerized cargo, storage and miscellaneous services. VPA also generates additional revenues from sources that include tenant activities (e.g. transshipment operations), RMT operations, and security fees.

6.1.1. General Container Rate Assumptions

Assumptions for containerized cargo revenue in this report include:

- Competition from other East Coast ports limiting the ability for the Port to fully pass on cost increases to the shiplines. While rates are typically negotiated to recover wage growth and general inflation, continued industry focus on lowering costs (e.g. increased use of automation technologies) is anticipated to further constrain opportunities to increase rates. The CE report

assumes per container rates will escalate at slightly less than CPI (~1.50% vs. 2.0% CPI) throughout the planning horizon.

- Ongoing adoption of simplified container rate structures as contracts are renewed. The new rate structures provide a generally equivalent but more consistent revenue stream compared to previous volume-based rate tiers and incentive programs.
- Non-renewal of selected incentive programs in conjunction with the simplified rate structures.
- Contract rates past existing ship line contracts will be equivalent to the average rate of the contract term preceding the contract expiration for each shipline.
- All demand growth will occur within the existing shiplines; new shiplines and changes to alliances are anticipated but are assumed to have no significant impact to the overall revenue stream characteristics.
- Stevedoring expenses and revenues generated at VIG will continue to be passed through to the ship lines.
- A security charge that offsets security costs is reflected from estimates of the amount of cargo volume expected at the terminals.
- \$3.5 million increase resulting from renegotiated rail lift charges in FY17

6.1.2. Demurrage

Significant policy changes were made to container storage rates in 2014 and 2015, resulting in an initial surge in container storage revenue that has since receded due to implementation of other Port policies restricting container time on terminal and actions by customers to lower their costs.

Month-to-month container storage revenue is assumed to remain consistent at the recent rates but then grow at a lower rate than overall volume, reflecting increasing sophistication in supply chains to reduce costs. Recent customer response to Port policy changes have demonstrated that container storage fees are one such cost they can control.

6.2. Operating Expenses

Operating expenses result from handling cargo. Fixed expenses are typically planned to increase at inflation (2.0%) with step increases occurring as new terminals develop new capacity. Variable expenses are typically planned to increase at inflation plus the increase in forecasted demand. Specific plans for extraordinary expenses, such as planned cost reductions, are also included. Operating costs at NIT are further adjusted in conjunction with planned implementation of new container handling equipment.

6.2.1. Terminal Operating Expenses

- CPI of 2.0% annual increase to represent inflation.
- Fixed operating expenses increase per CPI.
- Variable operating expenses increase at inflation and cargo demand increases.
- The current ILA contract defines the rate increases through 2018. Beyond 2018, forecast assumes a 3.19% average annual rate increase, which is consistent with the net effects of the current ILA contract's programmed rate increases.
- Throughput will be shifted (up to 85% of VIG's overall capacity) to VIG as it is expanded to benefit from the lower operating costs and to support the operating changeover activities at NIT.

- Throughput at NIT will be shifted to RMGs as they are implemented.
- A relationship between throughput and hourly labor rates was developed to capture the impact of premium labor rates (over-time and double-time pay) as terminal throughput approaches the operating capacity of NIT.
- Terminal labor expense projections at NIT reflect changes associated with the planned implementation of new container handling operations, which are anticipated to reduce costs as the proposed operations begin to resemble VIG. Container traffic through the terminal was proportioned between straddle carriers and the new operation based on the static capacity available to each operation. Operating costs for the existing and proposed operations are then applied to their associated throughputs.
- It is assumed that total annual labor hours from 2019 to 2028 remaining equal to or greater than the total labor hours associated with 2018.

6.2.2. Maintenance Expenses

Maintenance expenses include expenses planned by VIT to maintain facilities, vehicles, and cranes.

- Fixed maintenance expenses are adjusted in conjunction with planned capacity increases and escalated per CPI
- Crane maintenance expenses are calculated on based on number of cranes (straddle carriers and rail-mounted gantry cranes) and their relative utilization and escalated per CPI.
- NIT crane maintenance expenses transition to similar VIG expenses on a per-crane basis as it transitions to new equipment.
- Facility maintenance is fixed and based on the previous 12 month average expense plus increases per CPI. Expenses are also increased in conjunction with planned capacity increases.

6.2.3. Sales, General & Administrative (SG&A)

SG&A expenses are assumed to increase with CPI and in conjunction with planned capacity expansions.

6.3. VPA Operations

VPA is responsible for the Port's administration, security, paying the VIG and RMT leases, and funding the Port's capital improvements for infrastructure and container handling equipment.

VPA revenues are comprised of the VIT transfer, Commonwealth Port Fund (CPF) revenues, security fees, leases and miscellaneous revenues. VPA expenses include administration, the VIG and RMT leases, terminal operations and maintenance expenses it controls, as well as depreciation expenses for capital investments.

In conjunction with the renegotiated VIG lease, terminal lease payments will be reclassified as capital debt and no longer be continued as a VPA Operations expense. Cash flows relating to debt service are excluded from this Report and are documented elsewhere by others.

6.3.1. VPA Operating Revenues

VPA revenues include:

- The transfer of VIT's net revenues (which also reflect HRCPII's net revenues)
- Security surcharge
- Port of Richmond revenues generated from cargo handled by the 64 Express Barge Service and various general cargo operations occurring at the terminal.

Receipt of CPF funds are not reflected in the operating revenues, but are used to offset portions of VPA's operating expenses. The CPF is a special non-reverting fund established at 4.2% of the Commonwealth's Transportation Trust Fund, which is funded from sales taxes, excise taxes, and other tax and fee revenue collected by the Commonwealth.

6.3.2. VPA Operating Expenses

VPA expenses include:

- VPA portion of terminal operations. Includes recurring Payments in Lieu of Taxes (PILOT) that offset real estate tax revenue to local municipalities that state-owned facilities do not provide.
- VPA portion of terminal and infrastructure maintenance.
- Costs for the Port of Richmond until VIT assumes operations in November 2016.
- VIG (until the renegotiated lease takes effect, after which it becomes capital debt) and Port of Richmond lease payments.
- General and administrative expenses. Includes recurring payments for an Aid to Local Ports grant program the VPA oversees.

6.3.3. Non-Operating Items

VPA also has non-operating financial items which adjust VPA operating income to its increase in net position, including:

- Interest income and interest expense
- Non-operating revenues and expenses between governmental agencies (e.g. the Commonwealth and federal government)
- CPF revenues

7. Financial Statements

The revenue and expense forecast summarized in this section was developed to provide VPA with the ability to view proposed improvements from a financial planning perspective. VPA has capital projects and equipment acquisitions of over \$2.63 billion planned through 2030. The level of investment reflected in the CIP supports VPA's efforts to expand terminal capacity to meet projected demand.

Table 8 – Revenue & Expenses through 2030 (accrual basis)

Consolidated Operating Summary											
(000 \$)											
Financial Year Ending			2015	2016	2017	2018	2019	2020	2021	2022	2023
			(Actual)								
		Volume (Containers)	1,442,733	1,455,000	1,535,424	1,616,167	1,692,933	1,767,439	1,833,012	1,893,572	1,948,965
		VIT Total Revenue (A)	440,842	440,131	466,758	497,675	533,630	564,906	597,162	627,520	657,372
		VIT Operational Expenses	(197,639)	(192,221)	(208,258)	(222,630)	(233,263)	(243,882)	(236,680)	(246,053)	(256,810)
		VIT Maintenance Expenses	(83,904)	(88,801)	(93,450)	(104,298)	(110,455)	(122,396)	(127,382)	(130,494)	(133,930)
		VIT SG&A	(33,396)	(38,627)	(42,653)	(43,251)	(44,688)	(46,461)	(47,261)	(48,140)	(49,036)
		VIT Total Expense	(314,940)	(319,649)	(344,361)	(370,179)	(388,406)	(412,739)	(411,324)	(424,687)	(439,776)
		VIT Consolidated Income	125,902	120,482	122,397	127,496	145,223	152,167	185,839	202,833	217,597
		VPA Total Revenue (B)	15,327	15,230	15,946	16,945	17,783	18,633	19,449	20,256	21,051
		Terminal Operations Expense (C)	(1,133)	(1,165)	(1,254)	(1,346)	(1,439)	(1,532)	(1,621)	(1,708)	(1,793)
		Terminal Maintenance Expense (C)	(8,936)	(9,622)	(10,357)	(11,120)	(11,881)	(12,652)	(13,383)	(14,102)	(14,805)
		General & Administrative Expense (C)	(19,213)	(24,336)	(19,641)	(21,053)	(21,474)	(21,904)	(22,342)	(22,789)	(23,245)
		Facility Rental (C)(D)	(55,679)	(55,596)	(17,249)	-	-	-	-	-	-
		Depreciation & Amortization (C)	(42,654)	(44,038)	(46,360)	(51,170)	(61,762)	(67,210)	(67,809)	(64,451)	(65,409)
		VPA Total Expense	(127,616)	(134,757)	(94,861)	(84,689)	(96,556)	(103,298)	(105,155)	(103,049)	(105,251)
		VPA & VIT Consolidated Income	13,613	955	43,482	59,751	66,450	67,502	100,133	120,039	133,396

(A) VIT revenue and expenses include revenue and expenses generated by HRCF II.

(B) VPA Total Revenue excludes annual receipt of Commonwealth Port Funds, which are used to pay portions of the VPA expenses shown on the table.

The listed VPA expenses are the full projected expenses.

(C) VPA non-operational expenses based on projections from the VPA.

(D) Facility Rental reflects reclassification of the VIG lease from an operating lease to a capital lease beginning in FY2017 (on a prorated basis) and such amounts have been negotiated between VPA and VIG as part of the lease extension and estimated by VPA to range from [REDACTED] to [REDACTED] per year over the period from FY2017 to FY2030.

Table 8 (continued) – Revenue & Expenses through 2030 (accrual basis)

Consolidated Operating Summary								
(000 \$)								
Financial Year Ending	2024	2025	2026	2027	2028	2029	2030	
Volume (Containers)	1,999,617	2,047,882	2,096,015	2,144,391	2,193,393	2,243,423	2,295,092	
VIT Total Revenue (A)	686,760	716,322	746,733	778,129	810,663	844,503	879,918	
VIT Operational Expenses	(267,313)	(275,224)	(278,610)	(288,817)	(299,379)	(310,349)	(323,356)	
VIT Maintenance Expenses	(137,380)	(148,766)	(161,501)	(165,365)	(169,334)	(173,417)	(177,814)	
VIT SG&A	(49,948)	(51,528)	(52,824)	(53,810)	(54,816)	(55,841)	(56,886)	
VIT Total Expense	(454,642)	(475,518)	(492,935)	(507,992)	(523,529)	(539,607)	(558,056)	
VIT Consolidated Income	232,118	240,803	253,799	270,136	287,134	304,896	321,862	
VPA Total Revenue (B)	21,836	22,626	23,438	24,275	25,141	26,041	26,979	
Terminal Operations Expense (C)	(1,876)	(1,960)	(2,046)	(2,135)	(2,228)	(2,324)	(2,425)	
Terminal Maintenance Expense (C)	(15,494)	(16,185)	(16,897)	(17,632)	(18,396)	(19,192)	(20,027)	
General & Administrative Expense (C)	(23,710)	(24,184)	(24,667)	(25,161)	(25,664)	(26,177)	(26,701)	
Facility Rental (C)(D)	-	-	-	-	-	-	-	
Depreciation & Amortization (C)	(67,092)	(73,723)	(83,303)	(85,538)	(96,979)	(95,347)	(98,324)	
VPA Total Expense	(108,171)	(116,052)	(126,913)	(130,466)	(143,267)	(143,039)	(147,476)	
VPA & VIT Consolidated Income	145,783	147,377	150,324	163,946	169,008	187,897	201,365	

(A) VIT revenue and expenses include revenue and expenses generated by HRCP II.

(B) VPA Total Revenue excludes annual receipt of Commonwealth Port Funds, which are used to pay portions of the VPA expenses shown on the table.

The listed VPA expenses are the full projected expenses.

(C) VPA non-operational expenses based on projections from the VPA.

(D) Facility Rental reflects reclassification of the VIG lease from an operating lease to a capital lease beginning in FY2017 (on a prorated basis) and such amounts have been negotiated between VPA and VIG as part of the lease extension and estimated by VPA to range from [REDACTED] to [REDACTED] per year over the period from FY2017 to FY2030.

8. Risks

All projections for future growth and operational finances carry inherent risk. The assumptions herein reflect typical relationships between Port revenues and expenses, but are subject to local impacts and decisions by Port management.

- Forecasted growth is based on available economic data and cannot predict conflicts, natural disasters, or other disruptions that can have economic impacts. The impact of these may be either to divert cargo away from The Port of Virginia, or to The Port of Virginia (such as Hurricane Sandy disrupting Port of New York-New Jersey operations).
- Shipping line consolidation may increase their negotiating power and result in lower container rates than assumed in the model.
- The bankruptcy of Hanjin Shipping Company (announced August 31st, 2016) may impact revenue and operational expenses as VPA seeks to accommodate cargo owners and recover fees owed by Hanjin. As cargo owners engage with new shippers, revenue may be further affected (for better or worse) by differences in contract rates. Discretionary cargo volumes may likewise be affected based on the relationships between the shippers and railroads regarding their preferred intermodal routes.
- Within the planning horizon of this Report, contracts for both ship lines and labor will need to be renewed and will be subject to negotiation. Ship lines will continue to press for lower rates under threat to take cargo to other ports, and labor will continue to press for higher wages, thereby increasing operating expenses. While the assumptions on these items are considered conservative, they are not guaranteed and actual contract outcomes could have significant impact to financial performance of the Port.
- Construction at both NIT and VIG will disrupt existing operations and may introduce unanticipated short term impacts. Project phasing is being developed in part to mitigate these risks to the extent feasible. PMT is likewise being used to provide additional capacity to manage disruptions. Detailed implementation planning remains to be carried out in the near-term however.
- Schedule risk is inherently present for all projects within the CIP. This risk is generated by the potential for delays in the planning process, equipment procurement, operational priorities, negotiations with the ILA on new operations, prolonged periods of severe weather, and many other factors. Mitigating this risk to some extent is that NIT's south container yard design anticipated eventual conversion to other operations and will require very minimal infrastructure changes to support.
- Cost risk is also inherently present for all projects within the CIP. Estimates of costs were generated based on similar projects and feedback from equipment vendors. However, until such services or equipment is procured, actual cost is unknown. Unknown cost items may also be present and not identified until detailed implementation planning is complete. Contingency allowances have been added to the CIP costs to mitigate some of this risk.

9. Changes from the 2015 Consulting Engineer's Report

Since publication of the February 24th, 2015 Consulting Engineer's Report, VPA has undertaken negotiations with the owners of VIG and have reached an agreement in principle to expand the terminal under revised lease terms. Concurrently, the Commonwealth of Virginia has authorized \$350 million of state funding toward modernization of NIT. These two events have led the VPA to pursue an alternative capital improvement plan from the one reflected in the 2015 Consulting Engineer's Report.

Major changes to the plan include:

- Expansion of VIG is initiated in the near-term versus outside the planning horizon of the 2015 report
- More efficient electric rail-mounted gantry cranes are deployed at NIT versus the assumed diesel-powered rubber-tired gantry cranes assumed in the 2015 report.
- Creation of additional capacity at existing terminals defers the need for Craney Island Marine Terminal, allowing investments to occur over a longer time period.

Overall, these changes are intended to benefit the VPA by enabling greater use of technology that can reduce costs and improve utilization of their terminals to handle cargo.

10. Conclusion

In preparation of this report, the market area served by The Port of Virginia was reviewed and observed to provide the opportunity for continued long-term growth in containerized cargo through the Port's facilities. Within the planning horizon, additional capacity will be necessary to accommodate this growth.

VPA has developed a CIP to develop the needed capacity to keep abreast of demand. This capacity will be developed through the expansion of VIG and incremental implementation of new container handling operations at NIT. This implementation will provide the needed storage capacity and equipment to sufficiently convey containers between the inland markets and the ship lines that call upon the Port. The VPA also plans to continue investment towards the future CIMT, which will become necessary to continue meeting demand growth in the future.

This report provides revenue and expense forecasts based on the described CIP that can be used to demonstrate the feasibility of VPA's capability for funding long-term capital projects and associated equipment acquisitions through 2030.

11. Limitations

Moffatt & Nichol (M&N) has devoted effort consistent with (1) the level of diligence ordinarily exercised by competent professionals practicing in the area under the same or similar circumstances, and (2) the time and budget available for its work, to ensure that the data contained in this report is accurate as of the date of its preparation. In preparing this report M&N used estimates, assumptions, and other information developed by M&N from its independent research, general knowledge of the industry and information provided by Virginia Port Authority (VPA) and other third-parties. M&N does not assume responsibility for inaccuracies in reporting by VPA, VPA's agents and representatives or any third-party data source used in the preparation of this report. Likewise, M&N undertakes no obligation to update the information contained herein or to notify recipients of events occurring after the date on the front cover that might change the content or conclusion of this report.

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