



Philadelphia Regional  
Port Authority

# Southport Marine Terminal Development Philadelphia, PA

Regional Port, Global Impact



April 2016

# TIGER

US DOT TIGER  
Discretionary Grant Application



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## 1 EXECUTIVE SUMMARY

The Philadelphia Regional Port Authority (PRPA) is requesting \$25 million in discretionary grant funds from the 2016 TIGER Program for Phase 1 of the development of the Philadelphia Southport Marine Terminal Complex (Southport), to provide cost savings to the nation while meeting the growing regional need for seaport container capacity in the Northeast United States.

Development of the Southport terminal would be a transformative project that reinstates Philadelphia as a major shipping hub for the Northeast region, providing an equitable distribution of federal and state funds to a region that has struggled since the 2008 economic downturn.

Currently, 85% of all imported containerized goods that are consumed in the Philadelphia region are trucked in from the neighboring ports in New York, Baltimore, and Norfolk, per a PIERS data analysis performed by PRPA in 2014. The development of Southport would reverse this trend, resulting in a reduction of over 350 million trucking miles over the next 25 years.

Accounting for the value associated with reduced truck miles and emissions, this project has a **Benefit Cost Ratio of 2.92** and would provide socioeconomic benefits to the U.S., namely:

- **Safety** – Fewer traffic accidents and less wear and tear on roadways.
- **State of Good Repair** – Enhanced intermodal trade and increased efficiency of the regional freight network. The project would ease congestion and relieve inefficiencies at other regional terminals which collectively form a portion of our national transportation network.
- **Economic Competitiveness** – Improved regional efficiency of containerized cargo transport and creation of new jobs, providing a Ladder of Opportunity to a workforce that has been hard-hit by the struggling U.S. economy.
- **Quality of Life** – Alignment with the initiatives of the Commonwealth of Pennsylvania. The project will positively impact the region by reducing interstate trucks on local road networks, resulting in less congestion and shorter commutes.
- **Environmental Sustainability** – Reduced diesel consumption and greenhouse gas emissions will result in a cleaner, less polluted local region.

**Innovation** – Procurement strategy (public-private partnership) and state-of-the-art technological components will establish Southport as a first-class marine terminal.

**Partnership** – Multiple public agencies and stakeholders are working together with a major private partner, collaborating to leverage public funds for the betterment of the region.

**Project Readiness** – Concept design is well advanced. The project has received all environmental and legislative approvals and has completed the requisite environmental mitigation. PRPA, with the support of the Commonwealth of Pennsylvania, is in advanced stages of the public-private-partnership (P3) procurement process. The Southport Request for Proposals was released to bidders in February 2016 with responses due August 2016. Award for detailed design and construction is projected for fall 2016.



## 2 PROJECT DESCRIPTION

The Southport Marine Terminal Development will provide an annual throughput capacity of 300,000 twenty-foot equivalent units (TEUs) to service the region’s projected near-term container demand. The fully mechanized terminal will contain a new 1,064-foot vessel berth, dredged -45-ft (MLLW), and 20 acres of upland container storage.

The Phase 1 development will be funded through a Public-Private Partnership between PRPA and a private consortium.



**figure 1 / SOUTHPORT PROJECT LOCATION**

### 2.1 PROJECT BACKGROUND



**figure 2 / SOUTHPORT TERMINAL RENDERING**

PRPA is requesting \$25 million in discretionary grant funds from the 2016 TIGER Program for Phase 1 of the development of the Southport Marine Terminal to meet the growing regional need for seaport container capacity in the Northeast United States. This grant application applies only to the public portion of the development consisting of the ship berth infrastructure elements, valued at \$97.7M (see below).

PRPA is an independent agency of the Commonwealth of Pennsylvania charged with the management, maintenance, marketing, and

promotion of publicly-owned port facilities along the Delaware River in Philadelphia, as well as strategic planning throughout the port district. PRPA works with its terminal operators to modernize, expand, and improve its facilities, and to market those facilities to prospective port users. Port cargoes and the activities generated by the Port are responsible for thousands of direct and indirect jobs in Philadelphia and throughout the state.

2014 marked a landmark year in terms of containerized cargo growth at the Port of Philadelphia, with an increase in container throughput of over 22%. While 2015 showed a 5% decrease in throughput against the record numbers of 2014, the throughput numbers still showed significant positive growth over the past five years. These numbers further emphasize the need to expand operations and develop the Southport property into a marine terminal capable of meeting the container industry’s demands for the next 25 years and beyond.

	<b>TIGER Grant Funding</b>	<b>Public-Private Partnership (PPP) Funding</b>
Single vessel berth	\$25,000,000	\$72,700,000
Equipment & Infrastructure	\$0	\$211,000,000
<b>Total project cost</b>		<b>\$308,700,000</b>



## 2.2 PROJECT PURPOSE AND NEED

### ECONOMIC OVERVIEW OF THE NORTHEAST CONTAINER MARKET

The U.S. container shipping industry has experienced rapid growth over the past generation due to the surge in Asian manufacturing and other factors. For ports representing the U.S. Northeast, the largest consumer market in the nation, container volumes more than doubled in the decade leading up to the global recession that started in 2008<sup>1</sup> and have increased steadily since the recession, hitting all-time highs in 2014 at many East Coast terminals<sup>2</sup>.

Trends in U.S. container volumes follow trends in U.S. gross domestic product (GDP), due to the close dependencies of both on U.S. consumer spending. Therefore, as U.S. GDP is expected to grow, container demand is expected to follow within the U.S. Northeast, and the nation at large.

This growth in Asian containerized goods is especially apparent in the Philadelphia region. Large-scale distribution centers have been developed to serve as hubs to many of the East Coast ports. Of the facilities which have the least-cost trucking service from the Port of Philadelphia, over 300 are located throughout the Philadelphia hinterland in Westhampton, Delran, Swedesboro, and Burlington, NJ; and Mechanicsburg, Chambersburg, York, Reading, Allentown, and King of Prussia, PA<sup>3</sup>.

However, existing capacity is not sufficient to meet projected demand growth. While these distribution centers help alleviate road congestion away from the ports, they do little to improve efficiency at the ports themselves. The growth in regional demand for containerized goods has caused congestion in these ports that is expected to worsen in the coming decade.

### PORT OF PHILADELPHIA REGIONAL OVERVIEW

The Philadelphia region is currently serviced by the local Port of Philadelphia but also by the major ports of NY/NJ, Baltimore, and Virginia. The local Port of Philadelphia provides direct ship access to the region which, theoretically, is the least-cost alternative compared to truck or train. However, Philadelphia terminals satisfy only a small fraction (15%) of their own regional container demand, and the majority of that meager share enters through Packer Avenue Marine Terminal (PAMT).

With an abundance of refrigerated (reefer) plugs and warehouse space, PAMT provides excellent infrastructure for meat, fruit, and other perishable commodities. The PAMT facility is nearing capacity and the operator and PRPA have established a capital plan to increase capacity. However, even with the future planned expansion of PAMT, we believe that the growth in container demand will exceed capacity at the Port of Philadelphia, putting Southport in a prime position to take on new carriers and shippers that would benefit from a Philadelphia port call.



figure 3 / CONTAINER CRANE AT PORT OF BREMERHAVEN  
image © Andrew Shiva



Other regional Philadelphia terminals are poorly suited to handle new container growth. Nearby Wilmington Marine Terminal is a specialty port for refrigerated fruit and banana imports. Major expansion for general containerization would require significant modifications to its infrastructure, operations, and equipment. Upriver, the Delaware River terminals handle only a small fraction of the Port's containerized goods and are limited by air draft restrictions at the major bridges crossing the shipping channel.

Approximately 85% of all containerized cargo destined for the Philadelphia region arrives by truck. Based on a PRPA container market study of the Philadelphia hinterland as it relates to North Atlantic ports<sup>4</sup>, nearly two-thirds is trucked in from the port of NY/NJ, and an additional quarter is trucked in from the ports of Virginia and Baltimore. This analysis incorporates detailed cost and mileage data on container distribution to the 21 counties within Pennsylvania, New Jersey, and Delaware that have the least trucking distance from the Port of Philadelphia.

Historically, with the major port of NY/NJ so close by and the inland distribution network well-advanced to service it, the Philadelphia market has not attracted major global shipping lines of generalized container cargo. The Port's relative proximity to its competitors, in conjunction with insufficient water depth in the Delaware River channel, is partly why Philadelphia has evolved into a specialty port for meat, fruit, and other low-volume cargo.

But change is on the horizon. With \$208 million in federal dredging funds already appropriated, the U.S. Army Corps of Engineers (USACE) is deepening the Delaware River to a minimum depth of 45 feet. With scheduled completion in 2017<sup>5</sup>, this deepening will provide new opportunity for the region to attract the major North European and Asian shipping lines. The deepening would allow passage of post-Panamax vessels that are expected along the U.S. Atlantic coast with the opening of the new Panama Canal. Asian-sourced vessels would be approaching Philadelphia from the south, making it a closer destination than NY/NJ.

The inland distribution network for containerized cargo now extends well into the Philadelphia hinterland, so the network is set up to handle containers entering directly through Philadelphia. Therefore, it makes sense that a much larger share of the region's containerized goods should be shipped directly into Philadelphia, the fifth-largest city in the nation, rather than trucked in from outside the region.

Furthermore, the Ports of NY/NJ and Baltimore are nearing their maximum capacities and have become congested. Each of these major ports contains an inherent bottleneck that physically limits its future growth potential.

- Baltimore's bottleneck is the Howard Street Tunnel, which serves as the primary container rail link to the rest of the region. Container throughput through this 120-year-old tunnel has reached capacity. Plans, five years in the making, for a \$90-million bypass were recently scuttled by MDOT<sup>6</sup>, leaving the port of Baltimore with no near-term options for major growth.
- For NY/NJ, it is a land constraint. The real estate available for development is simply running out. In 2015, the Port of NY/NJ handled 6.4 million TEUs<sup>7</sup>. Based on a study<sup>8</sup> of the six NY/NJ regional container terminals, the total container throughput capacity for the Port of NY/NJ is 7.3 million TEUs. Container



throughput at the port has grown on average at a healthy clip of 4.1% per year since 2007, even including the reeling effects of the 2008 recession<sup>9</sup>. Based on continued near-term growth at this same pace, the terminal will be over capacity within the decade.

- To increase future capacity, NY/NJ terminals will need to densify their container stacking and handling operations. This will require large-scale capital investment for new infrastructure and new modern container handling equipment.
- Therefore, neither of these ports will be able to manage the projected growth in U.S. Northeast container demand without huge investment in new infrastructure.

Port of Virginia does not contain a specific bottleneck, but its particular drawback is its trucking distance to Philadelphia, which is nearly three times that of either NY/NJ or Baltimore.

With TIGER Grant funding available to capitalize on the national infrastructure development initiatives of Obama administration, it makes sense to situate this infrastructure in Philadelphia where it can put the federally funded dredging program to good use, while relieving some of the burden on NY/NJ and Baltimore and reducing inter-regional trucking.

A new container terminal at Southport would provide the capacity necessary to meet future regional and extra-regional demand for the next 25 years and beyond. It would relieve congestion at the major ports of NY/NJ and Baltimore and improve the share of U.S. Northeast container trade shipped directly to the Philadelphia region, as depicted in Figure 3 below.

Establishing a new container terminal at Southport would reduce trucking miles by providing container ships with a state-of-the-art alternative destination to the ports of NY/NJ, Baltimore, and Virginia. As calculated in the BCA<sup>10</sup>, six million truck miles would be saved in the first year of operation of a new Southport terminal. This savings would increase in proportion to the growth in container throughput demand.

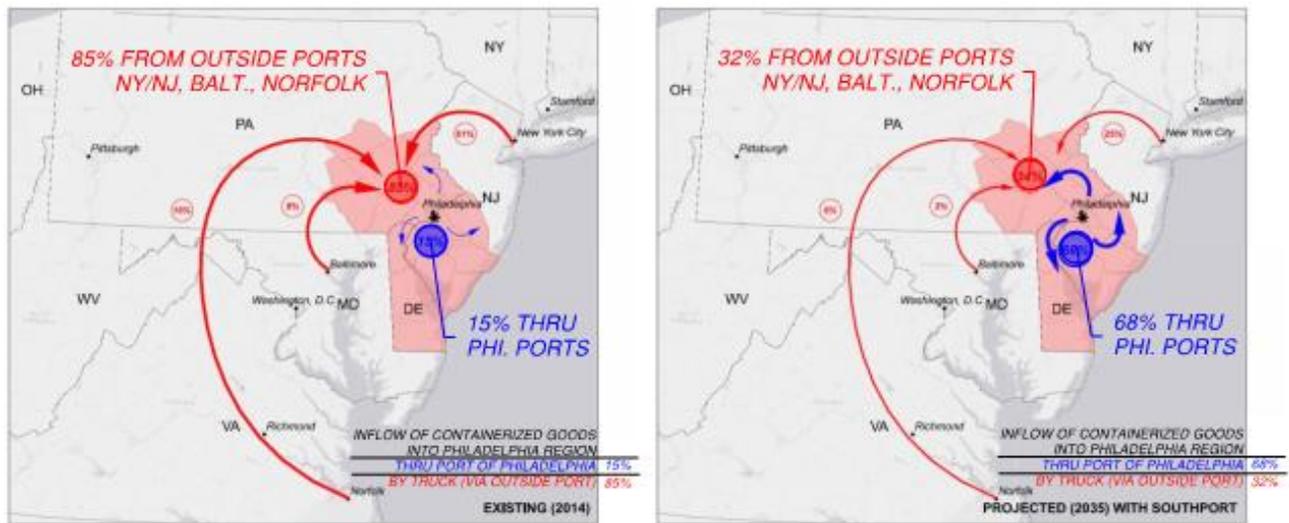


figure 4 / REGIONAL CONTAINERIZED CARGO FLOW: EXISTING (LEFT) AND PROJECTED (RIGHT)



## ANALYSIS OF REGIONAL DEMAND AND CAPACITY

A new container terminal at Southport would be a transformative project for the Philadelphia region. It would attract new types and volumes of containerized cargo through the Port of Philadelphia that have never been seen before. The Phase 1 terminal, which is the subject of this grant application, would provide capacity for 300,000 TEUs using modern container handling equipment. These capacities correspond with a market analysis of container demand by Martin Associates<sup>11</sup> that forecasts a throughput demand of 300,000 TEUs at start-up and increasing at a projected annual growth rate of 4%, growing to 450,000 TEUs after the first fifteen years.

Ultimate build-out capacity, which is outside the scope of the project, would provide the terminal with a throughput capacity in excess of 1.1 million TEUs starting in Year 25.

Initially, most of these Phase 1 containers would be bound for locations outside the region. But over time, a growing percentage would remain in the region, as they would supplant containers that have historically been trucked in from the major ports outside the region. Eliminating these trucking miles provides a huge benefit for the nation at large, in terms of operational cost savings, emissions reduction, road maintenance, traffic, and traffic safety. The reduction in trucking and the benefits derived therefrom is the subject of our Benefit-Cost Analysis (BCA).

In examining the benefits of a new Southport terminal, two cases need to be considered:

### 1 The No-Build Case

In this instance, the forecasted container growth would need to be met by trucking in containers from NY/NJ and, to a lesser extent, Baltimore and Virginia, much as it is today. This would increase congestion at these other ports and on the roadways. Eventually, new infrastructure would be developed to handle the growing throughput. However, such development would come at a premium cost to the nation, especially in the New York City region, as it would involve in-situ expansion of existing infrastructure, rather than new construction at a vacant site.

### 2 Development of Southport.

In this case, additional new demand could be satisfied by water transportation directly through the Port of Philadelphia. Container growth would no longer need to be met through the trucking-in of containers from other major ports. Eliminating these trucking miles provides a huge benefit. Costs for retrofitting congested infrastructure from the No-Build case would also be eliminated in favor of the cost of new construction for Southport. On the national level, this would represent a transfer of capital cost from a retrofit project in the New York City region to a new construction project in Philadelphia.

As previously mentioned, PRPA conducted an in-house analysis<sup>12</sup> of container movements within the twenty-one counties that are closer by truck to the port of Philadelphia than to NY/NJ, Virginia or Baltimore. This study is used to quantify the trucking of containers into the Philadelphia region from ports outside the region and encompasses the vast majority of container movements in and around the Philadelphia region. Based on the study, the 2014 container volumes bound for the Philadelphia regional counties are shown in Table 1 below.



**table 1 / CONTAINERS BOUND FOR PHILADELPHIA REGION, 2014 (TEUs)**

	<b>total, all northeast</b>	<b>by port of origin</b>			
	<b>U.S. ports</b>	<b>Philadelphia</b>	<b>NY/NJ</b>	<b>Baltimore</b>	<b>Virginia</b>
<b>Mode of travel</b>	mixed	ship	truck	truck	truck
<b>Total bound for Philadelphia region</b>	370,000	57,000	240,000	26,000	48,000
% , by port of origin	100%	15%	65%	7%	13%
% , by mode of travel into region	-	15% vessel	85% trucked into region		

Total annual container demand for the Philadelphia region is currently approximately 370,000 TEUs. As shown, 15% (or 57,000 TEUs) of all containers destined for the Philadelphia regional market arrive by ship through the Port of Philadelphia. As noted earlier, container facilities within the Port of Philadelphia are already at capacity and congested.

Therefore, these 57,000 TEUs represent the present-day container capacity of the Port of Philadelphia for regional distribution. The other 85% of containerized cargo shown in the table is trucked in and distributed outside the 21-county Philadelphia regional market.

The No-Build case is summarized in Table 2, and assumes a uniform 4% growth rate in container throughput over the project horizon. This 4% growth rate will fluctuate slightly with the change in GDP, but should be considered as a realistic estimate based on current containerized cargo trends.

With local terminals already at capacity, future demand growth would be met by trucking-in containers. As shown at 5-year increments, the number of trucked containers increases steadily so that by Year 25 the number of trucked containers would increase from 313,000 TEUs to over one million.

**table 2 / NO-BUILD CASE: CONTAINERS TRUCKED INTO PHILADELPHIA REGION (TEUs)**

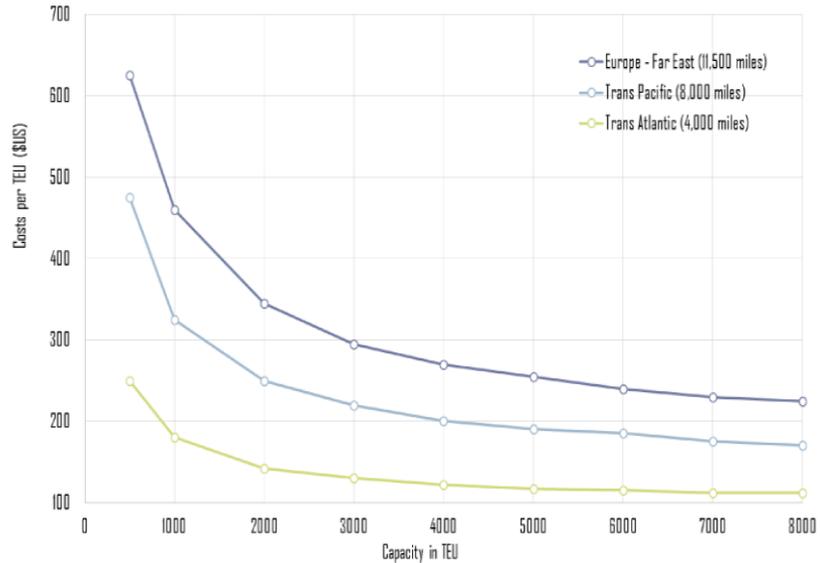
	<b>Years from start of operations (2018)</b>					
	<b>1</b>	<b>5</b>	<b>10</b>	<b>15</b>	<b>20</b>	<b>25</b>
Total bound for Philadelphia Region	416,200	486,895	592,382	720,723	876,870	1,066,846
Shipped to PAMT	57,000	57,000	57,000	57,000	57,000	57,000
Trucked into Philadelphia Region from outside	359,200	429,895	535,382	663,723	819,870	1,009,846



TRANSPORT COST COMPARISON

With the development of Southport, in conjunction with the newly deepened Delaware River, it would be more cost-effective for vessels to deliver directly to Philadelphia than to bypass Philadelphia and incur the added cost of trucking in Philadelphia-bound cargo.

A study was conducted<sup>13</sup> to determine the average oceangoing shipping costs as a function of vessel size. These costs are exclusive of origin and destination fees; they include only the cost to ship. The inset shows shipping costs per TEU for three major shipping routes. Based on the transatlantic route, which is the most expensive, the cost per TEU for the 4,000-mile journey aboard a 5,000-TEU vessel is estimated from the graph at \$120. This amounts to approximately 3 cents per mile.



Source: Data from Cullinane, K. and M. Khanna (2000) "Economies of Scale in Large Containerships", Journal of Transport Economics and Policy, Vol. 33, pp. 185-207.

Based on a 2014 study by ATRI, the average trucking cost per mile in 2013 was \$1.68<sup>14</sup>, approximately fifty times more. Therefore, the added 200-mile round trip up the Delaware River to Philadelphia for a vessel is barely significant compared to the cost of trucking from outside the region.

SOUTHPORT MARKET CAPTURE

The new Phase 1 terminal would provide a maximum throughput capacity of 300,000 TEUs, which would theoretically be ample to supplant over 80% of the anticipated TEU that would be otherwise trucked in during the first year of operation. However, to do so would require capturing the entire market of trucked containers from other terminals. Realistically, Southport would capture a good portion of the market, due to its better economics, but some remainder would continue to be trucked.

In quantifying the portion captured by Southport, it is reasonable to assume that overflow demand from PAMT could be directed to Southport. We forecast that this would represent 20% of all containers that would otherwise need to be trucked under the No-Build case. It is also reasonable to assume that through sound marketing and incentives offered by the Port, a uniform capture growth of 2% could be realized. Throughout the project life, as long-term contracts with the major ports expire and the paradigm shifts to favor Southport, the capture rate has been modeled to grow to 68% by Year 25. This scenario is summarized in Table 3.



During this growth period, successive phases of the terminal would be coming on line to handle the growing demand above the initial 300,000 TEU terminal capacity, including construction of a second berth and expansion of the cargo storage yard.

By Year 10, the Phase 1 terminal would be nearing its 300,000 TEU capacity. Future phased expansion of Southport is outside of the scope of this project. However, the available development area of the project site will allow for the phased build-out of the terminal to coincide with the projected increase in container demand. The projected amount of containers captured (in TEU) at the expanded Southport terminal are provided as a reference to show the long term benefit of the terminal development. For our purposes, a 25-year horizon is being considered. This scenario is summarized in Table 3.

table 3 / SOUTHPORT DEVELOPMENT: CONTAINERS SHIPPED DIRECTLY TO SOUTHPORT (TEUs)

	Years from start of operations (2018 construction completion / 2019 operations start-up)					
	1	5	10	15	20	25
Available for capture (otherwise trucked in)	416,200	486,895	592,382	720,723	876,870	1,066,846
% captured	0%	28%	38%	48%	58%	68%
Shipped to Southport	0	120,371	203,445	318,587	475,525	686,696
Remainder trucked from NY/NJ, Baltimore, Norfolk	359,200 (100%)	263,861 (72%)	289,410 (62%)	402,136 (52%)	401,345 (42%)	380,150 (32%)

By Year 12, the number of TEUs shipped to Southport approaches 300,000 TEU, while percentage of trucked TEUs decreases significantly.

The number of shipped TEUs corresponds directly with the reduction in truck traffic through Year 25 and highlights the benefits that the Southport Terminal project generates. ***This is the basis for the project BCA provided in Section 6.***

*(Note that the benefits associated with the reduced volume of trucked TEU's beyond the time when Southport reaches its 300,000 TEU capacity were not counted in the BCA calculation.)*



### 3 PROJECT LOCATION

#### 3.1 PROJECT SITE BENEFITS

The full build-out of the Southport Marine Terminal would occupy approximately 110 acres of land at the former Philadelphia Naval Complex in Ward 39 of Philadelphia County in southeastern Pennsylvania, approximately four miles south of Center City Philadelphia, as shown in Figure 5. The site is located on the United States Geological Survey (USGS) Philadelphia, Pennsylvania quadrangle map at 39° 53' 25" North and 75° 9' 4" West.

The site is located three miles upstream of the confluence of the Delaware and Schuylkill Rivers, and is strategically located in close proximity to existing truck, rail, and marine freight infrastructure.

Rail and intermodal yards, owned and operated by Norfolk Southern and CSX, bound the project site to the north, with shared-rights access provided to Canadian Pacific Railway. Each rail yard provides double stack connections to regional rail corridors for freight movement to major Midwest and Southern U.S. destinations.

The Delaware River channel lies to the south and east, with an existing water depth of no less than 40-ft below mean lower low water (MLLW) and an anticipated depth of 45-ft below MLLW upon completion of ongoing United States Army Corps of Engineers dredging operations, slated for completion in 2017.

The full project scope (including elements outside of this TIGER funding request) includes construction of new roads, utilities, stormwater BMPs, and marine loading infrastructure, with an overall project goal to develop the area into a state-of-the-art marine terminal with the potential to create thousands of sustainable jobs and inject new business and tax revenue into the regional economy.



figure 5 / SOUTHPORT LOCATION ALONG DELAWARE RIVER [GOOGLE EARTH PRO]

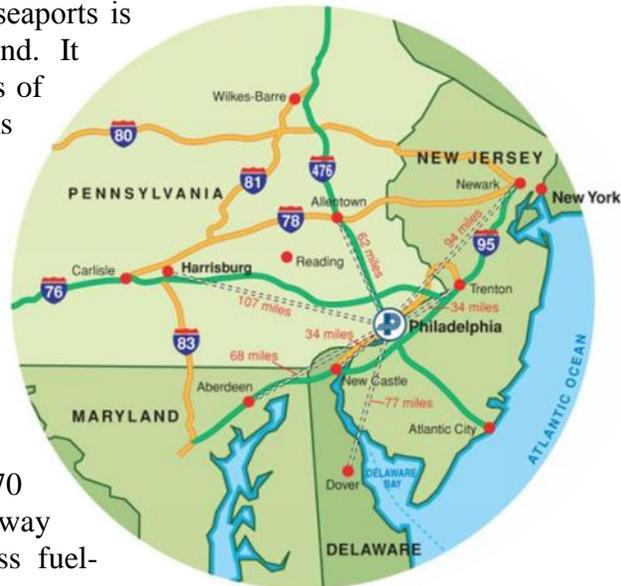


### 3.2 UTILIZING EXISTING INFRASTRUCTURE TO BENEFIT THE REGION

The Southport site is centrally located between the Ports of NY/NJ and Baltimore and provides convenient access to over one hundred million customers within a day’s trip, ranging from the Midwest to Canada via interstate highway and national rail connectivity located due north of the site.

The capacity of the nation’s roads, rails, and seaports is not keeping pace with the current freight demand. It is projected that an estimated three billion tons of freight will be carried by over 1.8 million trucks on roadways in the United States over the next 10 years. Major bottlenecks along the urban interstates cause an estimated loss of \$19 billion annually while also contributing to the decline of the nation’s air quality<sup>15</sup>.

Domestic marine transportation services can play an important role in enhancing the capacity and performance of the U.S. freight transportation system. Trucks are at least 70 percent less fuel-efficient than domestic waterway vessels and trains are at least 25 percent less fuel-efficient, based on revenue ton-miles per gallon.



The Southport project aims to contribute to the reduction of the landside congestion and stimulate the marine freight industry in the greater Philadelphia area by utilizing the existing infrastructure at and immediately surrounding the project site. Containerized goods will be able to enter and exit the Philadelphia region through the intermodal network strengthened by the Southport development and highlighted by the existing infrastructure components below:

#### DISTRIBUTION HUBS FOR MAJOR U.S. IMPORTERS AND EXPORTERS

- Prime geographic location allows for service area to stretch from Connecticut to Virginia.
- Over 300 distribution centers lie within the anticipated service area of Southport, allowing for streamlined importing of automobiles, pharmaceuticals, food products, and additional break bulk cargo.

#### INTERSTATE HIGHWAY

- Interstate Route 95 and Interstate Route 76 are located within two miles of the project site, allowing for seamless movement of goods to the North, South, and West.

#### REGIONAL RAIL

- Norfolk Southern, CSX, and Canada Pacific Rail operate facilities adjacent to the proposed Southport Site. Infrastructure tie-ins would be minimal and would provide access to over 200 million users throughout the United States.



- Canadian Pacific provides direct second-day delivery to major Eastern Canadian markets, including Montreal and Toronto.
- Improvement of the nation’s intermodal facilities is essential to add capacity and provide efficient and economical movement of freight.

SEAPORTS AND WATERWAYS

- Channel deepening in the Delaware River to 45 feet by 2017 will allow the Port to handle ship calls from over 80% of the world’s container fleet.
- Potential for direct trade connections with the Far East, improving export and manufacturing potential.
- Increased access to foreign markets by allowing for streamlined vessel operations and increased productivity.
- Southport development will lead to increased productivity and reduced vessel downtime at PAMT.

3.3 LOCAL DEMOGRAPHICS

The Philadelphia area was hit especially hard by 2008’s devastating recession.

While trending in a positive direction, the unemployment rate in Philadelphia County is still one of the highest of all major American cities. As of December 2015, the unemployment rate in Philadelphia County (conterminous with the City of Philadelphia) was above the national average (5.4% and 4.8%, respectively).<sup>16</sup>

Surrounding counties to the south have also struggled. Camden, Gloucester, and Salem Counties, NJ have seen miniscule changes in their unemployment rates in the past year.

This persistent high unemployment serves only to compound poverty rates well above the national average. Philadelphia has the highest deep-poverty rate of the ten largest cities in the country, at 12.2%, and Camden’s, at 20%, is even higher.<sup>17</sup>

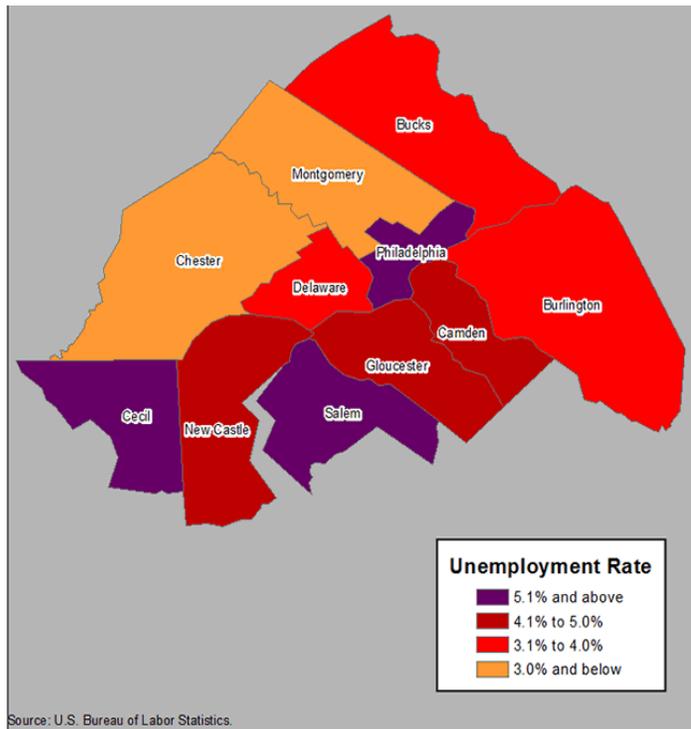


figure 6 / UNEMPLOYMENT RATE BY COUNTY, DECEMBER 2015 (U.S. BUREAU OF LABOR STATISTICS)

(Deep poverty is defined as subsistence on an income less than half of the defined poverty line.)



## 4 PROJECT PARTIES

The Commonwealth of Pennsylvania supports the Philadelphia Regional Port Authority’s (PRPA) application to the National Infrastructure Investment (TIGER) Discretionary Grant funding program. All project elements fall within the jurisdiction of the PRPA and within property that is owned by the PRPA. The PRPA is the state agency responsible for project implementation. The major funding agencies for the Southport Marine Terminal are:



Letters of support have been received by the Mayor, and a co-signed letter has been received from the Governor and Secretary of Transportation.

In addition to the project parties responsible for administration, oversight and approval processes required during the project’s development, numerous other potential stakeholders are engaged and would be continually involved throughout the catalytic transformation that would result from the construction of Southport.

Letters of support are currently being sought from the parties below and will be posted to the following website once received:

<http://www.philaport.com/grants-southport/>

### Southport Project Stakeholders



### Shortlisted Site 1 (Southport Marine Terminal) RFP Respondents

- Center Point Properties
- Philadelphia Energy Solutions
- Liberty Consortium
- Southport Development Partners



### 5 SOURCES AND USES OF PROJECT FUNDS

Sources and uses of project funds are presented in the tables below. The project will be funded through a Public-Private Partnership between the Commonwealth of Pennsylvania (through PRPA) and a private consortium, with the State requesting the TIGER grant to supplement their portion of the funds.

PRPA received sixteen formal Expressions of Interest in late 2015 from prospective consortiums. After shortlisting the initial submissions, four bidders have been selected to submit formal RFP's for their conceptual development of the Southport Marine Terminal Site, including detailed development plans and financing strategies. The Port is currently anticipating that the review and award of the successful proposal will occur in the Q3 2016. The breakdown of funding in the Public-Private Contribution will be determined as a result of the procurement to be concluded later this year.

table 4 / SOUTHPORT PROJECT FUNDING SOURCES

	Amount (USD)	Percent
2016 TIGER Grant request	\$ 25,000,000	8%
Public-Private Contribution	\$ 283,700,000	92%
<b>Total project cost</b>	<b>\$ 308,700,000</b>	<b>100%</b>

table 5 / SOUTHPORT PROJECT FUNDING USES, BY SOURCE

	FEDERAL TIGER	PUBLIC-PRIVATE CONTRIBUTION
Vessel berth	\$ 25,000,000	\$ 72,700,000
Other terminal elements*	\$ 0	\$ 211,000,000
<b>Total project cost</b>	<b>\$ 25,000,000</b>	<b>\$ 283,700,000</b>
<i>(by source type)</i>	<i>\$ 25,000,000</i>	<i>\$ 283,700,000</i>

\*Other terminal elements include cranes and handling equipment, upland storage yard development, roadway, building, and gate infrastructure, and environmental works.

The allotment of funding to the vessel berth is based on the concept that the most fundamental aspect of the terminal is the berth infrastructure. PRPA has elected to provide this portion to help attract and ease private investment.

There are no Federal funds currently being provided under other programs. PRPA previously submitted an application for \$25M in funding for the Southport Marine Terminal Project from the FY 2015 TIGER Discretionary Grant Program but did not advance to the Tier 2 Analysis.



## 6 SELECTION CRITERIA

### 6.1 PRIMARY SELECTION CRITERIA

#### 6.1.1 SAFETY

Nearly 350 million truck miles will be eliminated by developing Southport, when compared to the “no-build” case. This will have the effect of fewer traffic accidents resulting in property damage, personal injury, and fatalities.

Over the 25-year project horizon, this reduction in truck miles would alleviate dangerous situations in the Philadelphia region. It has been estimated that the reduction in truck miles will result in the following benefits:

- 8 fewer deaths;
- 127 fewer injuries; and
- 302 fewer instances of property damage only.

This equates to an accident cost savings of \$34 million (net present value, at a 7% discount rate) over the 25-year project life.

#### 6.1.2 STATE OF GOOD REPAIR

##### IMPROVED REGIONAL TRANSPORTATION SYSTEM

The proposed Southport Marine Terminal project represents an opportunity to invest in the state of good repair of the transportation network that services the Philadelphia region. The project promotes a safer and more efficient mobilization of goods throughout the region, and by reducing the number of trucks servicing the area, will alleviate some of the congestion issues seen on major Northeast truck routes.

Ideally, it will re-establish the Port of Philadelphia as a major, modern East Coast shipping hub, once again attracting major shipping lines to the Delaware River region.

##### RELIABLE AND EFFICIENT TECHNOLOGY

The Southport Marine Terminal will be state-of-the-art, with modern operating technology and asset management systems, which will optimize equipment usage at the terminal for maximum efficiency, utilization, and availability, and will allow the terminal operator to implement a robust and proactive maintenance program.

##### SUSTAINABLE AND INNOVATIVE FUNDING

By using a phased development approach, PRPA aims to ensure sufficient capital is invested up front to establish an economically viable operation, while not overinvesting in infrastructure that will sit unneeded and unused until container volume demand requires it.

The Port is working with private investment teams to identify and implement an efficient Public-Private-Partnership to develop the terminal and adjacent land parcels. This TIGER grant



application is for this initial portion of work required to establish a functioning marine terminal capable of handling the anticipated container demand over the next five to fifteen years. Subsequent phases that will meet container demand over and above the initial 300,000 TEU capacity are scheduled to be added beginning in Year 10.

With this approach in mind, maintenance costs on the publicly funded infrastructure will be nominal over the initial 25 years of the investment.

#### RESILIENT INFRASTRUCTURE

The Southport Marine Terminal will be designed and constructed with full consideration of climate change adaption principles and best practice resilience measures to ensure that the Southport Terminal can withstand storms and weather events such as Superstorm Sandy that are becoming more frequent in the Northeast region.

As there have been no other major terminal developments on the west side of the Delaware River in recent years, the Southport Marine Terminal will be well equipped to recover rapidly from a major weather event, and will be able to come back on line and provide the region with a source of food and water supply much quicker than other, older surrounding infrastructure.

PRPA's adjacent Packer Avenue Marine Terminal has been designated as a strategic military port and the Port of Philadelphia is classified as a Safe Harbor Port; however, in the event of a major climate-related emergency, PAMT will likely not be serviceable and available to the military for some period of time, and the Southport Terminal would provide the nation with another reliable alternative as redundancy to PAMT.

While the above benefits have not been quantified in the BCA analysis, a more resilient terminal in the Delaware River Region will provide real economic benefits in the event of a major event, though the uncertainty of this occurrence in magnitude, duration, and benefits cannot be quantified to the extent required for a BCA.

#### 6.1.3 ECONOMIC COMPETITIVENESS

As presented in the Project Description, the Southport Marine Terminal project will generate over 350 million fewer truck miles over the next 25 years when compared to the "no-build" case. These reduced truck miles represent an overall cost savings to the nation of **\$500 million**. These savings could be reasonably expected to be passed back to the local region in the form of cheaper goods as shippers take advantage of the more efficient transportation network into the local region that the project will establish.

#### LOCAL JOB CREATION

In addition to these tangible cost savings, the project will provide significant job creation and economic development to the local area. The project will transform the 110-acre Southport site from a currently abandoned semi-industrial property to an economic generator for the local community. By attracting major international shipping lines from Asia and North America to call at a Philadelphia port for the first time in many years, the project will provide new long-term jobs directly at the terminal facility as well as many indirect jobs required to service terminal operations within the local market.



Direct jobs at a container terminal consist of truck drivers, terminal operations staff, towing and pilots, longshoremen, ships’ agents and surveyors, freight forwarders, and warehouse staff. Indirect jobs will benefit the broader community due to the increased economic activity that the operation will stimulate, including jobs at local office-supply firms, maintenance and repair shops, steamship agents, and food services.

The Martin Associates report referenced earlier in this Project Narrative estimates that the Project will generate in the order of 3,500 new jobs in its first year of operations. These jobs that are associated with the initial 5-year start-up phase will continue to generate benefits throughout the 25-year horizon for this grant request. Job growth over time is presented in the figure below.

In addition to the baseline jobs identified during the initial project phase, additional jobs will be generated as phases of development are brought on line and the capacity of the terminal expands; these are shown in 5-year increments in the extracted table below. These additional phases and new jobs are not included in the BCA developed for this grant application; however, these jobs would not be possible without the initial terminal development.

YEAR TEUS	START-UP 300,000	YEAR 5 450,000	YEAR 10 560,782	YEAR 15 698,836	YEAR 20 870,877	YEAR 25 1,085,271
<b>JOBS</b>						
DIRECT	1,699	2,498	3,087	3,821	4,736	5,876
INDUCED	1,627	2,374	2,924	3,610	4,463	5,526
INDIRECT	<u>216</u>	<u>324</u>	<u>404</u>	<u>503</u>	<u>627</u>	<u>782</u>
<b>TOTAL</b>	<b>3,542</b>	5,196	6,415	7,934	9,826	12,184
<b>PERSONAL WAGES/SALARIES (\$1,000)</b>						
DIRECT	\$67,124	\$97,803	\$120,409	\$148,550	\$183,588	\$227,239
RE-SPENDING/LOCAL CONSUMPTION	\$228,155	\$332,433	\$409,271	\$504,920	\$624,015	\$772,385
INDIRECT	<u>\$8,091</u>	<u>\$12,136</u>	<u>\$15,124</u>	<u>\$18,847</u>	<u>\$23,487</u>	<u>\$29,270</u>
<b>TOTAL</b>	<b>\$303,371</b>	<b>\$442,373</b>	<b>\$544,805</b>	<b>\$672,317</b>	<b>\$831,089</b>	<b>\$1,028,893</b>

These new jobs to the region represent a *Ladder of Opportunity* to the local workforce. The majority of these jobs will be of a working-class nature and represent revenue and economic development that will be directly distributed into the local community.

EXPORT CARGO INITIATIVES

The cargo export opportunities which will be made available as a result of the Southport development directly align with the 2010 National Export Initiative (NEI), a collaborative, multi-agency effort aimed to assist U.S. companies increase export cargo and compete with the competitive global shipping environment.

The container export market along the Delaware River saw a sustained period of growth prior to 2008 and has been relatively stagnant since then. There is an immediate need for efficient container handling terminals along the eastern seaboard to keep pace with the Post-Panamax ready terminals throughout the world. As currently conceptualized, Southport would be equipped to meet the container handling and infrastructure needs of the modern container vessel fleet.



6.1.4 QUALITY OF LIFE

The Phase 1 of the Southport development will address some of the key Livability Principles established by the *Partnership for Sustainable Communities*.

By reducing the number of trucks bringing goods into the Philadelphia region, the communities around Philadelphia and the surrounding counties will benefit from better *transportation choices* from safer and less congested roadways, as well as cleaner air through reduced emissions.

The local *economic competitiveness* of the region will increase due to the improved transportation network for locally consumed goods.

The *existing communities* near to the proposed terminal development will benefit from the creation of new and sustainable jobs in the area.

The Southport Marine Terminal will provide *value to communities and neighborhoods*. It will be developed on a brownfield site located adjacent to other compatible industrial uses. It will not fragment neighborhoods or divide communities, nor remove any existing waterfront access; in fact, the proposed actions at the environmental mitigation site will enhance community access to the Delaware River which currently does not exist at the proposed site.

6.1.5 ENVIRONMENTAL SUSTAINABILITY

The Southport Marine Terminal aligns with the Obama administration’s aggressive efforts to protect natural resources, reduce pollution, and conserve energy.

The 350 million fewer truck miles that the Phase 1 project will realize directly results in reduced diesel consumption and reduced greenhouse gas emissions. Based on the reduction in truck miles, the following reductions in greenhouse gas emissions have been calculated:

table 6 / TRUCKING EMISSIONS ELIMINATED BY SOUTHPORT CONSTRUCTION (METRIC TONS)

Emission type	Total 25-Yr Reduction (metric tons)
CO <sub>2</sub> (greenhouse gas)	805
NO <sub>x</sub> (nitrogen oxides)	3,002
VOC (volatile organic compounds)	156
PM <sub>2.5</sub> (particulates)	70
PM <sub>10</sub> (particulates)	76

As part of the 2012 Environmental Assessment that has been completed for the project, the Department of the Army authorized the project on April 16, 2013, and concluded that after applying the proposed mitigation, the net environmental impacts resulting from the implementation of the proposed action are not significant.

The PRPA has satisfied the Delaware River Basin Commission (DRBC) – the leader in protecting, enhancing, and developing the water resources of the Delaware River – that the



project will be performed in compliance with applicable DRBC requirements, and the DRBC have included the project in the Commission’s Comprehensive Plan.

Furthermore, the Project will comply with port sustainability measures identified by the EPA, including Ports Initiative (see [www.epa.gov/otaq/ports](http://www.epa.gov/otaq/ports)) and, locally, the Clean Air Council Green Ports Initiative ([www.cleanair.org](http://www.cleanair.org)).

## 6.2 SECONDARY SELECTION CRITERIA

### 6.2.1 INNOVATION

Phase 1 of the Southport project has a number of innovative features that will both streamline the development of the Terminal and, once operating, will establish the terminal as a safe, environmentally friendly, and efficient facility providing the many benefits discussed throughout this project narrative.

#### INNOVATIVE PROCUREMENT

PRPA has worked diligently with a procurement team from the private sector that consists of both technical and financial advisory experts to develop an industry-leading procurement strategy focused on achieving a unique balance between attracting maximum private industry funds and ensuring that the Southport project creates the Ladders of Opportunity identified in this document and within PRPA’s Master Plan.

The Phase 1 terminal development will be one of the first truly Public-Private-Partnership port developments executed in the United States to date, and will look to leverage to the maximum extent possible the public funds already dedicated to the project, as well as those required to complete the construction and commissioning.



figure 7 / RMG [COURTESY KONECRANES]

#### INNOVATIVE TECHNOLOGY

The Phase 1 Southport Marine Terminal will be a state-of-the-art container terminal utilizing a number of latest industry technologies to ensure a safe, clean, and reliable facility. The proposed innovative technologies listed below will be consistent with processes developed by the stevedoring and terminal operating companies and the workforce that they employ:

- Terminal Operating System (TOS) – A web-based TOS will be employed at the terminal, enabling each container to be followed remotely as it passes through the terminal (leaving the vessel, moving into storage, and then departing on truck or train), and will provide the operator with guidance on most efficient placement and storage of each container within the terminal.



- Radio Frequency Identification (RFID) and Global Positioning System (GPS) – Automated identification and data collection technology will be used in conjunction with the TOS to locate containers through the terminal.
- Optical Character Recognition (OCR) – Optical scanners will allow digital recognition of a container as it exits (and enters) the terminal. This technology speeds the movement of containers through processing areas of the terminal – thereby reducing truck congestion outside of the terminal.
- Rail-Mounted Gantries (RMGs) – To maximize the efficiency and capacity of the container storage yard, the containers will be positioned in their storage area through the use of RMGs, electrically-powered handling modules which provide the most efficient and environmentally friendly means of handling containers within a terminal.

These innovative technologies are new to the port of Philadelphia and Delaware River region, and will be key to establishing the Southport Marine Terminal as a world-class facility that will attract international shipping lines to the region.

## 6.2.2 PARTNERSHIP

### 6.2.2.1 JURISDICTIONAL AND STAKEHOLDER COLLABORATION

The project development has been borne out of collaboration between a number of key stakeholders which are aimed at achieving similar objectives as they relate to regional infrastructure and freight movement. These include:

- ***PA Department of General Services and PennDOT*** – established a major multi-lane access road to the Southport area in preparation for increased activity on the site.
- ***Class One Railroads CSX and Norfolk Southern (NS)*** – both railroads have built high-capacity intermodal yards adjacent the Southport property in anticipation of the Southport development.
- ***U.S. Army Corps of Engineers and PRPA*** – together have worked on executing the dredging program underway in the Delaware River that will enable Southport to accommodate the larger vessels.

To the maximum extent possible, this project will demonstrate collaboration between the public and private sectors through a public-private partnership.

Going forward, the support for the project by numerous public agencies and stakeholders is evidenced by the letters of support presented in Section 4.

### 6.2.2.2 DISCIPLINARY INTEGRATION

The Delaware Valley Regional Planning Commission (DVRPC) will provide a “letter of consistency” outlining that the project is consistent with local plans for the region. Additionally, the DVRPC letter will indicate that they will work in conjunction with the PRPA and concessionaire(s) to include the project in the Transportation Improvement Program (TIP).



## 7 RESULTS OF BENEFIT-COST ANALYSIS

As presented in the Benefit-Cost Analysis included in Appendix B, the Phase 1 Southport Marine Terminal project has a **Present Value Cost (PVC) of \$265M (2015 dollars)** (3% discounted) and **\$260M (7%)** over its 25-year project lifetime. The associated **Present Value Benefits (PVB)** are estimated at **\$776M (3%) and \$459M (7%)**.

The resulting Benefit-Cost Ratio for the project is as follows:

- 3% discount rate = 2.92
- 7% discount rate = 1.77

The long-term net benefits calculated for the project are summarized in Table 7 below. The benefits and costs are further detailed in the Benefit-Cost Analysis Narrative in Appendix A.

The BCA spreadsheet calculations can be found at the following link:

<http://www.philaport.com/grants-southport/>

table 7 / LONG-TERM BENEFITS OF SOUTHPORT CONSTRUCTION

Long-term outcome	Identified benefit	Amount (\$USD)	Amount (\$USD)
		3% Discount Rate	7% Discount Rate
Economic competitiveness	Savings in operating cost	\$ 678 Million	\$ 401 Million
Livability	Accident reduction	\$ 44 Million	\$ 26 Million
Sustainability	Emissions reduction	\$ 54 Million	\$ 32 Million
<b>Present Value Benefits</b>		<b>\$ 776 Million</b>	<b>\$ 459 Million</b>
Present Value Costs*		\$ 265 Million	\$ 260 Million
<b>Total Net Benefit</b>		<b>\$ 511 Million</b>	<b>\$ 199 Million</b>

\* Includes credit for savings in infrastructure at other ports



## 8 PROJECT READINESS

The project readiness for the Phase 1 Southport Marine Terminal is well advanced. After several years of studies and engineering development, the project is fully permitted and endorsed by the Commonwealth of Pennsylvania and the Philadelphia Regional Port Authority (PRPA), an independent agency of the Commonwealth.

All phases of this project are being proposed as a Public-Private Partnership (PPP) for the financing, design development, construction, operation, and maintenance of a new container terminal. PRPA are engaged in the Request for Proposal process and plan to review and enter into contract with the chosen consortium in Q3 2016, which is within TIGER Grant obligation guidelines.

### 8.1 TECHNICAL FEASIBILITY

#### 8.1.1 CONCEPT

The technical feasibility of the project (all phases) has been confirmed based on the advanced state of engineering design completed to date, in conjunction with the full suite of environmental approvals already received.

The conceptual design plan for the Phase 1 Southport Marine Terminal is based on a single-berth marine terminal on approximately 110 acres of vacant land on an abandoned industrial site. The fully operational Phase 1 container terminal would provide a throughput capacity of approximately 300,000 TEUs per year.

Specific components of the Phase 1 terminal consist of the following major elements:

- Berth deepening to -45-ft MLLW, outward to the edge of the federal navigation channel, and the placement of dredged material into a confined disposal facility (CDF)
- 1,064-foot berth for containerized cargo ships with three electric-powered, post-Panamax container cranes;
- 20-acre paved container handling yard with twelve (12) electric-powered RMG yard cranes;
- New access roadway, utilities, various buildings and other infrastructure to support the operations of the terminal.



### 8.1.2 BASIS OF ESTIMATE

Construction estimates for the berth infrastructure components which are to be subject to TIGER grant coverage, as well as costs for the rest of the terminal, are presented in the subsection below.

The bases for the estimates are as follows:

- Quantities for the components subject to TIGER grant coverage are based on the construction of a single linear berth, with the minimum infrastructure requirements established in PRPA’s 2016 Request for Proposals for the Development of Southport Marine Terminal Complex.
- Direct costs for construction activities are based on 2015 dollars;
- Markups include:
  - Construction mobilization and phasing at 8% of total direct cost;
  - Overhead and profit at 20%;
  - Detail engineering at 3% of total construction;
  - Construction management at 3.5% of total construction.

### 8.1.3 CONTINGENCY AMOUNTS

The project estimates contain a 10% design contingency and a 10% construction contingency.

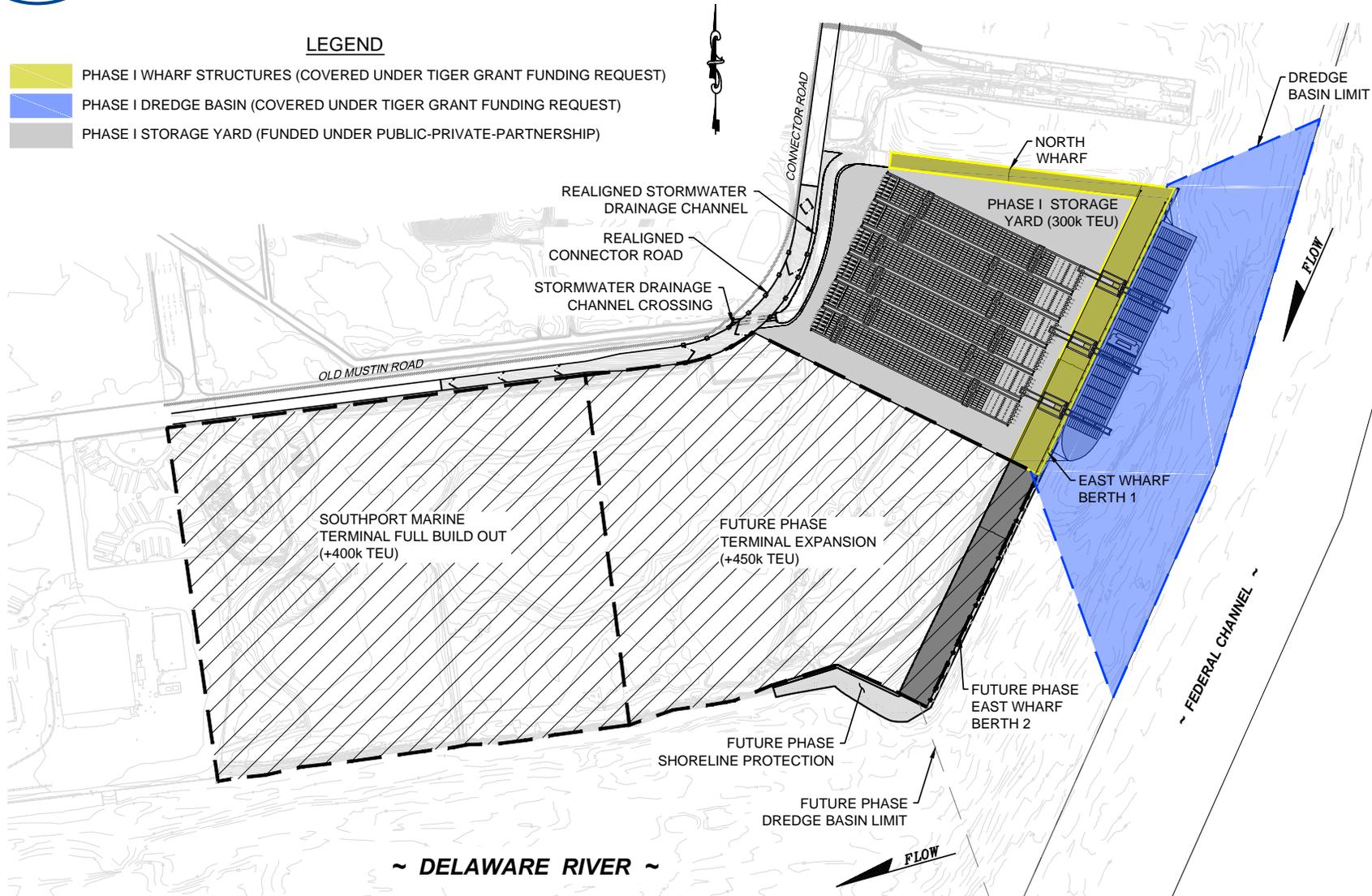
### 8.1.4 RISK MITIGATION MEASURES

The PRPA is aware of the risks associated with the development of the Southport Marine Terminal and are actively working to mitigate potential issues in a proactive manner.

Following is a summary of the key risks identified by the Project Development Team to date and PRPA mitigation measures in place.



Activity	Risk	Consequence	PRPA Mitigation
<b>Procurement</b>	Lack of private interest	<ul style="list-style-type: none"> <li>Delays to construction start</li> </ul>	PRPA have identified and shortlisted six (6) private design and development teams for Southport.
	Lack of public funding	<ul style="list-style-type: none"> <li>Delays to construction start</li> </ul>	PRPA and its Financial Advisors will work with Governor's office and PennDOT to ensure <b>funding availability</b> .
<b>Permitting</b>	Protracted review by regulators	<ul style="list-style-type: none"> <li>Delays to construction start</li> </ul>	Early submission of permits is <b>complete</b> . Project mitigation is <b>100% complete</b> . Monitoring period is ongoing.
	Negative stakeholder response	<ul style="list-style-type: none"> <li>Delays to construction start</li> </ul>	Public hearings have been held with minimal negative stakeholder response.
<b>Construction</b>	Issues with selection of contractor	<ul style="list-style-type: none"> <li>Delay to construction</li> </ul>	Contractor will be part of private entity's consortia.
	Inaccurate estimate	<ul style="list-style-type: none"> <li>Cost overruns</li> </ul>	Contingency and estimate checks during detailed design with industry pricing.



**FIG. 1 - SOUTHPORT MARINE TERMINAL PLAN**

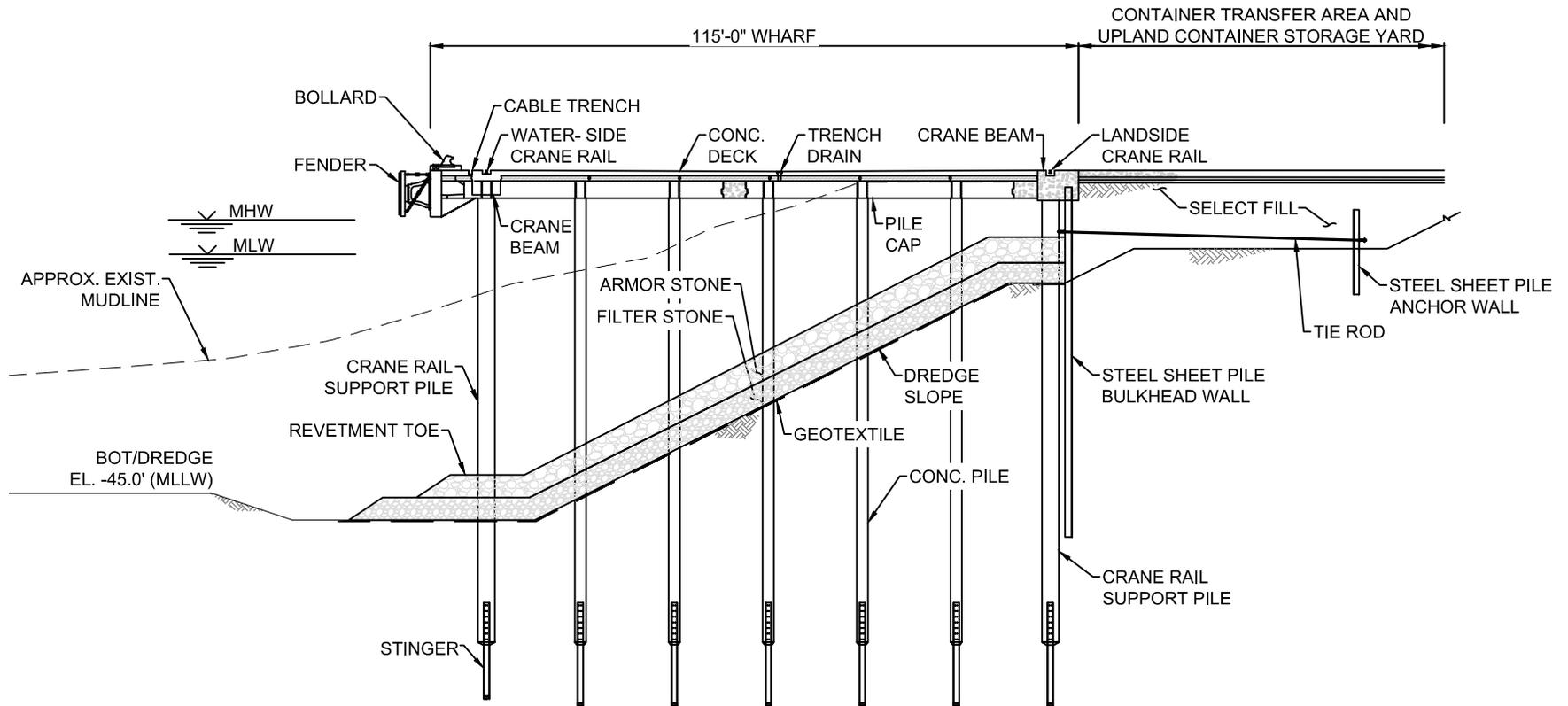


FIG. 2 - EAST WHARF CROSS SECTION



**8.2 FINANCIAL FEASIBILITY**

**8.2.1 COST ESTIMATE**

The project cost estimate consists of work to be covered under the grant application and other work that is still necessary for a complete project. Estimates for both of these contributions are presented below. The total project cost for Phase 1 is estimated at **\$308 Million**.

**PHASE 1 ELEMENTS TO BE COVERED UNDER GRANT APPLICATION**

**CONCEPTUAL CONSTRUCTION COST ESTIMATE - SOUTHPORT MARINE TERMINAL  
1,064 LF Wharf Structure, 20-Acre Upland Storage Area, Dredging to -45 ft MLLW**

ITEM DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
<b>DREDGING</b>				
INITIAL DREDGE MOBILIZATION	1	LS	3,000,000	3,000,000
INITIAL DREDGING TO -45 FT AND UPLAND DISPOSAL	554,000	CY	30	16,620,000
<b>SUBTOTAL</b>	554,000	CY		<b>\$ 19,620,000</b>
<b>OTHER CONSTRUCTION</b>				
MOBILIZATION	1	LS	3,500,000	3,500,000
REMOVE EXISTING SHEET PILING	920	FT	568	522,413
NORTH WHARF SHEET PILE WALL	46,150	SF	50	2,287,720
EAST WHARF ANCHORED SHEET PILE WALL	58,520	SF	101	5,937,790
24 IN CONCRETE PILES WITH STINGERS	32,385	FT	188	6,076,058
30 IN CONCRETE PILES WITH STINGERS	18,445	FT	392	7,230,451
LOAD TESTS	1	LS	504,000	504,000
RIPRAP	75,135	TON	134	10,092,471
SELECT FILL	29,600	TON	54	1,612,719
PRECAST CONCRETE PILE CAPS AND CONNECTIONS	3,670	CY	3,025	11,100,759
WATERSIDE CIP CONCRETE CRANE BEAM	440	CY	1,440	633,600
PRECAST CONCRETE PLANKS	142,572	SF	46	6,520,491
CIP CONCRETE OVERLAY	5,416	CY	624	3,378,008
CONCRETE SHEET PILE CAP	2,513	CY	923	2,318,953
FENDERS AND BOLLARDS	45	SETS	42,000	1,890,000
CABLE TRENCH AND REEL PITS	1,064	FT	141	149,760
CRANE TIE DOWNS AND STOWAGE PINS	3	SETS	76,800	230,400
<b>SUBTOTAL</b>	173,000	SF	370	<b>\$ 63,985,593</b>
<b>CONSTRUCTION COST SUBTOTAL</b>				
			-	<b>\$ 83,605,593</b>
CONSTRUCTION CONTINGENCY	10%			8,360,559
<b>TOTAL 2015 DREDGING AND CONSTRUCTION COST (ROUNDED)</b>			-	<b>\$ 91,966,000</b>
DESIGN ENGINEERING AS PCT OF 2015 TOTAL	3.0%			2,508,168
DESIGN CONTINGENCY	10%			250,816.78
CONSTRUCTION MANAGEMENT	3.5%		-	2,926,196
<b>GRAND TOTAL (ROUNDED)</b>			-	<b>\$ 97,700,000</b>



**OTHER PHASE 1 ELEMENTS NOT COVERED UNDER GRANT**

**CONCEPTUAL CONSTRUCTION COST ESTIMATE - SOUTHPORT MARINE TERMINAL  
20-Acre Mechanized Container Yard and Ancillary Terminal Construction Work**

ITEM DESCRIPTION	PHASE 1 COST
CONTAINER STACKING YARD - 6 RMGs	\$ 69,750,000
INFRASTRUCTURE	\$ 35,500,000
GATE	\$ 21,000,000
BUILDINGS	\$ 5,300,000
EQUIPMENT	\$ 74,100,000
ENVIRONMENTAL	\$ 5,150,000
<b>TOTAL - OTHER ENGINEERING AND CONSTRUCTION (2015 \$)</b>	<b>\$ 211,000,000</b>



### 8.3 PROJECT SCHEDULE

A schedule of key project milestones is shown in Table 8.

table 8 / SOUTHPORT PROJECT SCHEDULE

Milestone		Date
Environmental reviews completed	April	2013
Award of public-private partnership	August	2016
Design Completion	January	2017
Commence construction	April	2017
TIGER Grant award	June	2017
Commence TIGER Grant 25-year horizon	January	2018
Initial Phase 1 terminal completion (300,000 TEUs)	December	2018
Terminal operations commence	January	2019
End of TIGER grant 25-year horizon	December	2042

### 8.4 REQUIRED APPROVALS

#### 8.4.1 ENVIRONMENTAL PERMITS

The Southport Marine Terminal project (all phases) has received all required environmental approvals and permits and is shovel-ready from the environmental regulatory standpoint. On a federal level, the activities involved in the construction of Southport are regulated by the U.S. Army Corps of Engineers (USACE). Therefore, the project is subject to NEPA compliance. Based on a ruling by USACE, a formal environmental assessment (EA) was prepared, titled “December 2012 Southport Marine Terminal Project Final Environmental Assessment and Mitigation Plan.”

Based on the EA, a Finding of No Significant Impact (FONSI) was issued. The FONSI took into account specific mitigation measures proposed with the project that would reduce the net impact of the project to an acceptable level. Based on the FONSI, USACE issued the necessary Federal authorizations for the project, including Section 10, Section 401, and Section 404 permits. Permits were issued on April 16, 2013.

Approvals required on the state level are regulated through the Pennsylvania Department of Environmental Protection (PADEP), Delaware River Basin Commission (DRBC), and New Jersey Coastal Zone Management Program.

The PRPA and state Department of General Services (DGS) has satisfied the DRBC that the project will be performed in compliance with applicable DRBC requirements. The Commission’s concurrence and actions are documented in Resolution No. 2013-1 (March 6, 2013), which also confirms the project’s inclusion in the Commission’s Comprehensive Plan.



The DGS and PRPA have also reviewed the proposed activities for consistency with applicable rules of both the Pennsylvania and New Jersey Coastal Zone Management Programs. Although the proposed terminal will be located in the Commonwealth of Pennsylvania, certain elements of the dredging and disposal are subject to a consistency determination under the New Jersey Coastal Management Plan. Thus, as part of project planning, the project proponents have evaluated consistency with both the Pennsylvania Coastal Zone Management Program and the New Jersey Coastal Zone Management Program.

Additional in-hand permits obtained include:

- NPDES Construction Permit and Erosion and Sediment Control Plan (December 2012);
- NPDES Discharge for Stormwater Construction Activities Permit (Permit No. PAI01511003) by way of letter dated April 5, 2013.
- PADEP Consistency Concurrence with Pennsylvania's Coastal Resources Management Program (letter dated April 5, 2013); and
- State Open Water Obstruction and Encroachment Permit (letter dated April 5, 2013).

The EA and all the project approvals can be accessed at the following internet link:

<http://www.philaport.com/grants-southport/>

## 8.4.2 LEGISLATIVE APPROVALS

No legislative approvals are required for this project.

## 8.4.3 STATE AND LOCAL PLANNING

PRPA facilities are exempt from obtaining permits from the City of Philadelphia. All construction permits will be obtained through the Pennsylvania Department of Labor and Industry.

PRPA works closely with the Delaware Valley Regional Planning Commission (DVRPC). As indicated in their letter of support the DVRPC would amend the Pennsylvania Transportation Improvement Program (TIP) to include this project.

## 9 FEDERAL WAGE RATE CERTIFICATION

Federal Wage Rate Certification: The Philadelphia Regional Port Authority agrees to comply with the requirements of subchapter IV of Chapter 31 of Title 40, United States Code (Federal wage rate requirements), as required by the FY 2016 Continuing Appropriations Act. See Appendix D for the signed Wage Rate Certification Letter by Jack Dempsey, Deputy Executive Director.



## **APPENDIX A**    BENEFIT-COST ANALYSIS NARRATIVE



# 1 EXECUTIVE SUMMARY

The Philadelphia Regional Port Authority (PRPA) is requesting \$25 million in discretionary grant funds from the 2016 TIGER Program for the development of the Southport Marine Terminal Complex (Southport) in Philadelphia, PA.

The Southport project would provide several economic and societal benefits to the U.S., principally resulting from a reduction in truck miles that would result from the investment in Philadelphia port infrastructure. Currently 85% of all containerized goods imported through a Northeast US Port and consumed in the Philadelphia region are trucked into the region from the ports of NY/NJ, Baltimore, and Virginia.

A benefit-cost analysis (BCA) has been carried out to quantify the value of the benefits associated with the reduced trucking miles gained by establishing a state-of-the-art regional container handling terminal, weighted against the costs necessary for the project development.

The BCA shows that the benefits generated by Southport outweigh the cost of development by a factor of **2.92:1** (discounted at 3%) and **1.77:1** (discounted at 7%). A summary matrix of the benefits resulting from the Phase 1 Southport project is shown as Table 1.

This BCA narrative discusses the approach taken in developing the BCA and lists key assumptions and inputs used in the analysis. A sensitivity analysis has been carried out to account for uncertainties in forecasting future volumes, and the results are presented in Section 6.

**table 1** / MATRIX OF BENEFITS (DISCOUNTED AT 7%; SEE BCA WORKSHEET 1. EXECUTIVE SUMMARY)

Current Status/Problem	Change to Baseline	Type of Impacts	Population Affected by Impacts	Economic Benefit	Summary of Benefits (Discounted @ 7%)	BCA Wksht. Ref.
Current Philadelphia infrastructure inefficient and nearing capacity, resulting in 85% of locally consumed containerized imports being trucked into the region.	Project will provide additional container terminal capacity to the Philadelphia Region.	New terminal will provide more regional capacity and greater efficiencies, attracting a greater share of containerized goods into the Port of Philadelphia at a cost savings through fewer trucked miles.	Regional commuters, consumers, and workforce.	Monetized value of reduced truck miles and reduced trucking costs	\$401,239,000	4
				Monetized value of reduced truck emissions	\$32,043,100	5
				Monetized value of reduced traffic accidents & property damage	\$25,969,500	6
				<b>Total Monetized value</b>	<b>\$459,251,600</b>	<b>2</b>



## 2 FREIGHT (CONTAINER) VOLUME CALCULATION

### 2.1 CURRENT REGIONAL CONTAINER DISTRIBUTION

In this report, the “Philadelphia region” is defined as the 21 counties surrounding (and including) Philadelphia that are closer to the port of Philadelphia than to the other regional ports of NY/NJ, Baltimore, or Norfolk.

The demand and distribution of container truck trips into these 21 counties was provided by the PRPA based on a Port Import/Export Reporting Service (PIERS) report. A conversion factor of 1.54 was applied to convert Container Units (truck trips) to Twenty-Foot Equivalent Units (TEUs). An extract from this summary is shown as Table 2.

**table 2 /** EXTRACT FROM BCA WKSHT 3. PROJECT DEMAND & COST (PIERS, 2014)

21 County Container Distribution (TEUs)					
COUNTY	TOTAL	US NORTHEAST PORT OF ORIGIN			
		PHILADELPHIA	NY/NJ	BALTIMORE	VIRGINIA
MODE OF TRAVEL	MIXED	SHIP	TRUCK	TRUCK2	TRUCK3
Montgomery	43,209	4,863	25,849	4,024	8,473
Burlington	38,234	20,758	16,107	913	456
New Castle	14,448	4,124	2,458	1,747	6,118
Bucks	27,811	4,480	19,085	633	3,613
Chester	22,210	370	7,561	4,431	9,848
Berks	20,658	283	17,134	1,121	2,119
Kent	1,207	14	225	829	140
Cape May	537	68	464	3	3
Lehigh	17,357	1,540	13,942	604	1,272
Philadelphia	63,637	7,238	46,808	1,221	8,370
VOLUME BOUND FOR PHILADELPHIA REGION (2015)	370,000	57,000	240,000	26,000	48,000
PCT BY PORT OF ORIGIN	100%	15%	65%	7%	13%
PCT BY MODE OF TRAVEL		15%		85%	

Based on this information and a uniform 4% growth rate, a Year 1 (2018) total demand for the region was established as 416,200 TEUs.

### 2.2 FORECAST REGIONAL CONTAINER GROWTH

This BCA covers a 25-year period with an annual volume growth factor of 4% (see Section 5) applied uniformly over the project life to establish the annual regional demand. Growth in volume was capped for the BCA analysis at Year 15 when the Phase 1 development of Southport will reach its capacity limit of 300,000 TEUs and require future expansion phase of the terminal. This expansion would likely occur several years prior to the saturation of the cargo yard.



This additional capital investment beyond Phase 1 is not included in the BCA analysis. Therefore, this additional investment is not needed to continue to benefit from the volumes already going through the Southport terminal direct to the local region at that time.

The yearly demand into the Philadelphia region is shown in *BCA Worksheet 3 – Project Demand & Cost, Column S* (“Volume Bound for Philadelphia Region”).

## 2.3 SOUTHPORT REGIONAL CONTAINER VOLUMES

In developing the anticipated container volumes that Southport will distribute to the region, it has been assumed that Philadelphia’s Packer Avenue Marine Terminal (PAMT) is nearing full capacity, with a throughput of 57,000 TEUs into the Philadelphia region (amounting to 15% of the current Philadelphia-area demand), per Table 2 above. Furthermore, it is assumed that PAMT will remain at this capacity for the foreseeable future.

Therefore, the potential TEU volume available for Southport to capture is represented by the total regional demand, less the 57,000 TEUs shipped through PAMT. It is assumed the PAMT will continue to retain this share of the market.

In the initial years of the project, a conservative 20% of the available regional market has been assumed to be rerouted through the Southport terminal (% captured). As shown in Table 3, this percentage is assumed to increase at a uniform 2% rate annually over the 25-year project horizon as the terminal ramps up and regional shippers move their operations to the more economic and sustainable Southport option.

The number of TEUs captured (shipped to Southport) is simply the volume available for capture multiplied by the forecasted percent captured.

These annual capture volumes are rounded (to the nearest thousand) to produce the cells shown in the column labeled “TEU’s to Southport”. These TEU volumes have been used to calculate the benefits resulting from the construction of Southport. This cargo is assumed to enter the region directly via ship and remain in the region – resulting in fewer truck miles than if trucked from Baltimore, NY/NJ, or Norfolk into the region.



**table 3 / ANNUAL CONTAINER VOLUMES W/ SOUTHPORT (EXCERPT FROM BCA WKSHT 3. PROJECT DEMAND & COST)**

Annual Container Volumes with Southport						
4%	(CAGR)			2%	(CAPTURE RATE INCREASE)	
YEAR	VOLUME BOUND FOR PHILADELPHIA REGION	VOLUME SHIPPED DIRECTLY TO PACKER TERMINAL	VOLUME AVAILABLE FOR CAPTURE (OTHERWISE TRUCKED IN)	PCT CAPTURED	AMOUNT CAPTURED (SHIPPED TO SOUTHPORT)	TEUs TO SOUTHPORT*
2018	416,200	57,000	359,200	20%	71,840	
2019	432,848	57,000	375,848	22%	82,686	83,000
2020	450,162	57,000	393,162	24%	94,359	94,000
2021	468,168	57,000	411,168	26%	106,904	107,000
2022	486,895	57,000	429,895	28%	120,371	120,000
2038	911,945	57,000	854,945	60%	512,967	300,000
2039	948,423	57,000	891,423	62%	552,682	300,000
2040	986,359	57,000	929,359	64%	594,790	300,000
2041	1,025,814	57,000	968,814	66%	639,417	300,000
2042	1,066,846	57,000	1,009,846	68%	686,696	300,000
						5,574,000

### 3 PROJECT BENEFITS

#### 3.1 MILEAGE REDUCTIONS

The yearly TEU volumes established for the Southport development were then converted to Container Units (CUs) to establish number of truck trips affected by the Southport development.

*BCA Worksheet 7 – Local Distribution*, was used as the basis for the calculation of truck miles (and costs) saved, and contains three key inputs:

- **Point-to-point distances** – For each of the 21 counties in the Philadelphia region, the difference in distance from the Port of Philadelphia (Southport) to Baltimore, NY/NJ, and Norfolk ports is presented. This is used to calculate the potential mileage savings realized in shipping to Philadelphia compared to the other ports.
- **Point-to-point costs** – Point-to-point costs to truck a container from Philadelphia, Baltimore, NY/NJ or Norfolk to each of the 21 counties are presented. The difference in costs represent the potential truck cost savings (fuel, operations, and maintenance) realized if shipped direct to Philadelphia.
- **County distribution** – Current % Distribution of all the containers currently trucked from Baltimore, NY/NJ and Norfolk to the 21 counties. This distribution was assumed constant for all future years in the BCA analysis.

The above parameters were applied to the projected annual Southport volume (*BCA Worksheet 3 – Column X - “TEUs to Southport”*) to establish the number of containers going to each county, and subsequent total mileage savings for each year and total truck cost savings.



### 3.2 GREENHOUSE GAS EMISSIONS REDUCTIONS

The *TIGER BCA Resource Guide*<sup>17</sup> and the *Average In-Use Emission Rates for Heavy-Duty Trucks*<sup>18</sup> were used as a primary reference for the analysis of the reduction in greenhouse gas (GHG) emissions with the development of Southport. Emissions reductions were based on the mileage reductions over the 25-year horizon. Emissions reductions were separated into Carbon and non-Carbon emissions and annual values were determined based on the Social Cost of Carbon guidance and value of emissions per the Resource Guide.

### 3.3 ACCIDENT REDUCTIONS

This portion of the analysis focused on evaluating the benefits accrued by reduction in accidents as a result of the reduced Vehicle Miles Traveled (VMT). The value of injuries was monetized using the maximum Abbreviated Injury Scale (AIS) and the KABCO scale (which consists of categories designated fatal [K], serious [A], moderate [B], minor [C], and none [O]) using the *National Highway Traffic Safety Administration’s (NHTSA)* conversion matrix as outlined in the *TIGER BCA Resource Guide*. Table 4 illustrates the BCA for accident reductions at Southport over the 25-year horizon.

**table 4 / ACCIDENT REDUCTION WITH SOUTHPORT (FROM BCA WORKSHEET 3. PROJECT DEMAND & COST)**

Rates per 100 Million Vehicle Miles Traveled	Year	Total Truck Miles Reduced	Number of Accidents (Annually)			Accident Savings		PVB	
			Fatalities <sup>(1)</sup>	Injuries <sup>(2)</sup>	PDO <sup>(3)</sup>	\$2013	\$2017	3%	7%
			1.67	25.5	82.8				
0	2017		-	-	-	-	-	\$ -	\$ -
1	2018	-	-	-	-	\$ -	\$ -	\$ -	\$ -
2	2019	5,192,835	0.09	1.32	4.30	\$ 911,583	\$ 1,002,741	\$ 945,180	\$ 875,833
3	2020	5,843,816	0.10	1.49	4.84	\$ 1,025,860	\$ 1,128,446	\$ 1,032,688	\$ 921,148
4	2021	6,652,004	0.11	1.70	5.51	\$ 1,167,735	\$ 1,284,508	\$ 1,141,269	\$ 979,945
5	2022	7,460,191	0.12	1.90	6.18	\$ 1,309,609	\$ 1,440,570	\$ 1,242,648	\$ 1,027,106
6	2023	8,392,715	0.14	2.14	6.95	\$ 1,473,310	\$ 1,620,641	\$ 1,357,261	\$ 1,079,902
7	2024	9,325,239	0.16	2.38	7.72	\$ 1,637,011	\$ 1,800,712	\$ 1,464,144	\$ 1,121,393
8	2025	10,448,235	0.17	2.66	8.65	\$ 1,834,149	\$ 2,017,564	\$ 1,592,683	\$ 1,174,240
9	2026	11,574,392	0.19	2.95	9.58	\$ 2,031,842	\$ 2,235,026	\$ 1,712,961	\$ 1,215,706
10	2027	12,700,549	0.21	3.24	10.52	\$ 2,229,534	\$ 2,452,488	\$ 1,824,881	\$ 1,246,720
11	2028	14,014,398	0.23	3.57	11.60	\$ 2,460,176	\$ 2,706,193	\$ 1,955,012	\$ 1,285,693
12	2029	15,328,248	0.26	3.91	12.69	\$ 2,690,817	\$ 2,959,899	\$ 2,076,014	\$ 1,314,231
13	2030	16,767,227	0.28	4.28	13.88	\$ 2,943,425	\$ 3,237,767	\$ 2,204,762	\$ 1,343,558
14	2031	18,331,334	0.31	4.67	15.18	\$ 3,217,998	\$ 3,539,798	\$ 2,340,223	\$ 1,372,795
15	2032	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 2,326,343	\$ 1,313,637
16	2033	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 2,258,585	\$ 1,227,698
17	2034	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 2,192,801	\$ 1,147,381
18	2035	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 2,128,933	\$ 1,072,319
19	2036	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 2,066,925	\$ 1,002,167
20	2037	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 2,006,724	\$ 936,605
21	2038	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 1,948,275	\$ 875,332
22	2039	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 1,891,529	\$ 818,067
23	2040	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 1,836,436	\$ 764,549
24	2041	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 1,782,948	\$ 714,532
25	2042	18,769,284	0.31	4.79	15.54	\$ 3,294,878	\$ 3,624,366	\$ 1,731,017	\$ 667,786
	<b>Total</b>		<b>6</b>	<b>89</b>	<b>289</b>	<b>\$ 61,176,709</b>	<b>\$ 67,294,379</b>	<b>\$ 43,060,243</b>	<b>\$ 25,498,344</b>

Source: *Large Truck and Bus Crash Facts (2013)*<sup>19</sup>

- 1 Trends Table 16 (p. 25)
- 2 Trends Table 18 (p. 28)
- 3 Trends Table 20 (p. 31)



## **4 PROJECT COSTS**

The initial establishment cost of the project in Year 1 (2018) has been estimated at \$309M. This includes \$98M of public funds for the construction of one berth, and \$211M of private funds for the upland container yard development.

The cost of constructing similar wharf infrastructure in either Baltimore or NY/NJ to accommodate the growth in the Philadelphia region (No-Build Case) has been estimated at approximately 15% more expensive due to the increased difficulties in land acquisition and existing geographic constraints. These issues do not exist at the Southport site, and as such a capital cost savings has been included in the BCA at Year 5 in the amount of \$40M to reflect these savings to the U.S.

The \$40M figure is also in line with the Phase 1 equipment costs, estimated at \$35.2M and consisting of ship-to-shore cranes, yard handling equipment, and additional mechanized equipment and materials required for container yard development. It is envisioned that in order for expansion to occur at an existing land-constrained terminal such as NY/NJ, densification would need to occur. Densification would include yard and terminals upgrades requiring similar modernized container handling equipment.

In aggregate, these costs represent Present Value Costs (PVC) of \$300M for the 3% discount case and \$289M for the 7% discount case.

## **5 ANALYSIS SUMMARY**

To assess the overall BCA for the proposed project, the total costs for the project were compared to the total benefits accrued by the project over the 25-year horizon using 2018 dollars. As shown in Tables 5 and 6 below, under both a 3% and a 7% discount rate, the project will generate positive benefit vs. cost and would be deemed feasible from an economic standpoint.



**table 5 / OVERALL BCA WITH A 3% DISCOUNT RATE (FROM BCA WORKSHEET 2. SUMMARY TABLE)**

Year	Costs	PVC	Benefits (PVB)			
			Mileage Reduction	Truck Emission Reductions	Accident Cost Savings	Total
						\$ -
2017	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
2018	\$ (308,740,000)	\$ (299,747,573)	\$ -	\$ -	\$ -	\$ -
2019	\$ -	\$ -	\$ 14,872,280	\$ 1,187,636	\$ 962,643	\$ 17,022,560
2020	\$ -	\$ -	\$ 16,254,432	\$ 1,297,606	\$ 1,051,769	\$ 18,603,807
2021	\$ -	\$ -	\$ 17,963,481	\$ 1,434,041	\$ 1,162,355	\$ 20,559,878
2022	\$ 40,000,000	\$ 34,504,351	\$ 19,559,185	\$ 1,561,460	\$ 1,265,608	\$ 22,386,253
2023	\$ -	\$ -	\$ 21,363,187	\$ 1,705,496	\$ 1,382,339	\$ 24,451,022
2024	\$ -	\$ -	\$ 23,045,509	\$ 1,839,821	\$ 1,491,196	\$ 26,376,526
2025	\$ -	\$ -	\$ 25,060,665	\$ 2,001,363	\$ 1,622,111	\$ 28,684,138
2026	\$ -	\$ -	\$ 26,953,218	\$ 2,152,526	\$ 1,744,611	\$ 30,850,355
2027	\$ -	\$ -	\$ 28,714,265	\$ 2,293,214	\$ 1,858,599	\$ 32,866,078
2028	\$ -	\$ -	\$ 30,761,851	\$ 2,456,767	\$ 1,991,134	\$ 35,209,751
2029	\$ -	\$ -	\$ 32,665,800	\$ 2,608,851	\$ 2,114,371	\$ 37,389,023
2030	\$ -	\$ -	\$ 34,691,636	\$ 2,770,673	\$ 2,245,498	\$ 39,707,808
2031	\$ -	\$ -	\$ 36,823,103	\$ 2,940,905	\$ 2,383,462	\$ 42,147,471
2032	\$ -	\$ -	\$ 36,604,695	\$ 2,923,523	\$ 2,369,325	\$ 41,897,543
2033	\$ -	\$ -	\$ 35,538,539	\$ 2,838,401	\$ 2,300,316	\$ 40,677,256
2034	\$ -	\$ -	\$ 34,503,436	\$ 2,755,758	\$ 2,233,316	\$ 39,492,511
2035	\$ -	\$ -	\$ 33,498,482	\$ 2,675,521	\$ 2,168,268	\$ 38,342,272
2036	\$ -	\$ -	\$ 32,522,798	\$ 2,597,621	\$ 2,105,115	\$ 37,225,534
2037	\$ -	\$ -	\$ 31,575,532	\$ 2,522,015	\$ 2,043,801	\$ 36,141,348
2038	\$ -	\$ -	\$ 30,655,856	\$ 2,448,584	\$ 1,984,273	\$ 35,088,713
2039	\$ -	\$ -	\$ 29,762,967	\$ 2,377,291	\$ 1,926,478	\$ 34,066,736
2040	\$ -	\$ -	\$ 28,896,085	\$ 2,308,073	\$ 1,870,367	\$ 33,074,525
2041	\$ -	\$ -	\$ 28,054,451	\$ 2,240,895	\$ 1,815,891	\$ 32,111,237
2042	\$ -	\$ -	\$ 27,237,331	\$ 2,175,649	\$ 1,763,001	\$ 31,175,981
<b>Total</b>	<b>\$ (268,740,000)</b>	<b>\$ (265,243,221)</b>	<b>\$ 677,578,787</b>	<b>\$ 54,113,689</b>	<b>\$ 43,855,848</b>	<b>\$ 775,548,323</b>

**Overall B/C Ratio: 2.92**



**table 6 / OVERALL BCA WITH A 7% DISCOUNT RATE (FROM BCA WORKSHEET 2. SUMMARY TABLE)**

Year	Costs	PVC	Benefits (PVB)			
			Mileage Reduction	Truck Emission Reductions	Accident Cost Savings	Total
						\$ -
2017	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
2018	\$ (308,740,000)	\$ (288,542,056)	\$ -	\$ -	\$ -	\$ -
2019	\$ -	\$ -	\$ 13,781,118	\$ 1,100,501	\$ 892,015	\$ 15,773,634
2020	\$ -	\$ -	\$ 14,498,803	\$ 1,157,453	\$ 938,168	\$ 16,594,423
2021	\$ -	\$ -	\$ 15,424,258	\$ 1,231,332	\$ 998,051	\$ 17,653,642
2022	\$ 40,000,000	\$ 28,519,447	\$ 16,166,574	\$ 1,290,619	\$ 1,046,084	\$ 18,503,277
2023	\$ -	\$ -	\$ 16,997,566	\$ 1,356,974	\$ 1,099,854	\$ 19,454,394
2024	\$ -	\$ -	\$ 17,650,639	\$ 1,409,126	\$ 1,142,113	\$ 20,201,877
2025	\$ -	\$ -	\$ 18,476,519	\$ 1,475,548	\$ 1,195,936	\$ 21,148,004
2026	\$ -	\$ -	\$ 19,128,973	\$ 1,527,670	\$ 1,238,168	\$ 21,894,810
2027	\$ -	\$ -	\$ 19,616,981	\$ 1,566,676	\$ 1,269,755	\$ 22,453,412
2028	\$ -	\$ -	\$ 20,230,209	\$ 1,615,667	\$ 1,309,448	\$ 23,155,324
2029	\$ -	\$ -	\$ 20,679,244	\$ 1,651,546	\$ 1,338,513	\$ 23,669,303
2030	\$ -	\$ -	\$ 21,140,711	\$ 1,688,419	\$ 1,368,383	\$ 24,197,513
2031	\$ -	\$ -	\$ 21,600,741	\$ 1,725,159	\$ 1,398,159	\$ 24,724,059
2032	\$ -	\$ -	\$ 20,669,906	\$ 1,650,852	\$ 1,337,909	\$ 23,658,667
2033	\$ -	\$ -	\$ 19,317,669	\$ 1,542,869	\$ 1,250,382	\$ 22,110,920
2034	\$ -	\$ -	\$ 18,053,896	\$ 1,441,948	\$ 1,168,581	\$ 20,664,426
2035	\$ -	\$ -	\$ 16,872,800	\$ 1,347,629	\$ 1,092,132	\$ 19,312,562
2036	\$ -	\$ -	\$ 15,768,972	\$ 1,259,480	\$ 1,020,684	\$ 18,049,136
2037	\$ -	\$ -	\$ 14,737,357	\$ 1,177,109	\$ 953,910	\$ 16,868,376
2038	\$ -	\$ -	\$ 13,773,231	\$ 1,100,113	\$ 891,505	\$ 15,764,849
2039	\$ -	\$ -	\$ 12,872,179	\$ 1,028,154	\$ 833,182	\$ 14,733,515
2040	\$ -	\$ -	\$ 12,030,074	\$ 960,901	\$ 778,675	\$ 13,769,650
2041	\$ -	\$ -	\$ 11,243,059	\$ 898,058	\$ 727,734	\$ 12,868,851
2042	\$ -	\$ -	\$ 10,507,532	\$ 839,315	\$ 680,125	\$ 12,026,972
<b>Total</b>	<b>\$ (268,740,000)</b>	<b>\$ (260,022,609)</b>	<b>\$ 401,239,014</b>	<b>\$ 32,043,116</b>	<b>\$ 25,969,466</b>	<b>\$ 459,251,596</b>

**Overall B/C Ratio: 1.77**



## 6 SENSITIVITY ANALYSIS

A sensitivity analysis was performed to determine the sensitivity of the BCA to the primary assumptions. These consist of the assumed growth rate for TEU demand over time, which based on the Martin report is set at 4%, and the assumed market share that the Phase 1 terminal would be able to capture over the 25-year horizon. The market share has been assumed to increase uniformly over the project life at 2% and is capped at 68%. The sensitivity analysis consisted of varying these two percentages and noting the effect on BCA, as follows:

### **Base case (annual growth rate = 4%, max capture rate increase @ 2%/yr)**

The Southport TEU demand reaches a maximum of 300,000 TEUs in Year 14 (2031).

The overall B/C (3%) is 2.92.

The overall B/C (7%) is 1.77.

### **Reduce annual growth rate from 4% to 2%; maintain capture rate increase @ 2%/yr**

The Southport TEU demand reaches a maximum of 300,000 TEUs in Year 21 (2038).

The overall B/C (3%) is now 2.50.

The overall B/C (7%) is now 1.49.

### **Maintain annual growth rate at 4%, reduce capture rate increase to 1%/yr**

The Southport TEU demand reaches a maximum of 300,000 TEUs in Year 19 (2036).

The overall B/C (3%) is now 2.53.

The overall B/C (7%) is now 1.50.

### **Reduce annual growth rate from 4% to 2%; maintain capture rate increase @ 1%/yr**

The Southport TEU demand reaches a maximum of 253,000 TEUs in Year 25 (2042).

The overall B/C (3%) is now 1.89.

The overall B/C (7%) is now 1.15.

The sensitivity analysis shows that conservative forecasts, which include significantly reduced demand and market share, the Phase 1 Southport Marine Terminal is still positively beneficial.

It should also be noted that the 25-year horizon is by no means the true ending of the stream of revenue (benefits). Port infrastructure projects are commonly built for service lives between 35 and 50 years. Benefits for this project would therefore continue to accrue well beyond the BCA horizon, even accounting for periodic maintenance.



- 
- <sup>17</sup> TIGER Benefit-Cost Analysis (BCA) Resource Guide (2016): <http://www.dot.gov/policy-initiatives/tiger/tiger-bca-resource-guide-2016>
- <sup>18</sup> *Average In-Use Emissions from Heavy-Duty Trucks*; United States Environmental Protection Agency (July 2008)
- <sup>19</sup> Large Truck and Bus Crash Facts (2013): <http://www.fmcsa.dot.gov/safety/data-and-statistics/large-truck-and-bus-crash-facts-2013>



**APPENDIX B BENEFIT-COST ANALYSIS**



(The benefit-cost analysis is provided electronically in Excel format at <http://www.philaport.com/grants-southport/> )



## APPENDIX C LETTERS OF SUPPORT



(Letters of support are provided electronically at  
<http://www.philaport.com/grants-southport/> )



**APPENDIX D WAGE RATE CERTIFICATION LETTER**



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**Philadelphia Regional Port Authority**

April 22, 2016

Hon. Secretary Anthony Foxx  
U.S. Department of Transportation  
1200 New Jersey Ave, SE  
Washington, DC 20590

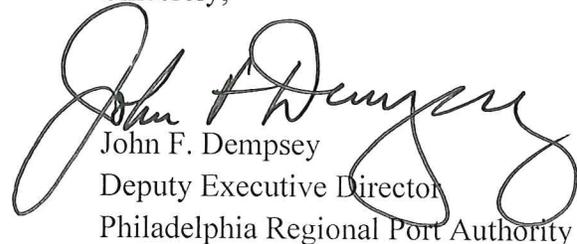
RE: 2016 TIGER Grant Application

Dear Secretary Foxx,

The Philadelphia Regional Port Authority (PRPA) will comply with the requirements of subchapter IV of chapter 31 of title 40, United States Code (Federal Wage Rate Requirements), as required by the FY 2016 Appropriations Act for all contracted or in-house work necessary to implement the proposed project.

If the PRPA is awarded a TIGER grant for the SouthPort Marine Terminal Development project we will require all contractors meet all applicable Federal Wage Rate Requirements.

Sincerely,



John F. Dempsey  
Deputy Executive Director  
Philadelphia Regional Port Authority



## APPENDIX E

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- 1 American Association of Port Authorities, NORTH AMERICA: CONTAINER PORT TRAFFIC IN TEUS, 1990- 2009; see Appendix E-5 and Appendix E-6.
- 2 U.S. Ports See Costly Delays as Cargo Ships, Volumes Grow, Wall Street Journal, April 29, 2015, Business/Logistics Report
- 3 Martin Associates and St. Onge Company, 2006
- 4 Philadelphia Regional Port Authority, May 2015
- 5 Delaware River Main Channel Deepening Fact Sheet, USACE Philadelphia District, Design Center, February 2015,
- 6 Baltimore Business Journal: Port of Baltimore Looks Beyond Scuttled Intermodal Facility, Rick Seltzer, October 8, 2014, Baltimore, MD
- 7 Port of NY and NJ Website, Loaded Containers in TEUs and Total Express Rail Lifts by Month, <https://www.panynj.gov/port/monthly-loaded-containers.html>
- 8 Cambridge Systematics, Memorandum: NYEDC Maritime and Freight Planning Support, October 17, 2008, Bethesda MD, Table 2
- <sup>9</sup> See endnote 7
- <sup>10</sup> BCA Sheet 4, Under heading, *Total Truck Miles Reduced*, Year 2018
- 11 The Projected Economic Impacts Of The Development Of The Southport Container Terminal, John C. Martin Associates, LLC, Lancaster, PA, 2009, page 1
- 12 PRPA Container Market Analysis of the Philadelphia Hinterland as it Relates to North Atlantic Ports, May 2015
- <sup>13</sup> *Economies of Scale in Large Containerships*; Journal of Transport Economics and Policy, Vol. 33, 2000.
- 14 New ATRI Research Finds Industry's Operational Costs on The Rise Again, Dan Murray, American Transportation Research Institute, Arlington, VA, September 2014
- <sup>15</sup> FHWA Large Truck and Bus Crash Facts, 2013.
- <sup>16</sup> Unemployment in the Philadelphia Area by County – March 2015, Mid-Atlantic Information Office, Bureau of Labor Statistics, U.S. Department of Labor, May 2015.
- <sup>17</sup> Phila. Rates Highest among Top 10 Cities for Deep Poverty, by Alfred Lubrano, Philadelphia Inquirer (at [http://articles.philly.com/2014-09-26/news/54322611\\_1\\_deep-poverty-poverty-line-south-philadelphia](http://articles.philly.com/2014-09-26/news/54322611_1_deep-poverty-poverty-line-south-philadelphia)), September 2014.
- <sup>18</sup> TIGER Benefit-Cost Analysis (BCA) Resource Guide (2016): <http://www.dot.gov/policy-initiatives/tiger/tiger-bca-resource-guide-2016>
- <sup>19</sup> *Average In-Use Emissions from Heavy-Duty Trucks*; United States Environmental Protection Agency, July 2008.
- <sup>20</sup> Large Truck and Bus Crash Facts (2013): <http://www.fmcsa.dot.gov/safety/data-and-statistics/large-truck-and-bus-crash-facts-2013>