

# BENEFIT COST ANALYSIS

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## CARTERET INTERMODAL FERRY TERMINAL FY2024 RAISE INTERMODAL GRANT APPLICATION

BOROUGH OF CARTERET  
MIDDLESEX COUNTY, NEW JERSEY

February 20, 2024  
CME File No.: HCA00536.01



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## 1. PROJECT SUMMARY

A benefit-cost analysis (BCA) was conducted for the *Carteret Intermodal Ferry Terminal* for submission to the U.S. Department of Transportation (USDOT) as a requirement of a discretionary grant application for the FY2024 *Rebuilding American Infrastructure with Sustainability and Equity* (RAISE) Grant Program. The analysis was conducted in accordance with the benefit-cost methodology outlined in the Benefit-Cost Analysis Guidance for Discretionary Grant Programs, supplied by the USDOT, the costs and benefits of which are summarized below. The period of analysis corresponds to 25 years of operational analysis spanning 2025 through 2049.

The Carteret Intermodal Ferry Terminal project continues the Borough of Carteret's effort to redevelop their existing waterfront area to create a regional transit village with high-density residential, commercial, office, and retail components supporting ridership for the passenger ferry and establishing Carteret as a destination for working, living, and entertainment. The service will provide commuters with water access to Manhattan.

Due to lack of convenient rail stations, bus stations, or ferry terminals, highway routes to Manhattan are congested and operate at or over-capacity. The Carteret Ferry Terminal will support intermodal mass transit operations between buses, cars, and pedestrian commuters by providing ready access to a fleet of two (2) 149-passenger commuter ferries providing round trip service between Carteret, Lower Manhattan and Midtown Manhattan, helping to eliminate vehicles from daily commuter routes and provide travelers with a more enjoyable commuting experience.

The project represents a critical investment to connect the densely-populated central and northern New Jersey region with direct access to the New York City job market. According to the *NYC Planning's Ins and Outs of Commuting*, in 2017, approximately 4.6 million commuters traveled into NYC from New Jersey, with approximately 38% travelling by car, van, or truck. Traffic is anticipated to grow, with an estimated 3% increase in traffic each year within the Borough of Carteret (Nelson Nygaard). **Figure 1** shows the distribution of commuters within the NYC Metropolitan region and Carteret's central location in the metropolitan area.

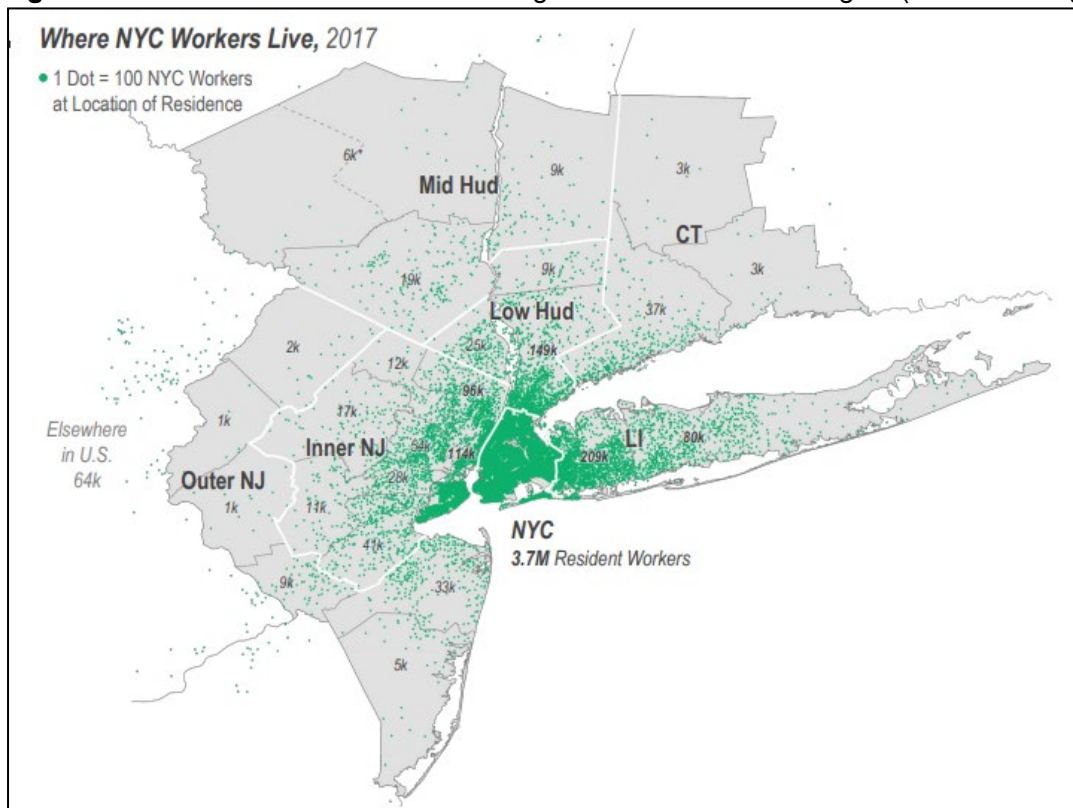
It is noted that this report's corresponding RAISE grant application is seeking funding for the landside intermodal improvements only, including the ferry terminal building, a 696-space parking facility, access roads, and associated work. As laid out in the Project Cost Estimate (See **Appendix B**), grant funding for costs related to the ferry boats, docking facilities, bulkheads, is not being sought as it has been partially funded by other state and federal agencies. However, as the need for the ferry service and the ferry terminal are not mutually exclusive, costs related to the operation and maintenance of the ferries themselves have been included in this analysis for a holistic examination of the project. The project is expected to be financed according to the allocation shown in **Table 1**.



**Table 1:** Project Costs by Funding Source, in Undiscounted Dollars

|                     | Total Amount        | Total Percentage |
|---------------------|---------------------|------------------|
| RAISE Grant Request | \$13,476,300        | 36%              |
| FTA Grant FY22      | \$6,000,000         | 16%              |
| USDOT Earmark FY23  | \$6,000,000         | 16%              |
| NJ DCA SFRF FY23    | \$3,900,000         | 10%              |
| NJ DCA SFRF FY24    | \$8,000,000         | 21%              |
| <b>TOTAL:</b>       | <b>\$37,376,300</b> | <b>100%</b>      |

**Figure 1:** NYC commuter distribution throughout the NYC Metro Region (NYC Planning)



**Costs**

The capital cost for this project is expected to be \$37,376,300 in undiscounted 2024 dollars. To comply with the BCA guidance provided by USDOT, the costs are converted from their base year values in 2024 dollars to 2020 dollars to align with standardized factors used to calculate the benefits and costs in the analysis. The discounted values are 2020 dollars in the year 2024. At a 7% real discount rate, (as prescribed by the USDOT), the capital cost is \$28,514,200. Operation and maintenance costs are anticipated to average \$301,768 per year after construction, in undiscounted 2024 dollars. Over the analysis period the operation and maintenance costs are \$7,544,200 in total undiscounted 2024 dollars, or \$2,688,920, when discounted at 7%. Lastly, rehabilitation and replacement costs are expected to total

\$1,544,836 in undiscounted 2024 dollars over this same period, or \$460,283 when discounted at the 7% rate. Additional costs for air pollutant emissions and fuel were also considered for the passenger ferries and are detailed in **Appendix A**.

Benefits

In 2020 dollars, the project is expected to generate \$54,985,347 in discounted benefits, using a 7% discount rate. The construction of the ferry terminal and associated site improvements at the Carteret Waterfront will reduce the number of commuter vehicles on the road, leading to a decrease in accidents, air pollutants, wear and tear on vehicles and facilitate the swift and comfortable transport of commuters into Manhattan. The benefits lead to an overall project The overall project impacts can be seen in **Table 3**, which shows the level of change for the multiple impact categories due to the net reduction in the following impact categories.

**Table 2: Project Benefits Summary, in Discounted Dollars**

|                              | Type of Impact    | Group Affected | Economic Benefit  | Summary of Results<br><small>(at 7% discounted rate)</small> |
|------------------------------|-------------------|----------------|---|--|
| Economic Competitiveness     | Costs and Savings | Auto           | Reduced fuel consumption for commuters                      | \$4,479,103  |
| Safety                       | # of crashes      | Auto           | Reduced fatalities, injuries, and property damage incidents | \$7,887,822  |
| Revenue                      | Cost and Savings  | Owner          | Revenue to be applied back into the Borough                 | \$17,291,313   |
| Environmental Sustainability | Air Quality       | Society        | Emissions reductions  | \$21,824,631   |
| Residual Value               | Cost and Savings  | Owner          | Salvage value to be applied back into the Borough           | \$3,502,479  |
| Resilience                   | Infrastructure    | Region         | Emergency response  | -  |
| Economic Development         | Cost and Savings  | Region         | Economic link with NYC market                               | -  |

Net Present Value (NPV) of \$7,917,271 (discounted at 7%) and a Benefit Cost Ratio (BCR) of 1.17. The overall project benefit matrix can be seen in **Table 2**. As the calculated NPV is greater than zero and the BCR is greater than 1.0, the cost for the proposed project is justified.

**Table 3: Project Impacts and Savings, 25-Year Life Span**

| <b>Category</b>                         | <b>Unit</b>  | <b>Quantity</b> |
|---|--------------|-----------------|
| Fuel Consumed                           | Value (2020) | \$4,479,103     |
| Fatalities                              | Value (2020) | \$930,223       |
| Injury Accidents                        | Value (2020) | \$2,530,036     |
| Property Damage Only<br>Accidents (PDO) | Value (2020) | \$4,427,563     |
| CO <sub>2</sub> Emissions               | Metric Tons  | 2,494,847       |
| NO <sub>x</sub> Emissions               | Metric Tons  | 448             |
| PM <sup>2.5</sup>                       | Metric Tons  | 61              |

## 1. INTRODUCTION

### BCA Framework

A BCA is a systematic process for identifying, quantifying, and comparing expected economic benefits and costs of a proposed infrastructure project. All benefits and costs are quantified to the best extent possible. The overall goal of a BCA is to determine if the expected benefits justify the required costs for the project. A BCA framework aims to demonstrate the net welfare change created by a project by comparing the cost savings and increases in welfare, with the disbenefits and potential welfare reductions.

The BCA framework defines a Base-Year case or “No Build” case and compares against a “Build” case, assuming the grant request is awarded and the proposed project is constructed. A BCA analyzes both the No-Build and Build cases over a project life-cycle. As the project is a completely new development, the No-Build case is the existing growth of Carteret without the reduction in commuters from roadways. The values of future net-value change are determined through discounting, which is the principle that benefits and costs that occur sooner in time are more highly valued than those that occur in the more distant future, and that there is a cost associated with diverting the resources needed for an investment from other productive uses in the future. This process results in future expected benefits and costs to be expressed in the same present value terms. The 2020 base year is maintained, as a point of consistency in relation to formerly prepared analyses for the project.

The BCA presented in this report was conducted in accordance with the methodology provided by the USDOT in the Benefit-Cost Analysis Guidance for Discretionary Grant Programs.

- ❖ The analysis procedures include the following: Defining existing and future conditions under a Build case;
- ❖ Estimating benefits and costs associated with the project over a 25-year analysis period;
- ❖ Standard USDOT values have been utilized fatalities, injuries, property damage, emissions, and estimating best practices for quantifying other benefits;
- ❖ Discounting benefits and costs with a real discount rate of 7%, as defined by the USDOT.

## 2. PROJECT OVERVIEW

### Description

The Borough of Carteret, New Jersey is applying to the US Department of Transportation's Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Program for construction of an intermodal transportation building at its waterfront and associated site work. Once complete, the building will provide access to several forms of alternative transportation in the form of ferry service to New York City, Borough jitney service, NJ Transit bus service along the 48 and 116 routes, and bicycling and walking via a two-mile river walk that is designed and ready to begin construction. The project is located in approximately 20 miles from Manhattan by waterway, as shown on the route map in **Appendix C**.

The planned intermodal transportation building is part of a larger multi-year, \$173.5 million plan to transform the Borough of Carteret's Waterfront into a regional transportation hub and destination. The overall vision includes two miles of open public access waterfront along the Arthur Kill (under construction); construction of a \$47 million marina adjacent to the project site, (completed in 2019); the construction of two commercial docks along with supporting infrastructure; the construction of a 500,000 square-foot film production studio; helipad, and 150,000 square feet of ancillary retail and hotel space. See **Appendix D** for the overall concept plan prepared by Melillo Bauer Carman, September 2022.

The Borough, together with its partners including the New Jersey Department of Transportation (NJDOT), NJTransit (NJT), North Jersey Transportation Planning Authority (NJTPA), and Port Authority of New York and New Jersey (PANYNJ), envision improved, faster, and more environmentally friendly transportation options between central New Jersey and New York City via the introduction of daily ferry service and access via NJTransit bus and Borough jitney services. The project site will include a mixed-use intermodal transportation center, 20-foot-wide elevated pedestrian boardwalk, fixed pier, floating docks, wave screen, and handicap access ramp. The project encompasses environmental remediation, public access and recreation, economic development, and improved public transportation.

In addition to serving as a commuter service, the ferries will also provide educational and sightseeing tours, as well as serve as critical logistics tool during emergencies. As was seen during the September 11<sup>th</sup> attacks, when bridges and tunnels into and out of New York City were shutdown. Vessels were the only means of transportation for people, first responders and equipment. Ferry service to the Borough provides a third critical regional link for ferry service, adding to existing service from Belford, Highlands, and Atlantic Highlands in Monmouth County, and routes back and forth across the Hudson River between Jersey City and Edgewater.

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### General Assumptions

#### *Evaluation Period:*

The project evaluation period analyzes a 25-year span, evaluating benefits and costs starting in 2025 and extending through 2049. For the purposes of the BCA it is assumed that the project will enter into service beginning in 2025. A 25-year evaluation period for the service was selected as it aligns with the anticipated service life of the vessels.

#### *Discount Rates:*

For the purposes of present value discounting, all benefits and costs are assumed to occur at the end of each year. All benefits from the project Build case are assumed to begin in the calendar year immediately following the final construction year.

All project benefits and costs monetary values are given in year-end 2020 dollars (maintained for consistency with previous project analyses). The real discount rate used for this analysis is 7%, as given by the USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs.

### Base Case and Build Case

The analysis of the ferry terminal project examined long term benefits versus costs resulting from the Build Case scenario for its users and regional residents, compared to the No-Build situation where the improvements are not made.

In the Build case the project includes the construction of the intramodal ferry terminal building and all associated site improvements. The No-build case includes the societal costs of not constructing the ferry terminal project while highway and local traffic continues to increase, leading to additional vehicular accidents, increased traffic delays, increased property damage/damage to existing infrastructure, increased costs for vehicles, and increased vehicular emissions. The Build case and calculations reflect the net difference in these benefits and costs.

### Projected Ridership and Ferry Operations

In order to determine the costs and net benefits that will be realized from the implementation of ferry service, this analysis draws upon previous ridership and feasibility studies commissioned by the Borough for this facility. These include the following:

- “Proposed Carteret Passenger Ferry Expanded Ridership Demand Study”, prepared by Rutgers University, dated October 23, 2018
- “Carteret Ferry Feasibility Study, Tier 2 Analysis”, prepared by Nelson Nygaard and Weinberger & Associates, dated December 2016

These reports were used to establish existing travel patterns and modes, potential ferry routes, ridership projections, revenues, operation and maintenance costs, vehicle trip times, and costs and benefits related to emissions and modal shifts in commuter transportation. Based on the recommendations and forecasts in these reports, ferry service will include two (2) 149-passenger ferry boats, each making one round-trip voyage from Carteret to at least two (2) stops in Manhattan during the AM peak and from Manhattan to Carteret during the PM peak. In the time during the AM and PM peak commuting periods, the vessels are anticipated to remain in the Upper New York Harbor to eliminate fuel costs associated with a return trip to Carteret during off-peak hours.

The Nelson Nygaard study ranked the following Manhattan commuter destinations in order of preference: (1) Wall Street; (2) Midtown West (W. 39<sup>th</sup> Street); (3) World Financial Center; and, (4) Midtown East (E. 35<sup>th</sup> Street). This BCA will assume ridership statistics and operational costs associated with daily trips to and from routes (1) and (2) only as they ranked highest when comparing parameters including overall travel time reductions over traditional transportation and projected demand.

The Study also established annual ridership numbers for each of the routes assuming a \$15 one-way fare, in 2022 undiscounted dollars. This price has been adjusted from \$13 (2016 dollars) at the time the study was generated to reflect changes in the consumer price index (CPI). This fare represents the medium-price option and was selected as a reasonable balance between ridership demand and projected revenues. Annual ridership numbers for year 2015 and 2040 are summarized below in **Table 4**.

**Table 4: Ridership Forecasts, (Nelson Nygaard, 2016)**

| <b>Forecast Year</b>          | <b>Annual One-Way Ridership</b> |
|-------------------------------|---------------------------------|
| Maximum Demand Forecast, 2015 | 48,776                          |
| Maximum Demand Forecast, 2040 | 70,838                          |

Assuming a linear growth rate between the base year and 2040, annual ridership numbers have been adjusted in the BCA calculations accordingly. Using a growth rate of approximately 3 passengers per day, per year, 215 riders are forecasted to use the ferry when it opens in 2025. In the final two years of the analysis the ferry vessels will be at maximum capacity of 298 passengers.

### 3. PROJECT COSTS

#### Capital Costs

Initial Project investment (capital) costs include soft costs, such as engineering and design, construction, and contingency, totaling \$37,376,300 in 2024 dollars. In discounted 2020 dollars, the total cost of the ferry project is \$28,514,200. **Table 5** shows the estimated schedule of the project. The intermodal ferry terminal building is anticipated to open in 2024. A detailed cost estimate is provided in **Appendix B**.

#### Right of Way Acquisition

The property on which the project is proposed at 200 Lighthouse Way (Block 304, Lots 2.01 and 2.02) is owned by the Borough. Accordingly, no right-of-way acquisition is required for the construction of this project.

**Table 5: Project Schedule and Cost, In Discounted Dollars**

| <b>Project Activity</b>                               | <b>Unit</b> | <b>Value</b> |
|---|-------------|--------------|
| Construction Design/Start                             | Year        | 2023         |
| Construction End                                      | Year        | 2025         |
| Construction Duration                                 | Year        | 2            |
| Project Opening                                       | Year        | 2025         |
| Capital Cost – Construction and Professional Services | \$2020      | \$28,514,200 |

#### Operations and Maintenance Costs

The annual operating and maintenance (O&M) costs are included in this benefit-cost analysis. Since the redevelopment area is currently vacant and exempt from taxes, there are no O&M costs associated with the project until the first year that ferry service is fully operational, which is anticipated to be 2025 in conjunction with the completion of site work for the access roads and parking lot.

The Build case includes the operational and maintenance costs for the ferry terminal building and vessels assuming all improvements are constructed.

These costs include the following:

- Facility and vessel maintenance costs
- US Coast Guard inspections
- Fuel and consumables
- Janitorial and crew costs
- Utility costs

O&M costs for the building have been determined on a per square foot basis according to Facility Service Partners and are summarized below. O&M costs for the building have been



calculated based on industry standards for facility maintenance for the 43,450 square foot building on a per square foot basis of \$5.15 per square foot as shown in **Table 6**.

**Table 6:** Facility Maintenance, In 2024 Dollars per Square Foot

| <b>Cost</b>   | <b>Cost per Square Foot</b> |
|---------------|-----------------------------|
| Maintenance   | \$1.63                      |
| Utilities     | \$2.15                      |
| Janitorial    | \$1.37                      |
| <b>Total:</b> | <b>\$5.15</b>               |

Additionally, every two (2) years, the passenger ferries will need to be dry-docked, serviced, and inspected by the US Coast Guard at a cost of \$75,000 per vessel.

The annual combined operating and maintenance costs for the Build case is shown in **Table 7** on the following page.

#### Repair and Rehabilitation (R&R) Costs

It is anticipated that repair and rehabilitation will be required for the Build case of the project in the future. The assumptions have been based on similar site improvements made for other projects throughout the Borough as well as information provided by New York Waterways and May Shipbuilding of Staten Island, NY. Furthermore, it is estimated that the project site will need repairs in 2039 for a mill and overlay of the parking lot surface, and continue on a 15-year basis, and engine replacement every seven (7) years (approximately every 2,000 hours), costing \$100,000 per vessel. Additionally, maintenance dredging is projected to be required every ten (10) years after project construction at an estimated cost of \$250,000; therefore, the cost of this task is shown in years 2034 and 2044.

O&M and R&R results are shown in **Table 7** on the following page.

**Table 7:** Schedule of Operations and Maintenance and Repair/Rehabilitation/Replacement Costs (In Undiscounted Dollars)

| Year | Build Case |           |
|------|------------|-----------|
|      | O&M        | R&R       |
| 2022 | \$0        | \$0       |
| 2023 | \$0        | \$0       |
| 2024 | \$0        | \$0       |
| 2025 | \$373,768  | \$0       |
| 2026 | \$223,768  | \$0       |
| 2027 | \$373,768  | \$0       |
| 2028 | \$223,768  | \$0       |
| 2029 | \$373,768  | \$0       |
| 2030 | \$223,768  | \$0       |
| 2031 | \$373,768  | \$200,000 |
| 2032 | \$223,768  | \$0       |
| 2033 | \$373,768  | \$0       |
| 2034 | \$223,768  | \$250,000 |
| 2035 | \$373,768  | \$0       |
| 2036 | \$223,768  | \$0       |
| 2037 | \$373,768  | \$0       |
| 2038 | \$223,768  | \$200,000 |
| 2039 | \$373,768  | \$444,836 |
| 2040 | \$223,768  | \$0       |
| 2041 | \$373,768  | \$0       |
| 2042 | \$223,768  | \$0       |
| 2043 | \$373,768  | \$0       |
| 2044 | \$223,768  | \$250,000 |
| 2045 | \$373,768  | \$200,000 |
| 2046 | \$223,768  | \$0       |
| 2047 | \$373,768  | \$0       |
| 2048 | \$223,768  | \$0       |
| 2049 | \$373,768  | \$0       |

### Emissions Costs

The passenger ferry boats will emit small quantities of certain pollutants into the air. The three (3) emissions analyzed are: nitrous oxide (NO<sub>x</sub>), particulate matter (PM), and carbon dioxide (CO<sub>2</sub>). SO<sub>x</sub> emissions have been disregarded as the vessel will operate using ultra low sulfur diesel fuel. Costs related to emissions for electricity generation to power the building are included in the per-square foot costs of building O&M. The total cost related to the emissions specified, in total discounted dollars, is \$11,766,854, as shown in **Tables 8 and 9**.

**Table 8:** Valuation of Environmental Costs

| Cost                   | Total Cost          |                     |
|------------------------|---------------------|---------------------|
|                        | Undiscounted        | Discounted          |
| <b>Total Emissions</b> | <b>\$33,408,522</b> | <b>\$11,766,854</b> |

**Table 9:** Valuation of Environmental Costs

| Cost                        | Total Cost   |              |
|-----------------------------|--------------|--------------|
|                             | Undiscounted | Discounted   |
| CO <sub>2</sub> Emissions   | \$139,230    | \$43,055     |
| NO <sub>x</sub> Emissions   | \$28,756,350 | \$10,131,400 |
| PM <sub>2.5</sub> Emissions | \$4,512,942  | \$1,592,399  |

Fuel Consumption

The average trip of one passenger ferry to NYC is 20.45 miles, which equates to 21,350 VMT for one boat annually. Diesel fuel consumption has been calculated as 146 gallons per vessel per round trip at a current average cost of \$5.37 per gallon. Summarized in **Table 10**, the total fuel cost after the 25-year analysis is \$10,638,738 in undiscounted dollars, and \$3,949,983 in discounted dollars.

**Table 10:** Valuation of Diesel Fuel Consumption Costs, in Discounted Dollars

| Cost                          | Ferry Costs  |             |
|-------------------------------|--------------|-------------|
|                               | Undiscounted | Discounted  |
| Total Fuel and Operating Cost | \$10,229,556 | \$3,637,819 |

**4. PROJECT BENEFITS**

Benefits from this project can be categorized by the following: user benefits, which include automobile operating costs; and social benefits, including decreases in fatalities, emissions, property damage reductions, residual value, agglomeration economies, and increased emergency resilience.

The BCA covers the following quantifiable benefits:

- Safety Benefits
- Vehicle Operating Cost Savings
- Revenue
- Reduced Emissions
- Residual Value

All standardized factors come from the USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs to determine the monetized value for the various benefits generated by the project, where applicable. These benefits reduce or prevent future costs associated with the existing highways and the No-Build Condition and are summarized in **Table 11** below.

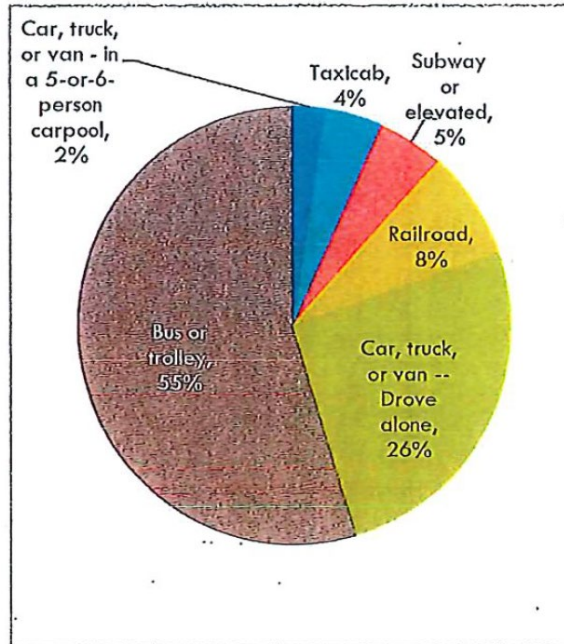
**Table 11: Project Benefits**

| Type of Benefit                | Description  | Monetized Value (Discounted) |
|--------------------------------|--|------------------------------|
| Safety                         | Reduction in crashes, fatalities, and injuries   | \$7,887,822                  |
| Vehicle Operating Cost Savings | Reduction in wear and tear on vehicles, reduced fuel consumption due to modal shift from passenger cars to ferry | \$4,479,103                  |
| Revenue                        | One-way ticket sale revenue  | \$17,291,313                 |
| Reduced Emissions              | Quality of life enhancements, reduced health risks   | \$21,824,631                 |
| Residual Value                 | Value of project after design life   | \$3,502,479                  |
| Resilience                     | Improved transportation infrastructure resilience during emergencies and/or natural disasters                    | -                            |
| Economic Development           | Access to new jobs, economic development potential, property value increase, and enhanced quality of life        | -                            |

Valuation of Operating Costs (Benefits from Modal Shift)

Commuters consider in-vehicle travel time a cost in their day-to-day lives. Less travel time allows for more time available to distribute to work, leisure, etc. Based on the existing modal splits for commuters in the no-build scenario (See **Figure 2**), it is assumed that these splits will be mirrored across new ferry ridership.

**Figure 2:** Modal Split to for NYC-bound Carteret commuters (Nelson Nygaard, 2016)



**Table 12:** Economic Competitiveness Valuation of Benefits, in Discounted Dollars

| Benefit                               | Ferry Opening Year |            | Final Year of BCA (2049) |            |
|---------------------------------------|--------------------|------------|--------------------------|------------|
|                                       | Undiscounted       | Discounted | Undiscounted             | Discounted |
| Total Fuel and Operating Cost Savings | \$443,961          | \$316,538  | \$602,519                | \$84,692   |

Safety

The following safety benefits have been assessed in this analysis: reduction in fatalities, injuries, and property damage caused by accidents.

As previously mentioned, the New Jersey commuter routes leading to New York City are overcrowded and frequently operate above capacity, with conditions only projected to worsen during the analysis period. This often leads to accidents along the highways and frequent delays. Approximately 7.28 fatalities occur per 1 billion VMT (vehicle mile traveled) and similarly 84 injuries and 147 property damage incidents occur per every 100 million VMT

according to USDOT statistics. Since the ferry terminal project is designed to eliminate vehicles from the roadway, fatalities, injuries, and property damage incidents will be reduced. Over the span of the analysis, it has been calculated that shift away from drivers and taxis will result in 0.22 fewer fatalities, 25 fewer injuries, and 44 fewer property damage only incidents per year. Safety savings benefits are provided in **Table 13** below.

**Table 13:** Valuation of Safety Benefits, in 2020 Dollars

| Benefit                      | Ferry Opening Year |                  | Final Year of BCA (2049) |                  |
|------------------------------|--------------------|------------------|--------------------------|------------------|
|                              | Undiscounted       | Discounted       | Undiscounted             | Discounted       |
| Fatality Reduction           | \$92,202           | \$65,739         | \$125,131                | \$17,589         |
| Injury Reduction             | \$250,773          | \$178,797.58     | \$340,335                | \$47,838         |
| Property Damage Reduction    | \$438,852          | \$312,896        | \$595,586                | \$83,717         |
| <b>Total Safety Benefits</b> | <b>\$770,658</b>   | <b>\$587,932</b> | <b>\$1,061,052</b>       | <b>\$149,144</b> |

#### Environmental Sustainability

There are environmental and sustainability benefits associated with the project as it relates to reduction of air pollutants through decreased vehicle traffic. Reducing air pollution has a positive impact on society's health and plays a role in the protection of the environment. The total savings associated with a reduction in emissions for vehicular travel as a result of the ferry terminal build case is \$21,824,631 in discounted 2020 dollars as shown in **Table 14**.

**Table 14:** Valuation of Environmental Benefits, in 2020 Dollars

| Benefit                          | Combined Savings    |                     |
|----------------------------------|---------------------|---------------------|
|                                  | Undiscounted        | Discounted          |
| <b>Total Emissions Reduction</b> | <b>\$64,627,231</b> | <b>\$21,824,631</b> |

Values and assumptions made to quantify the savings in emissions are taken from the U.S. DOT BCA Guidance for Discretionary Programs and shown below.

As directed, three (3) types of emissions were analyzed, estimated, and monetized for the BCA: nitrous oxide (NO<sub>x</sub>), particulate matter (PM), and carbon dioxide (CO<sub>2</sub>). Cost per metric ton varies by year. Values for the calculations were given in the USDOT Guidance for Discretionary Grant Programs and can be seen in **Appendix A**. These reductions represent the reduction in single passenger vehicle trips equivalent to the number of passenger cars removed from the road due to a proportionate amount of commuters utilizing the ferry.

The reach of these environmental benefits extends to more than just users of the ferry terminal building. The emissions reduction helps the surrounding area where less vehicles need to be on the roads and highways to commute to New York. The types of emissions can be broken down into the following savings:

**Table 15:** Valuation of Environmental Benefits, per Parameter, in 2020 Dollars

| Benefit                               | Total Savings |              |
|---------------------------------------|---------------|--------------|
|                                       | Undiscounted  | Discounted   |
| CO <sub>2</sub> Emissions Reduction   | \$3,993,196   | \$1,182,733  |
| NO <sub>x</sub> Emissions Reduction   | \$7,998,101   | \$2,884,166  |
| PM <sub>2.5</sub> Emissions Reduction | \$52,635,934  | \$17,575,732 |

### Residual Value

The residual value calculated within the benefit-cost analysis is determined by the percentage of useful life remaining after the final year of the analysis period, and multiplying that value by the total construction cost for the project. A design life of 75 years has been recommended by the project architect, consistent with the class of construction and observed service life of similar public facilities. The analysis period for the ferry terminal project is 25 years of service, and the design life is 75 years, so the residual value is 67% of the initial build cost when using the straight-line depreciation method. Using our construction cost of \$37,376,300 for the intermodal ferry terminal, multiplied by 67%, the total undiscounted value is \$24,917,533. The leftover capital can be considered savings, or a benefit, applied to the last year of the BCA period. The residual value, expressed in 2020 dollars, is discounted to \$3,502,479 when applied as shown in **Table 16**.

**Table 16:** Valuation of Residual Value

| Benefit                              | Final Year of BCA (2049) |                    |
|--------------------------------------|--------------------------|--------------------|
|                                      | Undiscounted             | Discounted         |
| <b>Total Residual Value Benefits</b> | <b>\$24,917,533</b>      | <b>\$3,502,479</b> |

### Revenue

The ferry terminal is expected to generate revenue each year through the purchase of tickets by commuters. Using the Nelson Nygaard feasibility study recommended one-way ticket price of \$13 (adjusted via CPI for \$15 in 2024 dollars), the terminal will generate a total of \$50,902,830 through the 25-year analysis period, or \$17,291,313 when discounted at 7% as shown in **Table 17**.

**Table 17:** Valuation of Revenue

| Benefit                         | Total Benefits      |                     |
|---------------------------------|---------------------|---------------------|
|                                 | Undiscounted        | Discounted          |
| <b>Total Revenue Generation</b> | <b>\$50,902,830</b> | <b>\$17,291,313</b> |

## 5. SUMMARY OF RESULTS

### Evaluation Measures

As previously mentioned, the benefit-cost analysis compares potential benefits and costs of a complete build out scenario associated with the project. The following evaluation measures were used to analyze this BCA for the Carteret Intermodal Ferry Terminal project:

- **Net Present Value (NPV):** The NPV provides clarity on the overall dollar value of cash flows over time in today's dollar terms by comparing the net benefits (benefits minus costs) after applying the 7% discount rate given by the USDOT. A NPV greater than zero indicates the cost-effectiveness of a project.
- **Benefit Cost Ratio (BCR):** The BCR analyzes the relationship between discounted benefits and discounted costs to see whether a project's benefits exceed or fall below the costs. The BCR is determined by taking the present value of incremental benefits and dividing the present value of incremental costs. A BCR greater than 1.0 indicates the cost-effectiveness of a project.

### BCA Results

**Table 18** below shows the evaluation results for the proposed project. Results are given in both undiscounted and discounted (at 7%) dollar values over a 25-year evaluation period.

Total benefits and costs were used to determine the desirability of the project. The total benefits of the complete build out are \$54,985,347 in discounted 2020 dollars. The total capital costs including design, construction, operation, and maintenance and repairs, equate to \$47,068,076 in discounted 2020 dollars. The difference between discounted costs and discounted benefits result in a net present value of \$7,917,271 discounted in 2020 dollars, and BCR of 1.17.

**Table 18: Benefit Cost Analysis Results, In 2020 Dollars**

| BCA Metric                      | Project Life Cycle  |                    |
|---------------------------------|---------------------|--------------------|
|                                 | Undiscounted        | Discounted         |
| Total Benefits                  | \$176,835,999       | \$54,985,347       |
| Total Costs                     | \$90,103,414        | \$47,068,076       |
| <b>Net Present Value (NPV)</b>  | <b>\$86,732,585</b> | <b>\$7,917,271</b> |
| <b>Benefit Cost Ratio (BCR)</b> | <b>1.96</b>         | <b>1.17</b>        |

### Other Non-Quantifiable Benefits

#### *Resilience:*

This analysis recognizes the difficulty in correlating a monetary measure to resilience benefits. Notably, ferry service was an invaluable mode of rescuing commuters,



residents, and victims of the September 11<sup>th</sup>, 2001 attacks on the World Trade Center. The frequency of such an event cannot be reliably estimated. This report also notes that one of the ferry vessels purchased by the Borough was the first responder to the 2009 crash landing of US Airways Flight 1549 in the Hudson River, rescuing 24 victims from the aircraft. This vessel has also been involved in the 2017 rescue of a man that had jumped into the Hudson River and rescuing a helicopter pilot that had ditched into the River in 2019.

*Economic Development:*

A significant non-quantifiable benefit resulting in the build out of the ferry terminal project is the creation of agglomeration economies. Agglomeration economies are defined as the benefits that come when firms and people locate near one another in cities and industrial clusters. The Intermodal Ferry Terminal connects people of Carteret and surrounding municipalities to the massive New York City market. Both firms and households benefit from the effects of the connected economic activity. The ferry terminal and adjacent land is to be developed into a regional transportation hub, with future retail, residential, and commercial spaces supporting the proposed hot spot. The additional benefits of living in a desirable area, plus the proposed ferry terminal project that will transport passengers to the newly accessed NYC job market, brings future residents into the Borough of Carteret and boosts the local economy. See **Appendix D** for the overall conceptual design of the Waterfront Redevelopment Area, highlighting the importance of this project on a local and regional level.

Conclusion

A benefit-cost analysis (BCA) was conducted for the *Carteret Intermodal Ferry Terminal* for submission to the USDOT as a requirement of a discretionary grant application for the *Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Program*. The analysis was conducted in accordance with the benefit-cost methodology outlined in the Benefit-Cost Analysis Guidance for Discretionary Grant Programs, supplied by the USDOT. The period of analysis corresponds to 25 years after operations begin in 2025.

The BCA examined all costs associated with ferry operations at the waterfront development area in Carteret, New Jersey. The benefits lead to an overall project Net Present Value (NPV) of \$7,917,271 (discounted at 7%) and a Benefit Cost Ratio (BCR) of 1.17. The overall project benefit matrix can be seen in **Table 2**. As the calculated NPV is greater than zero and the BCR is greater than 1.0, the cost for the proposed project is justified.

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**REFERENCES**

1. "Guidance for Discretionary Grant Programs", prepared by USDOT, 2022
2. "NYC Ins and Out of Commuting", prepared by NYC Planning, 2022
3. "Carteret Ferry Feasibility Study, Tier 2 Analysis", prepared by Nelson Nygaard and Weinberger & Associates, December 2016
4. "Proposed Carteret Passenger Ferry Expanded Ridership Demand Study", prepared by Rutgers University, October 23, 2018
5. "The Economic and Societal Impact of Motor Vehicle Crashes", prepared by NHTSA, 2010 (revised)
6. "Navigational Safety Plan, Borough of Carteret Ferry Service to Manhattan", prepared by Panaveer Quality Partners, February 14, 2020.
7. "Greenhouse Gas Emissions from a Typical Passenger Vehicle", prepared by US EPA, March 2018
8. "Estimated National Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel", prepared by Bureau of Transportation Statistics, 2021
9. Facility Service Costs provided by Facility Service Partners
10. Operational and maintenance resources: New York Waterways, Weehawken, NJ and May Shipbuilding, Staten Island, NY

**APPENDIX A**  
**BENEFIT COST ANALYSIS**

**BENEFIT COST ANALYSIS  
2024 RAISE INTERMODAL GRANT APPLICATION  
CARTERET INTERMODAL FERRY TERMINAL  
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**Table 1: BCA Overall Results**

| TOTAL COST |            | DISCOUNTED COSTS |            | TOTAL BENEFITS |             | DISCOUNTED BENEFITS |            |
|------------|------------|------------------|------------|----------------|-------------|---------------------|------------|
| \$         | 90,103,414 | \$               | 47,068,076 | \$             | 176,835,999 | \$                  | 54,985,347 |

**NET PRESENT VALUE (NPV):** \$ 86,732,585 \$ 7,917,271

**BENEFIT-COST RATIO (BCR):** 1.96 1.17

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**2024 RAISE INTERMODAL GRANT APPLICATION**  
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**Table 2: Total Costs of Project**

| YEAR          | TOTAL COST           | DISCOUNTED COST      |
|---------------|----------------------|----------------------|
|               | <u>"Future"</u>      | <u>2020</u>          |
| 2022          | \$ -                 | \$ -                 |
| 2023          | \$ -                 | \$ -                 |
| 2024          | \$ 37,376,300        | \$ 28,514,200        |
| 2025          | \$ 2,015,167         | \$ 1,436,786         |
| 2026          | \$ 1,887,133         | \$ 1,257,477         |
| 2027          | \$ 2,059,120         | \$ 1,282,317         |
| 2028          | \$ 1,931,170         | \$ 1,123,959         |
| 2029          | \$ 2,103,262         | \$ 1,144,035         |
| 2030          | \$ 1,981,822         | \$ 1,007,458         |
| 2031          | \$ 2,331,822         | \$ 1,107,832         |
| 2032          | \$ 1,981,822         | \$ 879,953           |
| 2033          | \$ 2,131,822         | \$ 884,630           |
| 2034          | \$ 2,231,822         | \$ 865,539           |
| 2035          | \$ 2,131,822         | \$ 772,670           |
| 2036          | \$ 1,985,392         | \$ 672,521           |
| 2037          | \$ 2,135,392         | \$ 676,010           |
| 2038          | \$ 2,185,392         | \$ 646,579           |
| 2039          | \$ 2,580,228         | \$ 713,455           |
| 2040          | \$ 1,985,392         | \$ 513,063           |
| 2041          | \$ 2,135,392         | \$ 515,725           |
| 2042          | \$ 1,985,392         | \$ 448,129           |
| 2043          | \$ 2,135,392         | \$ 450,454           |
| 2044          | \$ 2,235,392         | \$ 440,700           |
| 2045          | \$ 2,335,392         | \$ 430,294           |
| 2046          | \$ 1,985,392         | \$ 341,876           |
| 2047          | \$ 2,135,392         | \$ 343,649           |
| 2048          | \$ 1,985,392         | \$ 298,607           |
| 2049          | \$ 2,135,392         | \$ 300,157           |
| <b>TOTAL:</b> | <b>\$ 90,103,414</b> | <b>\$ 47,068,076</b> |

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**Table 3: Capital Costs of Project**

| YEAR | CAPITAL COST     | DISCOUNTED COST  |
|------|------------------|------------------|
|      | <u>"Future"</u>  | <u>2020</u>      |
| 2022 | \$ -             | \$ -             |
| 2023 | \$ -             | \$ -             |
| 2024 | \$ 37,376,300.00 | \$ 28,514,200.31 |
| 2025 | \$ -             | \$ -             |
| 2026 | \$ -             | \$ -             |
| 2027 | \$ -             | \$ -             |
| 2028 | \$ -             | \$ -             |
| 2029 | \$ -             | \$ -             |
| 2030 | \$ -             | \$ -             |
| 2031 | \$ -             | \$ -             |
| 2032 | \$ -             | \$ -             |
| 2033 | \$ -             | \$ -             |
| 2034 | \$ -             | \$ -             |
| 2035 | \$ -             | \$ -             |
| 2036 | \$ -             | \$ -             |
| 2037 | \$ -             | \$ -             |
| 2038 | \$ -             | \$ -             |
| 2039 | \$ -             | \$ -             |
| 2040 | \$ -             | \$ -             |
| 2041 | \$ -             | \$ -             |
| 2042 | \$ -             | \$ -             |
| 2043 | \$ -             | \$ -             |
| 2044 | \$ -             | \$ -             |
| 2045 | \$ -             | \$ -             |
| 2046 | \$ -             | \$ -             |
| 2047 | \$ -             | \$ -             |
| 2048 | \$ -             | \$ -             |
| 2049 | \$ -             | \$ -             |

**TOTAL: \$ 28,514,200**

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**Table 4: Operational and Maintenance Costs of Project**

| YEAR | DISCOUNTED COST |            |
|------|-----------------|------------|
|      | "Future"        | 2020       |
| 2022 | \$ -            | \$ -       |
| 2023 | \$ -            | \$ -       |
| 2024 | \$ -            | \$ -       |
| 2025 | \$ 373,768      | \$ 266,491 |
| 2026 | \$ 223,768      | \$ 149,106 |
| 2027 | \$ 373,768      | \$ 232,764 |
| 2028 | \$ 223,768      | \$ 130,235 |
| 2029 | \$ 373,768      | \$ 203,305 |
| 2030 | \$ 223,768      | \$ 113,752 |
| 2031 | \$ 373,768      | \$ 177,574 |
| 2032 | \$ 223,768      | \$ 99,356  |
| 2033 | \$ 373,768      | \$ 155,100 |
| 2034 | \$ 223,768      | \$ 86,781  |
| 2035 | \$ 373,768      | \$ 135,471 |
| 2036 | \$ 223,768      | \$ 75,798  |
| 2037 | \$ 373,768      | \$ 118,325 |
| 2038 | \$ 223,768      | \$ 66,205  |
| 2039 | \$ 373,768      | \$ 103,350 |
| 2040 | \$ 223,768      | \$ 57,826  |
| 2041 | \$ 373,768      | \$ 90,270  |
| 2042 | \$ 223,768      | \$ 50,507  |
| 2043 | \$ 373,768      | \$ 78,845  |
| 2044 | \$ 223,768      | \$ 44,115  |
| 2045 | \$ 373,768      | \$ 68,866  |
| 2046 | \$ 223,768      | \$ 38,532  |
| 2047 | \$ 373,768      | \$ 60,151  |
| 2048 | \$ 223,768      | \$ 33,655  |
| 2049 | \$ 373,768      | \$ 52,538  |

**TOTAL: \$ 7,544,200 \$ 2,688,920**

**Table 5: Repair and Rehabilitation Costs of Project**

| YEAR | DISCOUNTED COST |            |
|------|-----------------|------------|
|      | "Future"        | 2020       |
| 2022 | \$ -            | \$ -       |
| 2023 | \$ -            | \$ -       |
| 2024 | \$ -            | \$ -       |
| 2025 | \$ -            | \$ -       |
| 2026 | \$ -            | \$ -       |
| 2027 | \$ -            | \$ -       |
| 2028 | \$ -            | \$ -       |
| 2029 | \$ -            | \$ -       |
| 2030 | \$ -            | \$ -       |
| 2031 | \$ 200,000      | \$ 95,019  |
| 2032 | \$ -            | \$ -       |
| 2033 | \$ -            | \$ -       |
| 2034 | \$ 250,000      | \$ 96,954  |
| 2035 | \$ -            | \$ -       |
| 2036 | \$ -            | \$ -       |
| 2037 | \$ -            | \$ -       |
| 2038 | \$ 200,000      | \$ 59,173  |
| 2039 | \$ 444,836      | \$ 123,001 |
| 2040 | \$ -            | \$ -       |
| 2041 | \$ -            | \$ -       |
| 2042 | \$ -            | \$ -       |
| 2043 | \$ -            | \$ -       |
| 2044 | \$ 250,000      | \$ 49,287  |
| 2045 | \$ 200,000      | \$ 36,850  |
| 2046 | \$ -            | \$ -       |
| 2047 | \$ -            | \$ -       |
| 2048 | \$ -            | \$ -       |
| 2049 | \$ -            | \$ -       |

**TOTAL: \$ 1,544,836 \$ 460,283**



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**Table 6: CO<sub>2</sub> Emissions Cost**

| YEAR          | METRIC TONS | COST / METRIC TON | COSTS             |                  | DISCOUNTED |
|---------------|-------------|-------------------|-------------------|------------------|------------|
|               |             |                   | "Future"          | 2020             |            |
| 2022          |             |                   |                   |                  |            |
| 2023          |             |                   |                   |                  |            |
| 2024          |             |                   |                   |                  |            |
| 2025          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 2,545         |            |
| 2026          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 2,379         |            |
| 2027          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 2,223         |            |
| 2028          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 2,078         |            |
| 2029          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 1,942         |            |
| 2030          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 1,815         |            |
| 2031          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 1,696         |            |
| 2032          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 1,585         |            |
| 2033          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 1,481         |            |
| 2034          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 1,385         |            |
| 2035          | 3,570       | \$ 1.00           | \$ 3,570          | \$ 1,294         |            |
| 2036          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 2,419         |            |
| 2037          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 2,260         |            |
| 2038          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 2,112         |            |
| 2039          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,974         |            |
| 2040          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,845         |            |
| 2041          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,724         |            |
| 2042          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,612         |            |
| 2043          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,506         |            |
| 2044          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,408         |            |
| 2045          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,316         |            |
| 2046          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,229         |            |
| 2047          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,149         |            |
| 2048          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,074         |            |
| 2049          | 3,570       | \$ 2.00           | \$ 7,140          | \$ 1,004         |            |
| <b>TOTAL:</b> |             |                   | <b>\$ 139,230</b> | <b>\$ 43,055</b> |            |

Note: Cost per metric ton varies based on values provided by USDOT

**BENEFIT COST ANALYSIS  
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**Table 7: NOx Emissions Cost**

| YEAR | METRIC TONS | COST / METRIC TON | COSTS           | DISCOUNTED    |
|------|-------------|-------------------|-----------------|---------------|
|      |             |                   | "Future"        | 2020          |
| 2022 |             |                   |                 |               |
| 2023 |             |                   |                 |               |
| 2024 |             |                   |                 |               |
| 2025 | 64.26       | \$ 16,500.00      | \$ 1,060,290.00 | \$ 755,972.12 |
| 2026 | 64.26       | \$ 16,800.00      | \$ 1,079,568.00 | \$ 719,361.74 |
| 2027 | 64.26       | \$ 17,100.00      | \$ 1,098,846.00 | \$ 684,306.06 |
| 2028 | 64.26       | \$ 17,400.00      | \$ 1,118,124.00 | \$ 650,758.35 |
| 2029 | 64.26       | \$ 17,700.00      | \$ 1,137,402.00 | \$ 618,671.33 |
| 2030 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 591,264.11 |
| 2031 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 552,583.28 |
| 2032 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 516,432.97 |
| 2033 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 482,647.64 |
| 2034 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 451,072.56 |
| 2035 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 421,563.14 |
| 2036 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 393,984.24 |
| 2037 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 368,209.57 |
| 2038 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 344,121.10 |
| 2039 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 321,608.50 |
| 2040 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 300,568.69 |
| 2041 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 280,905.32 |
| 2042 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 262,528.34 |
| 2043 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 245,353.59 |
| 2044 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 229,302.42 |
| 2045 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 214,301.32 |
| 2046 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 200,281.61 |
| 2047 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 187,179.08 |
| 2048 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 174,933.72 |
| 2049 | 64.26       | \$ 18,100.00      | \$ 1,163,106.00 | \$ 163,489.45 |

**Total** **\$ 28,756,350.00** **\$ 10,131,400.25**

Note: Cost per metric ton varies based on values provided by USDOT

**BENEFIT COST ANALYSIS  
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**Table 8: PM<sub>2.5</sub> Emissions Cost**

| YEAR | METRIC TONS | COST / METRIC TON | COSTS         | DISCOUNTED    |
|------|-------------|-------------------|---------------|---------------|
|      |             |                   | "Future"      | 2020          |
| 2022 |             |                   |               |               |
| 2023 |             |                   |               |               |
| 2024 |             |                   |               |               |
| 2025 | 0.21        | \$ 801,700.00     | \$ 168,357.00 | \$ 120,036.21 |
| 2026 | 0.21        | \$ 814,500.00     | \$ 171,045.00 | \$ 113,974.51 |
| 2027 | 0.21        | \$ 827,400.00     | \$ 173,754.00 | \$ 108,205.26 |
| 2028 | 0.21        | \$ 840,600.00     | \$ 176,526.00 | \$ 102,739.74 |
| 2029 | 0.21        | \$ 854,000.00     | \$ 179,340.00 | \$ 97,549.08  |
| 2030 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 92,619.21  |
| 2031 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 86,560.01  |
| 2032 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 80,897.20  |
| 2033 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 75,604.86  |
| 2034 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 70,658.75  |
| 2035 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 66,036.21  |
| 2036 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 61,716.09  |
| 2037 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 57,678.59  |
| 2038 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 53,905.22  |
| 2039 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 50,378.71  |
| 2040 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 47,082.91  |
| 2041 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 44,002.72  |
| 2042 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 41,124.04  |
| 2043 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 38,433.68  |
| 2044 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 35,919.33  |
| 2045 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 33,569.46  |
| 2046 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 31,373.33  |
| 2047 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 29,320.87  |
| 2048 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 27,402.68  |
| 2049 | 0.21        | \$ 867,600.00     | \$ 182,196.00 | \$ 25,609.98  |

**Total** **\$ 4,512,942.00** **\$ 1,592,398.64**

Note: Cost per metric ton varies based on values provided by USDOT

**TOTAL COMBINED** **\$ 33,408,522.00** **\$ 11,766,853.89**

**BENEFIT COST ANALYSIS  
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CARTERET INTERMODAL FERRY TERMINAL  
BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 9: Fuel Costs**

| <b>YEAR</b> | <b>ROUND TRIPS / YEAR</b> | <b>FUEL PER ROUND TRIP (GAL)</b> | <b>COST/GAL</b> | <b>COSTS</b> | <b>DISCOUNTED COSTS</b> |
|-------------|---------------------------|----------------------------------|-----------------|--------------|-------------------------|
| 2022        |                           |                                  |                 |              |                         |
| 2023        |                           |                                  |                 |              |                         |
| 2024        |                           |                                  |                 |              |                         |
| 2025        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 291,741              |
| 2026        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 272,655              |
| 2027        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 254,818              |
| 2028        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 238,148              |
| 2029        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 222,568              |
| 2030        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 208,007              |
| 2031        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 194,400              |
| 2032        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 181,682              |
| 2033        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 169,796              |
| 2034        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 158,688              |
| 2035        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 148,306              |
| 2036        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 138,604              |
| 2037        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 129,537              |
| 2038        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 121,062              |
| 2039        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 113,142              |
| 2040        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 105,740              |
| 2041        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 98,823               |
| 2042        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 92,358               |
| 2043        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 86,316               |
| 2044        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 80,669               |
| 2045        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 75,391               |
| 2046        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 70,459               |
| 2047        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 65,850               |
| 2048        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 61,542               |
| 2049        | 522                       | 146                              | \$ 5.369        | \$ 409,182   | \$ 57,516               |

**TOTAL: \$ 10,229,556 \$ 3,637,819**

**BENEFIT COST ANALYSIS**  
**2024 RAISE INTERMODAL GRANT APPLICATION**  
**CARTERET INTERMODAL FERRY TERMINAL**  
**BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 10: Total Benefits of Project**

| YEAR          | TOTAL BENEFITS |                    | DISCOUNTED BENEFITS |                   |
|---------------|----------------|--------------------|---------------------|-------------------|
|               | "Future"       |                    | 2020                |                   |
| 2022          | \$             | -                  | \$                  | -                 |
| 2023          | \$             | -                  | \$                  | -                 |
| 2024          | \$             | -                  | \$                  | -                 |
| 2025          | \$             | 5,105,872          | \$                  | 3,640,416         |
| 2026          | \$             | 5,154,747          | \$                  | 3,434,826         |
| 2027          | \$             | 5,228,979          | \$                  | 3,256,345         |
| 2028          | \$             | 5,291,940          | \$                  | 3,079,957         |
| 2029          | \$             | 5,364,530          | \$                  | 2,917,949         |
| 2030          | \$             | 5,483,662          | \$                  | 2,787,615         |
| 2031          | \$             | 5,507,152          | \$                  | 2,616,408         |
| 2032          | \$             | 5,634,150          | \$                  | 2,501,630         |
| 2033          | \$             | 5,705,479          | \$                  | 2,367,571         |
| 2034          | \$             | 5,784,638          | \$                  | 2,243,383         |
| 2035          | \$             | 5,855,968          | \$                  | 2,122,472         |
| 2036          | \$             | 6,033,576          | \$                  | 2,043,781         |
| 2037          | \$             | 6,106,106          | \$                  | 1,933,037         |
| 2038          | \$             | 6,186,466          | \$                  | 1,830,352         |
| 2039          | \$             | 6,258,996          | \$                  | 1,730,664         |
| 2040          | \$             | 6,388,395          | \$                  | 1,650,883         |
| 2041          | \$             | 6,460,925          | \$                  | 1,560,398         |
| 2042          | \$             | 6,541,285          | \$                  | 1,476,454         |
| 2043          | \$             | 6,613,815          | \$                  | 1,395,164         |
| 2044          | \$             | 6,694,175          | \$                  | 1,319,734         |
| 2045          | \$             | 6,766,704          | \$                  | 1,246,760         |
| 2046          | \$             | 6,847,064          | \$                  | 1,179,034         |
| 2047          | \$             | 6,919,594          | \$                  | 1,113,573         |
| 2048          | \$             | 6,992,124          | \$                  | 1,051,631         |
| 2049          | \$             | 31,909,657         | \$                  | 4,485,311         |
| <b>TOTAL:</b> | <b>\$</b>      | <b>176,835,999</b> | <b>\$</b>           | <b>54,985,347</b> |

**BENEFIT COST ANALYSIS  
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CARTERET INTERMODAL FERRY TERMINAL  
BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 12: Valuation of Fatality Savings**

| <b>YEAR</b>  | <b>FATALITY</b> | <b>COST PER FATALITY</b> | <b>SAVINGS</b>         | <b>DISCOUNTED SAVINGS</b> |
|--------------|-----------------|--------------------------|------------------------|---------------------------|
| 2022         |                 |                          |                        |                           |
| 2023         |                 |                          |                        |                           |
| 2024         |                 |                          |                        |                           |
| 2025         | 0.01            | \$ 12,837,400.00         | \$ 92,202.09           | \$ 65,738.82              |
| 2026         | 0.01            | \$ 12,837,400.00         | \$ 93,519.26           | \$ 62,315.83              |
| 2027         | 0.01            | \$ 12,837,400.00         | \$ 94,836.43           | \$ 59,059.36              |
| 2028         | 0.01            | \$ 12,837,400.00         | \$ 96,153.61           | \$ 55,962.27              |
| 2029         | 0.01            | \$ 12,837,400.00         | \$ 97,470.78           | \$ 53,017.65              |
| 2030         | 0.01            | \$ 12,837,400.00         | \$ 100,105.13          | \$ 50,888.37              |
| 2031         | 0.01            | \$ 12,837,400.00         | \$ 100,105.13          | \$ 47,559.22              |
| 2032         | 0.01            | \$ 12,837,400.00         | \$ 102,739.47          | \$ 45,617.55              |
| 2033         | 0.01            | \$ 12,837,400.00         | \$ 104,056.64          | \$ 43,179.81              |
| 2034         | 0.01            | \$ 12,837,400.00         | \$ 105,373.82          | \$ 40,865.78              |
| 2035         | 0.01            | \$ 12,837,400.00         | \$ 106,690.99          | \$ 38,669.72              |
| 2036         | 0.01            | \$ 12,837,400.00         | \$ 108,008.16          | \$ 36,586.10              |
| 2037         | 0.01            | \$ 12,837,400.00         | \$ 109,325.33          | \$ 34,609.60              |
| 2038         | 0.01            | \$ 12,837,400.00         | \$ 110,642.51          | \$ 32,735.13              |
| 2039         | 0.01            | \$ 12,837,400.00         | \$ 111,959.68          | \$ 30,957.78              |
| 2040         | 0.01            | \$ 12,837,400.00         | \$ 114,594.02          | \$ 29,613.27              |
| 2041         | 0.01            | \$ 12,837,400.00         | \$ 115,911.20          | \$ 27,994.07              |
| 2042         | 0.01            | \$ 12,837,400.00         | \$ 117,228.37          | \$ 26,459.99              |
| 2043         | 0.01            | \$ 12,837,400.00         | \$ 118,545.54          | \$ 25,006.81              |
| 2044         | 0.01            | \$ 12,837,400.00         | \$ 119,862.72          | \$ 23,630.53              |
| 2045         | 0.01            | \$ 12,837,400.00         | \$ 121,179.89          | \$ 22,327.29              |
| 2046         | 0.01            | \$ 12,837,400.00         | \$ 122,497.06          | \$ 21,093.44              |
| 2047         | 0.01            | \$ 12,837,400.00         | \$ 123,814.23          | \$ 19,925.47              |
| 2048         | 0.01            | \$ 12,837,400.00         | \$ 125,131.41          | \$ 18,820.04              |
| 2049         | 0.01            | \$ 12,837,400.00         | \$ 125,131.41          | \$ 17,588.82              |
| <b>Total</b> |                 |                          | <b>\$ 2,737,084.87</b> | <b>\$ 930,222.75</b>      |

**BENEFIT COST ANALYSIS  
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BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 13: Calculation of Fatalities per Year**

| <b>YEAR</b>   | <b>VMT</b> | <b>BILLION VMT</b> | <b>FATALITY RATE<br/>PER BILLION VMT</b> | <b>FATALITIES</b> |
|---------------|------------|--------------------|--|-------------------|
| 2022          |            |                    |  |                   |
| 2023          |            |                    |  |                   |
| 2024          |            |                    |  |                   |
| 2025          | 986,580    | 0.001              | 7.28                                     | 0.01              |
| 2026          | 1,000,674  | 0.001              | 7.28                                     | 0.01              |
| 2027          | 1,014,768  | 0.001              | 7.28                                     | 0.01              |
| 2028          | 1,028,862  | 0.001              | 7.28                                     | 0.01              |
| 2029          | 1,042,956  | 0.001              | 7.28                                     | 0.01              |
| 2030          | 1,071,144  | 0.001              | 7.28                                     | 0.01              |
| 2031          | 1,071,144  | 0.001              | 7.28                                     | 0.01              |
| 2032          | 1,099,332  | 0.001              | 7.28                                     | 0.01              |
| 2033          | 1,113,426  | 0.001              | 7.28                                     | 0.01              |
| 2034          | 1,127,520  | 0.001              | 7.28                                     | 0.01              |
| 2035          | 1,141,614  | 0.001              | 7.28                                     | 0.01              |
| 2036          | 1,155,708  | 0.001              | 7.28                                     | 0.01              |
| 2037          | 1,169,802  | 0.001              | 7.28                                     | 0.01              |
| 2038          | 1,183,896  | 0.001              | 7.28                                     | 0.01              |
| 2039          | 1,197,990  | 0.001              | 7.28                                     | 0.01              |
| 2040          | 1,226,178  | 0.001              | 7.28                                     | 0.01              |
| 2041          | 1,240,272  | 0.001              | 7.28                                     | 0.01              |
| 2042          | 1,254,366  | 0.001              | 7.28                                     | 0.01              |
| 2043          | 1,268,460  | 0.001              | 7.28                                     | 0.01              |
| 2044          | 1,282,554  | 0.001              | 7.28                                     | 0.01              |
| 2045          | 1,296,648  | 0.001              | 7.28                                     | 0.01              |
| 2046          | 1,310,742  | 0.001              | 7.28                                     | 0.01              |
| 2047          | 1,324,836  | 0.001              | 7.28                                     | 0.01              |
| 2048          | 1,338,930  | 0.001              | 7.28                                     | 0.01              |
| 2049          | 1,338,930  | 0.001              | 7.28                                     | 0.01              |
| <b>Total:</b> |            |                    |  | <b>0.21</b>       |

**BENEFIT COST ANALYSIS  
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**Table 14: Valuation of Injury Savings**

| <b>YEAR</b>   | <b>INJURIES</b> | <b>COST PER INJURY</b> | <b>SAVINGS</b>         | <b>DISCOUNTED SAVINGS</b> |
|---------------|-----------------|------------------------|------------------------|---------------------------|
| 2022          |                 |                        |                        |                           |
| 2023          |                 |                        |                        |                           |
| 2024          |                 |                        |                        |                           |
| 2025          | 0.83            | \$ 302,600.00          | \$ 250,772.85          | \$ 178,797.58             |
| 2026          | 0.84            | \$ 302,600.00          | \$ 254,355.32          | \$ 169,487.69             |
| 2027          | 0.85            | \$ 302,600.00          | \$ 257,937.79          | \$ 160,630.69             |
| 2028          | 0.86            | \$ 302,600.00          | \$ 261,520.26          | \$ 152,207.17             |
| 2029          | 0.88            | \$ 302,600.00          | \$ 265,102.73          | \$ 144,198.32             |
| 2030          | 0.90            | \$ 302,600.00          | \$ 272,267.67          | \$ 138,407.08             |
| 2031          | 0.90            | \$ 302,600.00          | \$ 272,267.67          | \$ 129,352.41             |
| 2032          | 0.92            | \$ 302,600.00          | \$ 279,432.61          | \$ 124,071.42             |
| 2033          | 0.94            | \$ 302,600.00          | \$ 283,015.07          | \$ 117,441.19             |
| 2034          | 0.95            | \$ 302,600.00          | \$ 286,597.54          | \$ 111,147.47             |
| 2035          | 0.96            | \$ 302,600.00          | \$ 290,180.01          | \$ 105,174.59             |
| 2036          | 0.97            | \$ 302,600.00          | \$ 293,762.48          | \$ 99,507.52              |
| 2037          | 0.98            | \$ 302,600.00          | \$ 297,344.95          | \$ 94,131.80              |
| 2038          | 0.99            | \$ 302,600.00          | \$ 300,927.42          | \$ 89,033.57              |
| 2039          | 1.01            | \$ 302,600.00          | \$ 304,509.89          | \$ 84,199.52              |
| 2040          | 1.03            | \$ 302,600.00          | \$ 311,674.83          | \$ 80,542.70              |
| 2041          | 1.04            | \$ 302,600.00          | \$ 315,257.30          | \$ 76,138.76              |
| 2042          | 1.05            | \$ 302,600.00          | \$ 318,839.77          | \$ 71,966.33              |
| 2043          | 1.07            | \$ 302,600.00          | \$ 322,422.24          | \$ 68,013.97              |
| 2044          | 1.08            | \$ 302,600.00          | \$ 326,004.71          | \$ 64,270.73              |
| 2045          | 1.09            | \$ 302,600.00          | \$ 329,587.18          | \$ 60,726.17              |
| 2046          | 1.10            | \$ 302,600.00          | \$ 333,169.64          | \$ 57,370.31              |
| 2047          | 1.11            | \$ 302,600.00          | \$ 336,752.11          | \$ 54,193.64              |
| 2048          | 1.12            | \$ 302,600.00          | \$ 340,334.58          | \$ 51,187.07              |
| 2049          | 1.12            | \$ 302,600.00          | \$ 340,334.58          | \$ 47,838.39              |
| <b>TOTAL:</b> |                 |                        | <b>\$ 7,444,371.20</b> | <b>\$ 2,530,036.07</b>    |



**BENEFIT COST ANALYSIS  
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**Table 15: Calculation of Injuries per Year**

| <b>YEAR</b>   | <b>VMT</b> | <b>100 MILLION VMT</b> | <b>INJURY RATE PER<br/>100 MILLION VMT</b> | <b>INJURIES</b> |
|---------------|------------|------------------------|--|-----------------|
| 2022          |            |                        |  |                 |
| 2023          |            |                        |  |                 |
| 2024          |            |                        |  |                 |
| 2025          | 986,580    | 0.0099                 | 84   | 0.83            |
| 2026          | 1,000,674  | 0.01                   | 84   | 0.84            |
| 2027          | 1,014,768  | 0.01                   | 84   | 0.85            |
| 2028          | 1,028,862  | 0.01                   | 84   | 0.86            |
| 2029          | 1,042,956  | 0.01                   | 84   | 0.88            |
| 2030          | 1,071,144  | 0.01                   | 84   | 0.90            |
| 2031          | 1,071,144  | 0.01                   | 84   | 0.90            |
| 2032          | 1,099,332  | 0.01                   | 84   | 0.92            |
| 2033          | 1,113,426  | 0.01                   | 84   | 0.94            |
| 2034          | 1,127,520  | 0.01                   | 84   | 0.95            |
| 2035          | 1,141,614  | 0.01                   | 84   | 0.96            |
| 2036          | 1,155,708  | 0.01                   | 84   | 0.97            |
| 2037          | 1,169,802  | 0.01                   | 84   | 0.98            |
| 2038          | 1,183,896  | 0.01                   | 84   | 0.99            |
| 2039          | 1,197,990  | 0.01                   | 84   | 1.01            |
| 2040          | 1,226,178  | 0.01                   | 84   | 1.03            |
| 2041          | 1,240,272  | 0.01                   | 84   | 1.04            |
| 2042          | 1,254,366  | 0.01                   | 84   | 1.05            |
| 2043          | 1,268,460  | 0.01                   | 84   | 1.07            |
| 2044          | 1,282,554  | 0.01                   | 84   | 1.08            |
| 2045          | 1,296,648  | 0.01                   | 84   | 1.09            |
| 2046          | 1,310,742  | 0.01                   | 84   | 1.10            |
| 2047          | 1,324,836  | 0.01                   | 84   | 1.11            |
| 2048          | 1,338,930  | 0.01                   | 84   | 1.12            |
| 2049          | 1,338,930  | 0.01                   | 84   | 1.12            |
| <b>TOTAL:</b> |            |                        |  | <b>24.60</b>    |

**BENEFIT COST ANALYSIS  
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**Table 16: Valuation of Property Damage Savings**

| <b>YEAR</b>   | <b>PROPERTY<br/>DAMAGE<br/>INCIDENTS</b> | <b>COST PER<br/>VEHICLE</b> | <b>SAVINGS</b>       | <b>DISCOUNTED<br/>SAVINGS</b> |
|---------------|--|-----------------------------|----------------------|-------------------------------|
| 2022          |  |                             |                      |                               |
| 2023          |  |                             |                      |                               |
| 2024          |  |                             |                      |                               |
| 2025          | 1.45                                     | \$ 302,600                  | \$ 438,852           | \$ 312,896                    |
| 2026          | 1.47                                     | \$ 302,600                  | \$ 445,122           | \$ 296,603                    |
| 2027          | 1.49                                     | \$ 302,600                  | \$ 451,391           | \$ 281,104                    |
| 2028          | 1.51                                     | \$ 302,600                  | \$ 457,660           | \$ 266,363                    |
| 2029          | 1.53                                     | \$ 302,600                  | \$ 463,930           | \$ 252,347                    |
| 2030          | 1.57                                     | \$ 302,600                  | \$ 476,468           | \$ 242,212                    |
| 2031          | 1.57                                     | \$ 302,600                  | \$ 476,468           | \$ 226,367                    |
| 2032          | 1.62                                     | \$ 302,600                  | \$ 489,007           | \$ 217,125                    |
| 2033          | 1.64                                     | \$ 302,600                  | \$ 495,276           | \$ 205,522                    |
| 2034          | 1.66                                     | \$ 302,600                  | \$ 501,546           | \$ 194,508                    |
| 2035          | 1.68                                     | \$ 302,600                  | \$ 507,815           | \$ 184,056                    |
| 2036          | 1.70                                     | \$ 302,600                  | \$ 514,084           | \$ 174,138                    |
| 2037          | 1.72                                     | \$ 302,600                  | \$ 520,354           | \$ 164,731                    |
| 2038          | 1.74                                     | \$ 302,600                  | \$ 526,623           | \$ 155,809                    |
| 2039          | 1.76                                     | \$ 302,600                  | \$ 532,892           | \$ 147,349                    |
| 2040          | 1.80                                     | \$ 302,600                  | \$ 545,431           | \$ 140,950                    |
| 2041          | 1.82                                     | \$ 302,600                  | \$ 551,700           | \$ 133,243                    |
| 2042          | 1.84                                     | \$ 302,600                  | \$ 557,970           | \$ 125,941                    |
| 2043          | 1.86                                     | \$ 302,600                  | \$ 564,239           | \$ 119,024                    |
| 2044          | 1.89                                     | \$ 302,600                  | \$ 570,508           | \$ 112,474                    |
| 2045          | 1.91                                     | \$ 302,600                  | \$ 576,778           | \$ 106,271                    |
| 2046          | 1.93                                     | \$ 302,600                  | \$ 583,047           | \$ 100,398                    |
| 2047          | 1.95                                     | \$ 302,600                  | \$ 589,316           | \$ 94,839                     |
| 2048          | 1.97                                     | \$ 302,600                  | \$ 595,586           | \$ 89,577                     |
| 2049          | 1.97                                     | \$ 302,600                  | \$ 595,586           | \$ 83,717                     |
| <b>TOTAL:</b> |  |                             | <b>\$ 13,027,650</b> | <b>\$ 4,427,563</b>           |

**BENEFIT COST ANALYSIS  
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**Table 17: Calculation of Property Damage Incidents**

| <b>YEAR</b> | <b>VMT</b> | <b>100 MILLION VMT</b> | <b>PROP. DAMAGE<br/>RATE 100<br/>MILLION VMT</b> | <b>PROPERTY<br/>DAMAGE<br/>INCIDENTS</b> |
|-------------|------------|------------------------|--|--|
| 2022        |            |                        |  |  |
| 2023        |            |                        |  |  |
| 2024        |            |                        |  |  |
| 2025        | 986,580    | 0.01                   | 147  | 1.45                                     |
| 2026        | 1,000,674  | 0.01                   | 147  | 1.47                                     |
| 2027        | 1,014,768  | 0.01                   | 147  | 1.49                                     |
| 2028        | 1,028,862  | 0.01                   | 147  | 1.51                                     |
| 2029        | 1,042,956  | 0.01                   | 147  | 1.53                                     |
| 2030        | 1,071,144  | 0.01                   | 147  | 1.57                                     |
| 2031        | 1,071,144  | 0.01                   | 147  | 1.57                                     |
| 2032        | 1,099,332  | 0.01                   | 147  | 1.62                                     |
| 2033        | 1,113,426  | 0.01                   | 147  | 1.64                                     |
| 2034        | 1,127,520  | 0.01                   | 147  | 1.66                                     |
| 2035        | 1,141,614  | 0.01                   | 147  | 1.68                                     |
| 2036        | 1,155,708  | 0.01                   | 147  | 1.70                                     |
| 2037        | 1,169,802  | 0.01                   | 147  | 1.72                                     |
| 2038        | 1,183,896  | 0.01                   | 147  | 1.74                                     |
| 2039        | 1,197,990  | 0.01                   | 147  | 1.76                                     |
| 2040        | 1,226,178  | 0.01                   | 147  | 1.80                                     |
| 2041        | 1,240,272  | 0.01                   | 147  | 1.82                                     |
| 2042        | 1,254,366  | 0.01                   | 147  | 1.84                                     |
| 2043        | 1,268,460  | 0.01                   | 147  | 1.86                                     |
| 2044        | 1,282,554  | 0.01                   | 147  | 1.89                                     |
| 2045        | 1,296,648  | 0.01                   | 147  | 1.91                                     |
| 2046        | 1,310,742  | 0.01                   | 147  | 1.93                                     |
| 2047        | 1,324,836  | 0.01                   | 147  | 1.95                                     |
| 2048        | 1,338,930  | 0.01                   | 147  | 1.97                                     |
| 2049        | 1,338,930  | 0.01                   | 147  | 1.97                                     |

**TOTAL: 43.05**



**TOTAL SAFETY BENEFITS: \$ 23,209,106 \$ 7,887,822**

**BENEFIT COST ANALYSIS**  
**2024 RAISE INTERMODAL GRANT APPLICATION**  
**CARTERET INTERMODAL FERRY TERMINAL**  
**BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 18: Valuation of CO<sub>2</sub> Emissions Savings**

| YEAR          | METRIC TONS      | COST / METRIC TON | SAVINGS             |                     | DISCOUNTED |
|---------------|------------------|-------------------|---------------------|---------------------|------------|
|               |                  |                   | "Future"            | 2020                |            |
| 2022          |                  |                   |                     |                     |            |
| 2023          |                  |                   |                     |                     |            |
| 2024          |                  |                   |                     |                     |            |
| 2025          | 84,042           | \$ 1.00           | \$ 84,042           | \$ 59,921           |            |
| 2026          | 85,243           | \$ 1.00           | \$ 85,243           | \$ 56,801           |            |
| 2027          | 86,443           | \$ 1.00           | \$ 86,443           | \$ 53,832           |            |
| 2028          | 87,644           | \$ 1.00           | \$ 87,644           | \$ 51,009           |            |
| 2029          | 88,844           | \$ 1.00           | \$ 88,844           | \$ 48,325           |            |
| 2030          | 91,246           | \$ 1.00           | \$ 91,246           | \$ 46,385           |            |
| 2031          | 91,246           | \$ 1.00           | \$ 91,246           | \$ 43,350           |            |
| 2032          | 93,647           | \$ 1.00           | \$ 93,647           | \$ 41,580           |            |
| 2033          | 94,847           | \$ 1.00           | \$ 94,847           | \$ 39,358           |            |
| 2034          | 96,048           | \$ 1.00           | \$ 96,048           | \$ 37,249           |            |
| 2035          | 97,249           | \$ 1.00           | \$ 97,249           | \$ 35,247           |            |
| 2036          | 98,449           | \$ 2.00           | \$ 196,898          | \$ 66,696           |            |
| 2037          | 99,650           | \$ 2.00           | \$ 199,300          | \$ 63,093           |            |
| 2038          | 100,850          | \$ 2.00           | \$ 201,701          | \$ 59,676           |            |
| 2039          | 102,051          | \$ 2.00           | \$ 204,102          | \$ 56,436           |            |
| 2040          | 104,452          | \$ 2.00           | \$ 208,904          | \$ 53,985           |            |
| 2041          | 105,653          | \$ 2.00           | \$ 211,306          | \$ 51,033           |            |
| 2042          | 106,853          | \$ 2.00           | \$ 213,707          | \$ 48,236           |            |
| 2043          | 108,054          | \$ 2.00           | \$ 216,108          | \$ 45,587           |            |
| 2044          | 109,255          | \$ 2.00           | \$ 218,509          | \$ 43,078           |            |
| 2045          | 110,455          | \$ 2.00           | \$ 220,910          | \$ 40,703           |            |
| 2046          | 111,656          | \$ 2.00           | \$ 223,312          | \$ 38,453           |            |
| 2047          | 112,856          | \$ 2.00           | \$ 225,713          | \$ 36,324           |            |
| 2048          | 114,057          | \$ 2.00           | \$ 228,114          | \$ 34,309           |            |
| 2049          | 114,057          | \$ 2.00           | \$ 228,114          | \$ 32,064           |            |
| <b>TOTAL:</b> | <b>2,494,847</b> |                   | <b>\$ 3,993,196</b> | <b>\$ 1,182,733</b> |            |

Note: Cost per metric ton varies based on values provided by USDOT

**BENEFIT COST ANALYSIS  
2024 RAISE INTERMODAL GRANT APPLICATION  
CARTERET INTERMODAL FERRY TERMINAL  
BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 19: Calculation of CO<sub>2</sub> Emissions**

| <b>YEAR</b> | <b>CARS ANNUALLY</b> | <b>METRIC TON CO<sub>2</sub><br/>PER CAR</b> | <b>METRIC TONS</b> |
|-------------|----------------------|--|--------------------|
| 2022        |                      |  |                    |
| 2023        |                      |  |                    |
| 2024        |                      |  |                    |
| 2025        | 18,270               | 4.6  | 84,042             |
| 2026        | 18,531               | 4.6  | 85,243             |
| 2027        | 18,792               | 4.6  | 86,443             |
| 2028        | 19,053               | 4.6  | 87,644             |
| 2029        | 19,314               | 4.6  | 88,844             |
| 2030        | 19,836               | 4.6  | 91,246             |
| 2031        | 19,836               | 4.6  | 91,246             |
| 2032        | 20,358               | 4.6  | 93,647             |
| 2033        | 20,619               | 4.6  | 94,847             |
| 2034        | 20,880               | 4.6  | 96,048             |
| 2035        | 21,141               | 4.6  | 97,249             |
| 2036        | 21,402               | 4.6  | 98,449             |
| 2037        | 21,663               | 4.6  | 99,650             |
| 2038        | 21,924               | 4.6  | 100,850            |
| 2039        | 22,185               | 4.6  | 102,051            |
| 2040        | 22,707               | 4.6  | 104,452            |
| 2041        | 22,968               | 4.6  | 105,653            |
| 2042        | 23,229               | 4.6  | 106,853            |
| 2043        | 23,490               | 4.6  | 108,054            |
| 2044        | 23,751               | 4.6  | 109,255            |
| 2045        | 24,012               | 4.6  | 110,455            |
| 2046        | 24,273               | 4.6  | 111,656            |
| 2047        | 24,534               | 4.6  | 112,856            |
| 2048        | 24,795               | 4.6  | 114,057            |
| 2049        | 24,795               | 4.6  | 114,057            |

**BENEFIT COST ANALYSIS  
2024 RAISE INTERMODAL GRANT APPLICATION  
CARTERET INTERMODAL FERRY TERMINAL  
BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 20: Valuation of NOx Emissions Savings**

| YEAR          | METRIC TONS | COST / METRIC TON | SAVINGS             |                     | DISCOUNTED |
|---------------|-------------|-------------------|---------------------|---------------------|------------|
|               |             |                   | "Future"            | 2020                |            |
| 2022          |             |                   |                     |                     |            |
| 2023          |             |                   |                     |                     |            |
| 2024          |             |                   |                     |                     |            |
| 2025          | 26.52       | \$ 16,500         | \$ 437,617          | \$ 312,015          |            |
| 2026          | 22.98       | \$ 16,800         | \$ 386,122          | \$ 257,290          |            |
| 2027          | 21.45       | \$ 17,100         | \$ 366,850          | \$ 228,456          |            |
| 2028          | 18.80       | \$ 17,400         | \$ 327,073          | \$ 190,360          |            |
| 2029          | 17.15       | \$ 17,700         | \$ 303,543          | \$ 165,107          |            |
| 2030          | 15.10       | \$ 18,100         | \$ 273,250          | \$ 138,907          |            |
| 2031          | 15.10       | \$ 18,100         | \$ 273,250          | \$ 129,819          |            |
| 2032          | 15.49       | \$ 18,100         | \$ 280,441          | \$ 124,519          |            |
| 2033          | 15.69       | \$ 18,100         | \$ 284,037          | \$ 117,865          |            |
| 2034          | 15.89       | \$ 18,100         | \$ 287,632          | \$ 111,549          |            |
| 2035          | 16.09       | \$ 18,100         | \$ 291,227          | \$ 105,554          |            |
| 2036          | 16.29       | \$ 18,100         | \$ 294,823          | \$ 99,867           |            |
| 2037          | 16.49       | \$ 18,100         | \$ 298,418          | \$ 94,472           |            |
| 2038          | 16.69       | \$ 18,100         | \$ 302,014          | \$ 89,355           |            |
| 2039          | 16.88       | \$ 18,100         | \$ 305,609          | \$ 84,503           |            |
| 2040          | 17.28       | \$ 18,100         | \$ 312,800          | \$ 80,833           |            |
| 2041          | 17.48       | \$ 18,100         | \$ 316,395          | \$ 76,414           |            |
| 2042          | 17.68       | \$ 18,100         | \$ 319,991          | \$ 72,226           |            |
| 2043          | 17.88       | \$ 18,100         | \$ 323,586          | \$ 68,259           |            |
| 2044          | 18.08       | \$ 18,100         | \$ 327,181          | \$ 64,503           |            |
| 2045          | 18.27       | \$ 18,100         | \$ 330,777          | \$ 60,945           |            |
| 2046          | 18.47       | \$ 18,100         | \$ 334,372          | \$ 57,577           |            |
| 2047          | 18.67       | \$ 18,100         | \$ 337,968          | \$ 54,389           |            |
| 2048          | 18.87       | \$ 18,100         | \$ 341,563          | \$ 51,372           |            |
| 2049          | 18.87       | \$ 18,100         | \$ 341,563          | \$ 48,011           |            |
| <b>TOTAL:</b> | <b>448</b>  |                   | <b>\$ 7,998,101</b> | <b>\$ 2,884,166</b> |            |

Note: Cost per metric ton varies based on values provided by USDOT

**BENEFIT COST ANALYSIS  
2024 RAISE INTERMODAL GRANT APPLICATION  
CARTERET INTERMODAL FERRY TERMINAL  
BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 21: Calculation of NOx Emissions**

| <b>YEAR</b> | <b>CARS ANNUALLY</b> | <b>METRIC TON NOx<br/>PER CAR</b> | <b>METRIC TONS</b> |
|-------------|----------------------|-----------------------------------|--------------------|
| 2022        |                      |                                   |                    |
| 2023        |                      |                                   |                    |
| 2024        |                      |                                   |                    |
| 2025        | 18,270               | 0.001451682                       | 26.52              |
| 2026        | 18,531               | 0.001240272                       | 22.98              |
| 2027        | 18,792               | 0.001141614                       | 21.45              |
| 2028        | 19,053               | 0.00098658                        | 18.80              |
| 2029        | 19,314               | 0.000887922                       | 17.15              |
| 2030        | 19,836               | 0.000761076                       | 15.10              |
| 2031        | 19,836               | 0.000761076                       | 15.10              |
| 2032        | 20,358               | 0.000761076                       | 15.49              |
| 2033        | 20,619               | 0.000761076                       | 15.69              |
| 2034        | 20,880               | 0.000761076                       | 15.89              |
| 2035        | 21,141               | 0.000761076                       | 16.09              |
| 2036        | 21,402               | 0.000761076                       | 16.29              |
| 2037        | 21,663               | 0.000761076                       | 16.49              |
| 2038        | 21,924               | 0.000761076                       | 16.69              |
| 2039        | 22,185               | 0.000761076                       | 16.88              |
| 2040        | 22,707               | 0.000761076                       | 17.28              |
| 2041        | 22,968               | 0.000761076                       | 17.48              |
| 2042        | 23,229               | 0.000761076                       | 17.68              |
| 2043        | 23,490               | 0.000761076                       | 17.88              |
| 2044        | 23,751               | 0.000761076                       | 18.08              |
| 2045        | 24,012               | 0.000761076                       | 18.27              |
| 2046        | 24,273               | 0.000761076                       | 18.47              |
| 2047        | 24,534               | 0.000761076                       | 18.67              |
| 2048        | 24,795               | 0.000761076                       | 18.87              |
| 2049        | 24,795               | 0.000761076                       | 18.87              |

**BENEFIT COST ANALYSIS  
2024 RAISE INTERMODAL GRANT APPLICATION  
CARTERET INTERMODAL FERRY TERMINAL  
BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 22: Valuation of PM<sub>2.5</sub> Emissions**

| YEAR          | METRIC TONS | COST / METRIC TON | SAVINGS              | DISCOUNTED        |
|---------------|-------------|-------------------|----------------------|-------------------|
|               |             |                   | <u>"Future"</u>      | <u>2020</u>       |
| 2022          |             |                   |                      |                   |
| 2023          |             |                   |                      |                   |
| 2024          |             |                   |                      |                   |
| 2025          | 2.06        | \$ 801,700        | \$ 1,651,485         | \$ 1,177,486      |
| 2026          | 2.09        | \$ 814,500        | \$ 1,701,822         | \$ 1,133,996      |
| 2027          | 2.12        | \$ 827,400        | \$ 1,753,125         | \$ 1,091,758      |
| 2028          | 2.15        | \$ 840,600        | \$ 1,805,831         | \$ 1,051,010      |
| 2029          | 2.18        | \$ 854,000        | \$ 1,859,749         | \$ 1,011,580      |
| 2030          | 2.24        | \$ 867,600        | \$ 1,940,430         | \$ 986,416        |
| 2031          | 2.24        | \$ 867,600        | \$ 1,940,430         | \$ 921,884        |
| 2032          | 2.30        | \$ 867,600        | \$ 1,991,494         | \$ 884,247        |
| 2033          | 2.32        | \$ 867,600        | \$ 2,017,026         | \$ 836,994        |
| 2034          | 2.35        | \$ 867,600        | \$ 2,042,558         | \$ 792,139        |
| 2035          | 2.38        | \$ 867,600        | \$ 2,068,089         | \$ 749,571        |
| 2036          | 2.41        | \$ 867,600        | \$ 2,093,621         | \$ 709,182        |
| 2037          | 2.44        | \$ 867,600        | \$ 2,119,153         | \$ 670,870        |
| 2038          | 2.47        | \$ 867,600        | \$ 2,144,685         | \$ 634,535        |
| 2039          | 2.50        | \$ 867,600        | \$ 2,170,217         | \$ 600,083        |
| 2040          | 2.56        | \$ 867,600        | \$ 2,221,281         | \$ 574,021        |
| 2041          | 2.59        | \$ 867,600        | \$ 2,246,813         | \$ 542,635        |
| 2042          | 2.62        | \$ 867,600        | \$ 2,272,345         | \$ 512,898        |
| 2043          | 2.65        | \$ 867,600        | \$ 2,297,877         | \$ 484,730        |
| 2044          | 2.68        | \$ 867,600        | \$ 2,323,409         | \$ 458,052        |
| 2045          | 2.71        | \$ 867,600        | \$ 2,348,941         | \$ 432,790        |
| 2046          | 2.74        | \$ 867,600        | \$ 2,374,473         | \$ 408,874        |
| 2047          | 2.77        | \$ 867,600        | \$ 2,400,005         | \$ 386,234        |
| 2048          | 2.80        | \$ 867,600        | \$ 2,425,537         | \$ 364,806        |
| 2049          | 2.80        | \$ 867,600        | \$ 2,425,537         | \$ 340,940        |
| <b>TOTAL:</b> | <b>61</b>   | <b>TOTAL: \$</b>  | <b>52,635,934 \$</b> | <b>17,757,732</b> |

Note: Cost per metric ton varies based on values provided by USDOT



**BENEFIT COST ANALYSIS  
 2024 RAISE INTERMODAL GRANT APPLICATION  
 CARTERET INTERMODAL FERRY TERMINAL  
 BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 23: Calculation of PM<sub>2.5</sub> Emissions**

| <b>YEAR</b> | <b>CARS</b> | <b>METRIC TON PM<br/>PER CAR</b> | <b>METRIC TONS</b> |
|-------------|-------------|----------------------------------|--------------------|
| 2022        |             |                                  |                    |
| 2023        |             |                                  |                    |
| 2024        |             |                                  |                    |
| 2025        | 18,270      | 0.000112752                      | 2.06               |
| 2026        | 18,531      | 0.000112752                      | 2.09               |
| 2027        | 18,792      | 0.000112752                      | 2.12               |
| 2028        | 19,053      | 0.000112752                      | 2.15               |
| 2029        | 19,314      | 0.000112752                      | 2.18               |
| 2030        | 19,836      | 0.000112752                      | 2.24               |
| 2031        | 19,836      | 0.000112752                      | 2.24               |
| 2032        | 20,358      | 0.000112752                      | 2.30               |
| 2033        | 20,619      | 0.000112752                      | 2.32               |
| 2034        | 20,880      | 0.000112752                      | 2.35               |
| 2035        | 21,141      | 0.000112752                      | 2.38               |
| 2036        | 21,402      | 0.000112752                      | 2.41               |
| 2037        | 21,663      | 0.000112752                      | 2.44               |
| 2038        | 21,924      | 0.000112752                      | 2.47               |
| 2039        | 22,185      | 0.000112752                      | 2.50               |
| 2040        | 22,707      | 0.000112752                      | 2.56               |
| 2041        | 22,968      | 0.000112752                      | 2.59               |
| 2042        | 23,229      | 0.000112752                      | 2.62               |
| 2043        | 23,490      | 0.000112752                      | 2.65               |
| 2044        | 23,751      | 0.000112752                      | 2.68               |
| 2045        | 24,012      | 0.000112752                      | 2.71               |
| 2046        | 24,273      | 0.000112752                      | 2.74               |
| 2047        | 24,534      | 0.000112752                      | 2.77               |
| 2048        | 24,795      | 0.000112752                      | 2.80               |
| 2049        | 24,795      | 0.000112752                      | 2.80               |



**TOTAL EMISSIONS BENEFITS: \$ 64,627,231 \$ 21,824,631**

**BENEFIT COST ANALYSIS  
2024 RAISE INTERMODAL GRANT APPLICATION  
CARTERET INTERMODAL FERRY TERMINAL  
BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 24: Valuation of Fuel Savings**

| YEAR          | AVERAGE TRIP<br>(MILES/DAY) | CARS<br>REMOVED<br>(DAY) | WORKDAYS<br>PER YEAR | VMT<br>(ANNUALLY) | COST/MILE            | SAVINGS              | DISCOUNTED<br>SAVINGS |
|---------------|-----------------------------|--------------------------|----------------------|-------------------|----------------------|----------------------|-----------------------|
| 2022          |                             |                          |                      |                   |                      |                      |                       |
| 2023          |                             |                          |                      |                   |                      |                      |                       |
| 2024          |                             |                          |                      |                   |                      |                      |                       |
| 2025          | 54                          | 70                       | 261                  | 986,580           | \$ 0.45              | \$ 443,961           | \$ 316,538            |
| 2026          | 54                          | 71                       | 261                  | 1,000,674         | \$ 0.45              | \$ 450,303           | \$ 300,056            |
| 2027          | 54                          | 72                       | 261                  | 1,014,768         | \$ 0.45              | \$ 456,646           | \$ 284,376            |
| 2028          | 54                          | 73                       | 261                  | 1,028,862         | \$ 0.45              | \$ 462,988           | \$ 269,463            |
| 2029          | 54                          | 74                       | 261                  | 1,042,956         | \$ 0.45              | \$ 469,330           | \$ 255,285            |
| 2030          | 54                          | 76                       | 261                  | 1,071,144         | \$ 0.45              | \$ 482,015           | \$ 245,032            |
| 2031          | 54                          | 76                       | 261                  | 1,071,144         | \$ 0.45              | \$ 482,015           | \$ 229,002            |
| 2032          | 54                          | 78                       | 261                  | 1,099,332         | \$ 0.45              | \$ 494,699           | \$ 219,652            |
| 2033          | 54                          | 79                       | 261                  | 1,113,426         | \$ 0.45              | \$ 501,042           | \$ 207,914            |
| 2034          | 54                          | 80                       | 261                  | 1,127,520         | \$ 0.45              | \$ 507,384           | \$ 196,772            |
| 2035          | 54                          | 81                       | 261                  | 1,141,614         | \$ 0.45              | \$ 513,726           | \$ 186,198            |
| 2036          | 54                          | 82                       | 261                  | 1,155,708         | \$ 0.45              | \$ 520,069           | \$ 176,165            |
| 2037          | 54                          | 83                       | 261                  | 1,169,802         | \$ 0.45              | \$ 526,411           | \$ 166,648            |
| 2038          | 54                          | 84                       | 261                  | 1,183,896         | \$ 0.45              | \$ 532,753           | \$ 157,622            |
| 2039          | 54                          | 85                       | 261                  | 1,197,990         | \$ 0.45              | \$ 539,096           | \$ 149,064            |
| 2040          | 54                          | 87                       | 261                  | 1,226,178         | \$ 0.45              | \$ 551,780           | \$ 142,590            |
| 2041          | 54                          | 88                       | 261                  | 1,240,272         | \$ 0.45              | \$ 558,122           | \$ 134,794            |
| 2042          | 54                          | 89                       | 261                  | 1,254,366         | \$ 0.45              | \$ 564,465           | \$ 127,407            |
| 2043          | 54                          | 90                       | 261                  | 1,268,460         | \$ 0.45              | \$ 570,807           | \$ 120,410            |
| 2044          | 54                          | 91                       | 261                  | 1,282,554         | \$ 0.45              | \$ 577,149           | \$ 113,783            |
| 2045          | 54                          | 92                       | 261                  | 1,296,648         | \$ 0.45              | \$ 583,492           | \$ 107,508            |
| 2046          | 54                          | 93                       | 261                  | 1,310,742         | \$ 0.45              | \$ 589,834           | \$ 101,567            |
| 2047          | 54                          | 94                       | 261                  | 1,324,836         | \$ 0.45              | \$ 596,176           | \$ 95,943             |
| 2048          | 54                          | 95                       | 261                  | 1,338,930         | \$ 0.45              | \$ 602,519           | \$ 90,620             |
| 2049          | 54                          | 95                       | 261                  | 1,338,930         | \$ 0.45              | \$ 602,519           | \$ 84,692             |
| <b>TOTAL:</b> |                             |                          |                      |                   | <b>\$ 29,287,332</b> | <b>\$ 13,179,299</b> | <b>\$ 4,479,103</b>   |

**BENEFIT COST ANALYSIS**  
**2024 RAISE INTERMODAL GRANT APPLICATION**  
**CARTERET INTERMODAL FERRY TERMINAL**  
**BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 25: Revenue Generated from Intermodal Ferry Terminal**

| <b>YEAR</b>   | <b>ONE-WAY<br/>TICKETS</b> | <b>ONE-WAY<br/>TICKET PRICE</b> | <b>REVENUE</b>    | <b>DISCOUNTED<br/>REVENUE</b> |                   |
|---------------|----------------------------|---------------------------------|-------------------|-------------------------------|-------------------|
| 2022          |                            |                                 |                   |                               |                   |
| 2023          |                            |                                 |                   |                               |                   |
| 2024          |                            |                                 |                   |                               |                   |
| 2025          | 113,796                    | \$ 15.00                        | \$ 1,706,940      | \$ 1,217,025                  |                   |
| 2026          | 115,884                    | \$ 15.00                        | \$ 1,738,260      | \$ 1,158,276                  |                   |
| 2027          | 117,450                    | \$ 15.00                        | \$ 1,761,750      | \$ 1,097,129                  |                   |
| 2028          | 119,538                    | \$ 15.00                        | \$ 1,793,070      | \$ 1,043,583                  |                   |
| 2029          | 121,104                    | \$ 15.00                        | \$ 1,816,560      | \$ 988,088                    |                   |
| 2030          | 123,192                    | \$ 15.00                        | \$ 1,847,880      | \$ 939,368                    |                   |
| 2031          | 124,758                    | \$ 15.00                        | \$ 1,871,370      | \$ 889,074                    |                   |
| 2032          | 126,846                    | \$ 15.00                        | \$ 1,902,690      | \$ 844,817                    |                   |
| 2033          | 128,412                    | \$ 15.00                        | \$ 1,926,180      | \$ 799,296                    |                   |
| 2034          | 130,500                    | \$ 15.00                        | \$ 1,957,500      | \$ 759,152                    |                   |
| 2035          | 132,066                    | \$ 15.00                        | \$ 1,980,990      | \$ 718,002                    |                   |
| 2036          | 134,154                    | \$ 15.00                        | \$ 2,012,310      | \$ 681,639                    |                   |
| 2037          | 135,720                    | \$ 15.00                        | \$ 2,035,800      | \$ 644,482                    |                   |
| 2038          | 137,808                    | \$ 15.00                        | \$ 2,067,120      | \$ 611,586                    |                   |
| 2039          | 139,374                    | \$ 15.00                        | \$ 2,090,610      | \$ 578,071                    |                   |
| 2040          | 141,462                    | \$ 15.00                        | \$ 2,121,930      | \$ 548,347                    |                   |
| 2041          | 143,028                    | \$ 15.00                        | \$ 2,145,420      | \$ 518,147                    |                   |
| 2042          | 145,116                    | \$ 15.00                        | \$ 2,176,740      | \$ 491,319                    |                   |
| 2043          | 146,682                    | \$ 15.00                        | \$ 2,200,230      | \$ 464,132                    |                   |
| 2044          | 148,770                    | \$ 15.00                        | \$ 2,231,550      | \$ 439,943                    |                   |
| 2045          | 150,336                    | \$ 15.00                        | \$ 2,255,040      | \$ 415,489                    |                   |
| 2046          | 152,424                    | \$ 15.00                        | \$ 2,286,360      | \$ 393,701                    |                   |
| 2047          | 153,990                    | \$ 15.00                        | \$ 2,309,850      | \$ 371,725                    |                   |
| 2048          | 155,556                    | \$ 15.00                        | \$ 2,333,340      | \$ 350,939                    |                   |
| 2049          | 155,556                    | \$ 15.00                        | \$ 2,333,340      | \$ 327,981                    |                   |
| <b>TOTAL:</b> |                            | <b>\$</b>                       | <b>50,902,830</b> | <b>\$</b>                     | <b>17,291,313</b> |

Note: Full operation assumed to begin January 2024

**BENEFIT COST ANALYSIS  
2024 RAISE INTERMODAL GRANT APPLICATION  
CARTERET INTERMODAL FERRY TERMINAL  
BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

**Table 26: Valuation and Calculation of Residual Value**

| YEAR          | RESIDUAL VALUE       | DISCOUNTED          |
|---------------|----------------------|---------------------|
|               | "Future"             | 2020                |
| 2022          | \$ -                 | \$ -                |
| 2023          | \$ -                 | \$ -                |
| 2024          | \$ -                 | \$ -                |
| 2025          | \$ -                 | \$ -                |
| 2026          | \$ -                 | \$ -                |
| 2027          | \$ -                 | \$ -                |
| 2028          | \$ -                 | \$ -                |
| 2029          | \$ -                 | \$ -                |
| 2030          | \$ -                 | \$ -                |
| 2031          | \$ -                 | \$ -                |
| 2032          | \$ -                 | \$ -                |
| 2033          | \$ -                 | \$ -                |
| 2034          | \$ -                 | \$ -                |
| 2035          | \$ -                 | \$ -                |
| 2036          | \$ -                 | \$ -                |
| 2037          | \$ -                 | \$ -                |
| 2038          | \$ -                 | \$ -                |
| 2039          | \$ -                 | \$ -                |
| 2040          | \$ -                 | \$ -                |
| 2041          | \$ -                 | \$ -                |
| 2042          | \$ -                 | \$ -                |
| 2043          | \$ -                 | \$ -                |
| 2044          | \$ -                 | \$ -                |
| 2045          | \$ -                 | \$ -                |
| 2046          | \$ -                 | \$ -                |
| 2047          | \$ -                 | \$ -                |
| 2048          | \$ -                 | \$ -                |
| 2049          | \$ 24,917,533        | \$ 3,502,479        |
| <b>TOTAL:</b> | <b>\$ 24,917,533</b> | <b>\$ 3,502,479</b> |

$$RV = \frac{U - Y}{U} * \text{Project Capital Cost}$$

$$RV = 24,917,533.33$$

U = Useful life = 75 yrs  
Y = Analysis Period = 25 yrs  
Capital Cost = \$37,376,300.00

**APPENDIX B**  
**COST ESTIMATE**

**PROJECT COST ESTIMATE**  
**2024 RAISE INTERMODAL GRANT APPLICATION**  
**CARTERET FERRY TERMINAL**  
**BOROUGH OF CARTERET, MIDDLESEX COUNTY, NEW JERSEY**

| ITEM  | DESCRIPTION                                | QUANTITY | UNIT | UNIT PRICE      | TOTAL                   |
|---|--|----------|------|-----------------|-------------------------|
| 1   | Temporary Requirements                     | 1        | LS   | \$ 1,006,300.00 | \$ 1,006,300.00         |
| 2   | Site Work (Immediate Vicinity of Building) | 1        | LS   | \$ 903,300.00   | \$ 903,300.00           |
| 3   | Foundations                                | 1        | LS   | \$ 2,228,800.00 | \$ 2,228,800.00         |
| 4   | Superstructure                             | 1        | LS   | \$ 4,233,800.00 | \$ 4,233,800.00         |
| 5   | Exterior Closure                           | 1        | LS   | \$ 9,469,100.00 | \$ 9,469,100.00         |
| 6   | Roofing                                    | 1        | LS   | \$ 989,600.00   | \$ 989,600.00           |
| 7   | Interior Closure                           | 1        | LS   | \$ 2,040,300.00 | \$ 2,040,300.00         |
| 8   | Interior Finishes                          | 1        | LS   | \$ 1,270,600.00 | \$ 1,270,600.00         |
| 9   | Interior Specialties                       | 1        | LS   | \$ 257,800.00   | \$ 257,800.00           |
| 10  | Vertical Transportation                    | 1        | LS   | \$ 1,150,400.00 | \$ 1,150,400.00         |
| 11  | Plumbing                                   | 1        | LS   | \$ 1,568,000.00 | \$ 1,568,000.00         |
| 12  | HVAC                                       | 1        | LS   | \$ 2,360,600.00 | \$ 2,230,600.00         |
| 13  | Fire Protection                            | 1        | LS   | \$ 526,100.00   | \$ 526,100.00           |
| 14  | Building Controls                          | 1        | LS   | \$ 411,500.00   | \$ 411,500.00           |
| 13  | Electrical                                 | 1        | LS   | \$ 3,307,700.00 | \$ 3,307,700.00         |
| 14  | Building Equipment                         | 1        | LS   | \$ 24,700.00    | \$ 24,700.00            |
| 14  | Furnishings                                | 1        | LS   | \$ 269,400.00   | \$ 269,400.00           |
| <b>CONSTRUCTION SUBTOTAL:</b>                         |  |          |      |                 | <b>\$ 31,888,000.00</b> |
| <b>CONSTRUCTION CONTINGENCY (5%):</b>                 |  |          |      |                 | <b>\$ 1,594,400.00</b>  |
| <b>GENERAL CONDITIONS, MANAGEMENT, AND INSURANCE:</b> |  |          |      |                 | <b>\$ 3,893,900.00</b>  |
| <b>PROJECT TOTAL:</b>                                 |  |          |      |                 | <b>\$ 37,376,300.00</b> |

Schematic Level Cost Estimate prepared by Torcon, inc (1/19/24)

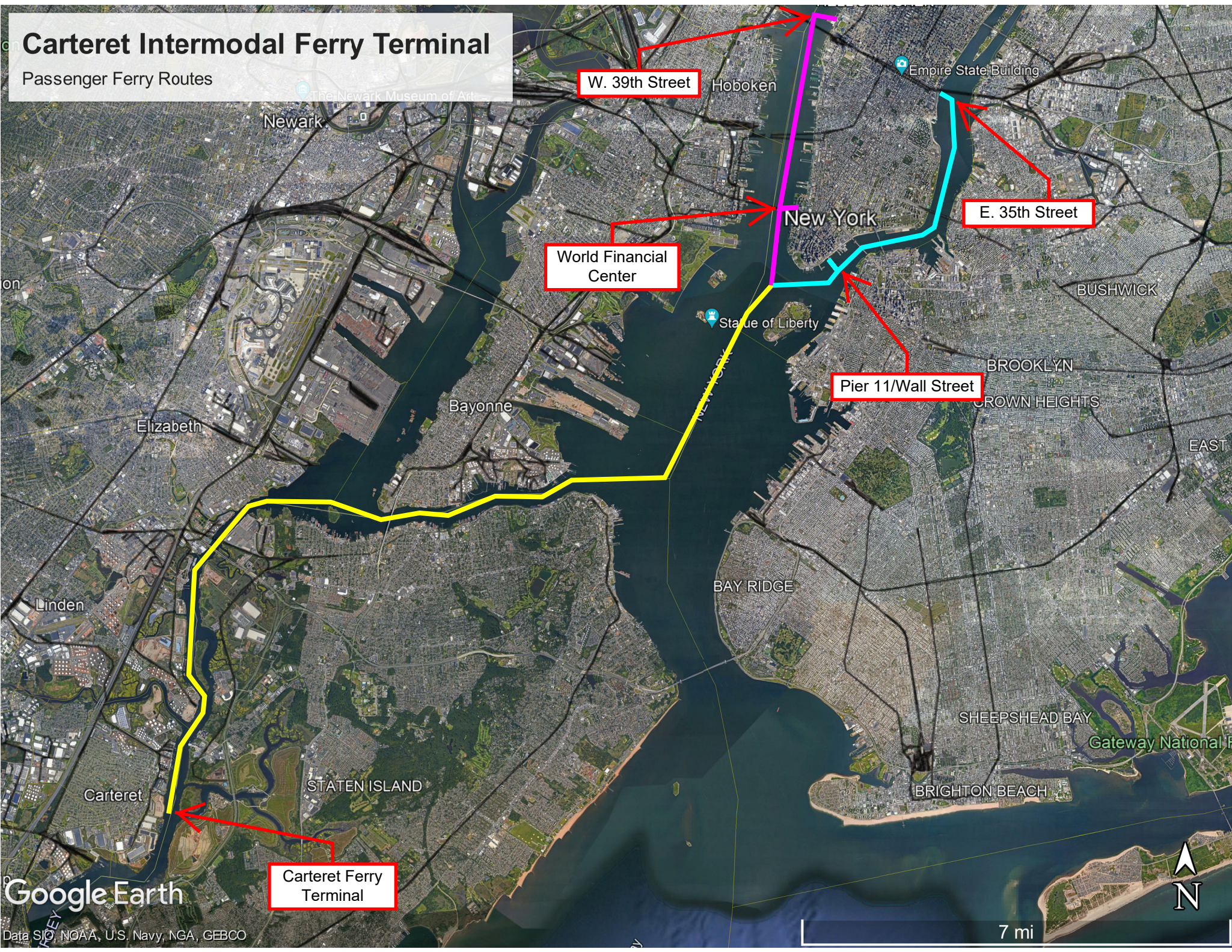
**APPENDIX C**

**FERRY ROUTE MAP**



# Carteret Intermodal Ferry Terminal

Passenger Ferry Routes



Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO



**APPENDIX D**

**OVERALL WATERFRONT CONCEPT PLAN**



