




PORT MASTER PLAN 2050

**THE PORT AUTHORITY
OF NY & NJ**



CHARTING THE COURSE FOR THE FUTURE

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SETTING THE SCENE

PORT MASTER PLAN 2050

The Port Authority of New York and New Jersey (the Port Authority) manages a variety of transportation assets, including airports, tunnels, bridges, transit facilities, and marine terminal properties across two states. Over the last two decades, the Port Authority has made major investments to ensure efficient movement of goods through the region. The Port Master Plan 2050 (PMP) establishes a flexible roadmap outlining options for maximizing these investments and identifies the next generation of potential planning studies, land use, and infrastructure development projects. By implementing elements of the PMP, the Port Authority will secure its port facilities' future in the industry, with a focus on safety, sustainability, and resiliency in a manner that benefits all stakeholders for the next 30 years and beyond.

The maritime industry is in the midst of a transformational period, where the range and pace of technological and operational changes call for the Port Authority to put in place collaborative solutions to improve throughput capabilities and efficiencies, while optimizing the financial performance of existing assets. In late 2016, the Port Authority's Port Department (The Port Department) commissioned development of a long-range Port Master Plan to identify opportunities over the next 30 years that will allow the Port Authority to maximize and diversify land use, unlock freight network capacity, and identify innovative revenue opportunities across its marine facilities.

The PMP provides strategies for addressing and developing opportunities to confront these challenges and guide business in the Port into this new era. It presents a proactive roadmap for the future that is adaptable to change over the 30-year period, that serves the region by providing sustainable jobs and opportunities for business to thrive, and that enables operations to become more sustainable.

THE PORT MASTER PLAN IS AND IS NOT:

- ✓ **A Framework**
Provides a framework of potential options and a guide for future land use decisions
- ✓ **Near and Long**
Provides near and long-term strategies to ensure delivery of needed infrastructure
- ✓ **Consistent**
Ensures future development is consistent with goals and policies
- ✓ **Commercial**
Facilitates commerce and business growth
- ✓ **Flexible**
Adapts to changes in the baseline assumptions and provides flexibility over time
- ✓ **Holistic**
Helps integrate Port facilities into a transportation network
- ✓ **Change-Based**
Considers changes in shipping, population, environmental impacts, and technological advances
- ✓ **Economic**
Supports long-term economic benefits to the region, including jobs and tax revenue
- ✗ **Definitive**
Not absolute in its recommendations
- ✗ **Final**
Not the final plan for all development over the next 30 years

....AND IMPLEMENTATION WILL REQUIRE DESIGN, PERMITS, OUTREACH AND AUTHORIZATION

GUIDING THE REGION

The Port Authority serves as a vital economic engine for the nation's largest metropolitan area. Established through a bi-state compact in 1921, it is one of the oldest, largest, and most diverse public authorities in the United States in terms of the types of assets within and volume of passengers and cargo moving through the Port District (see map, facing page).

The Port Department manages and oversees operations at the Port Authority's port facilities, including auto, dry and liquid bulk cargo, container, cruise, warehousing, intermodal freight movement, heavy lift, and marine support services.

In keeping with the Port Authority's original charter, the Port Department's overall mission is "to develop and manage competitive port infrastructure and service by providing leadership to expedite movement of cargo in a secure, environmentally and financially sound manner. Our approach will be transparent and inclusive."

With a history of innovation, a strong and committed labor workforce, a deep harbor, and access to millions of consumers, the Port Authority's port facilities have been the backbone of the safe, secure, and environmentally responsible movement of goods into and out of the region for many decades.



The 14,414-TEU *CMA CGM T. Roosevelt* was the largest container ship to ever call an East Coast Port when she passed under the Bayonne Bridge in September 2017.



PORT DISTRICT - The Port District comprises an area roughly within a 25-mile radius of the Statue of Liberty in both states, centered on the New York Harbor.

'THE PORT REMAINS ONE OF THE WORLD'S MOST DYNAMIC CENTERS OF ECONOMIC AND CULTURAL ACTIVITY, AND THERE SEEMS TO BE NO END TO ITS POTENTIAL AS AN INCUBATOR OF FINANCIAL AND SOCIAL INNOVATION AND PROGRESS.'

- KEEPING THE REGION MOVING (2014)



ADAPTING TO CHANGE

In terms of containerized cargo volume, the Port of New York and New Jersey (the Port) is the largest port on the East Coast and third largest in North America, serving a local population of over 27 million people. In addition to the Port Authority's port facilities, the Port includes numerous privately owned dry and liquid bulk terminals, general cargo and barging facilities, cruise terminals, ferry landings, and recreational users, as well as vessel support facilities (such as tie-up berths, marine fueling facilities, and tug support). The Port Authority's port facilities consist of over 3,000 acres of property spread across its primary facilities –

- Port Newark (PN)
- Elizabeth-Port Authority Marine Terminal (Elizabeth PAMT or EPAMT)
- Howland Hook Marine Terminal (Howland Hook MT or HHMT)
- Port Jersey-Port Authority Marine Terminal (Port Jersey PAMT or PJPAMT)
- Brooklyn-Port Authority Marine Terminal (Brooklyn PAMT or BPAMT)

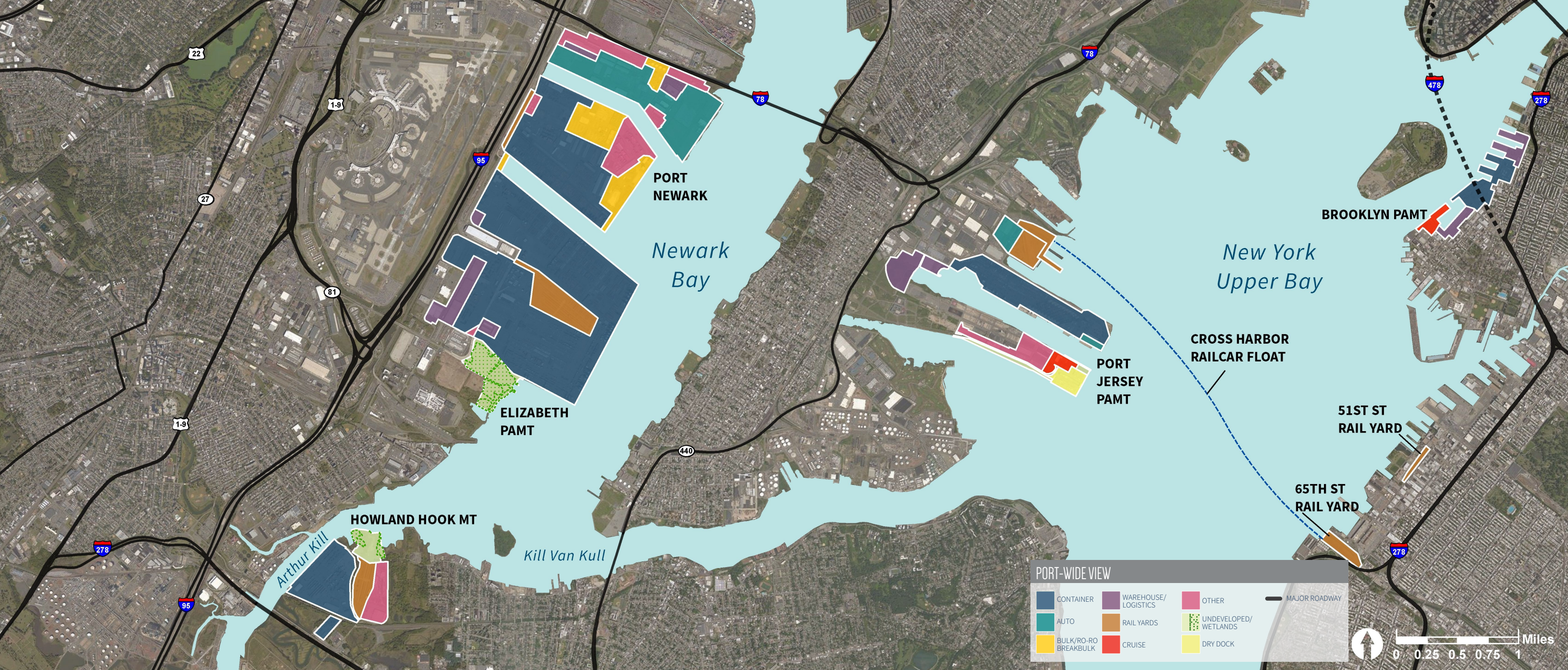
Over the past 15 years, the Port has seen consistently steady growth in cargo volumes, and the Port Authority has made substantial investments in transformative infrastructure projects to ensure its position as a key driver for the regional economy. These have included the raising of the Bayonne Bridge, deepening of the harbor and terminal berths to 50 feet, and development of roadway and intermodal rail

facility capacity improvement projects at key container terminals. With these investments completed, the Port of New York and New Jersey is now able to accommodate the largest container vessels visiting the East Coast of North America, strengthening its position as the largest East Coast port.

The Port Authority has championed the development of a number of industry-leading initiatives to facilitate the safe, sustainable, and resilient growth including the development of the Clear Air Strategy (including the Clean Vessel Incentive Program and the Truck Replacement Program), the Council on Port Performance (CPP), the Workforce Development Implementation Team, and the Security Working Group.

Over the next 30 years, the Port has an opportunity to enhance its position within the global marketplace and efficiently respond to ever-increasing cargo volumes and vessel sizes. To capitalize on this opportunity, the Port Authority and its partners must invest in equipment, infrastructure, and technologies that will be required to be flexible and adaptable to future change.

These investments will drive the Port forward, setting its course as a leader for the next 30 years and beyond.



CURRENT STATE OF THE PORT

PORT NEWARK

- 930-acre facility
- Constructed by City of Newark in 1915
- Served as major shipyard during WWI and WWII
- Leased by PANYNJ since 1948, expanded in 1963
- Containers, autos, bulk, warehousing, and intermodal transport

ELIZABETH PAMT

- 1,200-acre facility owned by PANYNJ
- Constructed by PANYNJ in 1958 as the world's first dedicated container port.
- Containers, bulk, intermodal transport, and warehousing

HOWLAND HOOK MT

- 311-acre facility
- Partially leased from the City of New York; Other portions PANYNJ-owned since 1990
- Containers, warehousing, and intermodal transport

PORT JERSEY PAMT & GREENVILLE YARD

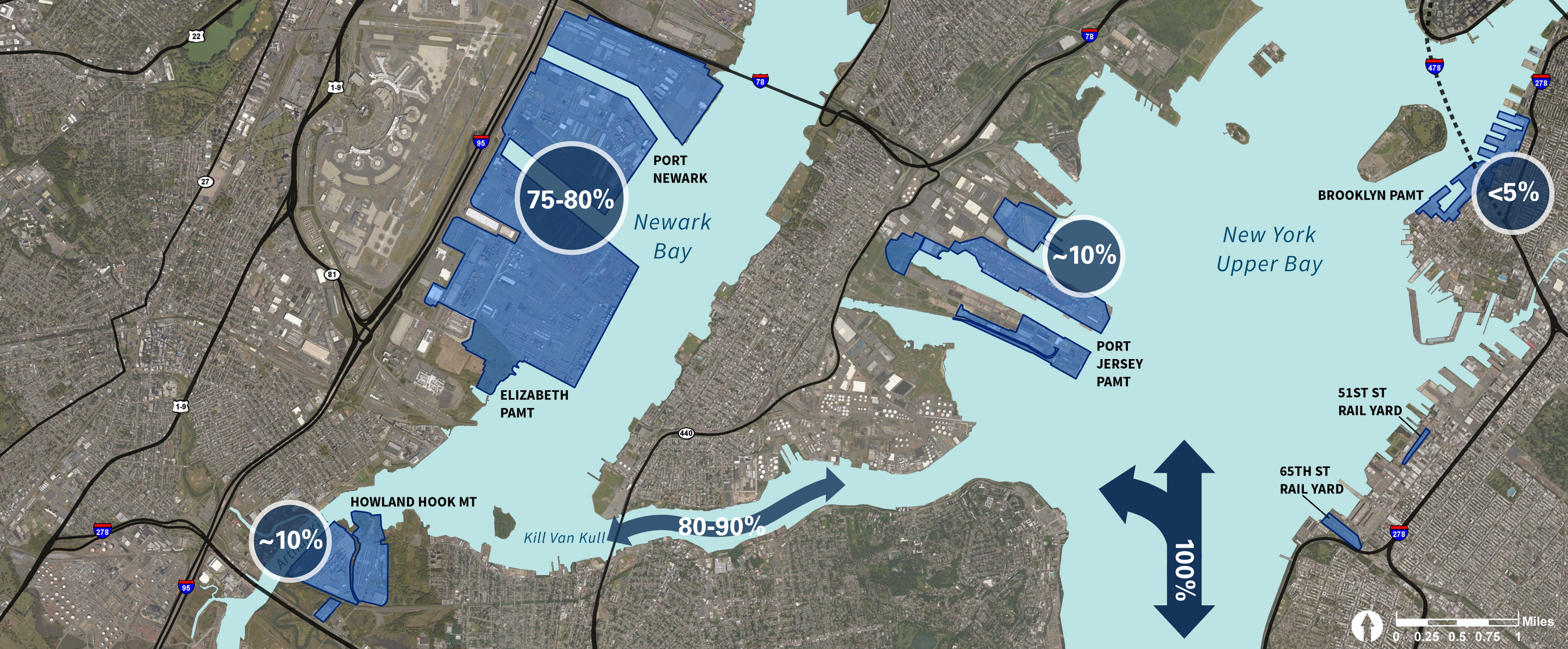
- 388-acre facility across Bayonne and Jersey City, NJ owned by PANYNJ
- Port Jersey peninsula constructed from 1968-76
- Contains former Military Ocean Terminal at Bayonne (MOTBY), now Port Jersey South
- Containers, auto, warehousing, cruise, intermodal transport, and western terminus of Cross Harbor Railcar Float

BROOKLYN PAMT

- 122-acre facility owned by PANYNJ and the City of New York
- Constructed between 1956 and 1964
- Containers, warehousing, and cruise

BROOKLYN RAIL YARDS

- 65th Street Rail Yard and 51st Street Rail Yard
- Eastern terminus of Cross Harbor Rail Float
- Operated by New York New Jersey Rail, LLC (NYNJR)
- Connects New York City and points east to national rail network (via Cross Harbor Railcar Float)
- Interchange with New York and Atlantic Railway (NY&A)
- Allows direct rail delivery to South Brooklyn Marine Terminal and Sunset Park businesses, plus transload facility



CURRENT CONTAINER TERMINAL CAPACITY DISTRIBUTION

Historically, most of the Port's waterborne trade flowed through dozens of narrow piers perpendicular to the Manhattan, Brooklyn, and Jersey City shorelines. Through the 1960s, containerization replaced the need for breakbulk piers with a need for contiguous blocks of land with thousands of feet of uninterrupted berthline. This necessitated the development of thousands of acres of wetlands into Elizabeth PAMT (and redeveloping part of Port Newark) to serve the burgeoning container trade. As the container trade grew, smaller container terminals also grew in Brooklyn, Staten Island, and Jersey City.

Today, the container terminals in the Port Newark and Elizabeth PAMT complex account for the majority of container capacity in the Port, comprising 75-80% of the Port's total capacity. The terminal at Howland Hook MT comprises another ~10% of the total. Combined, the

container terminals accessed via the Kill Van Kull (the narrow tidal strait separating Bayonne and Staten Island, spanned by the Bayonne Bridge) make up 80-90% of container capacity in the Port. The remainder of Port-wide container capacity is at Port Jersey PAMT (~10%) and Brooklyn PAMT (less than 5%), both located outside the Kill Van Kull (KVK).

In response to navigational and safety challenges faced by today's largest container vessels, the Port's Harbor Safety, Operations, and Navigation Committee published a Deep Draft Advisory in May 2017. That bulletin restricts large vessels transiting the Kill Van Kull to favorable sailing conditions; the largest vessels are restricted from passing and meeting in the KVK, and may only transit the KVK during slack water.

Container vessels have driven major investments over the past twenty years as their size has continued to increase. Among these is the New York and New Jersey Harbor Deepening Program, which dredged the Kill Van Kull and Newark Bay from a depth of ~35 feet to today's 50 feet. Even more visible is the Bayonne Bridge Navigational Clearance Project, which raised the roadway by 64 feet to provide vertical clearance for the next generation of container ships.

Beyond these projects, and looking ahead to the next 30 years, the PMP process has revealed the heightened criticality of the Kill Van Kull to the Port's ability to handle increasing throughput and increasing vessel size.

READY TO LAUNCH

Recognizing the Port's pivotal role in the region, the vision for the PMP has been crafted to provide flexibility and adaptability, accommodating evolving stakeholder and customer priorities as well as shifting regional demographic, economic, and technological trends. Above all else, the vision aims to re-affirm the Port Authority's commitment to the people and the businesses of New York and New Jersey, working collaboratively with existing customers, shipping lines, railroads, labor groups, and other stakeholders to ensure a high level of service.

***CREATE A FLEXIBLE
ROADMAP TO DEVELOP
A COMPETITIVE,
FINANCIALLY SUCCESSFUL
PORT, MAXIMIZING
REGIONAL JOBS AND
ECONOMIC IMPACTS,
AND MINIMIZING
ENVIRONMENTAL
EFFECTS.***

- PMP VISION STATEMENT



PRIMARY OBJECTIVES

The primary objectives for the PMP, presented below, were developed in collaboration with numerous key stakeholder groups within the Port Department and the Port Authority's senior leadership over a series of visioning workshops.

ENGAGE STAKEHOLDERS & PROVIDE OPPORTUNITIES FOR GROWTH

Conduct work with transparency and communicate project goals to a wide network of constituents and stakeholders, including host communities, tenants, and Port users, to inform and receive feedback on the PMP.

SERVE AS AN ECONOMIC ENGINE FOR THE REGION

Increase the efficiency of the marine cargo system and identify strategies to unlock capacity in the inland freight network.

Diversify land use and operations, focusing infrastructure investment on preparing for future technologies and renewable energy opportunities.

Enable jobs and contract opportunities for local residents and businesses.

PROMOTE SAFE, RESILIENT, AND ENVIRONMENTALLY SUSTAINABLE OPERATIONS

Implement a comprehensive asset inventory and management program to identify and protect existing and future assets from the effects of climate change, including sea level rise and storm surge.

Continue to develop programs and strategies that aid the environment and reinforce commitment to environmental stewardship in neighboring communities and society at large.

IMPROVE COMMERCIAL VALUE OF THE PORT

Investigate opportunities to maximize lease revenue in support of improving net contributions.

Refine and develop leasing strategies focusing on identifying the highest and best use of existing properties and assets.

PROJECT DRIVERS

After taking a holistic view of the Port and its current place in the regional and national landscape, several key project drivers were identified to guide the development of the PMP.

1 MARKET

Preparing for Increased Container Volumes

Continuing strong year-over-year growth, 2018 container cargo volumes were 7.2 million twenty-foot equivalent units (TEU) and the container facilities account for approximately 70% of the Port Authority's port land acreage. With container volumes projected to double or triple over the next 30-year time frame, it is critical for the Port Authority to assess the location and distribution of future container capacity.

2 ENVIRONMENT

Identifying Sustainable and Resilient Planning Solutions

The Port Authority has made significant progress towards achieving environmental sustainability and hardening its key infrastructure. However, facing an imminent rising sea level and an increasing number of extreme weather events caused by climate change, the Port Authority should proactively develop protection strategies for its critical assets and continue to work with tenants and users to reduce emissions that induce adverse health risks or environmental impacts and slow down climate change by taking aggressive steps in greenhouse gas abatement.

3 TECHNOLOGY

Evolving with the Industry

Technological innovation is causing unprecedented levels of disruption across the industry, dramatically changing productivity of assets, streamlining operational processes, and potentially impacting market dynamics through shifts to e-commerce, 3-D printing, autonomous vehicles and the Internet of Things. Adaptability to technology will be critical for the Port Authority into the future.

4 STAKEHOLDERS

Focusing on the Customers & Communities

Active stakeholder support throughout the regional supply chain will be key for the Port Authority to successfully implement developmental projects that will be required to maintain efficient operations, and an ongoing positive relationship and partnership with host communities and users will be critical to future success.

5 CAPACITY

Improving the Road & Rail Freight Network

The Port Authority relies on its ability to efficiently move cargo through its waterway system, the marine terminals, and inland freight corridors. Along with partner agencies in the region, the Port Authority has invested in some of the nation's largest transportation infrastructure projects to improve traffic movements and unlock freight network capacity. Continuing to ensure connectivity through the entire network to maximize these investments will be a primary focus.

6 REVENUE

Achieving Financial Sustainability

A balanced and strategic funding program is integral to long-range planning horizons focused on asset sustainability and growth. The Port Authority will strive to identify new revenue-generating strategies to improve net contribution.

7 INFRASTRUCTURE

Addressing Aging Infrastructure

While the Port Authority's existing facilities vary significantly in age, much of the critical waterside infrastructure was originally constructed before 1950. Over the next 30 years, the Port Authority plans to make significant investments to assess and replace mission-critical wharf and berth infrastructure. It is essential that this investment and other planned capital outlays are targeted at infrastructure that will have long-term utility and is aligned with the PMP.

8 NETWORK

Balancing the Distribution Network

The success of the Port is directly tied to a functioning and balanced freight network. However, the current configuration of the Port Authority's port assets are heavily focused in a single geographic region that is highly utilized. By spreading cargo more evenly across Port Authority facilities, the distribution network can be enhanced to improve cargo movement across the whole region.

BUILDING STRONG PARTNERSHIPS

The Port Authority sought a robust stakeholder and community engagement strategy to inform constituents and guide the development of the PMP.

Between February and October 2017, stakeholders including host-community residents and representatives, federal agencies, planning associations, and shippers were engaged through a series of presentations, workshops, and activities.

Engagement activities provided an opportunity for the Port Authority to share information about the purpose of the PMP within the dynamic port landscape and yielded valuable information from stakeholders about what they consider critical elements of the PMP as it moves from development to implementation.

Key topics discussed included employment and the economy, new technology, waterfront access, improved stakeholder relationships, environmental sustainability, climate change, and resiliency, road network capacity, public health, safety, and security.

These activities resulted in critical feedback on the PMP, broadened and strengthened relationships among the Port Authority and the stakeholder groups, and bolstered the sense of inclusion felt by all engaged parties.

After the PMP was drafted, the Port Authority returned to stakeholders between March and June 2019 to share draft recommendations, present PMP findings, answer questions, and garner additional feedback. Key stakeholder recommendations, questions, and comments were captured and, where relevant, incorporated into the PMP.



- CURRENT TENANTS
- HOST COMMUNITIES
- RAIL AND TERMINAL OPERATORS
- FEDERAL, STATE, AND LOCAL AGENCIES
- HARBOR PILOTS
- SHIPPING AND LABOR MANAGEMENT ASSOCIATIONS
- LABOR ASSOCIATIONS
- TRUCKING AND LOGISTICS COMPANIES
- NY & NJ ELECTED OFFICIALS
- TRANSPORTATION AND PLANNING AUTHORITIES
- COMMERCIAL REAL ESTATE & PROPERTY MANAGEMENT GROUPS
- TECHNOLOGY LEADERS
- ACADEMIC INSTITUTIONS
- ENVIRONMENTAL JUSTICE GROUPS



45+
Total Presentations to Regional Stakeholders and Community Groups



50+
Planning Workshops, Interviews, and Activities



480+
Stakeholders Across New York & New Jersey



EMERGING TRENDS

Over the past decade, the global shipping industry has undergone a major period of transformational change, as technological advancement has permeated through every element of the global supply chain. Each of the key players within and around a port, including port authorities, shipping lines, cargo owners, trucking and logistics companies, customers, and labor are striving to achieve greater efficiencies in their everyday operations. Even greater transformations are expected over the next decade, as changing demographics, increased urbanization, and shifting consumer needs will continue to push the technical and operational limits of the industry, requiring greater efficiencies throughout the supply chain.

Whether structured as an owner-operator, landlord, or a combination of the two, port authorities across the globe are faced with critical capital investment decisions to remain competitive in a global marketplace. Ports are inherently high-cost elements of the regional infrastructure framework, requiring significant capital, operating, and maintenance expenditures to keep them in a state of good repair and to provide the flexibility to adapt to evolving industry trends. Port authorities are constantly looking for ways to fund capital improvements, turning more and more to private sector investment and public-private partnerships to fund the infrastructure improvements needed to unlock capacity and streamline the movement of goods.

Containers



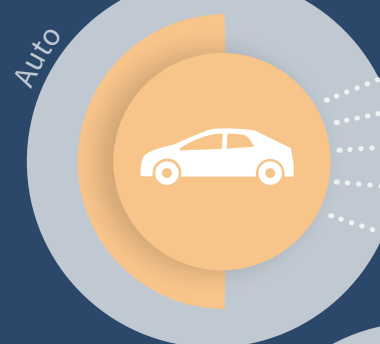
- Ocean carrier consolidation and alliances
- Increased productivities at the berth
- Electrification of terminal equipment to promote emissions reduction
- Use of real-time decision making tools and other technologies
- Stricter alternative fueling requirements and regulatory mandates
- Cargo security and screening
- Increasing vessel sizes

Trucking & Logistics



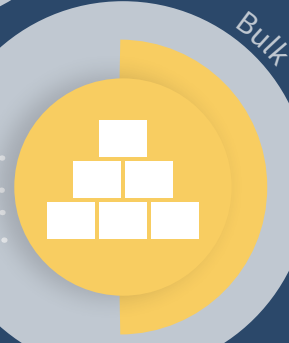
- Driver attraction and retention
- Supply chain integration
- Information and communications technology (ICT) solutions
- Digitization of information streams
- Truck data capture
- Shared chassis pools and empty container depots
- Autonomous trucking and platooning

Auto



- Mobility as an on-demand service
- Electric and hybrid vehicles to promote emissions reduction
- Autonomous vehicles
- Partnerships and alliances amongst manufacturers
- Vertical terminal storage and land optimization

Bulk



- Additive manufacturing
- Offshore wind and renewable energy sources
- Evolution of fueling sources and increase in biofuel use
- LNG bunkering & support services

Cruise



- Strong order book for new vessels
- Flexible and adaptable market
- Strong growth potential for PANYNJ port of call
- Travel is contingent on strength of personal income, and the economy

MARKET TRENDS

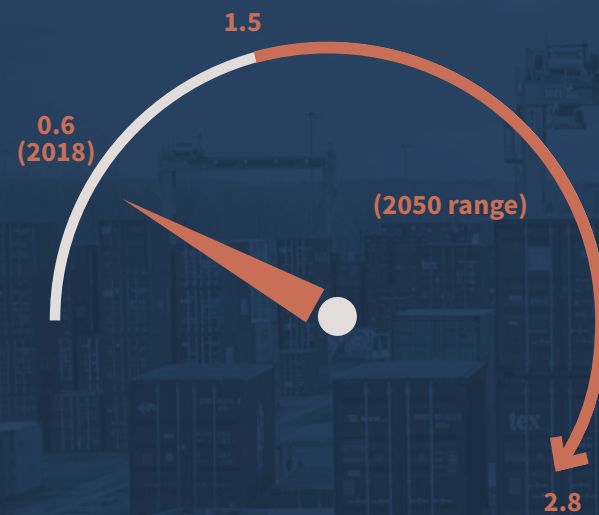
INTERMODAL RAIL

With 2018 intermodal rail lifts at 646,000, and built capacity of 1.5M lifts in the ExpressRail System, a network of four on- or near -dock rail facilities, the Port Authority facilities have significant capacity available to promote intermodal rail share and continue to serve inland regions.

Emerging Considerations

- Potential demand for inland port facilities
- Need to expand staging tracks and track lengths to support longer unit trains
- Discretionary market opportunity

Intermodal Demand Forecast
(millions of rail lifts)



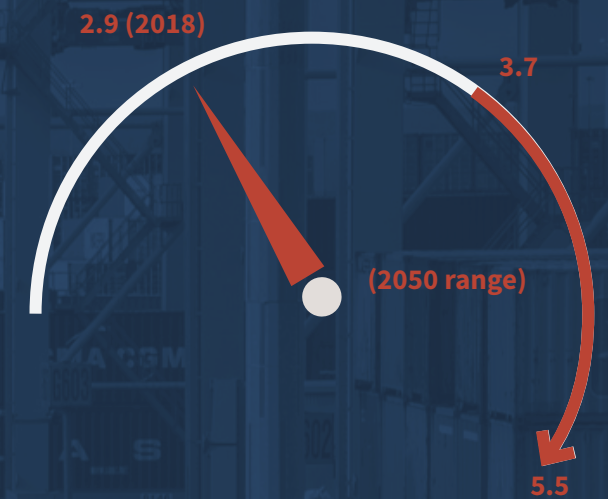
BULK MARKET

Dry bulk demand is projected to increase to between approximately 3.7 million and 5.5 million MT by 2050. Average annual growth ranges from 1.1 percent under low forecast assumptions to 2.4 percent under high forecast assumptions. Dry bulk projections focus exclusively on the market potential of cement, salt, and scrap, which represent most of the tonnage currently handled at Port Authority facilities.

Emerging Considerations

- Bulk volumes remain strong
- Offshore wind and other renewable energy sources
- LNG bunkering
- Additive manufacturing (i.e. 3D printing)
- Beneficial use of recycled commodities

Bulk Demand Forecast
(millions of metric tons)



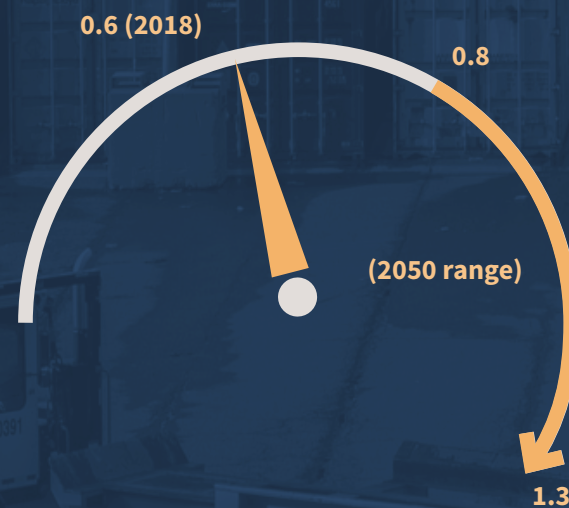
AUTO MARKET

Auto demand through the Port is projected to increase from 573,000 vehicle units (CEU) in 2018 to a range of approximately between 800,000 to 1.3 million units by 2050. Average annual growth ranges from 1.6 percent under low forecast assumptions to 3.3 percent under high forecast assumptions.

Emerging Considerations

- Auto volumes remain strong
- Mobility as an on-demand service
- Autonomous vehicles
- Electric and hybrid vehicles

Auto Demand Forecast
(millions of auto units)



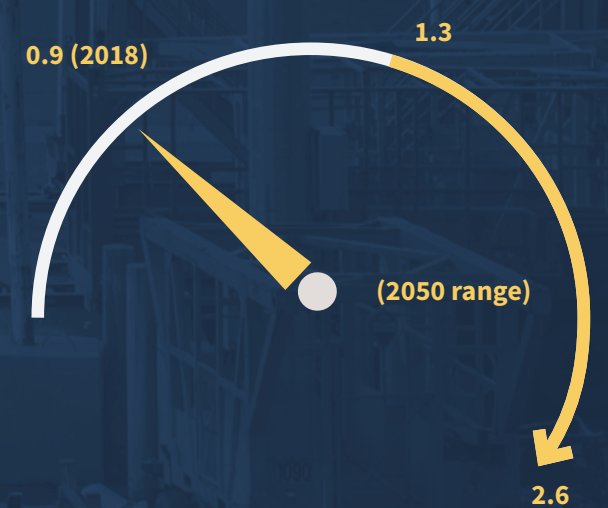
CRUISE MARKET

Cruise demand captured by PANYNJ tenants is projected to increase from 856,000 passengers (pax) in 2018 to between 1.3 million and 2.6 million pax by 2050. Average annual growth ranges from 2.5 percent under low forecast assumptions to 4.8 percent under high forecast assumptions.

Emerging Considerations

- Consistent growth in passenger volumes
- Increasing vessel size
- Cruise industry incorporating NY/NJ as a recurring port of call

Cruise Demand Forecast
(millions of passengers)



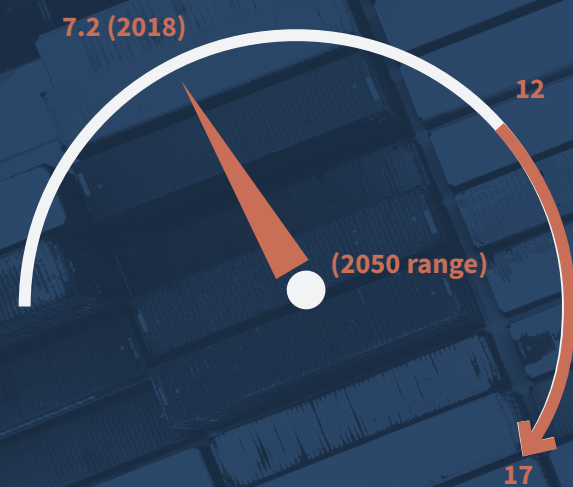
CONTAINER MARKET

Container demand at Port Authority facilities is projected to increase from 7.2 million twenty-foot equivalent units (TEU) in 2018 to between 12 million and 17 million TEU by 2050. Average annual growth ranges from 2.1 percent under low forecast assumptions to 3.4 percent under high forecast assumptions. Approximately 85 percent of inbound container activity is currently destined for the local truck market. Achieving long-term growth above and beyond the organic growth in local consumption (12 million) hinges on capturing a larger share of imports destined for inland distribution centers. To accomplish this, Port Authority facilities must compete on price and service reliability with other Atlantic Coast ports.

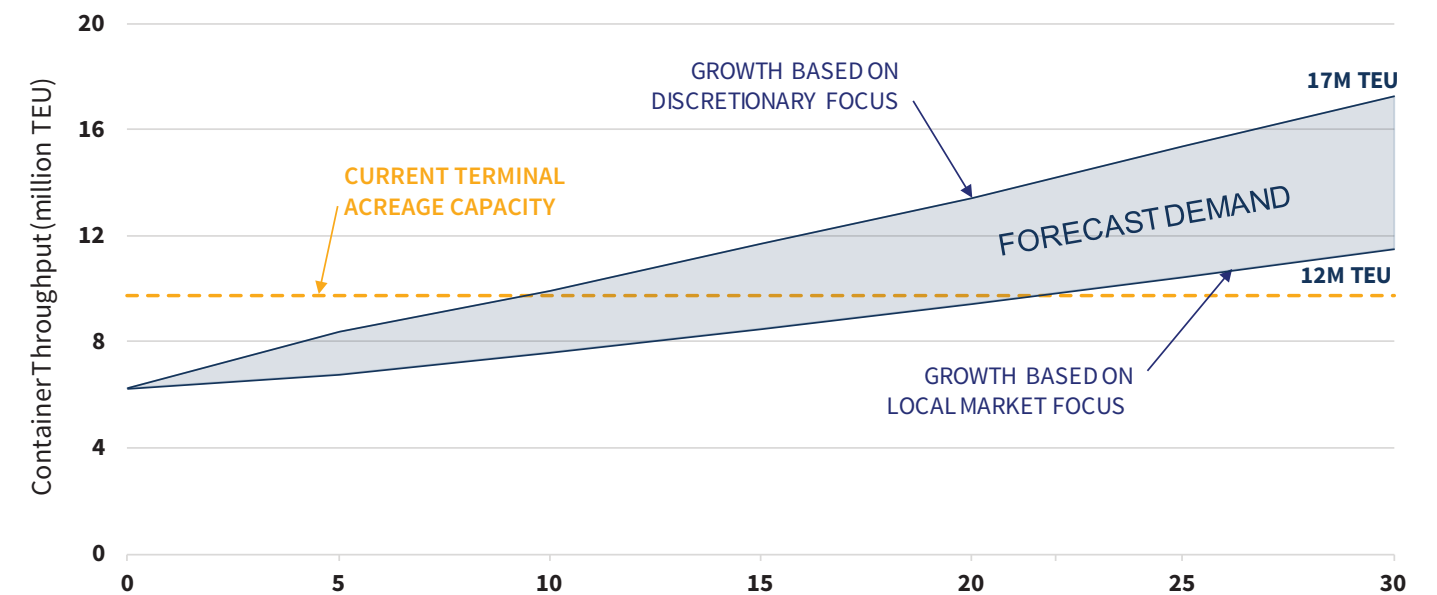
Emerging Considerations

- Container volumes are projected to double or triple by 2050
- Ocean carrier consolidation and alliances
- Vessel size increasing rapidly
- Use of real-time decision making tools and other technologies

Container Demand Forecast
(millions of TEU)



CONTAINER CAPACITY AND DEMAND



The capacity of the existing container terminals on their current footprint (“Terminal Acreage Capacity”) is in the order of 9 million TEU per annum—compared to 2018 volumes of 7.2 million TEU. This capacity is based on status quo operating conditions: operating hours, equipment productivity, density, and terminal layouts.

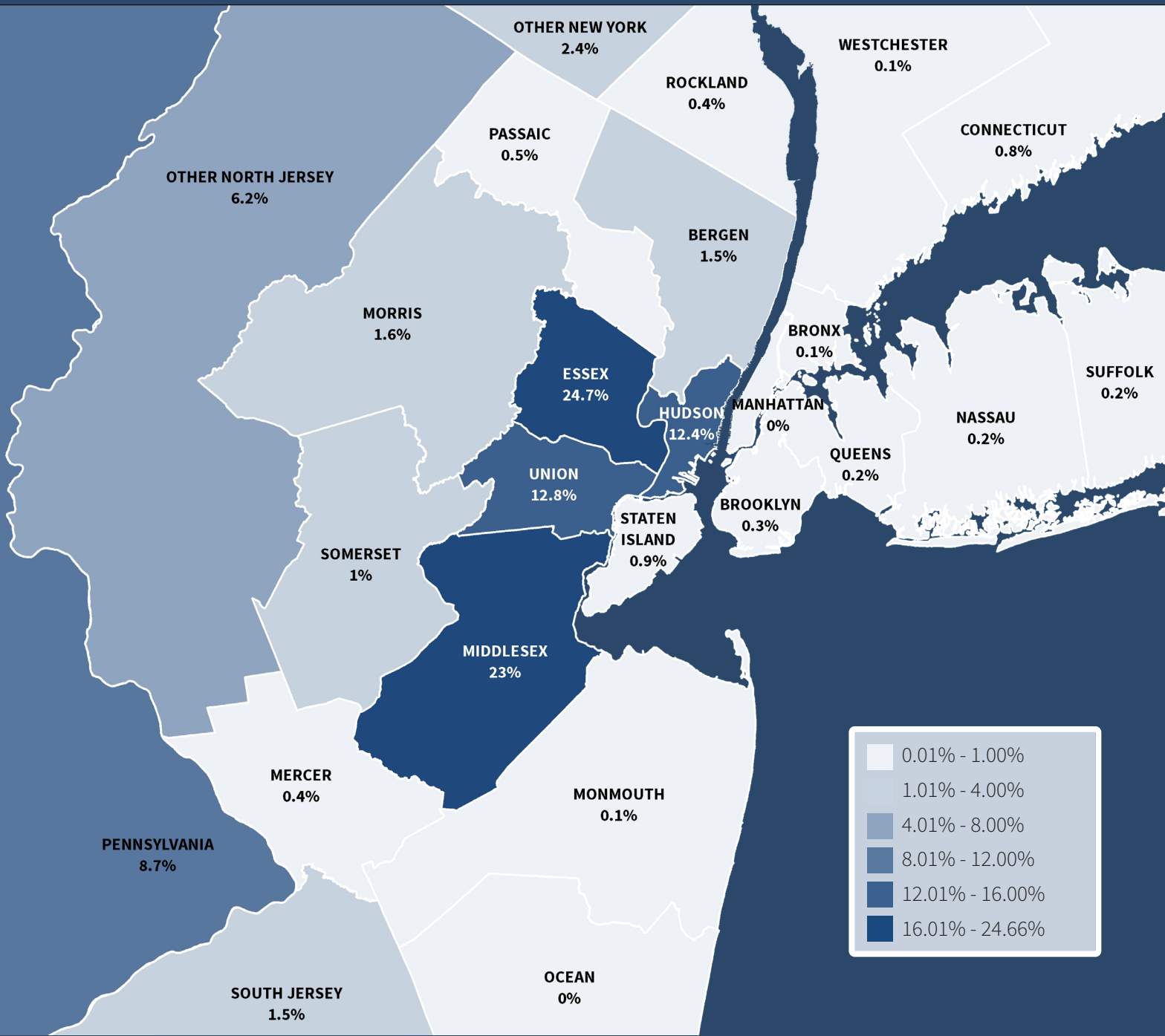
Depending on demand and the ability of the Port Authority and its terminal operators to capture more of the discretionary market, volumes will reach this terminal capacity over the next 10 to 20 years.

To support this capacity, the Port Authority and regional partners will need to invest in road, rail, and waterside infrastructure projects through the next 10 years.

In advance of these timelines, the Port Authority will need to initiate major waterside and road projects to ensure its facilities are unconstrained in their ability to continue to lead the East Coast market.

Terminal operators will need to invest in yard densification, berth expansions, and enhanced gate access projects, together with increased operating hours, to stay ahead of demand.

The PMP will outlay the timing and sequence of decisions required to ensure that capacity remains sufficient to sustain this growth.



ORIGIN AND DESTINATION

This map shows the primary destinations (i.e. the first stop) for truck traffic originating at Port Authority facilities (including container, bulk, and auto terminals). All in New Jersey, the top four counties – Hudson, Essex, Union, and Middlesex – account for almost 75% of truck trip destinations.

PORT TRUCK DESTINATIONS

The current regional goods distribution network, fed by international cargo entering through the Port Authority's container terminals, focuses on a dominant cluster of warehousing/distribution center activity located along the New Jersey Turnpike.

Comparing two origin-destination surveys performed for the Port Authority in 2005 and 2017 (the latter as part of the PMP) reveals the percentage of cargo moving from the Port to these locations is growing.

The 2005 study showed 66% of cargo volume being trucked from the Port to distribution centers in four New Jersey counties (Hudson, Essex, Union, and Middlesex), while the 2017 study shows those counties have grown to almost 75% of the total. In comparison, the amount of cargo moving directly to destinations east of the Hudson River has fallen from around 10% in 2005 to less than 5% in 2017. It is noted that these figures do not mirror the population statistics, where the study area's population is more heavily weighted east of the Hudson River (61%).

It is clear that an increasing amount of cargo is being trucked between the Port facilities and a concentrated region of northern and central New Jersey, necessitating additional truck movements as cargo is then distributed from those centers to east-of-Hudson destinations.

While the PMP may not be able to affect the location of warehousing and distribution center activity, consideration will be given to minimizing truck trips in and around the Port and optimizing interstate access in and around the Port District.

PORT MASTER PLAN 2050

The Port Authority's desire to have state-of-the-art facilities that are integrated with the **Environment, Technology, Customers, and Stakeholders**, can be realized over the next 30 years by implementing some or all of the recommendations contained within this section.

The next generation of the Port Authority's port facilities will provide safe, secure, resilient and efficient operations, concentrated around similar maritime uses and complementary, adjacent upland acreage.

The Vision of the Port in 30 years

The maritime industry is changing – ships are getting bigger, trade is growing, climate change is upon us, and technology is fast impacting our operations.

The economy of NY and NJ is shifting – the region is dynamic and growing, serving as the engine for the whole Northeast Corridor. And while the Port is a major employer and enabler of economic growth, it is also a contributor to congestion and other environmental impacts.

The next thirty years will see more change, and at a faster pace.

If the Port is to maintain its essential role in the region's economy it will need to change, and lead by example, by partnering and taking the initiative to shape the future, rather than responding to it.

The Port in 2050 will be dramatically different. The number of containers will more than double, ships will be bigger than we can currently imagine, trucks and cars may be driving themselves off the terminal, roads and rail links will be improved, tidal surges will be higher, land area may need to be larger, there will be thousands more jobs, access to information will be immediate and comprehensive – and 2020 will be a distant memory.

VISION FOR 2050

The Port of New York & New Jersey is and will continue to be...

SUSTAINABLE AND RESILIENT

...leading by example, the Port Authority will continue to drive down diesel emissions, and minimize noise, congestion, and environmental impacts at its facilities and throughout the Port of New York and New Jersey.

Vision for 2050

- Incorporation of latest technologies to reduce or eliminate emissions (adopt electric and low-energy operations at facilities).
- Support alternate energy sectors with marine facilities for alternate fuels (offshore wind, LNG bunkering).
- Enhanced collaboration with tenants and operators to incorporate performance goals and incentives into lease structures.
- Updated stormwater Best Management Practices to stay ahead of evolving design and regulatory standards.
- Partnerships with regulators to adapt to sea level rise.
- Resilient against extreme sustained temperatures and temperature fluctuations.

These vision statements form fundamental guiding principles for the recommendations within the PMP, and are focus areas for the Port Authority's key next steps in setting up the Port of New York and New Jersey as a port of the future.

STATE OF THE ART

...with technology, safety, and data management at the heart of improved operations.

Vision for 2050

- Full visibility and optimization of the supply chain (work with stakeholders to build an end-to-end solution).
- Deployment of electric and semi-autonomous port vehicles and equipment.
- Investment into next-gen electrical and communications infrastructure suitable for future productivity gains.
- Installation and monitoring of state-of-the-art cyber security measures.
- Partnering with stakeholders to become early adapters of machine learning and artificial intelligence (AI) technology.

A PLATFORM FOR PARTNERSHIP

...with communities, customers, operators, shippers, logistics providers, and potential partners all actively involved in decision-making and implementation.

Vision for 2050

- Deployment of formalized, proactive, and flexible stakeholder engagement framework.
- Stakeholder mapping specifically tailored for each project.
- Communication of project goals, timeline, and status to stakeholder groups.
- Proactive engagement with local community and businesses through facilities such as learning centers, tours and public viewing locations.

SHAPING FUTURE GROWTH

...accommodating the future needs of shippers, rationalizing land uses, consolidating containers, autos, and bulk, and partnering to improve regional rail, road, and off-site facilities.

Vision for 2050

- Connection to inland rail ports.
- Strategic locating of container support facilities such as: empty storage depots, chassis depots, and secure parking facilities.
- Plan for long-term infrastructure development.
- Promotion of intra-harbor/regional short sea shipping routes.
- Establishment of Shipper Forum, comprised of national and regional users of the Port to share information and foster collaboration.
- Joint marketing strategies with terminal operators to actively seek new business opportunities.

A REGIONAL ECONOMIC GENERATOR

...with increased jobs on the Port and in the region, enabling small and large businesses to thrive and providing opportunities for training, job creation, and entrepreneurship.

Vision for 2050

- Strong partnership with labor organizations.
- Continued high level of service and responsiveness, enforcing commitments to customers and communities and promoting the Port's thriving work environment.
- Collaboration with existing customers and community to identify opportunities for growth and the creation of new business and employment.

CLEAN AIR FOR TODAY AND TOMORROW

The Port Authority is the first public transportation agency in the U.S. to embrace the Paris Climate Agreement – targeting a 35% reduction in greenhouse gases by 2025 and a long-term 80% reduction by 2050.

As the states of New York and New Jersey move towards shifting the power paradigm to increase the use of more sustainable power generation options, such as solar, wind and alternate fuels, there will be a need for marine infrastructure to support this growing trend at Brooklyn PAMT as well as alternatives for reducing stack emissions.

Given the heavy dependence on trucks for cargo delivery, the Port Authority will continue to incentivize truck owners to upgrade their trucks to those meeting the latest US EPA standards for diesel emissions. Once electric Class 8 trucks are readily available in the marketplace, the Port Authority expects diesel trucks to eventually be phased out in the Port.

A sustainability roadmap will serve as the starting point for development and rollout of an Alternate Energy Program, involving the implementation of hybrid and renewable power sources and energy efficient best management practices.

Electrified and Low-Emissions Operations

The Port Authority will lead by example as it progressively moves to low- and zero-emissions operations across its terminal facilities, including converting to electric port vehicles and equipment at all its facilities.

The Port Authority will work to develop pilot programs and initiatives, including potential for continued rollout of hybrid-power and electrified port vehicles and container handling equipment, and explore potential for expanding shore power beyond initial location at Brooklyn PAMT.

Offshore Wind

As part of the States' sustainability plans, the Governors of New York and New Jersey have together committed to the installed capacity of nearly 12.5 gigawatts of wind generated energy by 2030. The Port is uniquely situated to provide critical support to the offshore wind needs.

Port facilities in Howland Hook, Elizabeth, and Brooklyn have been identified as suitable locations for these operations. The Port is also expected to support the supply chain (import of raw materials, parts, components, etc.) associated with offshore wind.

LNG Bunkering

The PANYNJ will assess site feasibility and compatibility in support of LNG bunkering operations.

LNG supply replenishment alternatives could consist of onsite liquefaction or delivery by truck, barge, small ship, or potentially rail. Further development of the 'last-mile' infrastructure will likely depend on LNG suppliers, end users, and involved stakeholders.



JOBS, ECONOMIC IMPACT, AND WORKFORCE DEVELOPMENT

With opportunities ranging from trucking to technology development, the maritime sector is a driving force in the region's local economy. Based on activity from 2016, the New York Shipping Association reported via its Economic Impact Study that the Port is a dynamic force, supporting:

- 400,000 full-time jobs in the region;
- \$25.7 billion in personal income and \$64.8 billion in business income per annum; and,
- almost \$8.5 billion in federal, state, and local tax revenues.

According to the New Jersey Department of Labor, in 2017 transportation, logistics, and distribution (TLD) industries employed approximately 12% of the state's private sector workers with projected growth rates up to 42% over the next 10 years.

Similar data from the New York State Department of Labor show that TLD industries employed approximately 7% of New York State's and New York City's private sector workforce in 2017.

New York State projects 10-year growth rates of up to 22% for TLD industries. Statistics from New York City forecast even stronger growth, predicting warehousing and storage jobs to grow 25% over the same 10-year period.

Occupations within the TLD cluster include:

- Warehousing and storage workers;
- Industrial truck and tractor operators;

- Laborers and freight, stock, and material movers; and,
- Heavy and tractor-trailer truck drivers.

All of these industries are expected to see very strong growth over the next 10 years and beyond.

Today, the Port, through its participation in the Council on Port Performance's Workforce Development Implementation Team, provides a multi-faceted program approach to advancing meaningful programs and events that connect talent with port and other TLD employers. Examples of these initiatives include:

- Job fairs
- Career awareness events
- Internship fairs
- Port tours
- Adult education programs
- Career conversations
- Marketing and outreach about the importance of the Port and its wide range of viable careers

As technology and other sector trends begin to influence the maritime, logistics, and distribution industries, a gap analysis of job requirements will need to be undertaken to help support and guide which upskill and reskill programs will be needed for existing port workers; apprenticeships for future talent; and additional curriculum, training, and education needed within the high school and college-level programs.

According to a recent study,
the Port contributes
400,000 jobs
to local economies.

(Strauss-Wieder, 2017)



Over the next 30 years, the PMP forecasts a
2.4x increase
in jobs attributable to actual
cargo/warehouse operations, and

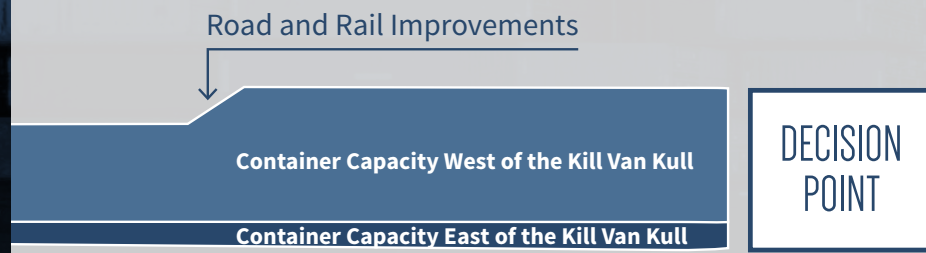


\$300 billion
in total business income
over that period.



MAPPING THE PORT OF THE FUTURE

The roadmap for the Port over the next 30 years is envisioned across two distinct phases. Within the first phase, there is a primary decision point to determine the location of additional container capacity in the Port – either east or west of the Kill Van Kull waterway.



Phase I: Maximizing Recent Investments

Phase I covers the next 10 to 15 years and will focus on maximizing the investments made to date by the Port Authority and its regional partners on projects such as the deepening of the Harbor and raising of the Bayonne Bridge.

Concurrent with the efforts to maximize recent investments, the Port Authority will work with all stakeholders to plan and map out Phase II, setting the building blocks for the future infrastructure investments and land use optimization strategies that will result in a safe, resilient, and efficient port of the future.

Phase I:
Years 0 to 10/15

Dredging and Navigational Improvements of KVK
Road and Rail Expansion at Port Newark, Elizabeth PAMT, and Howland Hook MT

Container Terminal Enhancements
Road and Rail Improvements

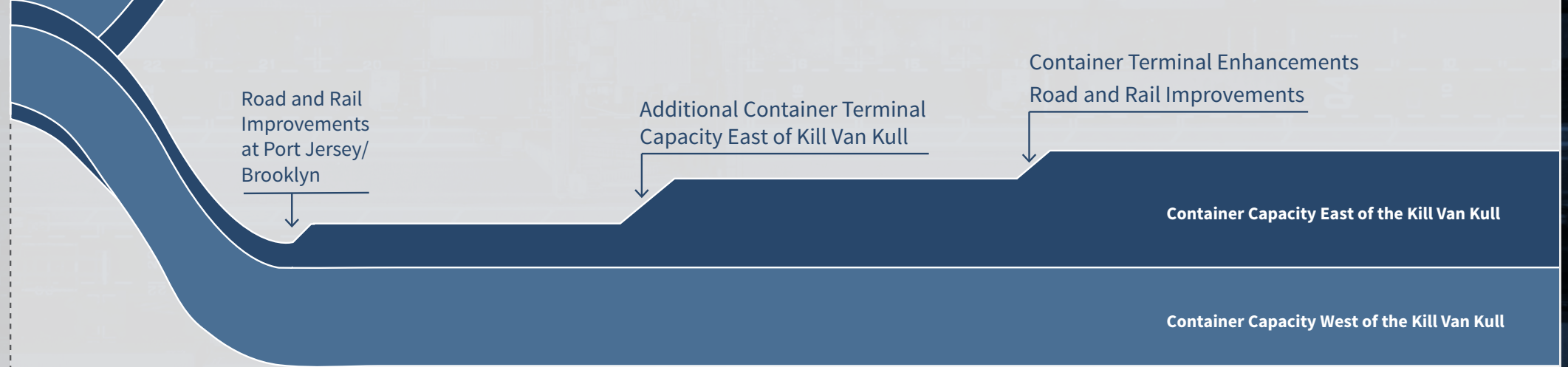


OPTION I: Increase Capacity West of the Kill Van Kull

Road and Rail Improvements at Port Jersey/Brooklyn

Additional Container Terminal Capacity East of Kill Van Kull

Container Terminal Enhancements
Road and Rail Improvements



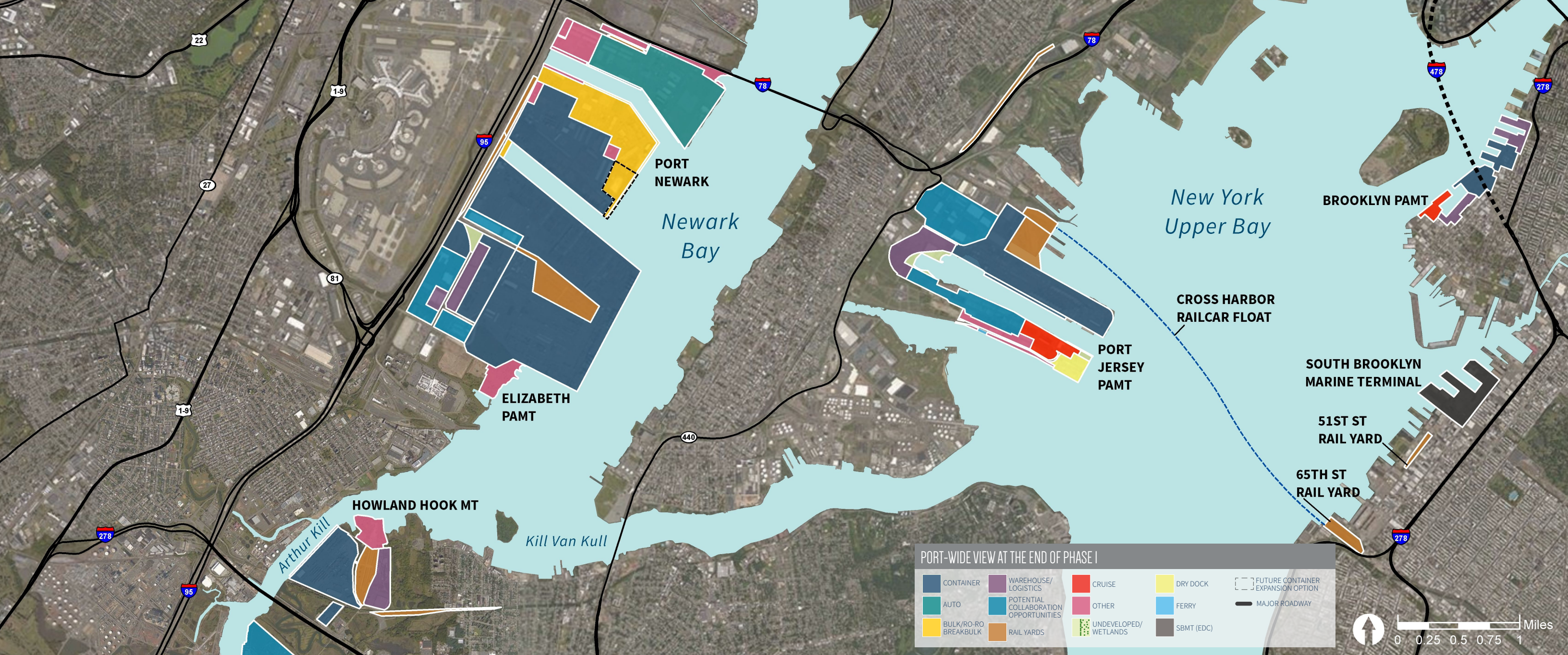
OPTION II: Increase Capacity East of the Kill Van Kull

Phase II: Planning for Future Growth

Phase II will see the implementation of the Port Authority's long-term vision, with potential new investment in either Option I (Increase Capacity West of the Kill Van Kull) or Option II (Increase Capacity East of the Kill Van Kull).

Auto, bulk, and passenger cruise will remain a core focus, as the Port Authority seeks to enhance collaboration with tenants and operators to maximize efficiencies by developing concentrated cargo precincts, linked by dedicated berths and port streets.

Phase II:
Years 10/15 to 30



PHASE I FIRST 15 YEARS

Building on the hard work of the Port Authority, its partners, and regional stakeholders who helped successfully complete the deepening of the Port’s waterways and raising of the iconic Bayonne Bridge, the Port Authority will focus early investment in Phase I on maximizing the investments made to date, including optimization of existing infrastructure west of

the Kill Van Kull, strategic expansion work at Port Jersey, and a renewed focus on assessing marine options along the Brooklyn waterfront.

Road projects at the major facility areas will be initiated and marine infrastructure will be hardened and upgraded through the Berth and Wharf Replacement program. Data collection technology can be enhanced to better understand the complex movements of goods close to the Port Authority port facilities and to regional distribution centers, and this next-generation technology would be used to constantly learn and improve the system and infrastructure over time for the betterment of all.

Striving to minimize the Port Authority’s port facilities’ impact on the environment and the communities in which they are located, the planning and potential implementation for an upgraded power and communication network will be initiated. This network could enable the Port Authority’s Port Department and its tenants to move more rapidly toward low emissions operations and alternate energy usages, as well as provide potential for the incorporation of the many rapidly developing technologies emerging in the industry.

The Port Authority will concurrently implement the next phase of detailed planning, involving a study of our critical waterways and assessing future port

development options east of the Kill Van Kull – in both Brooklyn and Port Jersey.

In parallel the Port Authority will embark on a long-range ecological and mitigation program to proactively plan the environmental strategies that will be required to sustainably realize the physical expansion projects required through Phase II.

Embracing the communities that they serve, each of the facilities could have enhanced public access established during Phase I, and the Port Authority will seek to establish partnering opportunities to participate in development of these unique locality-focused features.

PORT NEWARK & ELIZABETH PAMT

PHASE I

The Port Authority will lead by example in the drive to lower emissions by implementing, in coordination with its tenants, an **alternate power source program**, converting to low-emissions and zero-emissions operations and equipment over time, adopting alternate power sources for all administration facilities, and progressively moving to an electric or alternate fuel cell system. This program will simultaneously work to enhance current incentives programs and promote renewable technologies as part of lease discussions with tenants.

Working with tenants and industry working groups, the Port Authority will plan and develop a clear understanding of future technology needs and establish a **site-wide communications and electrical platform** that is forward-looking and resilient to industry change.

The Port Authority will focus investment over the next 10 to 15 years on road-and rail-enabling projects, maximizing returns on the landmark regional infrastructure projects completed over the past decade. Through collaboration with current tenants and regulators, the Port Authority seeks to ensure that the projected growth in cargo volume is managed in a safe, resilient and efficient manner and that tenant operations progressively reduce the effects of congestion and emissions on the local communities.

While jointly studying the future of the critical waterways with the USACE, the Port Authority will continue to implement **roadside improvement projects** – including the planned Port Street realignment project, data capture utilizing E-ZPass or GPS reader technology, and chassis and empty container storage depot location studies, while progressively implementing projects to **improve connectivity** with I-95 and I-78.

Intermodal rail volumes will continue to increase.

The Port Authority will work with tenants and the railroads to ensure ExpressRail facilities continue to operate even more efficiently over time and have the capacity to accommodate the growing demand.

Options for increasing container terminal capacity at Port Newark will be considered, including the potential of adding a container berth on the east face of Port Newark South.

Responding to stakeholders' desires to have greater access and interaction with the waterfront facilities, the Port Authority will seek to work with the Cities of Elizabeth and Newark to envision and construct greater public access and to provide community-focused learning opportunities and workforce development, opening pathways to maritime jobs, and a window into the maritime ecosystem at the terminals. Design of these facilities could be developed collaboratively with the community partners and local stakeholders, commencing with a design competition to conceptualize and shape these important community-facing features.

- Work with existing container terminal tenants to optimize facilities
- Improve circulation along the common transportation spine (refer p. 49-50 for description of major road and rail projects).
- Increase intermodal capacity and service from Port Newark and Elizabeth PAMT (refer p. 49-50 for description of major road projects).
- Establish unified auto and bulk precincts at Port Newark.
- Optimize trucking movements through use of data capture technology.
- Establish upgraded power and communications network to accommodate future tenant operations.
- Develop sustainability roadmap and implement alternate power source program.
- Engage public through creation of learning center and/ or public viewing locations.



HOWLAND HOOK MARINE TERMINAL

PHASE I

Working with local stakeholders and the existing tenant, the Howland Hook Marine Terminal will be progressively built out to support **enhanced container-handling capability**. To fully support the growth of the facility, the Port Authority will review the existing toll discount program for container cargo and determine if any enhancements are required to ensure economic equity with costs incurred to access New Jersey facilities.

Partnering with regional transportation and planning authorities such as NYCEDC and NYCDOT, recent **logistics and distribution center** developments at the neighboring properties could be leveraged through greater connectivity between the facilities, the marine terminal, and local road and interstate highway network.

The Port Authority will seek to work closely with the existing tenant to broaden the potential cargoes handled at the facility and to take advantage of emerging opportunities, including off-shore wind and renewable energy support, project cargo, temperature controlled commodities, and roll-on/roll-off (RoRo) cargo.

The **E-ZPass data capture program** currently in place as part of the regional interstate truck movement tracking will be enhanced to enable the Port Authority to study the movement

of vehicles once they depart the facility and will enable improved visibility as well as promote greater understanding of the regional distribution flow of the cargo through the facility. This enhanced knowledge could be leveraged into new business, traffic flow improvement projects, and enhanced user experience.

The **Port Ivory** site could be developed into a logistic facility linked into the existing ExpressRail network, with a **realigned Western Avenue** to fully integrate the logistic complex with the intermodal rail and container facilities or developed to provide a manufacturing facility for the Offshore Wind industry.

- Support growth of Howland Hook container terminal.
- Develop Port Ivory site – Parcels B and C.
- Realign Western Avenue.
- Establish formal connectivity with adjacent logistic parks.
- Implement data capture program of trucking movements.
- Implement access improvement projects (refer p. 50 for description of major road projects).
- Expand intermodal capacity as demand increases (refer p. 50 for description of major rail projects).



PORT JERSEY PAMT

Over the next 30 years, the Port Jersey facilities in Bayonne and Jersey City could be expanded to form a **major integrated hub of container handling and distribution capacity**, relieving the stress on the waterway and road infrastructure currently servicing the Port's Newark and Elizabeth facilities. This complex would be served by upgraded road and rail infrastructure connecting directly to the existing railroad mainline and regional road network, minimizing impacts on public road users and communities. The expansion would be phased over time, working closely with stakeholders to understand and mitigate impacts, and to progressively and sustainably provide the additional capacity.

PHASE I

The initial phases of development will be focused on continuing to improve road-side connectivity and land-side traffic movements around the existing container facility, building on the recent completion of the **New Jersey Turnpike Authority's Interchange 14A, and promoting enhanced separation** of port and public vehicles. The Port Authority will look to work closely with the existing tenant to support these operations with progressive expansion that could eventually link directly into an **expanded ExpressRail Port Jersey** network that provides highly-efficient on-dock rail capability.

Simultaneously, the Port Authority will look to **investigate expansion alternatives** in close coordination with all stakeholders, for future additional container capacity at the northern end of the facility.

In support of these expansion plans, the Port Authority will develop long term land-use plans and work with existing tenants and local governments, as applicable, in support of Port Jersey and Bayonne maritime growth. **Land acquisition** of some properties may be required to enable the envisaged plan, and the Port would work with stakeholders to investigate potential

partnering opportunities for co-development or purchase. These strategic acquisitions will **improve circulation and ease congestion** in the area surrounding the facility and are necessary for the expansion of Port Jersey North, ExpressRail Port Jersey, and the properties that link into future development at Port Jersey South.

The Port Jersey South peninsula could be developed into a coordinated **distribution and warehousing hub**, in conjunction with the adjacent marine property owners, and a dedicated road corridor connecting containers and logistics zones could be established, optimizing land use and enhancing logistics operations and connectivity to container facilities leveraging synergies of both operations.

The Port Authority will work closely with local officials to continue to support the establishment of a **ferry terminal** on the Port Jersey South peninsula, and the Cape Liberty Cruise facility could be enhanced with provisions for a potential **future second berth**. Existing dry dock facilities will be maintained to support their vital function to the harbor and preserve their historic and cultural value to the region.

- Support existing tenant, GCT Bayonne (Global Container Terminals).
- Investigate potential for northern container terminal.
- Improve cargo flow of current Port Jersey PAMT operations (refer p. 51-52 for description of major road projects).
- Extend ExpressRail Port Jersey to serve expanded GCT Bayonne.
- Continue strategic land acquisition around Port Jersey PAMT.
- Establish Port Jersey South into coordinated warehouse and distribution hub.
- Investigate provision for future second berth at Cape Liberty.
- Provide land for ferry terminal.
- Consider the possibility of incorporating chassis and empty yards, LNG, OSW, and secure parking.



BROOKLYN PAMT & WATERFRONT FACILITIES

PHASE I

The Port Authority will continue to evaluate alternatives to maintain and **grow East-of-Hudson marine cargo operations** together with its partners at New York City Economic Development Corporation (NYCEDC) and Empire State Development (ESD).

Discussions and actions arising from the ongoing study of these alternatives will depend on timing, as well as the **successful partnering and collaboration** among numerous public and private stakeholders such as the City and the State of New York, shippers, labor groups, local planning boards, logistics service providers and host communities.

The continuation and growth of marine cargo activity at the Brooklyn Port Authority Marine Terminal (BPAMT) in Red Hook will require additional investment in infrastructure improvements and an exploration of ways to improve the facility's capacity on a constrained footprint with no intermodal rail connectivity.

Development at SBMT could enable the establishment of **a state-of-the-art marine facility with potential opportunities for phased expansion** to meet the needs of the East-of-Hudson market anticipated during the later years of the PMP timeframe. This facility would also provide linkages to rail and increased cross harbor freight activity.

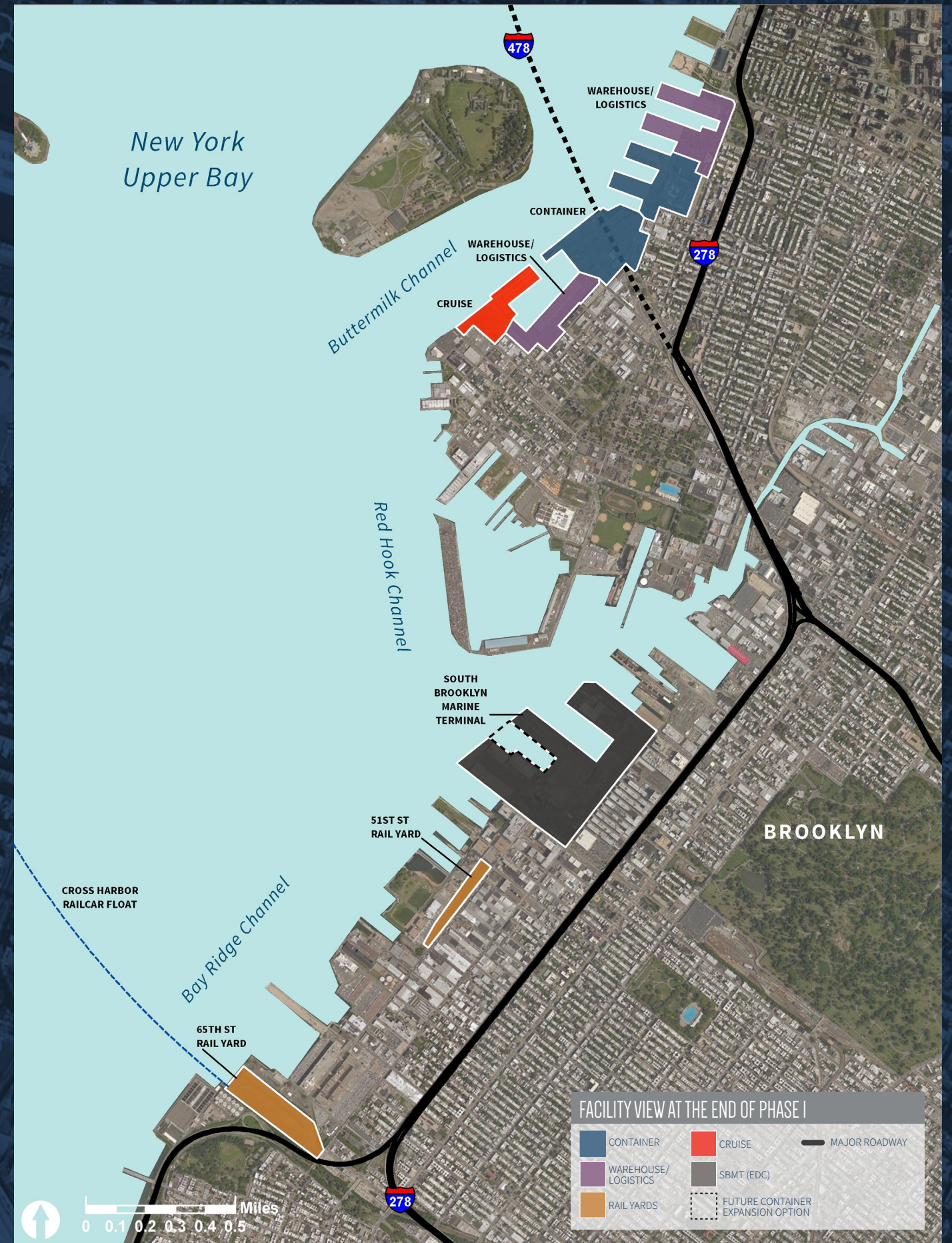
The parties will continue to assess a range of development plans to determine the appropriate size and location of marine terminal facilities and highlight any capital improvements necessary to ensure that cargo facilities are capable of not only accommodating the current Brooklyn

cargo volumes, but also the projected growth for East-of-Hudson cargo including offshore wind energy support facilities, temperature controlled commodities, project cargo, and recyclable materials as well as cruise passenger facilities.

An important component of Brooklyn's maritime future is the Cross Harbor Railcar Float. The Rail Float is operated between Greenville Yard (Port Jersey) and the 65th Street Rail Yard in Brooklyn by New York New Jersey Rail, LLC (NYNJRL, a wholly owned subsidiary of the Port Authority). These facilities, along with the First Avenue Line and the 51st Street Rail Yard, provide a vital link between the national rail network and rail customers in Brooklyn and Long Island. In turn, the provision of a rail- and waterborne linkage across the harbor has the potential to remove hundreds of trucks per day from the region's roads and bridges, along with reducing the associated emissions.

Marine cargo development options for the Brooklyn waterfront may include the following:

- Berth and apron upgrades supporting the existing Brooklyn Cruise Terminal
- Marine Highway (barge or other small vessels) facilities
- Upgrades and enhancements to the existing Red Hook pier structures
- Enhancements to existing terminal facilities to accommodate services in support of NYC passenger ferries
- Site modifications to the current SBMT facility
- Phased expansion of the SBMT facility
- Enhancements to the 1st Avenue rail corridor in Sunset Park and 51st Street Rail Yard
- Enhancement to existing cross-harbor facilities at 65th Street Rail Yard.





ROAD, RAIL, AND WATERWAY NETWORK

Strategies outlined for road, rail, and marine highway span across Phase I and Phase II.

Road

The Port Authority will work with partner agencies to collaboratively plan and look to implement connectivity projects to major road networks, including improvements to the Newark and Elizabeth transportation spine that runs along Corbin Street and McLeister Street, modified connections to I-78 and I-95, HHMT connectivity onto I-278, and the Newark Bay Bridge.

Rail & Intermodal

Partnering with major regional railroads, the Port Authority will promote increased intermodal rail volumes. Expansion by Class I railroad partners of off-dock facilities will be required. Capacity upgrades such as additional storage tracks and linkages to any future container capacity may be required. Opportunities for the development of an inland port facility outside the Port District will be investigated.

Waterways & Marine Highway

The Port Authority has initiated a joint study with the USACE to refine navigability on existing waterways and assess the timing and scale of future deepening projects.

Existing Cross Harbor Railcar Float operations between South Brooklyn and Greenville Yard will continue to be supported.

Recognizing the untapped potential and excess capacity of the coastal waterways, the Port Authority's Port Department has made regional barge service one of its strategic initiatives. The Port Authority and NYCEDC will continue to support the North Atlantic Marine Highway Alliance (NAMHA, initiated in 2018), which will seek to foster the use of barge services to offset the use of trucks and supplement rail cargo to and from the Port.

The development of the NAMHA complements Freight NYC, a plan released by NYCEDC designed to reduce dependency on trucking distribution of freight in and around New York City in favor of rail and marine barging.

As freight volumes increase and incoming vessels increase in size, barging presents one part of a sustainable solution. The development of the Marine Highway will aim to help reduce the reliance on trucks to transport goods to and from the port.

Commodities such as beverages, wood, paper, rubber, and iron and steel have been identified as ideal candidates for distribution via the Marine Highway.



FACILITY ROAD AND RAIL ENHANCEMENTS

PHASE I

PORT NEWARK & ELIZABETH PAMT

Road improvement projects will be focused on enhancing the circulation and movement along the common transportation spines of McLester and Corbin Street, with four primary enhancements identified.

NE-1. Port Street interchange improvements. Completion of the planned Port Street Corridor Improvement project. Potential new onramp to I-95 NB and two additional ramps if demand warrants.

NE-2. At-grade expansions of Corbin Street to achieve six lanes (3 each-way) south of Marsh Street and eight lanes (4 each-way) north of Marsh Street.

NE-3. McLester Street realignment. Millennium Marine Rail (MMR) Lead Track Flyover with elevated McLester Street realigned to ease existing horizontal alignments.

NE-4. North Avenue interchange improvements. Direct connection from I-95 NB to North Avenue and a realigned McLester Street. Flyover to I-95 SB and direct connections to I-95 NB. Rail improvements will focus on increasing intermodal capacity and service to the existing ExpressRail facilities and increase service to the newly established auto and bulk precincts.

NE-5. Corbin Street Support Yard improvements. Lengthened yard with five additional tracks.

NE-6. Millennium Marine Rail expansion. Realigned lead tracks plus third lead track. Up to 14 new tracks to support intermodal demand.

NE-7. Rail service to auto precinct. Rail access would be provided through the existing rail spur from the north; realigned along southern edge of Port Street and integrated with auto terminal working tracks.



HOWLAND HOOK MT

Road and Rail improvements at Howland Hook MT would include:

HH-1. Realignment of Western Avenue. Realigned Western Avenue east of a modernized Port Ivory, providing direct access between the container terminal and the adjacent ExpressRail intermodal facility.

HH-2. Howland Hook exit gate realignment and outbound roadway extension.

HH-3. Marine Terminal Highway designation for roadway connections to Matrix Global Logistics Park.

HH-4. Upgrade ExpressRail Staten Island. Constructing Tracks 8 through 11 at the existing rail yard, as volume demands. An expansion at adjacent Arlington Yard would also be required in coordination with NYCEDC and Conrail.



FACILITY ROAD AND RAIL ENHANCEMENTS

PHASE I

PORT JERSEY PAMT

Road and **Rail** improvements at Port Jersey PAMT will be focused on continuing to improve connectivity to the interstate system, connecting the GCT Bayonne container terminal to the newly constructed ExpressRail Port Jersey and to the expanding industrial complex at Port Jersey South. Primary enhancements include:

PJ-1. Improve cargo flow of current Port Jersey PAMT operations, including the realignment and construction of 6,000 linear feet of new access road, and the construction of dedicated internal road access connecting future warehouse and logistics center (northwest of GCT Bayonne).

PJ-2. Connecting GCT Bayonne and ExpressRail Port Jersey: Directly connect terminal to ExpressRail Port Jersey via a dedicated road corridor.

PJ-3. Extend ExpressRail Port Jersey to serve expanded GCT Bayonne. 600-foot extension for all eight tracks (currently 1,200 feet each), increasing working track length.

PJ-4. Establish direct connections between container facilities and Port Jersey South hub. Network of internal roadways to provide a direct link between the proposed in-gate at GCT Bayonne and the Port Jersey South hub.

PJ-5. Continue to support Cross Harbor Railcar Float. Advance Tier II EIS to provide further detail around feasibility of a dedicated freight rail tunnel, connecting Port Jersey with East-of-Hudson intermodal rail hubs.



BROOKLYN WATERFRONT

The Cross Harbor Railcar Float operations and Brooklyn rail facilities will continue to be supported. The Brooklyn Waterfront Railroad – including 65th Street and 51st Street Rail Yards and associated rail track linkages – will continue.

The Port Authority will continue to work closely with NYCEDC and NYCDOT to ensure that rail movements and vehicular traffic on First Avenue do not create unacceptable conflicts.

Roadway access to the container terminal at Brooklyn PAMT will continue to be via the main gate at Hamilton Avenue and Van Brunt Street.

PHASE II 30-YEAR PLAN

Phase II anticipates the movement of containerized cargo will continue to use a sizable portion of the Port Authority's land assets. Additionally, autos, bulk cargoes, and the passenger cruise industries will continue to be a strong focus and will be concentrated, with dedicated berths, around similar uses to streamline operations and enhance collaboration within each cargo sector.

Container terminal capacity will be centered around major container hubs on either side of the Kill Van Kull channel – with potential expansion options existing at Port Newark, Brooklyn, and Port Jersey.

Intermodal rail operations will be incrementally enhanced and may start to accommodate domestic intermodal containers as more international cargo shipments are trans-loaded into 53-foot domestic trailers in locations at or near the Port Authority facilities.

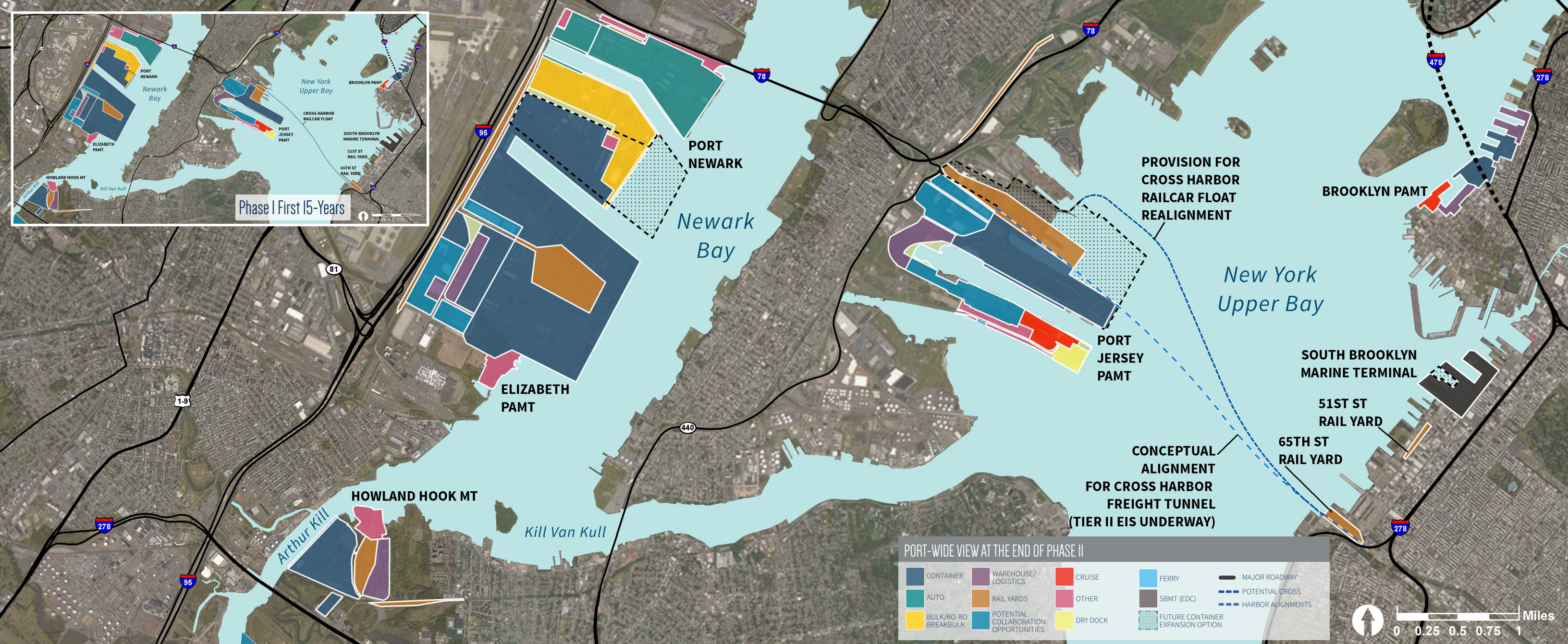
Operations across facilities will incorporate low-emission equipment and supporting infrastructure in partnership with tenants. State-of-the-art power and communication platforms will be in place, enabling the Port

Authority and its tenants to implement new technologies, such as hybrid fueling and smart lighting, further enhancing the Port Authority's leadership in emissions reduction, energy efficiency, safety, and security.

Key maritime functions will continue to be supported, through the retention of maritime-industry infrastructure such as dry docks, lay-up berthing, and provision for increased barging activities.

New technologies – such as semi-automated guided vehicles (AGVs), data-driven operations, and electric vehicles – could become widespread across the facilities. These technologies would enable an enhanced Operations Control Center to be established, allowing stakeholders to monitor, share, and learn from real-time performance data.





PHASE II FACILITIES

Existing terminal infrastructure and all new facilities will be raised or constructed above the flood hazard elevation and further protected against future extreme weather events, ensuring that a resilient node point exists within the region that could remain operational in the event of another extreme storm event. Solar panels will be installed on new warehouse facilities to provide renewable energy sources for the tenants and operations.

PORT NEWARK & ELIZABETH PAMT
 Phase II will see progressive consolidation and realignment of the current land use within specific cargo categories. An **auto precinct** may be established with potential for dedicated berths and improved rail access at Port Newark North, and existing bulk leaseholds may be consolidated into a **bulk precinct** at Port Newark South.
 The container terminal footprints may be adjusted over time with potential to allocate space for the incorporation of **integrated logistics centers** or to provide additional container capacity along Port Newark South. Focus will be placed on continuing to improve circulation along the common transportation spine, with an end-state view to **establish a port road network**

that is separated from public roads and supports AGV linkages.

HOWLAND HOOK MARINE TERMINAL
 As container volumes increase, **expansion of the ExpressRail facility** may be carried out to accommodate the intermodal volumes. The Port Authority will work closely with regional planning agencies to progressively study and seek to implement key infrastructure **projects to enhance traffic flow** around the facilities.

PORT JERSEY
 As container volumes dictate the need for additional capacity, the Port Authority will consider initiating the expansion plans developed in Phase I.

To accommodate the projected growth, a **high-efficiency intermodal rail yard** would connect with the existing Railcar Float operations and future Cross Harbor alternatives with direct connections to Corbin Street and National Docks Rail Yards.

BROOKLYN PAMT & WATERFRONT FACILITIES
 Having secured the future of marine cargo arriving directly to an East-of-Hudson facility, the Port Authority and its partners could look to continue expanding along the Brooklyn waterfront to provide additional **container capacity east of the Kill Van Kull channel**. This increased capacity could potentially link directly into Cross Harbor freight infrastructure, which will have been developed in parallel with Phase I developments.

FIRST STEPS (0 TO 5 YEARS)

PORT-WIDE

Following are the first implementation projects that would commence within the next 5 years as the Port Authority considers the initial stages of realizing a new future for the Port.

I. SUSTAINABLE & RESILIENT INITIATIVE

(start: month 0 – ongoing)

Striving to lead by example in the region, the Port Authority will continue to set green goals and policies aimed at driving down port-related impacts on the environment and surrounding communities. The agency will define the timeline and extent of internal Port Authority's transition to low-emission operations, and to establish procedures to ensure initiatives are shared and supported by future projects, processes, and stakeholders.



2. STATE OF THE ART INITIATIVE

(start: month 0 – ongoing)

Establish technology planning working group to coordinate the assessment and incorporation of new technologies into the Port Authority's operations, facilities and tenant interfaces. Facilitate a series of ongoing planning forums amongst tenants, industry and regional stakeholders to identify relevant technologies for incubation and implementation, and to define the needs for a future technology platform.



3. SHAPING FUTURE GROWTH

(start: month 0 – ongoing)

Scope the following near-term studies to enable decision making for future projects:

- NYNJ waterways capacity study project in conjunction with USACE (Refer to Item 6),
- Brooklyn siting study
- Intermodal initiatives.



4. PLATFORM FOR PARTNERSHIP

(start: month 0 – ongoing)

Recognizing the need to work collaboratively with all stakeholders, establish consistent stakeholder outreach procedures for future projects and studies. Work closely with host communities to scope initiatives identified in the PMP.



5. REGIONAL ECONOMIC GENERATOR

(start: month 0 – ongoing)

Demonstrate immediate action and partnering by developing scope of work for Port Ivory and Port Jersey South development projects, and commencing early engagement with local industry and commercial interests.



PORT-WIDE

6. Conduct detailed future capacity analysis of New York and New Jersey waterways *(start: month 0 > 2 years)* ●●●●●

Collaborate with USACE on the Navigational Improvement Study, to establish the extent of future dredging and widening requirements in the harbor (including Kill Van Kull, Bay Ridge Channel, and throughout Newark Bay) and conduct a detailed assessment into the full impacts of expansion, considering impacts to the numerous waterway stakeholders and the environment. This analysis will be developed concurrently with a long-range ecological and mitigation strategy centered around mutually beneficial projects. This study was authorized and approved by Congress in the fall of 2018.

7. Collaboratively plan for the future *(start: month 6 > 3 years)* ●●●●●

Establish planning forums with and among major tenants. Coordinate tenant expansion alternatives and develop location-specific plans informed by the PMP and future data capture analyses.

8. Increase intermodal (discretionary) rail cargo volume *(start: month 12 > 5 years)* ●●●

Work with Class I railroads, shippers, ocean carriers, terminals, and regional stakeholders to study potential inland port locations, begin environmental screening to identify candidate sites, and identify roadmap to prioritize and identify funding for these projects.

Sustainability & Resiliency



State of the Art



A Platform for Partnership



Shaping Future Growth



Regional Economic Generator



PORT NEWARK & ELIZABETH PAMT

1. Improve circulation along common transportation spine and local port streets (*start: month 6 > 2 years*) ●●●●●
Implement data capture project & optimize chassis and empty container storage locations. Continue with Port Street realignment and plan for long-term road improvement projects at North Avenue, Corbin Street, and McLeister Street.
2. Establish upgraded power and communications network (*start: month 6 > 2 years*) ●●●●●
Convene technology forum, conduct power use analysis, and develop outreach program on benefits of power and technology improvements.
3. Continue move to low emission operations (*start: month 12 > 5 years*) ●●●●●
Adopt improved energy management practices for Port Operations, including use of solar resources for on-site generation and deployment of electric and hybrid-powered ground equipment. Work with tenants to adopt similar practices and incorporate incentives into lease agreements. Enhance data capture, monitoring and sharing of emissions and port efficiency performance information.
4. Establish community & education projects (*start: month 6 > 5 years*) ●●●●●
Partner with City of Newark and City of Elizabeth to jointly plan public areas that can serve as meeting places for community use, focused on education, training, and interfacing with the working waterfront.

PORT JERSEY PAMT

1. Expand GCT Bayonne (*start: month 12 > 5 years*) ●●●●●
Work with current tenant and partner agencies to progressively and strategically expand GCT Bayonne capacity.
2. Plan for future capacity (*start: month 24 > 3 years*) ●●●●●
In conjunction with regional stakeholders and regulators, begin planning process to identify future capacity requirements and development opportunities at Port Jersey North.
3. Strategic land acquisition (*start: month 0 > 5 years*) ●●●●●
Continue strategic land acquisitions process west of existing facilities to enable greater control of landside vehicle movements and local impacts. Develop outreach program to inform host community of learning opportunities, job creation, and community benefits associated with potential acquisitions.
4. Support development at Port Jersey South (*start: month 0 > 5 years*) ●●●●●
Work with owner of adjacent industrial property to jointly establish an integrated warehousing and distribution hub on the Bayonne peninsula. Maintain and preserve the existing dry-dock capacity. Preserve existing cruise terminal capacity and explore opportunities for the construction of a second berth.
5. Support ferry terminal service (*start: month 0 > 2 years*) ●●●●●
In conjunction with City of Bayonne and regional stakeholders, continue to support the establishment of a ferry terminal landing on Port Jersey South peninsula.

HOWLAND HOOK MT

1. Support HHMT growth (*start: month 0 > 2 years*) ●●●●●
Review current toll discount program for container cargo moving through the terminal and assess alternatives to promote cargo growth.
2. Implement coordinated marketing strategy (*start: month 0 > 1 year*) ●●●●●
To support greater facility utilization, commence joint marketing programs and initiatives to investigate break-bulk, RoRo, project, and wind energy cargoes. Also investigate South American services that cater to the perishable market. Integrate cold storage capability into marketing program.
3. Develop Port Ivory site & re-align Western Ave (*start: month 0 > 2 years*) ●●●●●
Working with container terminal tenant and adjoining business, co-develop Port Ivory site into logistics center or offshore wind facility, with connections to re-aligned Western Ave.

BROOKLYN PAMT

1. Continue to support and enhance operations at the Red Hook and Brooklyn Piers Facilities (*Start: month 0 > 5 years*) ●●●●●
While further analysis of the maritime future for the Brooklyn waterfront is undertaken, continue to support and enhance current operations. Jointly market for additional business and take immediate action on necessary repairs and other facility upgrades.
2. Maintain and grow container and maritime activity on the Brooklyn Waterfront (*Start: month 0 > 5 years*) ●●●●●
In conjunction with New York City and State agencies, continue to jointly study options for maritime cargo development in Brooklyn. Potential development options include:
 - Site modifications to the current BPAMT and SBMT facilities.
 - Further expansion south and potential additional facility extending the 65th street rail yard with linkage to the Cross Harbor Freight operations.

SUMMARY OF FIRST STEPS (0 TO 5 YEARS)

Project	Purpose	Partners	Timeline (years)				
			0-1	1-2	2-3	3-4	4-5
Port-Wide							
1 ● Establish working group, green goals and policies.	Establish inputs into future projects, processes and lease negotiations	• EPA, communities, tenants, vendors	▶	▶	▶	▶	▶
2 ● Establish working group, planning forum and policies for inclusion in projects, processes and leases.	Identify relevant technologies for incubation and implementation, develop needs for future tech. platform.	• Tenants, vendors, tech companies	▶	▶	▶	▶	▶
3 ● Scope NYNJ waterways capacity study project, Brooklyn studies, intermodal initiatives.	Enable decision making for future built projects	• Tenants, NYCEDC, railroads, DOTs, USACE	▶	▶	▶	▶	▶
4 ● Establish consistent stakeholder outreach procedure; scope public access.	Develop great levels of openness and trust with stakeholders to enable future projects to progress	• Communities, elected officials	▶	▶	▶	▶	▶
5 ● Develop scope of work for Port Ivory and Port Jersey South development projects.	Demonstrate immediate action and partnering by acting on historic under-utilized properties	• Local business, adjoining owners	▶	▶	▶	▶	▶
6 ● Conduct detailed future capacity analysis of New York and New Jersey waterways.	Establish timing and direction of Phase II	• USACE	▶	▶	▶		
7 Collaboratively plan for the future	Establish dialogue between Port Authority, container terminals, and other stakeholders to prepare for Phase II implementation	• Tenants		▶	▶		
8 Increase intermodal (discretionary) rail cargo volume (planning and marketing)	Reduce truck traffic/congestion and promote the Port's continued status as first port of call to provide most favorable speed to market	• Railroads • Terminals; shippers • Regional stakeholders			▶	▶	▶
Port Newark & Elizabeth PAMT							
1 ● Improve circulation along common transportation spine and local port streets	Reduce congestion and emissions, including implementation of smart technologies	• Transcom, NJDOT, NYCDOT, NJTA		▶	▶		
2 ● Establish upgraded power and communications network (study phase; implementation to follow)	Provide future-proofed, resilient, and redundant power and communications links to support future Port Authority/tenant needs	• Utilities		▶	▶		
3 ● Continue move to low emission operations	Establish PANYNJ as green port			▶	▶	▶	▶
4 ● Establish community access & education programs	Create education pipeline; promote links between community and working waterfront	• City of Newark • City of Elizabeth		▶	▶	▶	▶
Howland Hook Marine Terminal							
1 ● Support HHMT growth	Promote equity between HHMT and other competing container terminals	• Tenants	▶	▶	▶		
2 ● Implement coordinated marketing strategy	Establish higher utilization of existing HHMT footprint	• Tenants	▶	▶			
3 ● Develop Port Ivory site and re-align Western Ave	Shift to highest and best land use at Port Ivory, including leveraging proximity to terminal	• SIEDC • Neighboring developments	▶	▶	▶		

● Sustainability & Resiliency ● State of the Art ● A Platform for Partnership ● Shaping Future Growth ● Regional Economic Generator



Project	Purpose	Partners	Timeline (years)						
			0-1	1-2	2-3	3-4	4-5		
Port Jersey PAMT									
1	Establish ferry terminal service	Aligns with host community needs and plans	• City of Bayonne	◆—————◆					
2	Strategic land acquisition	Support progressive establishment of Port Jersey marine district, in line with Port Master Plan	• Local stakeholders	◆—————◆					
3	Co-develop Port Jersey South	Enable highest and best use of Port Jersey South peninsula by integrating with neighboring landowner	• Adjacent owner	◆—————◆					
4	Expand GCT Bayonne	Facilitate expansion of terminal in line with increasing volumes	• Tenants • Cities of Bayonne and Jersey City		◆—————◆				
5	Plan for future capacity	Meet potential need for additional capacity outside of Kill Van Kull, dependent on direction of Phase II	• Regional stakeholders • Regulators			◆—————◆			
Brooklyn PAMT									
1	Maintain and grow container and maritime activity on the Brooklyn waterfront	Identify practical expansion options to accommodate East-of-Hudson cargo	• State of New York • City of New York	◆—————◆					
2	Continue to support and maintain operations at Brooklyn PAMT facilities	Enable continued success of maritime operations until alternate location, if any, is operational	• Tenants; carriers	◆—————◆					

PORT MASTER PLAN 2050 RESULTS

When successfully implemented, the Port will be a competitive and financially successful port that is environmentally sustainable and provides the maximum benefit for regional jobs and economic impact.



State of the Art

- Leveraging technology developments to:
 - Improve safety
 - Streamline infrastructure operations and maintenance (O&M)
 - Increase efficiency across the port and the region



Sustainability & Resiliency

- Greenhouse gas emissions reduced by 35% by 2025 and 80% by 2050
- Alternative-fuel vehicles deployed
- Alternative energy sources harnessed
- New construction includes resiliency measures
- Increasing modal split



Regional Economic Generator

- 80,000 new jobs created regionally
- \$25 billion in incremental economic activity
- Implements 30 major projects and develops unused space
- Workforce development and education opportunities



A Platform for Partnership

- Enhanced community engagement
- Ongoing Industry forums and summits
- Public and Port Authority engaged through greater connectivity



Shaping Future Growth

- Proactive rather than reactive
- Partnering with state and regional planning organizations

TEAM, ACRONYMS, AND CREDITS

TEAM

Governors: State of New Jersey: Governor Phil Murphy, State of New York: Governor Andrew Cuomo

The Port Authority Director's Office: Rick Cotton

The Port Authority Board of Commissioners: Kevin J. O'Toole (Chairman), Jeffrey H. Lynford (Vice Chairman), Richard H. Bagger, Leecia Eve, Daniel J. Horwitz, Gary LaBarbera, Kevin P. McCabe, George T. McDonald, Raymond M. Pocino, Rossana Rosado, David S. Steiner

The Port Authority Port Department: Sam Ruda, Bethann Rooney, Andy Saporito, Charlie Bontempo

Project Principal:

HATCH

Project Teaming Partners:

AKRF

Bermello Ajamil & Partners, Inc

Cheng Solutions LLC

Ernst & Young Infrastructure Advisors, LLC

HR&A Advisors

Karp Strategies

Martin Associates

M&J Engineering, P.C.

The Partnership for Sustainable Ports

STV

VJ Associates

ACRONYMS AND ABBREVIATIONS

AGV	Automated Guided Vehicle
AI	Artificial Intelligence
BMP	Best Management Practice
CEU	Car Equivalent Unit
CHFP	Cross Harbor Freight Program
CHFT	Cross Harbor Freight Tunnel
ECT	Electrical, Communications, and Technology
GCT	Global Container Terminal
HHMT	Howland Hook Marine Terminal
ICT	Information and Communications Technology
LNG	Liquefied Natural Gas
MOTBY	Military Ocean Terminal at Bayonne
NJ	New Jersey
NJDEP	New Jersey Department of Environmental Protection
NJTA	New Jersey Turnpike Authority
NS	Norfolk Southern
NY	New York
NYCDOT	New York City Department of Transportation
NYCEDC	New York City Economic Development Corporation
NYNJR	New York-New Jersey Rail
OSW	Offshore Wind
PMP	Port Master Plan
RHCT	Red Hook Container Terminal
RoRo	Roll-On/Roll-Off
SBMT	Brooklyn Marine Terminal
TEU	Twenty-foot Equivalent Units
USACE	United States Army Corps of Engineers

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