Appendix B

Benefit-Cost Analysis

Seagirt Marine Terminal Berth 3 Modernization P3 Project

SEAGIRT MARINE TERMINAL BERTH THREE MODERNIZATION P3 PROJECT – BENEFIT COST ANALYSIS APPENDIX

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July 13, 2018

TABLE OF CONTENTS

SEAGIRT MARINE TERMINAL BERTH THREE MODERNIZATION
P3 PROJECT - BENEFIT COST ANALYSIS APPENDIX

I. PROJECT DESCRIPTION

The Port of Baltimore is a strong, robust seaport founded in 1706 along the Chesapeake Bay in Maryland. Through the years, the port has planned and implemented numerous strategies to provide the maximum benefit to the region and nation while simultaneously achieving multiple objectives.

The Port of Baltimore is one of four Atlantic Coast ports that is served by a 50-foot channel and is connected to the Atlantic Ocean via the Chesapeake Bay shipping channel. In 2010, Ports America Chesapeake entered into a concession agreement with the Maryland Port Administration to operate the Seagirt Marine Terminal, the port's dedicated container terminal. The Seagirt Marine Terminal consists of four berths, only one of which is deepened to 50 feet. The expansion of the Panama Canal was completed in June 2016 and increased the capacity of the Canal's lock chambers to be able to handle container ships up to about 14,000 TEUs. Prior to the expansion, the maximum size vessel that could transit the locks was about 5,000 TEUs. As the vessel size increases, deeper channels, super-post Panamax cranes, and efficient terminal operations will become a necessity at those ports serving the larger vessels, now deployed on the Asian all-water services. In addition, as the ships of larger sizes cascade from one trade lane to another, there will be constant growth in the size of vessels deployed on all trade routes. For example, the largest container vessels, those in the 18,000 TEU and above category, are deployed on the Asia-Europe trade, as the economies of the largest container vessels are realized on the longest trade routes with minimal port calls. As these larger ships, the 18,000 TEU vessels and greater, are deployed on the Asia-Europe routings, the current vessels on that route are moved to the Transpacific routing, which is the routing offering the next level of distance and minimal port calls. These newly deployed vessels on the Transpacific trade (from the Asia-Europe trade) displace the current sized fleet on the Transpacific trade, and these displace vessels then cascade to the all-water Asia-U.S. East Coast/Gulf Coast trade via the Panama Canal.

A review of the most recent order book of container vessels, shown in Exhibit 1, underscores the growing average vessel size of the world container fleet. Of the 455 vessels on order as of January 1, 2016, 31 % are 12,000 TEUs or greater, while another 25% are in excess of 8,000 TEUs. The balance of the vessels, primarily Handymax vessels in 1,000-2,999 TEUs on order, are for feeder services throughout Asia and Europe, as well as in the Caribbean trades. Further noted in Exhibit 1, is the fact that the draft of the vessels in excess of 8,000 TEUs range from a low 45 feet to 50.5 feet. Typically, channel depths to handle such vessels require at least 2 feet in addition to the sailing draft of the vessel for a safe transit to the

terminal. This suggest that a channel depth of 50 feet and greater is needed to handle fully laden vessels that will dominate the future container fleet.[1]

Exhibit 1
World Order Book for Container Vessels

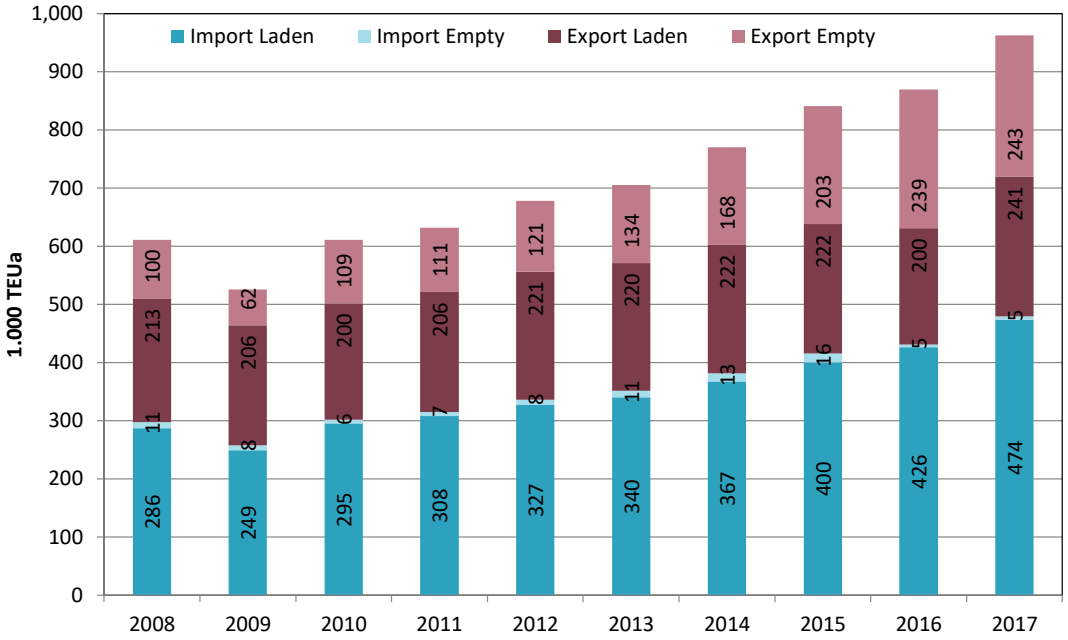
WORLD CELLULAR CONTAINERSHIP FLEET IN PROFILE As of January 1, 2016												
CLASS (TEU Range)	AVERAGE SIZE/DIMENSIONS/AGE/SPEED						IN SERVICE			ON ORDER		
	LENGTH (Feet)	BEAM (Feet)	DRAFT (Feet)	DWT (Metric)	Age (Years)	SPEED (Knots)	SHIPS	TEUs	Avg. TEUs	SHIPS	TEUs (000s)	Avg. TEUs
Feeder (100-999)	400.9	64.3	23.0	8,196	16.2	16.1	1,070	648,809	606	1	590	590
Handy +(1,000-2,999)	545.3	84.0	30.5	19,102	12.1	19.2	1,883	3,374,966	1,792	192	382,564	1,993
Sub-Panamax(2,000-2,999)	682.1	100.1	37.4	34,769	12.1	21.7						
Panamax (3,000 & Over)	871.8	105.6	41.0	53,524	10.5	23.8	844	3,549,442	4,206	3	9,910	3,303
Post-Panamax (>8,000)	919.0	130.3	44.9	71,915	9.2	24.1	680	3,916,853	5,760	33	134,440	4,074
Post-Panamax (8,000 - 11,999)	1,080.1	148.3	47.6	108,198	5.8	23.0	533	4,788,135	8,983	83	835,838	10,070
Post-Panamax (12,000 & over)	1,228.1	169.0	50.5	157,978	3.2	23.9	239	3,456,960	14,464	143	2,410,324	16,855
TOTALS	721.5	102.0	36.1	46,954	11.3	21.0	5,249	19,735,165	3,760	455	3,773,666	8,294
Source: Clarkson Research												

In addition to channel depth, it is critical that the terminals serving the container market have berths capable of handling the growing size of the container vessel fleet, as well as equipped with state of the art container cranes, and efficient terminal yard operations. Cranes with outreach capacity of 22-26 containers are required, and efficient terminal operations and highway and rail access are essential to handle the growing size of the container vessels.

Since 2010, containerized cargo handled at the Maryland Port Administration has reached record levels for each of the last 8 years, as shown in Exhibit 2.

[1] To emphasize the continually growing size of containerships, Hyundai Merchant Marine (HMM), has just announced plans to build twelve 23,000 TEU vessels, and another eight 14,000 TEU vessels. The 23,000 TEU ships will be delivered in the second quarter of 2020, while the 14,000 TEU ships will be delivered beginning in 2021. "Hyundai Merchant Marine's Building Spree Adds to Global Orderbook", Freightwaves, June 5, 2018

Exhibit 2
Containerized Cargo Handled at Maryland Port Administration



Source: Maryland Port Administration

In addition to the record setting pace at the Port of Baltimore, as shown in the previous chart, containerized cargo growth at the Port of Baltimore has increased at an annual growth rate that is greater than its neighboring container ports on the North Atlantic. Between 2003 and 2017, imported container cargo has grown at an annual rate of 4.9%, compared to a 3.0% annual growth rate for containerized imports at all U.S. ports, a 3.6% annual growth rate at the Port of New York and New Jersey, and a 3.1 % growth rate at the Port of Philadelphia. With respect to containerized exports, the Port of Baltimore has posted a 7.2% annual growth rate compared to a 5.8% annual growth rate for containerized cargo exports at all U.S. ports, and a 5.7% annual growth rate at the port of New York and New Jersey. Exports are minimal at the Port of Philadelphia.

Currently, the Seagirt Marine Terminal consists of four berths, only one of which is at a 50-foot depth. In order to continue to grow opportunities for even more containerized cargo handled at the Port of Baltimore, and to more cost effectively serve the growing export and import markets in the port's cost-effective hinterland, it is critical that an additional 50-foot berth becomes available to ocean carriers deploying the ever-growing size of container ships. The additional 50-foot container berth will relieve the current berth constraints associated with only one, 50-foot berth at the Seagirt Marine Terminal and provide the berth capacity necessary to accommodate an additional weekly service at the port and growing that to two times a week service over the five years after the berth is deepened.

With only one 50-foot draft berth, Seagirt lacks the capacity to handle the increasing number of ULCVs that are calling on the terminal due to the ever-increasing size of containerships

The **Port of Baltimore Seagirt Marine Terminal Berth 3 Modernization P3 Project** includes the following scope of work:

- Upgrading the existing Berth 3 wharf structures to accommodate a deeper dredge depth
- Dredging the existing Berth 3 pocket from a depth of 42 feet to a depth of 50 feet to accommodate deep-draft ULCVs
- Dredging of the access channel from the 50-foot deep federal channel to Seagirt Berth 3
- Widening the turning basin to provide better safety clearances for ULCVs
- Installing hardware to support large ship to shore cranes that will service ULCVs
- Repairing the existing wharf sub-structure, superstructure, and paving
- Installation of concrete runways in the container yard to allow for new, efficient Rubber Tired Gantry (RTG) cranes to provide additional capacity and better cargo velocity

This the **Port of Baltimore Seagirt Marine Terminal Berth 3 Modernization P3 Project** will:

1. Relieve the terminal's berth capacity bottleneck
2. Support the region's cargo growth demand
3. Provide growth opportunities for capturing additional containerized cargo, including the ability to immediately accommodate one additional weekly service at Seagirt, with a second additional weekly service within five years
4. Increase operational and commercial flexibility, and enable vessels to more efficiently move in and out of the terminal
5. Allow MPA to maximize the use of all its infrastructure assets, thereby increasing utilization, capacity, and productivity
6. More cost effectively serve the growing export and import markets in the Port of Baltimore's hinterland.
7. Upgrade the Berth's condition to a better state of repair, thereby reducing MPA's maintenance costs and providing better assurance of continued operations and capacity.
8. Reducing the all-in cost to the container shipping lines calling at the Port of Baltimore.

Under the without project case, which is used to describe the existing one, 50-foot berth situation at the Seagirt Marine Terminal, Baltimore's hinterland for containerized cargo is served by other North Atlantic ports, mainly the Port of New York and New Jersey for the growing Asian trade as well as the North Atlantic and Mediterranean trade lanes. With the capacity to handle an additional weekly service, growing into a twice a week service, Baltimore can increase its service to beneficial cargo owners and manufacturers located in its cost-effective hinterland. Based on a recent analysis of Piers data by the Maryland Port Administration's planning staff, 70% of the current imports are destined within a 50-mile radius, including the Baltimore Washington Corridor, one of the most affluent population consumption centers in the U.S. Another 14% of Baltimore's imports are consumed within a 50 to 100-mile radius, while 7% are consumed within a 100-200-mile market.

The Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grants program provides the guidelines to develop benefit cost analysis for projects applying for grants through the program. Martin Associates evaluated the merits of the project to deepen Berth 3 at Seagirt Marine Terminal, and provide the capacity to add an additional weekly service, and eventually a twice a week service to provide a more efficient and cost-effective routing to serve the Port's current hinterland of beneficial cargo owners and export manufacturers.

The with project scenario consists of the development of a weekly service and the expansion to a twice a week service after 5 years to serve the Port's consumer and export container base. In the without project case, or the current situation, due to only one 50-foot berth at Seagirt, the volume that would be carried on the future weekly and twice a week service is now moved to and from the Baltimore hinterland via vessels calling the Port of New York and New Jersey.

Strict guidelines for measuring the merits of projects applying for the grants are outlined in The Notice of Funding Opportunity for the Department of Transportation's National Infrastructure Investments Under the Consolidated Appropriations Act, 2018. Martin Associates has followed these guidelines to assess the benefits of the Berth 3 Modernization Project. These benefits are then combined with the costs of the project, as developed by the Maryland Port Administration and Ports America Chesapeake.

The benefit criteria applied to the project are:

1. ***Determination of the Safety Benefits*** which results from the reduction in the truck travel distance and resulting vehicle miles traveled to serve the Port's beneficial cargo owners and manufacturers, by adding a weekly service at Baltimore initially after the berth constraints are relived, and then growing the new volume to accommodate at twice a week service.
2. ***Determination of Environmental Benefits*** by reducing the truck distance and corresponding vehicle miles traveled to serve the Port's beneficial cargo owners and manufacturers, by adding a weekly service at Baltimore initially after the berth constraints are relieved, and then growing the new volume to accommodate at twice a week service.
3. ***Determination of External Trucking and National Infrastructure Benefits*** by reducing the truck distance and corresponding vehicle miles traveled to serve the Port's beneficial cargo owners and manufacturers, by adding a weekly service at Baltimore initially after the berth constraints are relieved, and then growing the new volume to accommodate at twice a week service.

4. ***Determination of Economic Competitiveness Benefits*** to container exporters and importers located in the Port of Baltimore's hinterland by reducing the truck distance, and hence transportation costs to serve the Port's beneficial cargo owners and manufacturers through adding a weekly service at Baltimore initially after the berth constraints are relieved, and then growing the new volume to accommodate at twice a week service.

These benefits are quantified over a 30-year period, assuming the berth 3 modernization is completed by 2021. The 30 year period is chosen as the useful life of the project

II. Key Assumptions

Interviews with Ports America Chesapeake indicated that with an additional 50-foot berth, the Port would attract one weekly container service that now cannot call the Port of Baltimore due to the size of the vessels deployed on the service, most likely an Asian service through the Panama Canal or the Suez Canal, and the lack of available 50 foot berth capacity at the Seagirt Marine Terminal. The weekly call would typically consist of a discharge of 3,000 containers, and a load of 1,000 export containers and 500 empty containers, for a total of 4,500 container moves per vessel call. Under a weekly call, this translates into 234,000 containers per year of which 212,940 are projected to move by truck, while under a twice a week service (104 vessel calls per year), 425,880 containers would move by truck through the Port's hinterland. Using the current hinterland distribution of containers handled at the Seagirt Marine Terminal, the containers would be destined or originate within the following regions surrounding Baltimore. It is further assumed that the twice a week service would start in 2026, assuming the project is completed by 2021.

Exhibit 3
Distribution of Containers Under the With Project (Berth 3 Modernization)

Destination/Origin	52 Calls per Year Annual Volume	104 Calls per Year Annual Volume
Within 50 Miles	163,800	327,600
50-100 Miles	32,760	65,520
Over 100 miles	16,380	32,760
Total	212,940	425,880

It is assumed that this volume now moves into the Baltimore hinterland from vessel services calling the Port of New York and New Jersey (primarily the marine terminals located in Newark, NJ), since the Seagirt Marine Terminal is currently constrained by only one 50-foot berth and is therefore unable to accommodate additional container services that are deploying larger vessels requiring a 50 foot channel and berth.

To estimate the mileage savings under the with project scenario (completion of the modernization of Berth 3), three points were selected to represent the three geographic ranges. For the within 50 miles region, Laurel, MD was selected as the point representing the Baltimore local market from which to measure mileage savings between a service via the Port of New York and New Jersey (under the without

scenario) versus Baltimore; for the 50-100 mile region, Hagerstown, MD was selected as this area is home to major distribution centers and the I-81/I-70 highway corridors; for the over 100 mile market, Pittsburgh was selected to represent the Port of Baltimore's distant truck hinterland.

The mileages between the marine terminals in Newark and these inland points were calculated, as well as between the Port of Baltimore and these cities. These mileages and the mileage savings under the with project are presented in Exhibit 4.

Exhibit 4
Mileage Savings Due to Berth Constraint Relief with the Berth 3 Modernization Project

	Mileage		
Key Locations	Baltimore	Newark	Mileage Savings
Laurel, MD	21.4	200.3	178.9
Hagerstown, MD	74.4	232.2	157.8
Pittsburgh, PA	247	360	113

The Vehicle Miles Traveled (VMT) savings due to the Berth 3 Modernization Project were estimated under the following assumptions. One truck is used to move one container, either an import or export. Vehicle miles traveled are estimated by multiplying the number of containers estimated to move to and from each of the three geographic regions by the mileage savings to each hinterland region representative city (Laurel, Hagerstown, and Pittsburgh) under the with project scenario.[2] The reduction in vehicle miles traveled per year under the 52 vessel calls (annually between 2021 and 2025), and 104 vessel calls (annually between 2026-2048) are shown in Exhibit 5.

Exhibit 5
Reduction of Vehicle Miles Traveled Due to Berth 3 Modernization

	Vehicle Miles Savings	
Key Locations	52 Vessel Calls	104 Vessel Calls
Laurel, MD	29,303,820	58,607,640
Hagerstown, MD	5,169,528	10,339,056
Pittsburgh, PA	1,850,940	3,701,880
Total	36,324,288	72,648,576

[2] It is important to note that vehicle miles traveled is equivalent to ton miles traveled when computing benefits.

III. BENEFITS ANALYSIS

1. Safety Benefits

Safety benefits are defined in terms of reduced accidents and associated injuries as the result of the reduced vehicle truck miles traveled due to the Berth 3 Modernization P3 Project. Accidents per 100 million vehicle miles traveled were developed from *Surface Transportation, A Comparison of the Costs of Road, Rail and Waterways Freight Shipments that are not Passed on to Consumers*, GAO, Report to the Subcommittee on Select Revenue Measures, Committee on Ways and Means House of Representatives, January 2011. The value of an accident, a fatality, injury, or property damage only (PDO) was collected from *BTS Motor Vehicle Safety* Data, 2015 National Transportation Statistics, 2015. The values were inflated from 2015 values to 2018 values based on the consumer price index published by the U.S. Bureau of Labor Statistics, May 2018.

Exhibit 6
Accidents per 100 Million VMT

	Accident Probability/100 million VMT	Value per Accident, 2018$
Fatal Accident Cost (K)	1.13369	$10,011,917
Severe Injury Accident Cost (A)	78.92426	$214,318
PDO Accident Cost (no injury)	203.40039	$3,337

Sources: *Surface Transportation, A Comparison of the Costs of Road, Rail and Waterways Freight Shipments that are not Passed on to Consumers*, GAO, Report to the Subcommittee on Select Revenue Measures, Committee on Ways and Means House of Representatives, January 2011.

BTS Motor Vehicle Safety Data, 2015 National Transportation Statistics, 2015

The accident rates per 100 million VMT by type of accident were multiplied by the 100 million vehicle miles traveled savings to estimate the number of accidents by type (due to the reduced VMT). The estimated number of accidents by type were then multiplied by the value accidents (by type) to estimate the total annual value of accidents that would be avoided under the Berth 3 Modernization Project due to savings in VMT. These safety savings were estimated through 2048, and then discounted under a 3% and 7% discount rate. The present value of the savings benefits of the Berth 3 Modernization Project are:

NPV of Safety @3%	**$326,526,502.72**
NPV of Safety@7%	**$185,260,195.04**

2. Environmental Benefits

Environmental benefits are generated due to the reduced vehicle miles traveled with the Berth 3 Modernization Project. Emissions of air pollutants are generated per VMT, and the metrics used to estimate the volume of emissions per truck VMT are shown in Exhibit 7. These emission rates are measured in terms of short tons emitted per million VMT.

Exhibit 7
Short Tons of Emissions per Million VMT

Emissions	TONS EMITTED PER MILLION VMT
Nitrogen Oxides (Nox)	3.0193
Volatile Organic Compounds (VOC)	0.11
Fine Particule (PM)	0.1191
Sulfur Dioxide (SO2)	0.0055

Source: *Surface Transportation, A Comparison of the Costs of Road, Rail and Waterways Freight Shipments that are not Passed on to Consumers*, GAO, Report to the Subcommittee on Select Revenue Measures, Committee on Ways and Means House of Representatives, January 2011

The cost per short ton of the emissions by type of emission were developed from *NHTSA, Final Regulatory Impact Analysis, CAFE for MY 2012-MY 2016 Passenger Cars and Light Trucks*, March 2010. The cost of carbon dioxide has historically been based on the social costs of carbon and their costs per metric ton (converted to short ton) are prepared for future years by the *IWGSCC, Social Cost of Carbon for Regulatory Impact Analysis* Under Executive Order 12866, February 2011. As of June 2018, the cost of carbon dioxide emissions is no longer considered in the evaluation of emissions. As a result, the $14 million of carbon dioxide reduction which would have been counted in previous grant benefit calculations is not included in this current benefits analysis. These costs were updated using the May 2018 CPI and are shown in Exhibit 8.

Exhibit 8
Value per Short Ton of Emissions

Cost meterics	Cost/Short Ton Emitted
Nitrogen Oxides (Nox)	$7,693.53
Volatile Organic Compounds (VOC)	$1,952.32
Fine Particule (PM)	$351,938.69
Sulfur Dioxide (SO2)	$45,470.79

Source: Final Regulatory Impact Analysis, CAFE for MY 2012-MY 2016 Passenger Cars and Light Trucks, March 2010. And *IWGSCC, Social Cost of Carbon for Regulatory Impact Analysis* Under Executive Order 12866, February 2011.

The net present value of the environmental cost savings of the Berth 3 Modernization Project are:

NPV of Emissions @3% without co2	**$74,016,290.59**
NPV of Emissions @7% without co2	**$41,994,362.84**

3. External Truck Cost Savings Benefits

External truck cost savings consist of reduced costs of highway/pavement repair, highway congestion, and noise pollution, due to reduced truck vehicle miles traveled resulting for the Berth 3 Modernization Project. Metrics that measure highway/pavement degradation costs per truck mile, noise pollution costs per truck mile and highway congestion per ton mile are published by the *1997 Federal Highway Cost Allocation Study*, Final Report, USDOT, Federal Highway Administration, May 2000, Table 13. These cost metrics are shown in Exhibit 9 and updated to 2018 dollars using the CPI for May 2018. These metrics are applied to the vehicle miles travelled saved under the Berth 3 Modernization Project.

Exhibit 9
External Truck Cost Savings

Combination Truck 4 Axel	Cost/VMT
Congestion	**$0.4730**
Noise	**$0.0232**
Pavement (Urban Interstate)	**$0.2623**

Source: *1997 Federal Highway Cost Allocation Study*, Final Report, USDOT, Federal Highway Administration, May 2000, Table 13

The present value of the External Truck Cost benefits is:

NPV of External Truck Cost Savings	**$855,721,317.50**
NPV of External Truck Cost Savings	**$485,507,598.48**

4. Economic Competitiveness Benefits

The economic competitiveness resulting from the Berth 3 Modernization Project consists of the transportation cost savings to the nation's importers and exporters as the result of lower truck costs due to the savings in miles traveled to the key consumption destinations and export origins in Baltimore's hinterland that are currently served via the container terminals in Newark since Seagirt Marine Terminal can offer only one 50-foot berth. After the project is completed, additional container volume will move through Baltimore to the consumption and production points at lower transportation costs. To estimate the transportation cost savings the hourly trucking cost was estimated from interviews with key trucking companies engaged in port drayage, as well as information provided by American Transportation Research Institute (ATRI), *An Analysis of the Operational Costs of Trucking, 2017.* Based on these sources, it is estimated that the daily trucking costs are $950. Using the 11 hours of daily service that are capped under the current hours of service regulation and enforced through the electronic logging devices (ELD), the current hourly operating cost per truck is estimated at $86.36. Further, due to greater congestion at the Newark container terminals, a 4-hour average truck queue and terminal retrieval time is assumed. For Seagirt Marine Terminal, the average queue time and terminal retrieval time is assumed to be two hours. For local truck trips within the 50-mile local market, an average speed of 30 miles per hour is assumed. For highway, an average speed of 40 miles per hour is assumed. Using these assumptions, the average truck cost savings per container was estimated for each of the three geographic distribution regions for the Port of Baltimore hinterland. The cost savings per container is presented in Exhibit 10.

Exhibit 10
Transportation Cost Savings Per Container Due to Berth 3 Modernization

TRUCKING COSTS TO:	From Newark		From Baltimore		Cost
	Hours	Cost	Hours	Cost	Savings/Truck
COST TO LAUREL	9.0075	$777.92	2.71	$234.33	$543.59
COST TO HAGERSTOWN	9.805	$846.80	3.86	$333.36	$513.43
COSTS TO PITTSBURGH	13	$1,122.73	8.18	$706.02	$416.70

The cost savings per truck trip multiplied by the number of truck trips was used to estimate the transportation cost savings to beneficial cargo owners and exporters that will be able to use the Port of Baltimore with the additional vessels service due to the Seagirt Marine Terminal Berth 3 Modernization P3 Project. The present value of the transportation cost savings benefits of the Berth 3 Modernization Project, or the Economic Competitiveness Benefits are:

NPV of Economic Competitiveness @3%	**$3,499,679,447.35**
NPV of Economic Competitiveness @7%	**$1,985,600,836.61**

5. Summary of the Benefits

The total benefits projected to occur due to the Seagirt Marine Terminal Berth 3 Modernization P3 Project are shown in Exhibit 11. Using a 3% discount rate over the period 2018 through 2041, the total benefits of the Berth 3 Modernization Project at the Seagirt Marine Terminal is $4.8 billion. Under a 7%

discount rate, the total benefits of the project are $2.7 billion. The annual benefits over the 30-year period are presented in the attached benefit-cost spreadsheet.

Exhibit 11
Summary of Benefits of the Seagirt Marine Terminal Berth 3 Modernization P3 Project

BENEFIT CATEGORIES	3% DISCOUNT	7% DISCOUNT
EMISSIONS	**$74,016,290.59**	**$41,994,362.84**
SAFETY	**$326,526,502.72**	**$185,260,195.04**
EXTERNAL TRUCK	**$855,721,317.50**	**$485,507,598.48**
ECONOMIC COMPETITIVENESS	**$3,499,679,447.35**	**$1,985,600,836.61**
TOTAL BENEFITS	**$4,755,943,558.16**	**$2,698,362,992.96**

IV. Costs

There are two cost components to the Seagirt Marine Terminal Berth 3 Modernization P3 Project. The one set of costs will be borne by the Maryland Port Administration and are summarized in Exhibit 12. In addition, a $3 million maintenance fee is charged in years 9, and 26 of the project.

Exhibit 12
Maryland Port Administration Cost Summary of Berth 3 Modernization Project

Category (State Costs Only)	Estimated Costs	Schedule
Permitting, sampling, coordination, procurement	$300,000	Oct. 2018 – Apr. 2020
Planning and engineering	$317,340	Oct. 2018 - Oct. 2019
Ship Simulations	$54,000	Jul. 2018 – Sep. 2018
Dredging (includes mob/demob)	$7,138,000	May 2020 – Oct. 2020
TOTAL	**$7,809,340**	

The Ports America Chesapeake costs are summarized in Exhibit 13. All costs will be incurred in 2019 and include the BUILD request.

Exhibit 13
Ports America Chesapeake Cost Summary

	Dollar Amount
Build Request	$6,554,575
Private Funding	18,408,961
Total Cost	**$32,772,876**

Exhibit 14 provides the net present value of the project costs. The annual costs are presented in the attached excel spreadsheet.

Exhibit 14
Present Value of the Project Costs

Present Value of Total Costs @3%	**$36,868,286.76**
Present Value of Total Costs @7%	**$32,960,599.49**

V. BENEFIT COST CALCULATION

The Seagirt Marine Terminal Berth 3 Modernization P3 Project has a very significant benefit cost ratio, reflecting the strong merits of the project due the reduction in truck traffic on the nation's highways, in turn resulting in significant environmental benefits, safety benefits, external truck benefits, and economic competitive benefits.

Using a 3% discount rate over the 30-year time horizon, the project has a benefit cost ratio of 129.0, and with a 7% discount rate the benefit cost ratio is 81.87. The annual benefits and costs are presented in the attached excel spreadsheet.

Total Present Value of Benefits @ 3% over 30 Years	**$4,755,943,558.16**
Total Present Value of Benefits @ 7% over 30 Years	**$2,698,362,992.96**
Total Present Value of Costs @3% over 30 Years	**$36,868,286.76**
Total Present Value of Costs @7% over 30 Years	**$32,960,599.49**
Benefit Cost Ratio with 3% Discount Rate	**129.00**
Benefit Cost Ratio with 7% Discount Rate	**81.87**