PORT OF OAKLAND

PHASE 1

# OUTER HARBOR TERMINAL REDEVELOPMENT

*BUILDING RESILIENCY NOW AND FOR THE FUTURE*

**FY 2022 PORT INFRASTRUCTURE DEVELOPMENT PROGRAM (PIDP) GRANT**

*Submitted to*
**U.S. DEPARTMENT OF TRANSPORTATION – MARITIME ADMINISTRATION**

*Submitted by*
**PORT OF OAKLAND**
**530 WATER STREET**
**OAKLAND, CA 94607**

**May 16, 2022**

# Introductory Information—Cover Page

| | |
|---|---|
| Name of applicant | Port of Oakland |
| Is the applicant applying as a lead applicant with any private entity partners or joint applicants? | No |
| What is the project name? | Phase 1 Outer Harbor Terminal Redevelopment—Building Resiliency Now and For the Future |
| Project description | The project constructs Phase 1 of redeveloping and modernizing the Outer Harbor Terminal area; creating a 25+/- acre off-dock container support facility with truck entry/exit gates and gatehouse, office trailer, perimeter fencing, grounded and wheeled storage, RTG refrigerated container (reefer) and grounded storage, LED high mast lighting, drainage, substation improvements, and battery storage and charging stations to expand the Port's electrical grid capacity and support power reliability and resiliency. The project will improve the Port's ability to accommodate supply chain uncertainties and surges in imports, exports, empties, and refrigerated cargo, particularly agricultural exports; improve operational efficiencies; and advance zero-emissions goals. |
| Is this a planning project? | No |
| Is this a project at a coastal, Great Lakes, or inland river port? | Coastal |
| GIS Coordinates (in Latitude and Longitude format) | 37°48'44.78"N, 122°18'55.51"W |
| Is this project in an urban or rural area? | Urban area |
| Project Zip Code | 94607 |
| Is the project located in a Historically Disadvantaged Community or a Community Development Zone? (A CDZ is a Choice Neighborhood, Empowerment Zone, Opportunity Zone, or Promise Zone.) | Yes, Historically Disadvantaged Community (Census Tract 4017) and Opportunity Zone (06001401700) |
| Has the same project been previously submitted for PIDP funding? | No |
| Is the applicant applying for other discretionary grant programs in 2022 for the same work or related scopes of work? | No |

| | |
|---|---|
| Has the applicant previously received TIGER, BUILD, RAISE, FASTLANE, INFRA or PIDP funding? | Yes-TIGER, PIDP |
| PIDP Grant Amount Requested | $36,592,875 |
| Total Future Eligible Project costs | $48,790,500 |
| Total Project Cost | $48,790,500 |
| Total Federal Funding | $36,592,875 |
| Total Non-Federal Funding | $12,197,625 |
| Will RRIF or TIFIA funds be used as part of the project financing? | No |

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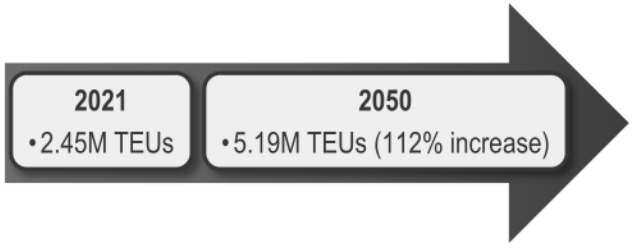
# 1 Project Description

## 1.1 Project Description and Components

The **Phase 1 Outer Harbor Terminal Redevelopment—Building Resiliency Now and For the Future Project** is essential to sustain the Port's future growth potential and operational efficiencies, support rural farming communities, and maintain and expand the global competitiveness of the Port and provide the Megaregion's primary connection point to world markets. This project would construct the first phase of a broader Outer Harbor Terminal (OHT) redevelopment (approximately 25 of 116 acres) providing much needed container capacity relief (particularly for refrigerated exports), and would eventually include wharf strengthening, larger container cranes, and related electrical improvements.

The Port of Oakland (Port) serves as a critical global gateway for the vast and diverse San Francisco Bay Area and Northern California Megaregion, supporting more than 500,000 jobs in the state of California (Martin Associates 2018) including the economy of the rural Central Valley farming sector, and is the second largest exporting region in the U.S. It is also the fourth busiest container port in the U.S. West Coast and one of the top ten in the U.S. with anticipated growth projections increasing from 2.45 million twenty-foot equivalent units (TEUs) in 2021 to 5.19 million TEUs in 2050.[1] Approximately 45% of the loaded TEUs are export commodities including recycled paper, nuts, fruit, meat, grains, iron/steel products, and dairy products, with these products often going to markets in Asia, primarily China, Japan and Korea.




COVID-19 revealed vulnerabilities and challenges within the supply chain, most notably in the areas of port capacity and congestion issues. Farm exports which rely heavily on the Port of Oakland have been hit particularly hard with transportation challenges and storage and handling fees. The project represents Phase 1 of modernizing the Outer Harbor Terminal area; creating a 25+/- acre (out of 116 acre total area) off-dock container support facility with truck entry/exit gates and gatehouse, an office trailer, perimeter fencing, grounded storage, wheeled storage, rubber tired gantry crane (RTG) refrigerated container (reefer) storage, RTG grounded storage, new light emitting diode (LED) high mast lighting, drainage improvements, pavement and other yard improvements, substation improvements, and battery storage and charging stations to expand the Port's electrical grid capacity and support power reliability and resiliency (see Figure 1). The project will improve the Port's ability to accommodate near-term supply chain uncertainties and surges in imports, exports, and refrigerated cargo; increase its container handling

**Project benefits include:**

- Accommodations for cargo surges
- Increased container handling capacity
- Reduced congestion, crashes, emissions, and improved operational efficiencies
- Advancing zero-emissions equipment and operations goals
- Support Port reliability and resiliency
- Benefit-cost ratio of 5.0

[1] The Tioga Group and Hackett Associates, *2019-2050 Bay Area Seaport Forecast* (Moderate Growth). SF Bay Conservation and Development Commission, 2020 (page 76). https://www.bcdc.ca.gov/seaport/2019-2050-Bay-Area-Seaport-Forecast.pdf.

capacity; reduce congestion and improve operational efficiencies at the Port; make it easier to fill empty shipping containers with agricultural commodities at a facility that can accommodate these transactions at the Port; and advance the Port's and State's goal of a zero-emissions freight transportation system.

As shown in Figure 1 and detailed in the cost estimate in Appendix A—Benefit-Cost Analysis Spreadsheet (Construction Cost worksheet), site work for the project will include: demolition of existing pavement, RTG runway foundation grading, demolition and relocation of K-Rail for perimeter, 8-foot high chain link security fencing on the concrete K-Rail, drainage, pavement markings/striping, precast concrete (PCC) wheel stops, foundation for lighting, trenching and backfill for the substations, duct banks and conductors for the substations, and conduit and trenching to connect the charging station and reefer racks to the substations. Table 1 contains a summary of the key project components. Values are estimates based on conceptual design.

The project is in the conceptual design stage but could be designed, constructed, and operational within 36 months following availability of funding as described in Section 5.0 Project Readiness. The project meets the PIDP grant eligibility requirements as it is located within the boundary of a port, in a designated Historically Disadvantaged Community and Opportunity Zone. It supports the program's goals of improving: the safety, efficiency, and reliability of loading and unloading of goods at the port; the movement of goods into, out of, around, and within the Port; the Port's resiliency; and reduces environmental and emissions impacts.

The Phase 1 Outer Harbor Terminal Redevelopment—Building Resiliency Now and For the Future Project meets **all six PIDP determinations**. See Section 7 for more details.

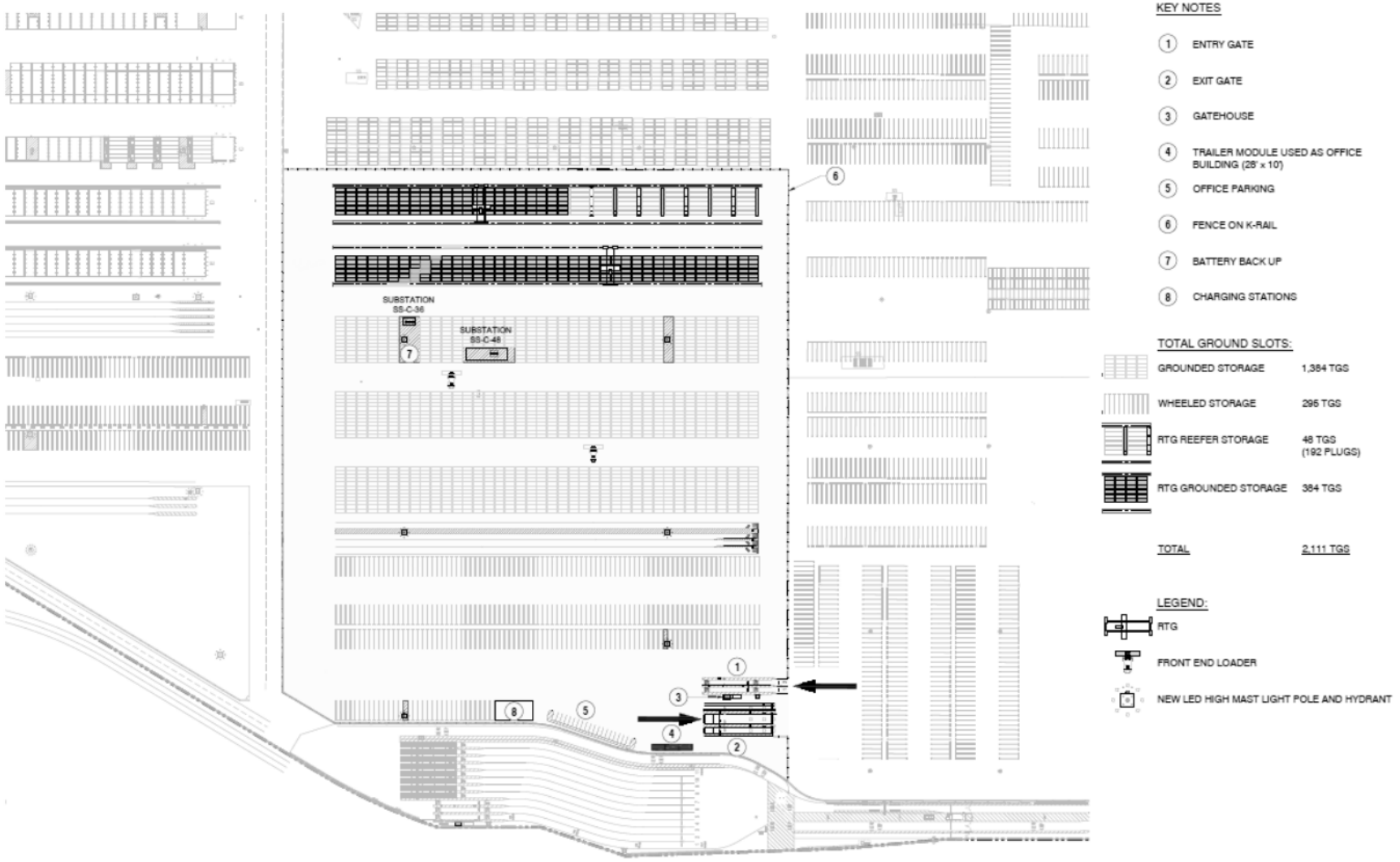
**Table 1 Key Phase 1 Outer Harbor Terminal Redevelopment Project Components**

| Component | Units/Capacity | Description |
|---|---|---|
| Pavement replacement | 28 acres[2] | 7" asphalt concrete (AC) pavement on 17" crushed miscellaneous base (CMP) that will support container stacking and capacity for structural stability. |
| RTG reefer storage and plugs | 48 total ground slots (TGS) with up to 192 plugs (capacity=192) | Stacked up to 4 containers high. Provides flexible reefer import or export storage capacity. Supports rural farmers and other agricultural suppliers to deliver goods to the Port with flexibility to accommodate ever-changing vessel arrivals and departures reducing potential spoilage and lost revenue. Plugs offer power reducing use of gensets (reduced pollutants). |
| RTG grounded storage | 384 TGS (capacity= 1,536) | Flexible import, export, and empty RTG grounded container storage stacked up to 4 containers high. In line with adjacent marine terminal RTG row to accommodate future expansion/integration into existing adjacent marine terminal. |

[2] Additional acreage above the 25+/- acre site includes extra contingency to address driveways and periphery of the fenced area.

| Component | Units/Capacity | Description |
|---|---|---|
| Grounded container storage | 1,384 TGS (capacity = 5,536 loaded; 6,920 empty) | Flexible staging/storage area to support empties, imports, or exports depending on need. Empties can be stacked 5 containers high and loaded 4 high. |
| Wheeled container storage | 295 TGS (capacity = 295) | Flexible import, export, and empty storage area for wheeled containers or temporary parking. |
| Truck exchange lanes | 4 | Locations to enable pick or placement of containers. |
| Guard house/entry lanes/exit lanes/ security gates | 1/2/3/2 | Facilities and equipment to restrict access to the Outer Harbor Terminal off-dock container support area. As a restricted area, these serve as a check point to verify and record entities entering or leaving the area. |
| Trailer modules for office building | 3 | To support administrative activities for the Outer Harbor Terminal off-dock support facility |
| LED high mast light poles and hydrants | 6 | Converting from common high-intensity discharge (HID) with existing lighting to LED which saves on electricity costs (resiliency) and operations and maintenance costs (O&M) |
| Substation modifications | 2 | Substation upgrades at two locations in the area, SS-C-36 and SS-C-48. Allows the Port to accommodate increased electrification demands, optimize the battery storage system, and support the reefer plugs and charging station. Needed to support the Port's zero-emissions operational infrastructure. |
| Charging stations | 2 | Charging equipment for the yard zero-emissions vehicles (ZEV) trucks. Supports the Port's 2020 and Beyond Plan and West Oakland Community Action Plan (WOCAP) to transition to zero emissions cargo-handling equipment and drayage truck operations. |
| Battery storage system | 1 | Located at substation SS-C-48. Expands the Port's electrical grid capacity, allow for operations on green power, and minimize energy reliability risks to the Port. |

**Figure 1 Phase 1 Outer Harbor Terminal Redevelopment Concept Diagram**



## 1.2 Challenges Addressed by the Project

**Export/Agricultural.** Disruptions in the supply chain have resulted in significant impacts to the Port of Oakland, particularly late arrivals of vessels due to the backlog at the Ports of Los Angeles and Long Beach. The delivery of export containers from agricultural shippers is one of the more notable, since they cannot bring their containers when they are originally scheduled to, nor do the terminals have the capacity to store containers for indeterminate periods of with the surge in imports. This has resulted in extra costs, lost revenue, and shippers diverting their containers to other Ports. A 2022 Martin Associates analysis[3] estimates that the Port of Oakland has lost approximately 2.9 TEUs to the Ports of Los Angeles, Long Beach, Seattle, and Tacoma with nearly one (1) million of that being exports. The Phase 1 Outer Harbor Terminal Redevelopment Project will convert the current low density wheeled truck parking and container storage area to a mostly stacked yard with a capacity of over 8,000 containers, providing access to equipment, safe plug-in reefer storage, faster turns times since truckers will not need to wait for in-terminal space, and flexible storage of export, import, or empty containers. This will make the Port more reliable and resilient with the ability to better handle disruptions and unpredictability of the supply chain with additional and flexible container capacity.


**Limited Capacity.** With the increased import volumes and near-dock storage near or at capacity, importers and exporters are being forced to use temporary staging areas until their containers are needed at distribution warehouses or until terminals are ready to load them onto vessels. The three temporary container storage facilities being used in Northern California include an armory in Stockton, a former prison in Tracy, and a fairground site in San Joaquin County, all of which are 60 miles or more from the Port. This results in additional truck trips, increased VMT, and increased truck miles without a container or payload (deadhead). These sites are supporting empty dry containers and refrigerated containers being pre-tripped for export until the terminals are ready to accept them. Refrigerated containers at these facilities utilize a Transport Refrigeration Unit (TRU) generator set (genset) to control the temperature. Gensets are powered by a small diesel engine which emits multiple air pollutants including diesel PM, fine particulate matter ($PM_{2.5}$), oxides of nitrogen ($NO_x$), and greenhouse gases (GHG). All of these locations are in a Historically Disadvantaged Community (Census Tracts 55.01, 38.03, and 22.01/22.01) where nearby residents will bear a disproportionate health burden. The project will provide flexible import, export, and refrigerated stacked and wheeled container storage at the Port reducing the need for the off-Port facilities during surges, decreasing VMT, truck trips, deadhead miles, and emissions. The project will also free up empty containers and chassis that would otherwise be unavailable at an off-Port storage facility.

The temporary container storage facilities set up in Stockton, Tracy, and San Joaquin County are causing additional truck trips, increased VMT, increased deadhead miles, but most importantly, increased greenhouse gas emissions in Historically Disadvantaged Communities.

[3] Analysis performed by John C. Martin & Associates based on S&P TRANSEARCH data, March 14, 2022.

In order to help mitigate container storage issues, the Port also has implemented a temporary 22-acre "pop-up" yard dedicated to export distribution as part of a partnership with the U.S. Department of Agriculture (USDA) to help clear bottlenecks impeding outbound shipments. Agricultural exporters have exclusive access to pre-cooled refrigerated containers for loading perishable products. This is located on the Howard Terminal property in the southeastern area of the Port and is anticipated to operate for approximately one year, through early 2023.

> The implementation of this project will reduce the need for shippers to divert their containers to other Ports, which has resulted in extra costs and lost revenue across the supply chain.

**Emissions/Disadvantaged Communities.** This project is located within federally designated Historically Disadvantaged Community and Opportunity Zone areas (see Section 2.2). The Port and neighboring communities experience some of the highest levels of air quality pollution in the Bay Area according to the Bay Area Air Quality Management District (BAAQMD) and have been identified as a priority Assembly Bill (AB) 617 Community Health Protection Program area, and are included in the Metropolitan Transportation Commission's (MTC) Equity Priority Communities effort representing census tracts that have a significant concentration of underserved populations, such as households with low incomes and people of color. Over 90 percent of the cancer risk from local air pollution in the adjacent West Oakland is attributable to diesel particulate matter[4]. Residents also experience higher rates of deaths from cancer, heart disease and strokes, and higher rates of asthma emergency visits and hospitalizations. The Port has been working together with the BAAQMD, West Oakland Environmental Indicators Project (WOEIP), California Air Resources Board (CARB) the freight community, and local community for over 15 years to improve air quality and support public health through major investments, innovation, and commitment. The Port's new plan for emissions reductions, *Seaport Air Quality 2020 and Beyond Plan, The Pathway to Zero Emissions,* (2019) addresses long-term planning for air quality, including the State's GHG emissions reductions targets, with extensive community and partner engagement. The electrical infrastructure systems (substation upgrades, charging stations, battery storage) implement actions in the Plan, and providing plug-in reefer storage as an alternative to gensets, supports zero-emissions equipment and operations which is essential to decarbonizing the Port and delivering related air quality community health, and jobs benefits.

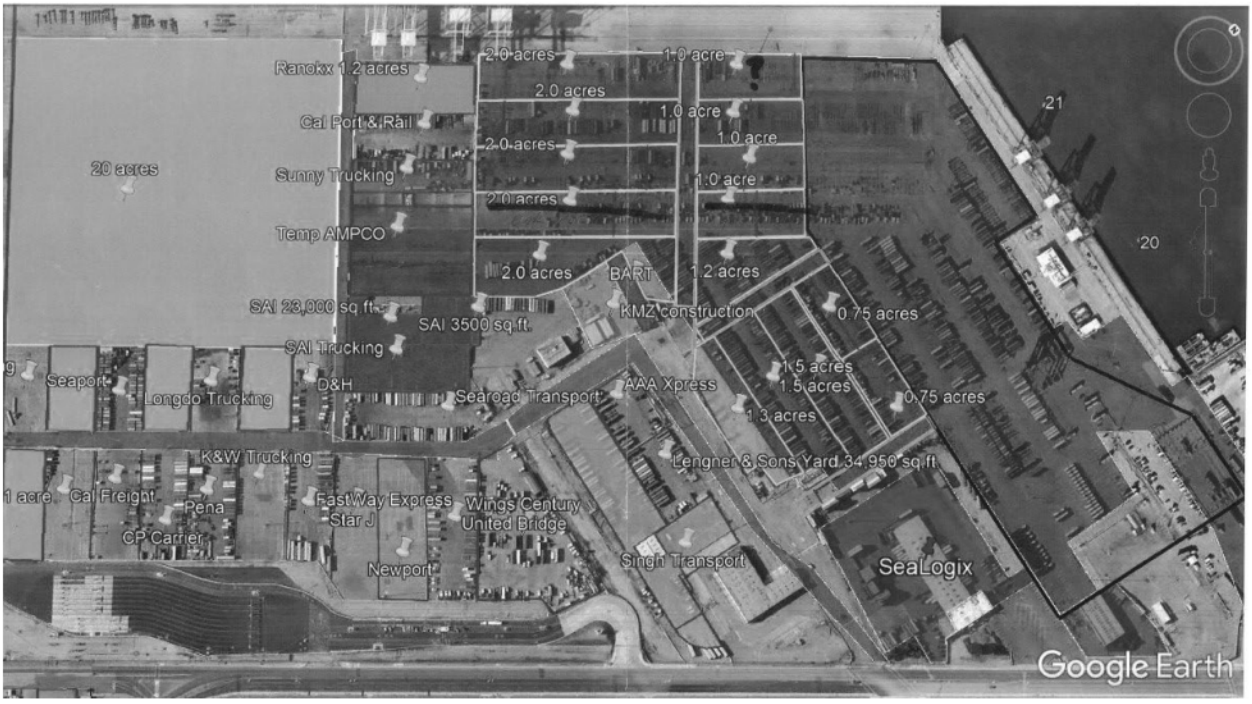
**Congestion/Idling.** Trucks utilizing the off-dock container storage facility can avoid the marine terminals, reducing Port congestion, gate queues and idling during the day, as the containers could be moved from the proposed off-dock facility during off-peak or the night shift when there are limited or no gate queues. The Port envisions that containers being moved would be transported using zero-emissions drayage trucks or yard equipment to the extent possible.

## 1.3 Historical Context

**Outer Harbor Terminal (OHT).** The Outer Harbor Terminal (including the proposed 25+/- acre improvement area) has been used as low density wheeled truck parking and container storage, leased to multiple tenants on short term (month-to-month) space assignments of approximately one acre. The sizes of the space assignments are generally very small, with the largest about 1.5 acres. Figure 2 shows an example of recent use of the space.

[4] West Oakland Environmental Indicators Project and BAAQMD, *Owning Our Air: The West Oakland Community Action Plan*, 2019 (page 2-3). https://woeip.org/featured-work/owning-our-air/.

**Figure 2 Recent Use of Proposed Site**




The Port is currently planning for long-term and permanent facilities for the Outer Harbor Terminal (OHT). As part of a 2021 condition assessment (Moffatt & Nichol) under this effort, the Berth 24 area pavement where the proposed site is located, appears to be in **fair condition and requires a pavement project to extend the life of the functional area.** Future concepts under development include portions of the site being available for integration into adjacent marine terminal expansion, wharf upgrades and structural support to accommodate state of the art cranes, new entry/exit gates and gate house, maintenance buildings, administrative building, longshoreman restroom facility, container wash, fueling station, stacked grounded wheeled storage, reefer storage and reefer racks with plugs, RTG grounded storage, export storage, truck holding lanes, Vehicle and Cargo Inspection System (VAICS), new lighting, shore power, electrical charging equipment and infrastructure, and/or auto shuttle positioning system technology.

*Example of Outer Harbor Terminal Pavement Condition*

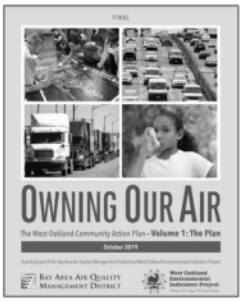
**2020 and Beyond Plan and Relationship to Other Plans.** In 2019, the Port formalized its commitment to becoming a zero-emissions Seaport by adopting the *Seaport Air Quality 2020 and Beyond Plan: The*


*Pathway to Zero Emissions.*[5] This project includes some of the implementing actions in the 2020 and Beyond Plan including: expanding the electrical charging infrastructure for the Port's vehicle fleet, expansion of electrical infrastructure to support equipment charging at terminals, and Port electrical grid reliability and capacity upgrades. It also builds upon the 2021 Powering the Future PIDP grant.[6]

In addition, the project supports or is consistent with strategies or projects in multiple State, regional, or local plans. Some examples include:

- California State Transportation Agency (CalSTA) and California State Department of Transportation (Caltrans), *California Freight Mobility Plan 2020*, 2020[7]


  - BA_007 Marine terminal modernization, including LED lighting upgrades. Reduces the Port's carbon footprint and helps the Region/State move towards achieving its zero emissions goal.
  - BA_008 Port wide electrification, upgrading electrical infrastructure at the Port to increase capacity needed to accommodate the electrification of terminals and equipment.
- Metropolitan Transportation Commission (MTC) and Association of Bay Area Governments (ABAG), *Plan Bay Area 2050*, 2021[8]
  - EN8. Expand clean vehicle initiatives with investment in chargers.
  - T2. Supporting community-led transportation enhancements in Equity Priority Communities.
- West Oakland Environmental Indicators Project (community-based organization) and Bay Area Quality Management District's (BAAQMD), *Owning Our Air: The West Oakland Community Action Plan*, 2019[9]




  - #18 Air District advocates for more electrical infrastructure and power storage, including truck charging stations.
  - #19 Port of Oakland infrastructure plan to remove barriers to adoption of zero emissions trucks, such as cost, land, and ownership of charging equipment.
  - #31 CARB amends transport refrigeration unit regulation to zero-emission technology and supporting infrastructure
  - #37 Port of Oakland supports transition to zero-emissions drayage truck operations
  - #43 Port of Oakland off-terminal container yard that uses zero-emission trucks to move containers to/from terminals

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5 https://www.portofoakland.com/files/PDF/Volume%20I.pdf.

6 https://www.portofoakland.com/wp-content/uploads/PIDP-Project-Narrative.pdf.

7 https://dot.ca.gov/programs/transportation-planning/division-of-transportation-planning/sustainable-freight-planning/cfmp-2020 (page 497-498).

8 https://www.planbayarea.org/ (Chapters 4 and 5).

9 https://woeip.org/featured-work/owning-our-air/ (page 6-23 to 6-26).

# 2 Project Location

## 2.1 Project Location

The Port, located in Alameda County within the San Francisco-Oakland urbanized area (3.5 million population)[10], links the San Francisco Bay Area (7.8 million population)[11], the Northern California Mega-region (12.7 million population)[12], and the interior U.S., to the Pacific Rim and the broader world, providing access to global markets and opportunities for increased trade. The 1,300-acre Port complex includes 770 acres of marine terminals, numerous transload/warehouse companies, and is served by two Class I railroads. The Port's facilities include six marine terminals served by more than 20 major ocean carriers, 20 deep-water berths equipped with 35 container cranes, and near-dock rail intermodal facilities operated by the UPRR and BNSF Railway.

The Phase 1 Outer Harbor Terminal Redevelopment Project is located in the northwest area of the Oakland Seaport (see Figure 3). The Port is served by multiple Primary Highway Freight System (PHFS) routes on the National Highway Freight Network (NHFN) that provide connections into and out of the Bay Area, including I-80, I-580, and I-880. Two PHFS intermodal connectors provide access to the project location including West Grand Avenue/Maritime Street and 7th Street.

The geospatial reference data (GIS coordinates) for the key project component locations are shown in Table 2.

**Table 2 GIS Coordinates of Key Project Components**

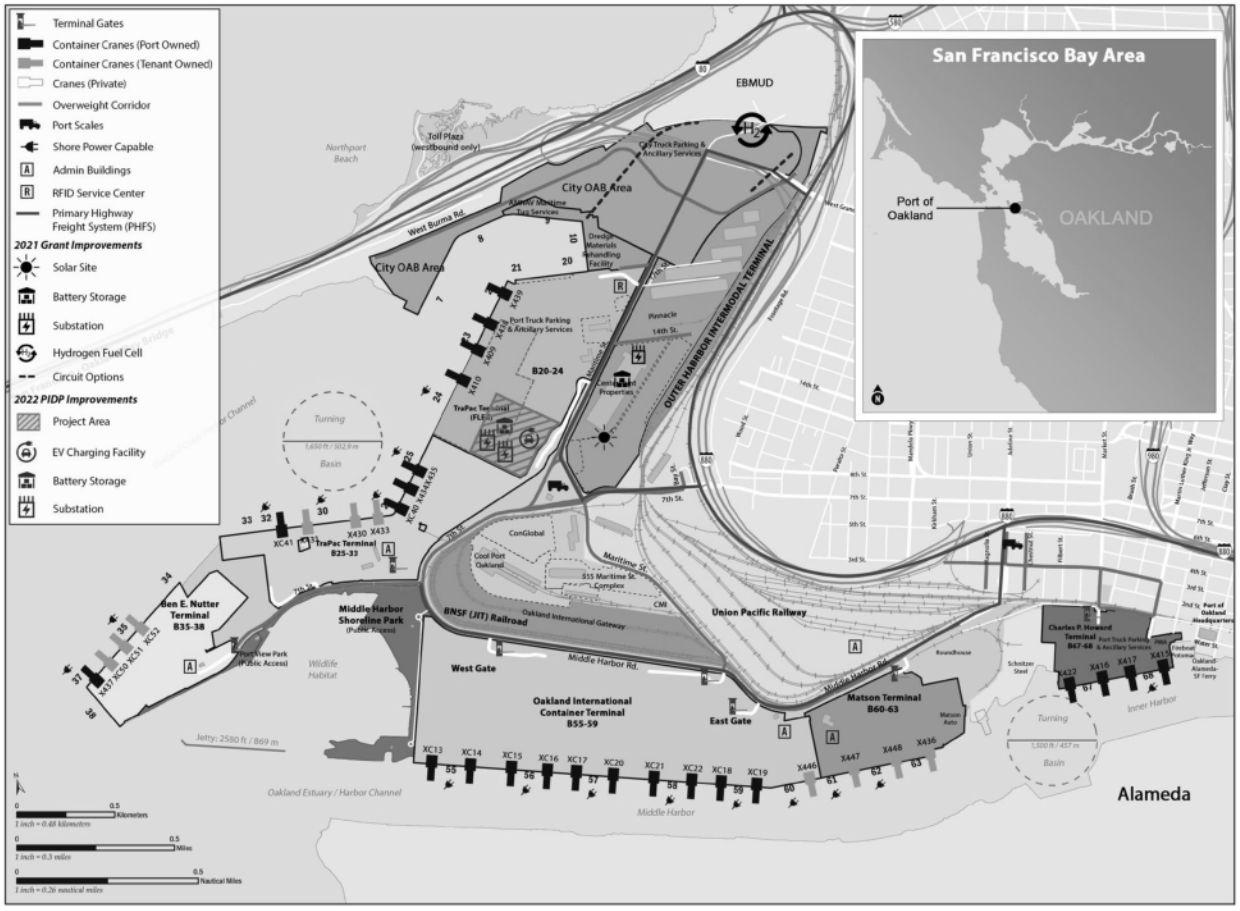
| Project Component | GIS Coordinate |
|---|---|
| **General boundary of improvement area** | |
| • Northwest corner | 37° 48' 52.03" N, 122° 18' 58.09" W |
| • Southwest corner | 37° 48' 43.88" N, 122° 19' 05.42" W |
| • Northeast corner | 37° 48' 44.02" N, 122° 18' 44.90" W |
| • Southeast corner | 37° 48' 37.18" N, 122° 18' 55.24" W |
| Substation SS-C-48 upgrades and battery storage | 37° 48' 44.78" N, 122° 18' 58.68" W |
| Substation SS-C-36 upgrades | 37° 48' 44.45" N, 122° 19' 00.16" W |
| Charging stations | 37° 48' 40.97" N, 122° 18' 50.51" W |
| RTG reefer storage area | 37° 48' 44.45" N, 122° 19' 00.16" W |
| Gatehouse, entry and exit gates | 37° 48' 49.91" N, 122° 18' 58.52" W |

[10] Census Reporter, from U.S. Census Bureau, 2020. American Community Survey 5-year estimates. https://censusreporter.org/profiles/40000US78904-san-francisco-oakland-ca-urbanized-area/.

[11] U.S. Census Bureau, 2020 Population and Housing State Data, 2021. https://www.census.gov/library/visualizations/interactive/2020-population-and-housing-state-data.html.

[12] Bay Area Council Economic Institute (BACEI), The Megaregional Case for a New Transbay Rail Crossing (Report), 2021 (page 5). http://www.bayareaeconomy.org/report/megaregionimpactsofnewtransbayrailcrossing/.

**Figure 3 Project Location**




## 2.2 Federal and Census Designations

The Port of Oakland is a Coastal Seaport located in the San Francisco—Oakland, CA Urbanized Area (Code 78904) based on the 2010 Census-designated urbanized areas. The project is located in a federally-designated Historically Disadvantaged Community[13] (Census Tract 4017) and Opportunity Zone[14] (06001401700) (see Figure 4 and Figure 5).

[13] https://usdot.maps.ArcGIS.com/apps/dashboards/d6f90dfcc8b44525b04c7ce748a3674a.

[14] https://opportunityzones.hud.gov/.

**Figure 4 Project Area Location Within Historically Disadvantaged Community**

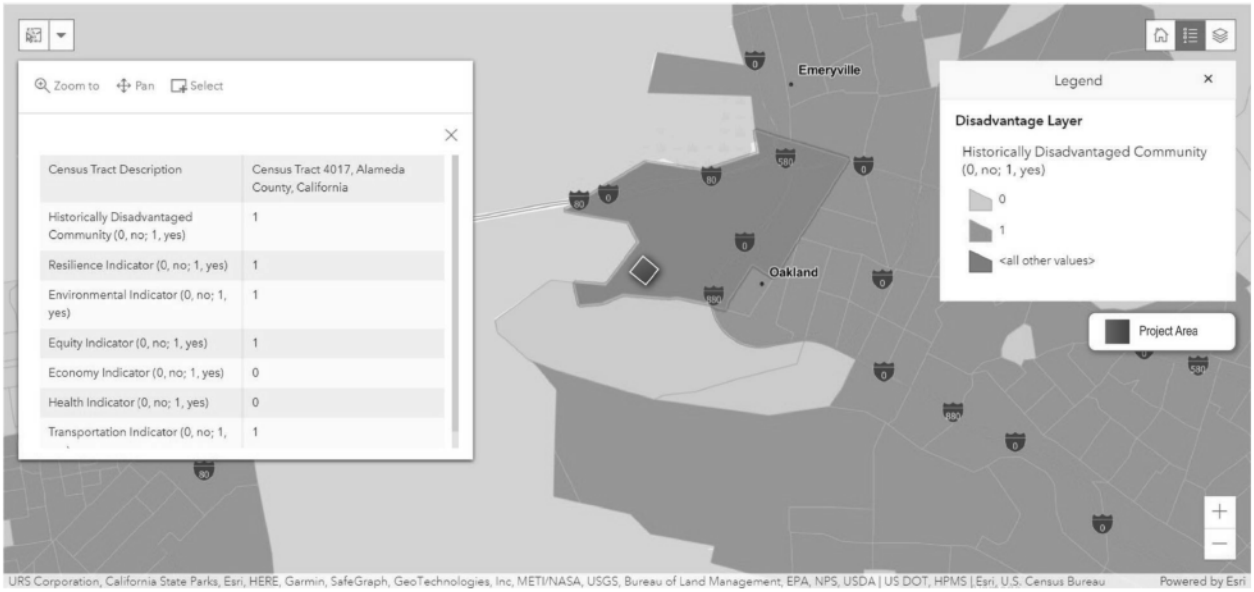
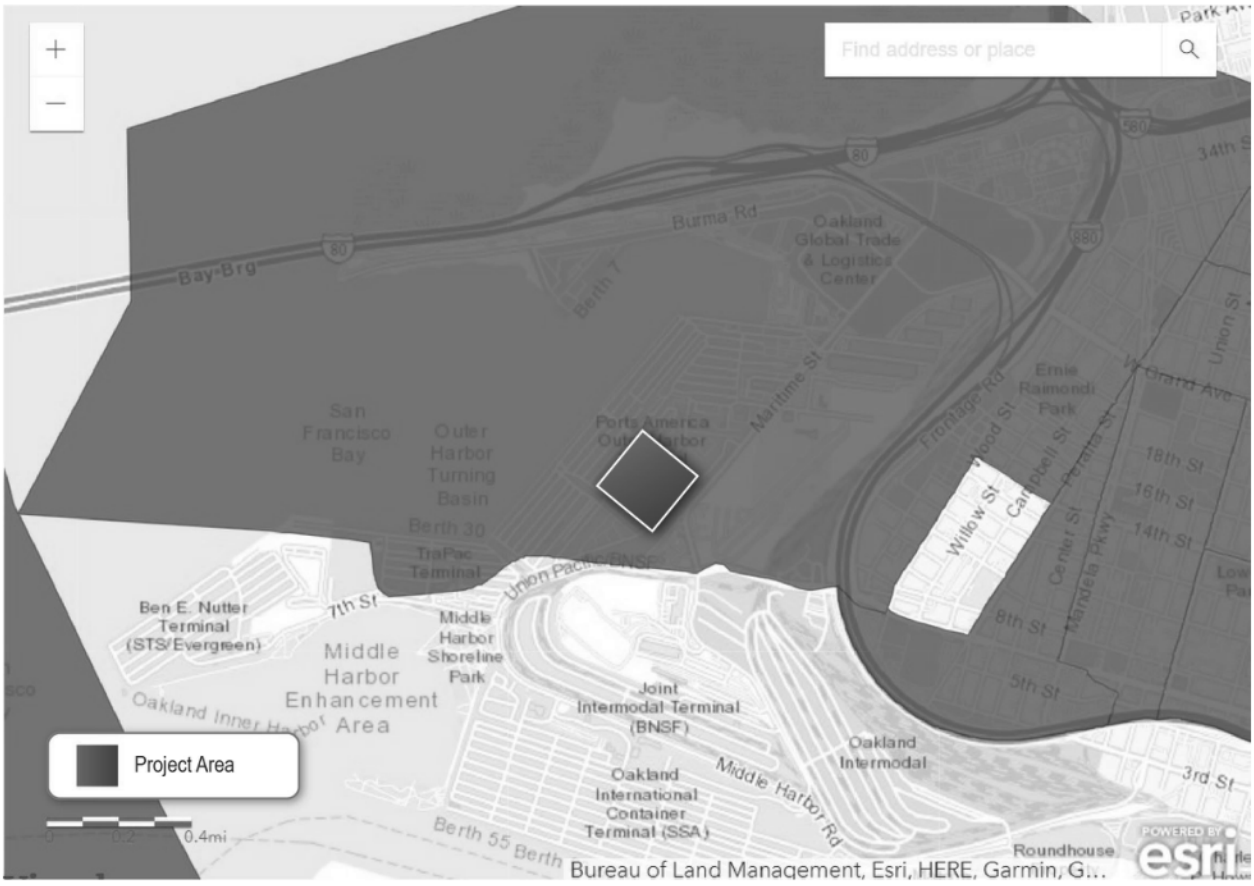



**Figure 5 Project Area Location Within Opportunity Zone**



# 3 Grant Funds, Sources, and Uses of Funds

Table 3 presents the cost of the project, as well as a breakdown of funding sources. A detailed breakdown of the project costs by component with unit costs and quantities is provided in the Appendix A—Benefit-Cost Analysis Spreadsheet. The estimates were prepared in 2022 based on conceptual design (Moffatt & Nichol, 2022).[15] No other Federal funds are available for this project, and all non-Federal funds would be provided by the Port of Oakland. There are no conditions on the Port funds, and the funds can be made available from the Port's reserves as soon as Federal grant funds are obligated. Additional information on leveraging Federal funding can be found in Section 4.5.

**Table 3 Cost Estimate with Sources and Uses of Project Funds**

| Item | Total Cost | % Total Cost | Eligible Cost (Y/N) | Port Contribution $ | Port Contribution % | PIDP (Federal) Contribution $ | PIDP (Federal) Contribution % |
|---|---|---|---|---|---|---|---|
| Construction Cost | $30,492,500 | 62% | Y | $7,623,125 | 25% | $22,869,375 | 75% |
| Mobilization/ Demolition | $1,525,000 | 3% | Y | $381,250 | 25% | $1,143,750 | 75% |
| Design, PM, CM, Procurement, Permitting, Port Staff Oversight | $8,767,000 | 18% | Y | $2,191,750 | 25% | $6,575,250 | 75% |
| Insurance/Legal | $382,000 | 1% | Y | $95,500 | 25% | $286,500 | 75% |
| Contingencies | $7,624,000 | 16% | Y | $1,906,000 | 25% | $5,718,000 | 75% |
| **Total** | **$48,790,500** | **100%** | | **$12,197,625** | **25%** | **$36,592,875** | **75%** |

# 4 Merit Criteria

The Phase 1 Outer Harbor Terminal Redevelopment Project will support **all of the key objectives of the PIDP program** including improving the safety, efficiency, or reliability of goods movement; supporting economic vitality at the national and regional levels; reducing climate change and environmental justice impacts; advancing equity and opportunity for all; and leveraging Federal funding to attract non-Federal sources of infrastructure investment.

The project will improve the loading and unloading of goods, the movement of goods, and Port operations (including improved port resilience).

[15] Moffatt & Nichol, Port of Oakland PIDP Application Assistance Technical Memo, 2022.

## 4.1 Section A: Achieving Safety, Efficiency, or Reliability Improvements (CS)

### *Safety*

The project's safety benefits stem from reductions in truck VMT due to the diversion of trucks from the Ports of Long Beach, Los Angeles, Seattle, and Tacoma to travel a shorter distance to the Port of Oakland. The reduced truck VMT leads to a reduction in truck-related crashes that would have resulted without the project. Approximately 96 fatal+injury and 327 property damage only crashes are estimated to be avoided over 20 years with the completion of the Phase 1 Outer Harbor Terminal Redevelopment Project, resulting in $26.9 million (discounted at 7% in 2020 dollars) in benefits from reduced VMT related incidents. More details on the source of the reduction in truck VMT can be found in Appendix A—Benefit-Cost Analysis Spreadsheet provided as an attachment to this grant application.

**420** Less crashes estimated as result of reductions in VMT from the Phase 1 Outer Harbor Terminal Redevelopment Project

Although not monetized in this application, safety and security benefits of the project also include:

- Improved vision within the off-dock terminal area from the new LED high-mast lighting and entry/exit gates and gatehouse; and
- Reduced worker exposure to accidents through upgrades and replacement of end-of-life electrical infrastructure.

### *Efficiency*

The Phase 1 Outer Harbor Terminal Redevelopment Project increases cargo throughput efficiency and capacity and provides greater on-dock flexibility by providing additional storage for import, export, and empty containers. It is estimated to divert approximately 288,500 truck TEUs from the Central California areas to/from the Ports of Los Angeles, Long Beach, Seattle, and Tacoma to the Port of Oakland which reduces truck VMT by 13.5 million miles and travel time by 269,407 hours per year on average, and $85.2 million in vehicle-operating costs (VOC) savings from fuel, maintenance, tires, and depreciation over the 20 years, discounted at 7% in 2020 dollars.

**Efficiency Benefits**

- Average annual reduction in truck VMT of 13.5 million miles
- Average annual travel time savings of 269,407 hours
- $85.2 million in vehicle-operating costs (VOC) savings from fuel, maintenance, tires, and depreciation over the 20-year life-cycle

The project will reduce or eliminate the need for the three temporary container storage facilities located 60-70 miles from the Port of Oakland in Stockton, Tracy, and San Joaquin County. This would reduce truck trips as the containers could be delivered straight to the Outer Harbor Terminal off-dock support yard and then (to the extent possible) transported via zero-emissions electric drayage trucks at night to the terminals. This would result in reductions in VMT and congestion, deadhead miles, fuel use and VOCs, wait time at the terminal gates, and associated emissions from idling, and would free up empty containers and chassis that would otherwise be unavailable at an off-Port storage facility over 60 miles away. The off-dock container storage available through this project can also improve operational efficiency at the terminals.

Containers can be stored at the Outer Harbor Terminal, freeing up space for processing the inbound and outbound containers, reducing on-dock congestion.

An existing operational marine container terminal is located adjacent to this Outer Harbor Terminal off-dock container support yard. The stacked RTG container rows are proposed to be in line with those within the adjacent terminal providing future integration and expansion opportunities for increased container capacity and improved operational efficiencies when needed in the future.

Lastly, providing electric charging stations within the project site will result in reductions in travel time, VMT, fuel use, and emissions by eliminating the need for trucks to travel to nearby fueling stations.

## *Reliability and Resiliency*

The additional container storage at the Outer Harbor Terminal will make the Port more reliable and resilient with the ability to handle disruptions and unpredictability of the supply chain. The site can provide reliability to its customers and terminal operators to handle surges in either imports or exports, most notably peaks in agricultural exports. The project will also improve reliability for the delivery of export containers from agricultural shippers. With the uncertainty of vessel arrivals to the Port of Oakland from congestion issues in Southern California, the new stacked reefer container facility would allow agricultural shippers to safely plug in and store their containers until needed at the terminal.

*Electric Charging Stations and Trucks at the Port of Oakland*

The project would also provide resiliency for the cold cargo storage and shipments due to power loss and/or energy limitations with the battery storage capabilities. The project will support electrification of drayage trucks and other port vehicles, and operational infrastructure with electric charging, battery storage infrastructure, and substation upgrades. It will improve the reliability of the electrical grid and backup power storage and climate resilience to help insulate and protect the Port of Oakland from the impacts of electric power reliability, including rolling blackouts during heat waves and public safety power shutoffs (PSPS).

## *Environmental and Emissions Mitigation*

Providing the electrical infrastructure systems (electrical chargers, battery storage, and substation upgrades) to support zero-emissions equipment and operations is essential to decarbonizing the Port and delivering the related air quality and community health benefits in support of State, regional, and local air quality and climate plans and goals. Specifically, the inclusion of chargers and electrical resiliency

upgrades implements measures identified in the Port's Seaport Air Quality 2020 and Beyond Plan. Storage and use of energy from renewable sources reduces air pollution and other health burdens associated with fossil-fuel-based electrical power. From the operational perspective, the project improves Port efficiency and reduces idling by optimizing the use of Port areas adjacent to its terminals. Over 90 percent of the cancer risk from local air pollution in West Oakland is attributable to diesel particulate matter[16]. Residents also experience higher rates of deaths from cancer, heart disease and strokes, and higher rates of asthma emergency visits and hospitalizations. This project would help to reduce harmful emissions and associated negative health impacts for workers at the Port and neighboring communities. Monetized and additional environmental and emissions benefits from the project are described in Section 4.3.

## 4.2 Section B: Supporting Economic Vitality at the Regional or National Level

Based on *The Economic Impact of the Port of Oakland* report by Martin Associates (2018)[17], the total economic value of marine cargo and vessel activity at the Port is estimated at $60.3 billion; supporting approximately 500,000 jobs in the State of California, including 11,393 jobs directly created by Port activities, as well as more than 16,000 induced and indirect jobs. Maintaining and increasing flexible container storage capacity at the Port of Oakland is essential to supporting economic vitality at the local, regional, and State levels, as well as the national level to handle future growth.

**5.0** **Estimated benefit-cost ratio of the Phase 1 Outer Harbor Terminal Redevelopment Project with net benefits over a 20-year life at *$139.9 million.***

A benefit-cost analysis (BCA) was performed for the Phase 1 Outer Harbor Terminal Redevelopment project as summarized in Table 4. **The project has a benefit-cost ratio (BCR) of 5.0:1** with expected net benefits over a 20-year project life of $139.9 million and total estimated benefits are $174.7 million when discounted at 7% in 2020 dollars. Benefits accrue from the reduction in truck vehicle miles traveled (VMT) from TEUs diverted from the Ports of Los Angeles/Long Beach and Tacoma/Seattle. The methodology and calculations that support the BCA results are transparent and repeatable, consistent with the 2022 *Benefit Cost Analysis Guidance for Discretionary Grant Programs,* and are detailed in Appendix A—Benefit-Cost Analysis Spreadsheet and Appendix B—Benefit-Cost Analysis and Methodology Report. Table 4 presents the expected monetary benefits costs for travel time savings, vehicle operating cost savings, safety (crash reductions), environmental sustainability (emissions reductions), noise, maintenance and operating costs, and residual value for assets with a useful life greater than 20 years.

**Table 4 Benefit-Cost Analysis Summary, Discounted at 7% in 2020 Dollars**

| Benefits and Costs | Discounted Value (2020$) |
|---|---|
| Travel Time Savings | $58,002,447 |
| Vehicle Operating Cost Savings | $85,191,094 |

[16] https://www.baaqmd.gov/~/media/files/ab617-community-health/west-oakland/100219-files/final-plan-vol-1-100219-pdf.pdf?la=en (page 2-3).

[17] https://www.portofoakland.com/wp-content/uploads/Economic-Impact-Report-2019-FULL-REPORT.pdf (page 11).

| Benefits and Costs | Discounted Value (2020$) |
|---|---|
| Safety Crash Cost Reduction | $26,925,455 |
| Environmental Sustainability | $8,735,656 |
| Noise Reduction | $1,785,388 |
| Maintenance & Operations Costs | ($6,399,922) |
| Residual Asset Life | $505,899 |
| **Total Benefits** | **$174,746,017** |
| | |
| **Total Costs** | **$34,840,054** |
| **Benefit/Cost Ratio** | **5.0** |
| **Net-Present Value (NPV)** | **$139,905,964** |

The project is also anticipated to result in the following non-quantified economic benefits:

- Reductions in health-related costs (deaths, cancer, heart disease, strokes, asthma, emergency room visits and hospitalizations) due to reductions in fuel use and emissions from the electrical infrastructure systems;
- Reductions in maintenance and operating expenses associated with more reliable LED lighting and electric-powered operational infrastructure;
- State of good repair (SOGR) benefits from pavement replacement;
- Reductions in lost revenue for the agricultural sector from delayed or missed export shipments and spoilage;
- Provide near- and long-term local, good paying job opportunities at the Port for construction of the project and operations for the facilities, services, and maintenance of the Phase 1 off-dock container terminal area; and
- Supports American industries by complying with the Buy American Act (41 U.S.C. 8301-8305).

## 4.3 Section C: Addressing Climate Change and Environmental Justice Impacts

### *Climate Change*

As documented by the emissions reductions estimates developed as part of the BCA, the project provides climate change benefits associated with reduced greenhouse gas (GHG) and criteria pollutants from the reductions in VMT. The project is estimated to provide nearly $8.3 million in emissions reductions benefits, of which $6.8 million is associated with $CO_2$, per the benefit-cost analysis contained in Appendix A—Benefit-Cost Analysis Spreadsheet. Other emissions and air pollutant benefits not included in the monetized benefits include the transition from the use of diesel-fuel based gensets to electric reefer storage and plugs, reduced VMT and deadhead miles from utilizing the container storage facilities in the Central Valley, reduced idling at the terminal gates, and the portion of the drayage trip to transport the containers

to/from the terminal via mostly electric vehicles. The reductions in VMT and associated environmental benefits will also help reduce the impacts on overburdened and disadvantaged communities.

The Phase 1 Outer Harbor Terminal Redevelopment Project improves climate adaptation and resiliency identified in local climate change adaptation plans. As discussed in Section 1.3, the project is included in the Port's *2020 and Beyond Plan* and the *Owning Our Air: The West Oakland Community Action Plan*. In addition, the City of Oakland *2030 Equitable Climate Action Plan* (ECAP) (2020)[18] builds on nearly three decades of progressive, science-based policies and programs that the City has pursued to reduce climate impacts and reverse environmental harms. The project implements the Port of Oakland actions in the ECAP: P-1 Reduce Emissions from Port Vehicles and Equipment and P-2 Reduce Emissions from Electricity. The project will support electrification of drayage trucks and other port vehicles, and operational infrastructure with electric charging, storage infrastructure, and substation upgrades. It will provide backup power and climate resilience to insulate and protect the Port of Oakland from the impacts of electric power reliability, including rolling blackouts during heat waves and public safety power shutoffs (PSPS).


*Battery-Electric Yard Equipment (Top Pick Stacker) at the Port of Oakland*

The project also addresses the goals and key priorities of the regional Bay Area Air Quality Management District's *Spare the Air Cool the Climate, A Blueprint for Clean Air and Climate Protection in the Bay Area Clean Air Plan* (2017), developed in collaboration with MTC, the Bay Conservation and Development Commission, and the Association of Bay Area Governments. The project improvements will help the Plan's two paramount goals, protecting air quality and health at the Regional and Local Scale and protecting the climate, by helping to advance the State's air quality, emissions, and climate goals, reducing disparities among Bay Area communities in cancer health risk from toxic air contaminants, and reducing GHG emissions through the increased use of electric vehicles and operational infrastructure within and near the Port. In addition, the project helps support to decrease demand for fossil fuels by providing the infrastructure to support electrification of drayage trucks and other port vehicles and equipment and the electric powered stacked reefer racks reducing the use of gensets.

Further, the Port has adopted criteria for evaluating the sustainability of proposed capital projects, including risks posed by a changing climate. To inform considerations of physical asset vulnerability and pathways to climate adaptation, in addition to being responsive to Assembly Bill 691, the Port of Oakland conducted a Sea Level Rise Assessment. The Port will soon be undertaking an additional sea level rise and groundwater study to further understand potential asset vulnerabilities, including to core electrical infrastructure. These studies and related mapping projects will be used to vet the final siting of proposed improvements and ensure physical risks to project investments are mitigated to the fullest extent possible.

[18] https://www.oaklandca.gov/projects/2030ecap (page 120).

In addition, the project supports efforts to reduce future sea level rise by reducing GHG emissions through electrification and reduced reliance on carbon-based fuels.

The project also supports the SB 671 Clean Freight Corridor Efficiency Assessment nominated by the Port of Oakland, Alameda County Transportation Commission, Solano Transportation Authority, Contra Costa Transportation Authority, and MTC, which connect the Port of Oakland with warehousing and distribution hubs, manufacturing facilities, and agriculture. There is strong support from local jurisdictions, elected officials, and the private sector throughout the region to advance zero emissions technologies along the two major freight corridors serving the Northern California Megaregion and the Port of Oakland.

### *Environmental Justice*

The West Oakland community, adjacent to the Port of Oakland, is considered an environmental justice community due to its high proportion of minority residents and high percentage of low income residents. The census tract where the project is located (06001401700) consists of 61% people of color. According to the U.S. EPA's EJSCREEN, this census tract has a 70 or higher percentile environmental justice index rating for 2017 diesel particulate matter, traffic proximity, superfund proximity, hazardous waste proximity, and underground storage tanks. The project location is located in both a historically disadvantaged community and opportunity zone as shown in Figure 4 and Figure 5.

The Port has been working with the West Oakland community to address health risks, air quality and other environmental impacts from Port operations for decades. The Port has invested substantial financial and staff resources on air quality, transportation, clean water, soil clean-up and open space and parks to improve environmental conditions and quality of life for West Oakland residents. In March 2008, the Port Board of Commissioners adopted the Port Maritime Air Quality Policy Statement which set a goal of reducing the excess community cancer health risk related to exposure to diesel particulate matter (DPM) emissions associated with the Port's maritime operations by 85% from 2005 to 2020, through all practicable and feasible means. It also committed the Port to implement early action emissions reduction measures to reduce the duration of the public's exposure to emissions that may cause health risks, through all practicable and feasible means. Through extensive collaboration with the local community, the Port subsequently prepared the *Maritime Air Quality Improvement Plan* (MAQIP), which was released in 2009.

> The neighboring Port of Oakland community wants a complete changeover to zero-emissions trucks and cargo-handling equipment for Port-related activities.

The Port reinitiated the community consultation and air quality planning process in 2018 to update the MAQIP; the updated plan is the *Seaport Air Quality 2020 and Beyond Plan*, which establishes the planning and policy framework as well as the implementation plan to transition to a zero-emissions seaport. The project includes strategies in the Plan as described in Section 1.3. Throughout the development of the 2020 and Beyond Plan, the community has been clear in its desire to see a complete changeover to zero-emissions trucks and cargo-handling equipment for Port-related activities and has requested that the Port take a leadership role in developing the infrastructure necessary to enable the transition to zero-emissions vehicles and equipment. The Port has also collaborated with the community and the City of Oakland to prepare two truck management plans that address the direct impacts of truck travel and parking in the community. The Port exceeded the 2005 to 2020 emissions reduction goals (e.g., 86 percent reduction in diesel particulate matter emissions) from the Maritime Air Quality Improvement Program (MAQIP), despite an increase in cargo volume.

In 2018, the West Oakland community was selected as one of the first communities to develop a Community Air Protection Program (CAPP or Program) under California Assembly Bill (AB) 617. The Program's focus is to reduce exposure in communities most impacted by air pollution. The Program enables selected communities to work together to develop and implement new strategies to measure air pollution and reduce health impacts. The Port has been a participant in the West Oakland air quality planning process since its inception. The West Oakland Community Action Plan (WOCAP) was completed in 2019. The Port continues to participate in implementation of the WOCAP. The project partially implements Strategies 19 (removing barriers to adoption of zero-emissions trucks, including charging equipment) and 37 (supporting the transition to zero-emissions drayage truck operations and investing in needed upgrades to the Port's electrical infrastructure) of the WOCAP.

In addition to its direct engagement with stakeholders in the community, the Port of Oakland implements best practices to ensure its activities are fully compliant with Title VI of the Civil Rights Act of 1964 and other equal access laws. The Port of Oakland's outreach strategies include, but are not limited to:

- Reasonable public access to technical and policy information;
- Adequate public notice of public involvement activities and time for public review and comment at key decision points;
- Concerted efforts to involve the public, especially those traditionally underserved by existing programs or plans including but not limited to low-income and minority households;
- Coordination of planning processes, especially where multiple levels of oversight exist, public processes to enhance public consideration of the issues, plans and programs and reduce redundancies and cost;
- Ensure opportunity for full participation of Limited English Proficiency (LEP) speakers through provision of language interpretation services; and
- Ensure opportunity of full participation of persons with disabilities by providing reasonable accommodations.

## 4.4 Section D: Advancing Equity and Opportunity for All

This section demonstrates how the Port has and will advance equity and promote workforce opportunities per the Notice of Funding Opportunity (NOFO). The Port of Oakland is structured to ensure all individuals benefit from Port and Federal funds. The Port of Oakland consistently reviews its policies and strategies to ensure all communities continue to have access to opportunities provided by Port and federally-funded projects. Port initiatives and staff specifically monitor and address:

- Compliance with state and Federal wage rate requirements.
- Employment and equal opportunity complaints.
- Bid preferences to encourage inclusion of small and local businesses.
- Job creation (especially for economically distressed areas).
- Local hours and apprenticeship goals.
- Environmental health, safety and justice concerns (especially as they affect traditionally marginalized communities).

- Port's Living Wage Policy: The Port living wage is an hourly wage level adopted by some local governments that set wages at a higher level than the local, Federal and/or state minimum wage.
- Port's MAPLA (Maritime and Aviation Project Labor Agreement): MAPLA is an agreement between the Port of Oakland and the Alameda Building and Construction Trades Council that promotes project stability, construction efficiency and local hiring opportunities on all Port projects over $150,000 that are a part of the Port's Capital Improvement Program (CIP). Contractors are required to pay $0.30 per work hour into a Social Justice Trust Fund that is used to support local workforce development programming.
- Port's Operations Jobs Policy tenets: (Fair Chance hiring, local hiring preferences/focus on disadvantaged workers and temporary worker protections). In 2017, the Port of Oakland Commissioners passed an Operations Jobs Policy for the Seaport Logistics Complex with Centerpoint Logistics, Inc. Key aspects of this jobs agreement include living wages and benefits for workers, priority consideration for unemployed individuals, armed forces veterans, single parents, ex-offenders, and foster care adults; and a ban on asking applicants about prior criminal offenses.
- Minority-owned, woman-owned, and small business program for construction and professional services contracts: In accordance with 2 C.F.R. 200.321, the Port has small and diverse business goals on its PIDP contracts. The goals are not an element of responsiveness.

In 2018, the Port hired a Workforce Development manager to support workforce policies and initiatives that expand economic opportunities for local impact area (LIA) residents. The LIA (consisting of the Cities of Oakland, Alameda, San Leandro, and Emeryville) encompasses areas most likely to experience benefits and adverse effects of Port operations. The Port's Workforce Development Manager is also tasked with strengthening education and training partnerships and aligning workforce policies and initiatives with the opportunities created by a transition to a zero-emissions Port. The Port adopted a Workforce Development Plan as part of its *2020 and Beyond Plan*. The Workforce Development Plan includes a framework that allows for growth, change, and innovation to support the pathway to a zero-emissions Port while playing a central role in the convening of partners, including state, local, and educational institutions.

The Port has a long history of implementing programs, policies, and initiatives that promote access to Port and Port-related careers, with a focus on reaching workers from communities defined as disadvantaged as a central part of the Port's mission. The Port of Oakland has been at the forefront in pioneering job creation and access to good paying jobs with an intentional focus on mitigating barriers towards employment since 2000, when the Port of Oakland adopted the region's first MAPLA with the Building and Construction Trades in Alameda County (BTC). Over the next two decades, the Port continued to strengthen workforce initiatives and policies to increase economic opportunities for disadvantaged workers with a clear focus on diversity, equity and inclusion.

In the aftermath of Prop 209 Affirmative Action, the Port of Oakland negotiated the first regional public agency project labor agreement (PLA) that included hiring goals for the local impact (LIA) areas (consisting of the Cities of Oakland, Alameda, San Leandro, and Emeryville); local impact areas are those most likely to experience the adverse effects of Port operations, such as traffic and noise. The MAPLA goals are a target to be achieved and are designed to help reassessment and improvement of local hiring strategies. The Social Justice Committee meets monthly to monitor contractor performance and provide recommendations to assist contractors with achieving their MAPLA requirements. MAPLA also requires

construction contractors to contribute into a trust that funds community-based organizations that provide training for construction sector jobs to low-income residents in the Port's LIA.

In 2016, the Port of Oakland issued a 5-year extension of MAPLA that included enhanced commitments that doubled the hourly contractor contributions from $0.15 to $0.30 cents; over $590,000 has been awarded to community-based training programs that serve underrepresented job seekers in the Port's LIA. The Port also strengthened language in MAPLA where the building trades unions commit to increase recruitment from the Port's LIA into the "list trades" and included goals for Disadvantaged Workers. The list trades provide access to some of the highest paying jobs in construction. During the period between 2017 to 2020 over 300 Port LIA residents joined the list trades (comprised of sheet metal workers, electricians, plumbers/pipefitters, glaziers, and elevator constructors). MAPLA compliance and tracking is central to ensuring accountability and commitment to serving our LIA residents. Below is a snapshot of the 2021 achieved goals.

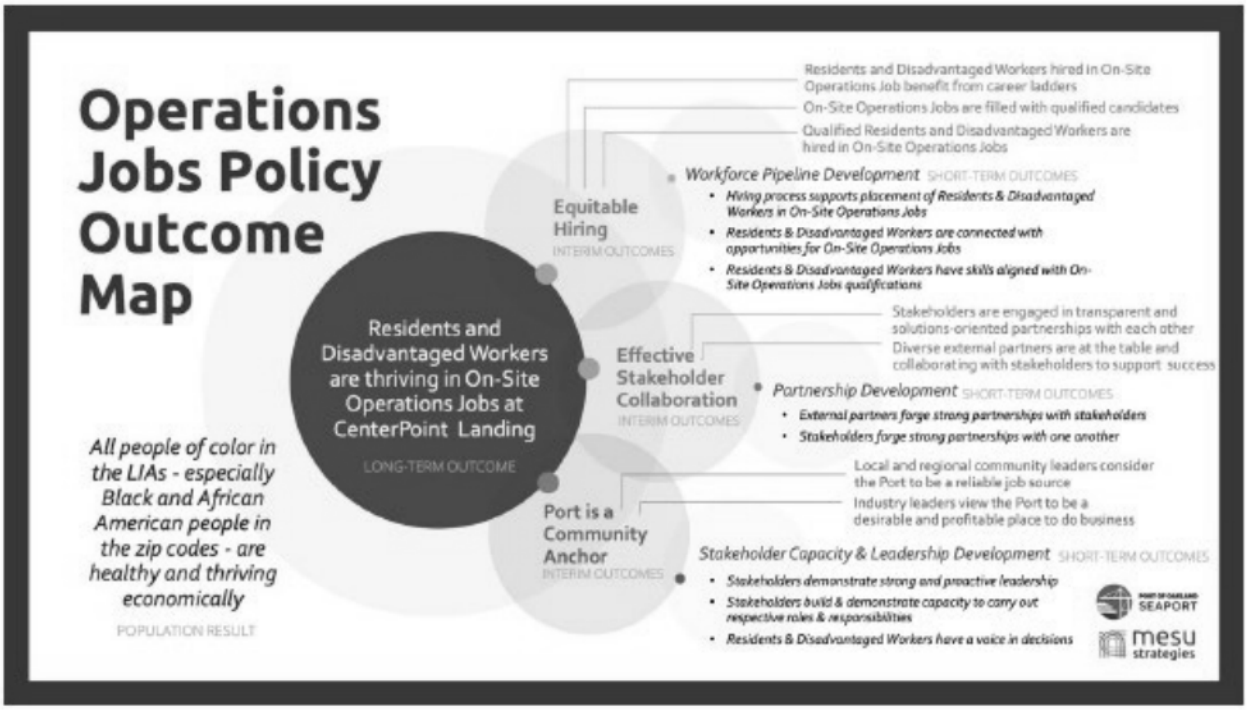
**Table 5 2021 MAPLA Achieved Goals**

| MAPLA Performance | 2021 MAPLA (July 2020—June 2021) | | |
|---|---|---|---|
| Total Hours Worked | 5,834,525 | | Goal |
| LIA residents | 1,762,468 | 30.21% | 50% |
| LIA apprentices | 3,416,504 | 58.56% | 50% |
| DW app (new goal) | 37,537 | 21.91% | 25% |
| NHA app (new goal) | 32,200 | | N/A |

In 2017, the Port adopted the Operations Jobs Policy (Jobs Policy) that included a Cooperation Agreement focused on equity, access, and good paying jobs on the CenterPoint Landing Project, a warehousing development. The language in the Jobs Policy specifically focuses on local hire preferences, "ban-the-box" prohibiting employers from asking about prior criminal offenses, special consideration for disadvantaged residents, living wages and benefits for workers, limits on the use of temporary agencies, support to local community-based workforce partners to conduct outreach, recruitment, job training/placement, and the creation of the Jobs and Stakeholder Working Group (SWG) to support implementation of the agreement.

The SWG is driven by a vision in which all people of color in Oakland and the East Bay are healthy and thriving economically. This vision is rooted in an understanding of longstanding and racialized social and economic inequities in the region. The SWG recognizes that to get there, the Port and its partners must achieve important outcomes around leadership, equitable hiring and institutional change. These key factors are important supports to the specific details outlined in the policy.

The SWG includes diverse and engaged local and regional community leaders, including representatives of the Port, its tenants, labor groups, and representatives of local neighborhoods. The SWG serves as an advisory body to the Port of Oakland. It provides technical expertise, analysis and recommendations to ensure that Port workforce decisions help transform low-income LIA neighborhoods into stable, healthy, thriving communities of opportunity.




The Port's Workforce Development manager also coordinates several workforce initiatives including: an inter-agency project labor agreement (PLA) research project in partnership with the San Francisco Foundation called "Improving Effectiveness of PLAs." The primary focus of this research project is to identify strategies for diversifying the construction workforce through PLAs. Phase I of the research was concluded in early 2021 and through a collaborative stakeholder process performed a scan of PLAs and Community Benefits Agreements nationally; interviewed current and former trade workers representative of Black/Indigenous/Brown People of Color (BIPOC) to better understand their lived experiences in the construction industry; conducted a labor demand and supply analysis of the local building trades, apprenticeship and pre-apprenticeship programs; assessed public agencies certified payroll data; reviewed construction demand forecasts; and generated findings supported by the recommendation below.

**Table 6 Improving Effectiveness of PLAs Recommendations**

| No. | Recommendation |
|---|---|
| 1 | Set Data-Driven Workforce Goals |
| 2 | Establish Clear Responsibilities for Achieving Workforce Goals |
| 3 | Collect Data to Track Progress on Workforce Goals |
| 4 | Enforce to Ensure Progress on Workforce Goals |
| 5 | Support the Retention and Advancement of Diverse Workers |
| 6 | Coordinate Ongoing Support for Diverse Workers |
| 7 | Collaborate on a Regional Level to Create a Diverse Workforce |

Phase 2 of the research project will center on the development of an action and sustainability plan that will prioritize the most effective and efficient implementation of the recommendations. This work is conducted in collaboration with the Port's MAPLA Joint Administrative and Social Justice Committee, an oversight body comprised of labor, management, union, and community representatives.

## 4.5 Section E: Leveraging Federal Funding to Attract Non-Federal Sources of Infrastructure Investment

As shown in Table 3 in Section 3 Grant Funds, Sources, and Uses of Funds, the proposed cost share is 25% non-Federal, 75% Federal. Of the total project costs, the Port's share would likely only cover a portion of the repaving costs ($12.6 million) without the support of Federal funding. It is important to note the project components are interrelated – repaving the yard alone would not address the supply chain constraints or yield the other project benefits. Federal funding would leverage the Port capital investment to include much needed refrigeration racks to support the Port's agricultural partners, bolster the Port's electrical infrastructure with additional resiliency features, and further implement the Port's zero-emissions equipment goals with charging infrastructure. More importantly, this project provides a long-term solution to address many of the supply chain constraints the Port continues to see. Without funding support, this project would likely be deferred until additional infrastructure funding was available.

*Battery-Electric Yard Equipment (Hostler) at Port of Oakland*

Furthermore, Federal and State grants are commonly available to support the purchase of zero-emissions equipment, and to a lesser degree, support the construction of charging infrastructure. Some examples include the HVIP—Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project, Carl Moyer Memorial Air Quality Standards Attainment Program, and EnergIIZE—Energy Infrastructure Incentives for Zero- Emission Commercial Vehicles[19]. These grants are typically awarded to Port tenants who own and operate the equipment, and not to the Port directly. Under this project, the Port would construct the necessary equipment charging infrastructure. With the availability charging infrastructure addressed, Port tenants would be further motivated to apply for funding for zero-emissions trucks and equipment.

In December 2021, the Port was awarded a PIDP grant for the *Powering the Future Project* which supports the Port's expansion of an electric heavy-duty truck fleet and electrically-powered cargo-handling equipment by increasing power capacity and resiliency through modernization of a substation and integration of a fuel cell, solar power generation and battery storage systems. The Port plans to attract

[19] https://business.ca.gov/industries/zero-emission-vehicles/zev-funding-resources/.

State funding by submitting the *Green Power Microgrid Project* for the California SB1 Trade Corridor Enhancement Program (TCEP) in late 2022, expanding upon the *Powering the Future Project*, which involves solar installations, battery storage, modernization of substations, and addition of charging stations. The Phase 1 Outer Harbor Terminal Redevelopment Project would further the Port's efforts towards supporting State, regional, and local air quality and climate goals.

# 5 Project Readiness

The Port has extensive experience working with Federal agencies to deliver projects. The funds can easily be obligated and expended within the timeframes desired by DOT, and potential project risks are low.

## 5.1 Technical Capacity

The Port of Oakland has successfully managed numerous state, Federal, and local grants totaling over $500M with the support of Port staff, specialized technical consultants, and a full-time grants coordinator.

The Port of Oakland has successfully managed, on an ongoing basis, numerous state, Federal, and local grants, including current Federal Airport Improvement Program (AIP) grant dollars for critical upgrades and maintenance work on airport facilities. Over the past decade, in fact the Port of Oakland has successfully received and deployed over $191 million in AIP funding from the Federal Aviation Administration. The Port also successfully managed two separate TIGER grants (awarded in 2009 and 2012, respectively) for the initiation of the Port's shore power program and later for the development of a rail facility that expanded the intermodal capability of the Port's cargo throughput. The Port of Oakland also has regularly and successfully managed projects through multiple funding rounds of the Port Security Grant Program, administered by the Federal Emergency Management Agency. Most recently, the Port is currently of administering a 2021 PIDP grant to increase local renewable power generation and electric utilities resiliency.

Currently, the Port has an 18-member PIDP grant project delivery team comprised of Port representatives from Maritime, Engineering, Utilities, Finance, Legal, Environmental, and Senior management to implement the latest PIDP grant-funded project. It is likely this same team would implement this project if successfully awarded. Additionally, the Port routinely retains the services of specialized technical consultants to supplement its staff, and maintains on-call, task-order contracts for specialized tasks, including engineering design, energy efficiency, renewable energy implementation, and environmental planning (NEPA/CEQA and environmental permitting) that enable the Port to quickly obtain assistance with specific projects, as needed.

### *Feasibility and Constructability*

The proposed project is highly feasible and constructible. As discussed previously, all work would occur on Port property, and only limited routine approvals, such as City of Oakland building permits, are required. In terms of constructability, there is a substantial pool of qualified contractors in the Port's LIA/LBA who are qualified to perform timely and expert work. As shown in the schedule in Figure 6, there is ample time to construct the project within the 5 year-period required by the grant.

## *Compliance with Federal Requirements*

The Port has a full-time grants coordinator who tracks and manages the requirements of grant funding and works with respective Port project managers to ensure the accurate and timely deliverability of each grant program. The Port of Oakland is in regular compliance with all state and Federal audits of grant funding. The Port's engineering and environmental planning and permitting divisions ensure that each project meets all applicable safety, construction, and environmental requirements. Port inspectors monitor all construction projects to ensure the project's compliance with applicable requirements.

## *Project Relationship to Ongoing Planning Efforts*

The additional refrigeration racks, electrical charging infrastructure and battery storage components of the project are an integral part of several planning efforts. The Port's *2020 and Beyond Plan*, the City of Oakland's *Equitable Climate Action Plan*, and the West Oakland Community Action Plan (WOCAP) all call for increased electrification of Port-related trucks and cargo-handling facilities. The project directly addresses two implementing actions in the *2020 and Beyond Plan* Near-Term Action Plan (Action #9—Replace Electrical Infrastructure That is Beyond its Serviceable Life, and Action #10—Port Electrical Grid Reliability and Capacity Upgrades), part of Strategy 37 in the WOCAP, and Port of Oakland Actions 1 (Reduce Emissions from Port Vehicles and Equipment) and 2 (Reduce Emissions from Electricity) in the ECAP.

## *Project Schedule*

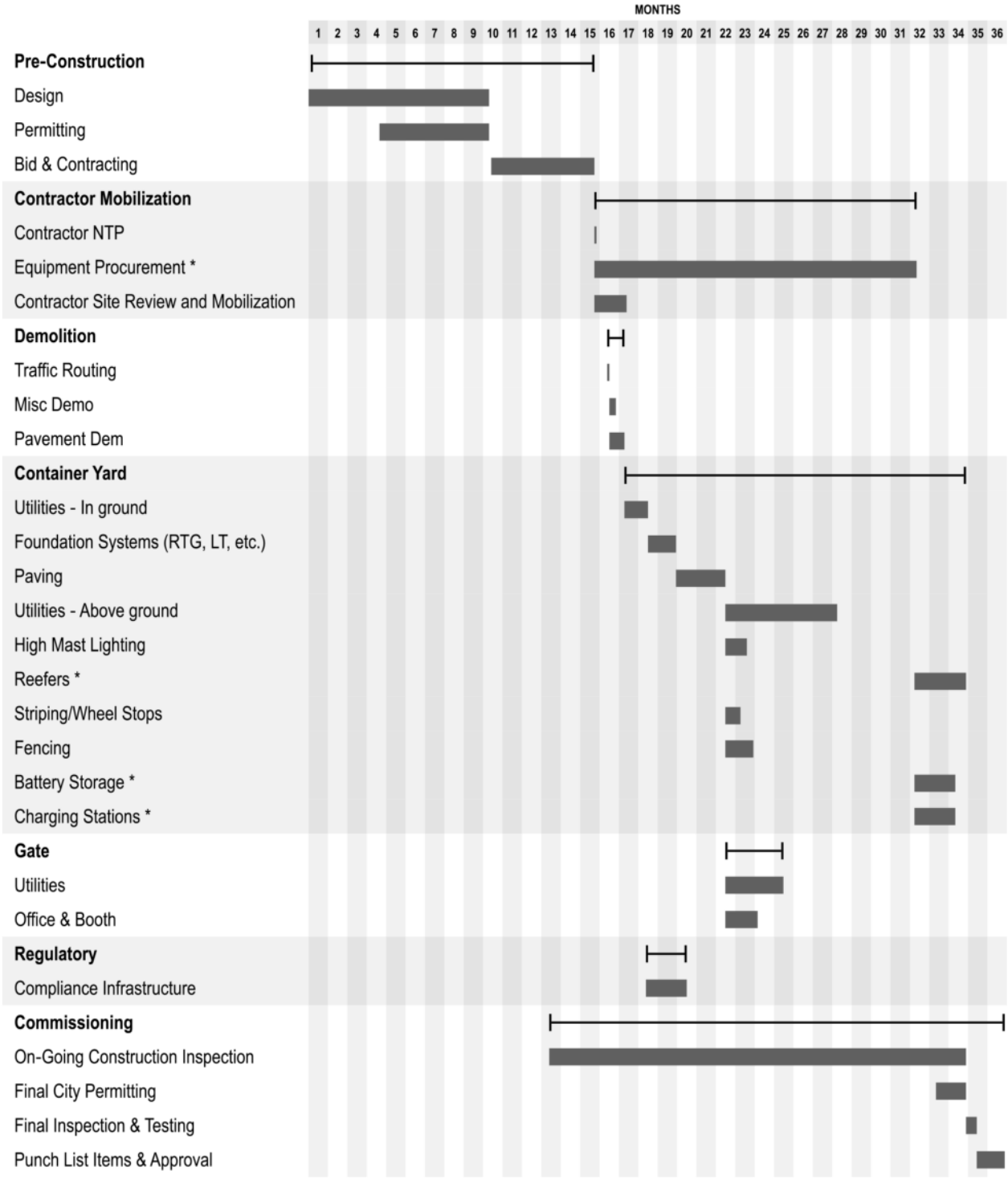
The project schedule is shown in Figure 6. The Port anticipates being ready for obligation of grant funds (i.e., to have obtained all necessary approvals and clearances) no later than July 1, 2024. Aside from the City of Oakland Building Permits and likely Construction stormwater permits from the local regional water quality control board, no other agency approvals will likely be required.

**Approvals and Design.** Design is expected to commence in July 2024. NEPA review will be the primary schedule driver for obligation of funds. As described below, due to the nature and location of the project, the only environmental permit that is required is a construction general stormwater permit that will be obtained by the contractor during mobilization. California Environmental Quality Act Review has been completed. The Port anticipates that NEPA review by MARAD would consist of a Categorical Exclusion, which can be completed quickly.

**Pre-Construction Phase.** The Port would begin the 9-month design process once grant funds have been obligated, with contractor bidding and contracting to begin after completion of design. After contractor selection and contracting, notice to proceed would follow approximately 3 weeks later, after necessary preconstruction submittals have been received. The preconstruction submittals would include an equipment procurement plan to ensure that necessary substation components are available on a timely basis. Contractors would be required to initiate acquisition of all long-lead time items immediately upon the Port's review of the equipment procurement plan. During this time, the contractor would also obtain the construction stormwater permit and other construction-related ministerial permits (e.g., required City of Oakland building permits).

**Construction Phase.** Following receipt of City construction permits (expected to require 2 months), mobilization and initial site work would begin. Site work will partially overlap with material procurement. Construction sequencing of the various project components would be further clarified in the design phase.

## Figure 6 Project Schedule




* Long Lead Procurement Items

## 5.2 Environmental Risk

The project enjoys broad public support as evidenced by the letters of support included as Appendix C—Letters of Support. The project is not dependent on or affected by any USACE investment or USACE planning activities.

**Letters of Support**

- California Department of Transportation
- Mayor of Oakland Libby Schaaf
- Bay Area Council
- East Bay Economic Development Alliance
- Bay Planning Coalition
- *and more in Appendix C*

### *NEPA and CEQA*

The project is located in a commercial Port area, and there are no sensitive environmental resources at the project location or in the immediate vicinity of the project location. Consequently, the potential for environmental impacts from the relatively minor footprint of construction associated with the project is low. The project provides substantial environmental benefits through increased availability of electric plugs for refrigerated containers, increased use of zero-emission trucks and equipment, and reduced VMT statewide.

**CEQA.** The 2002 Oakland Army Base Area (OAB) Area Redevelopment Plan Environmental Impact Report (2002 OAB EIR)[20] evaluated the potential impacts of redevelopment of the 1,800-acre redevelopment area, including the former OAB and the Maritime sub-district. The EIR was certified by the lead agency, the City of Oakland, in July 2002. On September 17, 2002, the Board of Port Commissioners, acting on behalf of the Port of Oakland as a responsible agency under CEQA, adopted findings and the mitigation program in the City's EIR (Resolution No. 02317). In 2012, the City of Oakland, in consultation with the Port, issued an Initial Study/Addendum[21] to the Redevelopment EIR to evaluate proposed changes to the redevelopment plan. The resulting updated Standard Conditions of Approval/Mitigation Monitoring and Reporting Program (SCA/MMRP) was adopted by the Board of Port Commissioners on June 21, 2012 (Resolution No. 12-76). The OAB EIR, as inclusive of the addendum, includes implementation of utility improvements and relocations and maritime facility improvements such as those included in this proposal. Construction and operational impacts would be the same as described in the 2002 OAB EIR inclusive of the addendum. This action does not trigger any of the conditions set forth in Section 15162 of the CEQA Guidelines, and no further CEQA review is required.

**NEPA.** NEPA review has not been completed. Due to the small physical footprint of the effort, lack of sensitive resources on the site, and low level of impacts, the Port expects the project to qualify for a Categorical Exclusion under NEPA (MARAD Categorical Exclusion (CatEx 4) described in MAO 660-1). CatEx 4 covers projects that involve "Reconstruction, modification, modernization, replacement, repair, and maintenance (including emergency replacement, repair, or maintenance) of equipment, facilities, or structures which do not change substantially the existing character of the equipment/facility/structure." The small footprint of the fuel cell and storage battery components of the project would not substantially change the existing character of the facility, nor would the proposed extensions of Circuit 2, or roof-top solar cells on a new warehouse within the Port area. Should MARAD determine that a more detailed NEPA review is required, a focused EA could be readily completed within 120 days.

20 https://www.oaklandca.gov/resources/2002-oakland-army-base-redevelopment-plan-eir

21 https://staging.oaklandca.dev/documents/2012-oakland-army-base-project

### *Federal and State Permits and Approvals*

The project does not require any Federal or state permits.

### *Local Permits*

Prior to the start of construction, the contractor will be required to prepare a stormwater pollution prevention plan and obtain a Construction General NPDES permit consistent with the level of risk posed by project construction. NPDES permits are routine activities and will readily be accomplished as part of the mobilization and pre-construction process. The City of Oakland will issue building and other construction-related permits for the project.

## 5.3 Risk Mitigation

Potential risks associated with the design and construction of the project are low. Budget risk is low because the Port will set aside budget in its capital improvement program, is familiar with the subsurface conditions in the project area, and has extensive experience building out the infrastructure. Schedule risks are associated with potential delays in receiving the necessary approvals and/or being able to obtain needed equipment. Because the project would be constructed on Port land and the existing tenants have short term month-to-month leases, only limited approvals are required (see Section 5.2). Therefore, schedule risk due to delays in approvals is low; the Port can draw on its on-call consultants if MARAD requires assistance completing the NEPA review.

The primary project construction risk is associated with the ability to obtain needed electrical equipment such as refrigeration racks and battery storage. However, the procurement process for long lead time items would be identified early and begin prior to construction.

As shown in the project schedule, design would begin by July 2024, following grant approval and obligation of funds. Overall design and construction of the project is expected to take 36 months, easily allowing for all obligated funds to be expended within 5 years of obligation, even should there be substantial delays in obtaining needed components.

The project will be constructed in a location not known to have any environmental contamination. Regardless, Port Environmental staff will be able to address any unforeseen environmental conditions during the construction process.

# 6 Domestic Preference

The project will meet the Buy American requirements for all equipment purchased for the project. All equipment will be 100% manufactured domestically and will have a greater than 50% domestic content for individual components as required by the Buy American Act. As part of the project scoping, the Port has developed the budget and cost components with the Buy American Act provisions in mind.

# 7 Determinations

| | |
|---|---|
| 1. The project improves the safety, efficiency, or reliability of the movement of goods through a port or intermodal connection to the port. | **Safety.** The project's safety benefits stem from reductions in truck VMT due to the diversion of trucks from the Ports in Southern California and Washington to travel a shorter distance to the Port of Oakland. Approximately 420 crashes are estimated to be avoided over 20 years resulting in $26.9 million in benefits.<br>**Efficiency.** The project increases cargo throughput efficiency and capacity and provides greater on-dock flexibility by providing additional storage for import, export, and empty containers. It is estimated to divert approximately 288,500 truck TEUs from the Central California areas to the Port of Oakland which reduces average annual truck VMT by 13.5 million miles and travel time by 269,407 hours, and vehicle-operating costs (VOC) of $85.2 million from fuel, maintenance, tires, and depreciation over the 20 years. In addition, providing electric charging stations within the project site will reduce travel time, VMT, fuel use, and emissions by eliminating the need for trucks to travel to nearby fueling stations.<br>**Reliability and Resiliency.** The additional container storage at the Outer Harbor Terminal will make the Port more reliable and resilient with the ability to handle disruptions and unpredictability in the supply chain. The site can provide reliability to its customers and terminal operators to handle import or export surges. With the uncertainty of vessel arrivals due to congestion issues in Southern California, the new stacked reefer container facility would allow agricultural shippers to safely plug in and store their containers until needed at the terminal. The battery storage and substation upgrades would provide resiliency for the cold cargo storage and shipments due to power loss and/or energy limitations. It will improve the reliability of the electrical grid and backup power storage and climate resilience to help insulate and protect the Port from the impacts of rolling blackouts during heat waves and public safety power shutoffs (PSPS).<br>**Environmental and Emissions Mitigation.** Emissions savings from VMT reductions is estimated at $8.7 million over 20 years. Providing the electrical infrastructure systems (electrical chargers, battery storage, and substation upgrades) to support zero-emissions equipment and operations is essential to decarbonizing the Port and delivering the related air quality and community health benefits. The project reduces VMT and associated emissions, and improves Port efficiency and reduces idling by optimizing the use of Port areas adjacent to its terminals. This project would help to reduce harmful emissions and associated negative health impacts for workers at the Port and neighboring historically disadvantaged communities. |
| 2. The project is cost effective. | As summarized in Section 4.2 and detailed in the Benefit-Cost Analysis Spreadsheet and Benefit-Cost Analysis and Methodology Report (Appendix A and B), the project has a has an estimated benefit-cost ratio of 5.0 with net benefits over a 20-year life at $139.9 million, and therefore is considered cost-effective. |
| 3. The eligible applicant has the authority to carry out the project. | The Port of Oakland is a department of the City of Oakland governed and managed by the Board of Port Commissioners ("Port Board") and its appointed staff. Under the Charter of the City of Oakland ("City Charter"),18 the Port Board has the "complete and exclusive power":<br>*"To take charge of, control, and supervise the Port of Oakland, including all the water front properties, and lands adjacent thereto, or under water,* |

| | |
|---|---|
| | *structures thereon, and approaches thereto, storage facilities, and other utilities, and all rights and interests belonging thereto, which are now or may hereafter be owned or possessed by the City, including all salt or marsh or tidelands and structures thereon granted to the City in trust by the State of California for the promotion and accommodation of commerce and navigation."*<br>As the above dictates, the Port Board has control over tidelands that were granted to the City by the State of California in trust and/or acquired with trust proceeds ("State Tidelands"). All such State Tidelands and other properties over which the Port Board has control and jurisdiction are referred to as the "Port Area" in the Charter. The Port Area includes the Oakland International Airport, the seaport, Jack London Square, and (with some exceptions) public lands along the Oakland waterfront. All of the property on which the project would occur is within the "Port Area." |
| 4. The eligible applicant has sufficient funding available to meet the matching requirements. | As detailed in Section 3, the total estimated cost of the project is $48,790,500 including contingency. The Port would fund $12,197,625 (25%) and PIDP $36,592,875 (75%). The Port of Oakland is a financially sound organization with a stable revenue base and a firm financial standing. The Port's liquidity position, comprised of both unrestricted cash and Board reserves, remains strong and provides the Port the financial flexibility to adapt and respond to COVID and other future operational and financial challenges. Furthermore, Port operations are supported by a strong and diverse local economy. The Bay Area continues to be an important center of commerce, and the Port remains an important, key gateway for both domestic and international trade and a top travel destination.<br>Non-Federal funds would be provided by the Port of Oakland; the Port will prioritize and set aside budget in its capital improvement program for the project. There are no conditions on the Port funds, and the funds can be made available from the Port's reserves prior to obligation of Federal grant funds. |
| 5. The project will be completed without unreasonable delay. | As shown in Figure 6 and discussed in Section 5.1, the Port is prepared to move ahead quickly with the project and be ready for obligation of grant funds (i.e., to have obtained all necessary approvals and clearances) no later than July 1, 2024. Upon notification of grant award, the Port would likely complete any necessary resource planning steps needed to facilitate the beginning of design. Overall, the Port anticipates that design and construction would be completed within 36 months of grant agreement execution. There are few regulatory approvals that would be required prior to construction. |
| 6. The project cannot be easily and efficiently completed without Federal funding or financial assistance available to the project sponsor. | Of the total project costs, the Port's share would likely only cover a portion of the repaving costs ($12.6 million) without the support of Federal funding. It is important to note the project components are interrelated – repaving the yard alone would not address the supply chain constraints or yield the other project benefits. Federal funding would leverage the Port capital investment to include much needed refrigeration racks to support the Port's agricultural partners, bolster the Port's electrical infrastructure with additional resiliency features, and further implement the Port's zero-emissions equipment goals with charging infrastructure. More importantly, this project provides a long-term solution to address many of the supply chain constraints the Port continues to see. Without funding support, this project will be deferred until additional infrastructure funding was available. |

# Appendices and Attachments

- Application for Federal Assistance (SF-424 and SF-424C) forms
- Disclosure of Lobbying Activities (SF-LLL) form
- Appendix A—Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment—Building Resiliency Now and For the Future
- Appendix B—Benefit-Cost Analysis and Methodology Report for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment—Building Resiliency Now and For the Future
- Appendix C—Letters of Support

## *APPENDIX B - BENEFIT-COST ANALYSIS AND METHODOLOGY REPORT*

# Executive Summary

This benefit-cost analysis (BCA) is conducted for the Port of Oakland *Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future*, for submission to the U.S. Department of Transportation (USDOT) as a requirement of a discretionary grant application for the 2022 Port Infrastructure Development Program. The analysis is conducted in accordance with the benefit-cost methodology as outlined by USDOT in the Benefit-Cost Analysis Guidance for Discretionary Grant Programs, released in March 2022 (revised). The period of analysis corresponds to 23 years and includes 3 years of construction and 20 years of benefits after operations begin in 2027.

The **Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future Project** is essential to sustain the Port's future growth potential and operational efficiencies, support rural farming communities, and maintain and expand the global competitiveness of the Port and provide the Megaregion's primary connection point to world markets. This project would construct the first phase of a broader Outer Harbor Terminal (OHT) redevelopment (approximately 25 of 116 acres) providing much needed container capacity relief (particularly for refrigerated exports), and would eventually include wharf strengthening, larger container cranes, and related electrical improvements.

The Port of Oakland (Port) serves as a critical global gateway for the vast and diverse San Francisco Bay Area and Northern California Megaregion, supporting more than 500,000 jobs in the state of California (Martin Associates 2018) including the economy of the rural Central Valley farming sector, and is the second largest exporting region in the U.S. It is also the fourth busiest container port in the U.S. West Coast and one of the top ten in the U.S. with anticipated growth projections increasing from 2.45 million twenty-foot equivalent units (TEUs) in 2021 to 5.19 million TEUs in 2050[1]. Approximately 45% of the loaded TEUs are export commodities including recycled paper, nuts, fruit, meat, grains, iron/steel products, and dairy products, with these products often going to markets in Asia, primarily China, Japan and Korea.

COVID-19 revealed vulnerabilities and challenges within the supply chain, most notably in the areas of port capacity and congestion issues. Farm exports which rely heavily on the Port of Oakland have been hit particularly hard with transportation challenges and storage and handling fees. The project represents Phase 1 of modernizing the Outer Harbor Terminal area; creating a 25+/- acre (out of 116 acre total area) off-dock container support facility with truck entry/exit gates and gatehouse, an office trailer, perimeter fencing, grounded storage, wheeled storage, rubber tired gantry crane (RTG) refrigerated container (reefer) storage, RTG grounded storage, new light emitting diode (LED) high mast lighting, drainage improvements, pavement and other yard improvements, substation improvements, and battery storage and charging stations to expand the Port's electrical grid capacity and support power reliability and resiliency (see Figure 1). The project will improve the Port's ability to accommodate near-term supply chain uncertainties and surges in imports, exports, and refrigerated cargo; increase its

[1] The Tioga Group and Hackett Associates, *2019-2050 Bay Area Seaport Forecast* (Moderate Growth). SF Bay Conservation and Development Commission, 2020 (page 76). https://www.bcdc.ca.gov/seaport/2019-2050-Bay-Area-Seaport-Forecast.pdf

container handling capacity; reduce congestion and improve operational efficiencies at the Port; make it easier to fill empty shipping containers with agricultural commodities at a facility that can accommodate these transactions at the Port; and advance the Port's and State's goal of a zero-emissions freight transportation system.

The capital cost for this project is $48.8 million in undiscounted dollars (2024-2026). At a seven percent real discount rate, these costs are $34.8 million. At the end of 20-years operating period, the assets will retain a residual value of $2.9 million in undiscounted dollars and $0.5 million in discounted dollars. The residual value is included in the total benefits of the project per USDOT guidance. The project will incur new operations and maintenance (O&M) costs of $18.2 million in undiscounted dollars or $6.4 million when discounted at seven percent.

The project will generate $174.7 million through 2046 in discounted net benefits using a seven percent discount rate (not including residual value). The project will improve Port capacity allowing for a recapture of freight lost to more distant ports, which will contribute to reduced congestion, crash incidents, operating costs, and emissions. Using a seven percent discount rate, this leads to an overall project Net Present Value (including residual value of assets) of $139.9 million and a **Benefit Cost Ratio (BCR) of 5.0**.[2] The overall project benefit matrix is in Table 1.

**Table 1 Phase 1 Outer Harbor Terminal Redevelopment Project Impacts and Benefits Summary, Monetary Values in Millions of Discounted 2020 Dollars**

| Current Status/Baseline & Problem to be Addressed | Change to Baseline/ Alternatives | Economic Benefit | Monetized Benefits, 2027-2046 ($millions at 7% discount rate) | Table Reference in BCA |
|---|---|---|---|---|
| Lack of container capacity limiting Port's ability to handle surges in container movement, including refrigerated containers for agricultural exports, with freight moving to other, farther away ports | Infrastructure to provide onsite storage and electricity for refrigerated containers, so Port can recapture freight lost to other ports | Travel time savings: Reclaiming containerized freight from other ports reduces trip miles and hours of travel | $58.0 | A-11 |
| | | Savings in vehicle operating costs due to reduced trip miles | $85.2 | |
| Additional miles to other ports increase truck crashes | Infrastructure to provide onsite container storage and electricity for refrigerated | Reduction in crashes: Reduction in costs associated with fatality, injury | $26.9 | A-12 |

[2] Per USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs (March 2022, Revised), savings in operations and maintenance costs are included in the numerator along with other project benefits when calculating the benefit-cost ratio.

| Current Status/Baseline & Problem to be Addressed | Change to Baseline/ Alternatives | Economic Benefit | Monetized Benefits, 2027-2046 ($millions at 7% discount rate) | Table Reference in BCA |
|---|---|---|---|---|
| | containers, so Port can recapture freight lost to other ports | and property damage crashes | | |
| Air pollution | Reduction in emissions as freight is recaptured from other more distant ports | Reduced vehicular emissions due to reduced trip miles | $8.7 | A-14 |
| Noise | Reduction in noise from recaptured freight lost to more distant ports | Reduced noise due to reduced trip miles | $1.8 | A-16 |
| Residual Asset Values | Value of remaining useful life on project assets | Remaining value of assets with a service life greater than 20 years | $0.5 | A-18 |

Source: Cambridge Systematics, Inc.

The overall Phase 1 Outer Harbor Terminal Redevelopment Project impacts are in Table 2, which shows the magnitude of the various metrics used in this analysis to quantify the project benefits.

**Table 2 Project Impacts for the Phase 1 Outer Harbor Terminal Redevelopment Project, Cumulative 2027-2046**

| Metric | Cumulative Savings |
|---|---|
| Vehicle-Hours Traveled Saved | 5.4 million hours |
| Vehicle Operating Costs Saved | 269.4 million fewer miles driven |
| Accidents Avoided | 422 crashes |

Source: Cambridge Systematics, Inc.

# 1 Introduction

This benefit-cost analysis (BCA) is conducted for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future Project, for submission to the U.S. Department of Transportation (USDOT) as a requirement of a discretionary grant application for the 2022 Port Infrastructure Development Program. The analysis is conducted in accordance with the benefit-cost methodology as outlined by USDOT in the Benefit-Cost Analysis Guidance for Discretionary Grant Programs, released in March 2022 (revised). The period of analysis corresponds to 23 years and includes 3 years of construction and 20 years of benefits after operations begin in 2027. This appendix is organized as follows:

- Section 2 contains the project description.
- Section 3 documents the BCA methodology, including key methodological components, assumptions, and the study scenarios.
- Section 4 provides freight projections, vehicle miles traveled, hours of freight travel for the project and the underlying assumptions.
- Section 5 contains a detailed explanation and calculation of the project benefits.
- Section 6 contains a detailed explanation and calculation of the project costs.
- Section 7 contains the summary results of the BCA.

# 2 Project Description

As shown in Figure 1 and detailed in the cost estimate in Appendix A – Benefit-Cost Analysis Spreadsheet (Construction Cost worksheet), site work for the project will include: demolition of existing pavement, RTG runway foundation grading, demolition and relocation of K-Rail for perimeter, 8-foot high chain link security fencing on the concrete K-Rail, drainage, pavement markings/striping, precast concrete (PCC) wheel stops, foundation for lighting, trenching and backfill for the substations, duct banks and conductors for the substations, and conduit and trenching to connect the charging station and reefer racks to the substations. Table 3 contains a summary of the key project components. Values are estimates based on conceptual design.

The project is in the conceptual design stage but could be designed, constructed, and operational within 36 months following availability of funding as described in the narrative, Section 5.0 Project Readiness. The project meets the PIDP grant eligibility requirements as it is located within the boundary of a port, in a designated Historically Disadvantaged Community and Opportunity Zone. It supports the program's goals of improving: the safety, efficiency, and reliability of loading and unloading of goods at the port; the movement of goods into, out of, around, and within the Port; the Port's resiliency; and reduces environmental and emissions impacts.

**Figure 1 Phase 1 Outer Terminal Harbor Redevelopment Concept Diagram**

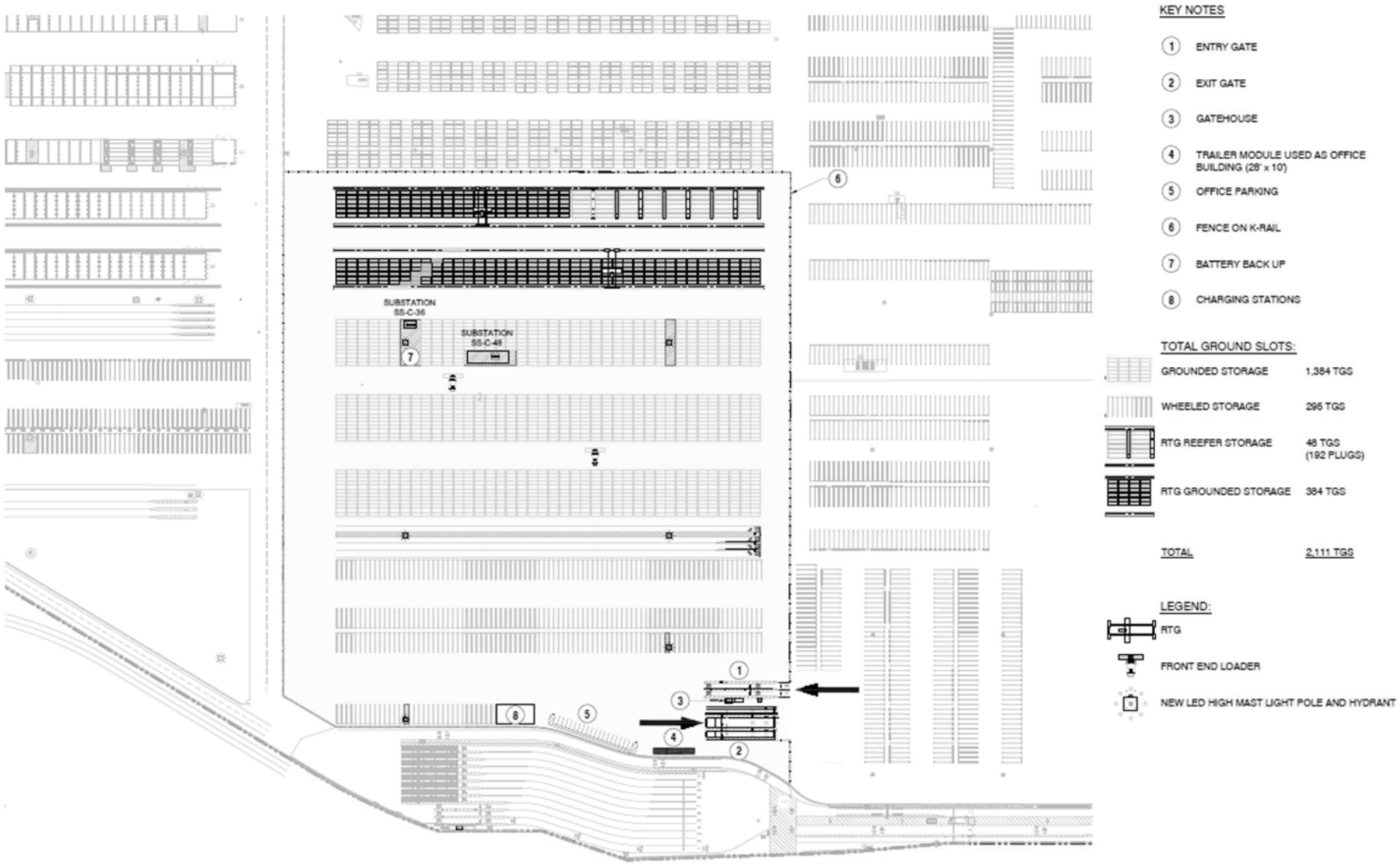


**Table 3 Key Phase 1 Outer Harbor Terminal Redevelopment Project Components**

| Component | Units/Capacity | Description |
|---|---|---|
| Pavement replacement | 28 acres[3] | 7" asphalt concrete (AC) pavement on 17" crushed miscellaneous base (CMP) that will support container stacking and capacity for structural stability. |
| RTG reefer storage and plugs | 48 total ground slots (TGS) with up to 192 plugs (capacity=192) | Stacked up to 4 containers high. Provides flexible reefer import or export storage capacity. Supports rural farmers and other agricultural suppliers to deliver goods to the Port with flexibility to accommodate ever-changing vessel arrivals and departures reducing potential spoilage and lost revenue. Plugs offer power reducing use of gensets (reduced pollutants). |
| RTG grounded storage | 384 TGS (capacity= 1,536) | Flexible import, export, and empty RTG grounded container storage stacked up to 4 containers high. In line with adjacent marine terminal RTG row to accommodate future expansion/integration into existing adjacent marine terminal. |
| Grounded container storage | 1,384 TGS (capacity = 5,536 loaded; 6,920 empty) | Flexible staging/storage area to support empties, imports, or exports depending on need. Empties can be stacked 5 containers high and loaded 4 high. |
| Wheeled container storage | 295 TGS (capacity = 295) | Flexible import, export, and empty storage area for wheeled containers or temporary parking. |
| Truck exchange lanes | 4 | Locations to enable pick or placement of containers. |
| Guard house/entry lanes/exit lanes/ security gates | 1/2/3/2 | Facilities and equipment to restrict access to the Outer Harbor Terminal off-dock container support area. As a restricted area, these serve as a check point to verify and record entities entering or leaving the area. |
| Trailer modules for office building | 3 | To support administrative activities for the Outer Harbor Terminal off-dock support facility |
| LED high mast light poles and hydrants | 6 | Converting from common high-intensity discharge (HID) with existing lighting to LED which saves on electricity costs (resiliency) and operations and maintenance costs (O&M) |
| Substation modifications | 2 | Substation upgrades at two locations in the area, SS-C-36 and SS-C-48. Allows the Port to accommodate increased electrification demands, optimize the battery storage |

[3] Additional acreage above the 25+/- acre site includes extra contingency to address driveways and periphery of the fenced area.

| Component | Units/Capacity | Description |
|---|---|---|
| | | system, and support the reefer plugs and charging station. Needed to support the Port's zero-emissions operational infrastructure. |
| Charging stations | 2 | Charging equipment for the yard zero-emissions vehicles (ZEV) trucks. Supports the Port's 2020 and Beyond Plan and West Oakland Community Action Plan (WOCAP) to transition to zero emissions cargo-handling equipment and drayage truck operations. |
| Battery storage system | 1 | Located at substation SS-C-48. Expands the Port's electrical grid capacity, allow for operations on green power, and minimize energy reliability risks to the Port. |

Source: Port of Oakland

# 3 Benefit Cost Analysis Framework

The BCA provides an evaluation framework to assess the economic advantages (benefits) and disadvantages (costs) of a potential infrastructure project. Project benefits and costs are quantified in monetary terms to the extent possible. The overall goal of the project BCA is to assess whether the expected benefits of the project justify the costs from a national perspective. The BCA framework attempts to capture the net welfare change created by the project, including cost savings and increases in welfare (benefits), as well as disbenefits where costs can be identified (e.g., project capital costs), and welfare reductions where some groups are expected to be made worse off because of the proposed project.

The BCA framework involves defining a Base or "No Build" scenario, which is compared to the "Build" scenario. The BCA assesses the incremental difference between the "Build" scenario and the "No Build" scenario, which represents the net change in welfare. BCAs are forward-looking exercises which seek to assess the incremental change in welfare over a project life cycle. The importance of future changes is determined through discounting, which is meant to reflect the time value of money.

## *Key Methodological Components*

The project BCA is conducted in accordance with the benefit-cost methodology recommended by the USDOT.[4] The methodology includes the following key components:

- Defining existing and future conditions under the "Build" scenario versus "No Build";
- Assessing the project benefits with respect to each of the primary selection criteria defined by the USDOT over the 20 years of operations beyond the project completion when benefits accrue and using USDOT recommended values to monetize changes in travel time, vehicle operating costs,

[4] U.S. Department of Transportation. Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised).

quality of life benefits, emissions and traffic crashes by severity while relying on best practices for monetization of other benefits or disbenefits;

- Estimating the project capital costs during project construction and project operation and maintenance costs over the 20 years of operations beyond the project completion when benefits accrue; and
- Discounting project benefits and costs to 2020 dollars using a real discount rate of 7 percent consistent with USDOT guidance.

## Key Assumptions

The assessment of the project benefits and costs associated with the Phase 1 Outer Harbor Terminal Redevelopment Project involve the following key assumptions:

- The evaluation period includes the design and engineering, right of way acquisitions, and construction during which capital expenditures are made plus 20 years of operations beyond the project completion within which to evaluate ongoing benefits and costs.
- The construction phase of the project will begin in 2024 ending in approximately 2026, at which point the project is complete.
- The project will open to the public in 2027 and the 20-year operational period will conclude in 2046. Project benefits begin in the calendar year immediately following final construction occurs.
- All project benefits and costs are assumed to occur at the end of each calendar year for purposes of present value discounting.
- Monetary values of project costs and benefits are in constant, year-end 2020 dollars.

## "Build" and "No Build" Scenarios

The analysis of the Phase 1 Outer Harbor Terminal Redevelopment Project considered how the balance of costs and benefits resulting from the construction of the project would result in long-term benefits by comparing the "Build" scenario relative to the "No-Build" scenario.

- The "No Build" (Base) scenario would consist of leaving the facilities as they currently stand.
- The "Build" scenario would consist of the components described in Section 2. Project Description above.

# 4 Freight Projections, Vehicle Miles and Hours of Freight Travel

Table 4 shows the number of TEUs lost to the Los Angeles/Long Beach (2,858,194) and Seattle/Tacoma (26,773) ports. The Port of Oakland estimated that, conservatively, 10 percent of those lost TEUs can be recaptured because of the proposed Port improvements. That would be 285,819 TEUs and 2,678 TEUS recaptured from Los Angeles/Long Beach and Seattle/Tacoma, respectively.

**Table 4 Annual TEUs Lost to Ports in Los Angeles/Long Beach and Seattle/Tacoma (2022)**

## Summary Potential Container Market for Oakland - Truck Market

| | Imports | | Exports | Total | Laden Moves (tons) | Laden TEUS | Empty TEUs | Additional TEUS |
|---|---|---|---|---|---|---|---|---|
| Lost to LA (tons) | 13,648,678 | | 9,032,759 | 22,681,436 | 1,334,202 | | | |
| *Laden TEUS Lost* | *1,429,097* | | *945,783* | | | *2,374,880* | | |
| Estimated Empties (TEUS) | | | | | | | *483,314* | |
| Total Lost to LA | | | | | | | | 2,858,194 |
| Lost to Seattle (tons) | 39,867 | | 127,848 | 167,715 | 9,866 | | | |
| *Laden TEUS* | *4,174* | | *13,386* | | | *17,561* | | |
| Estimated Emptiesc(TEUS) | | | | | | | *9,212* | |
| Total Lost to Seattle | | | | | | | | 26,773 |
| ***Total Lost TEUS by Truck- Potential Market*** | | | | | | | | ***2,884,967*** |

Source: Port of Oakland[5]

[5] 2022 analysis performed by Martin Associated using S&P Transearch data.

This equates to 142,910 container trips and 1,339 container trips recaptured from Los Angeles and Tacoma, respectively, assuming 2 TEUs per container.

The difference in trip distance is approximately 61 miles for freight recaptured from Los Angeles/Long Beach and 770 miles from Seattle/Tacoma. Multiplying the number of recaptured containers by the trip length provides a baseline of trip miles saved because of the Port improvements. These 2022 baseline miles saved are:

- Recaptured from Los Angeles/Long Beach 8,717,492 miles less traveled
- Recaptured from Seattle/Tacoma 1,030,761 miles less traveled
- Total Miles saved 9,748,252 miles less traveled

Assuming a travel speed of 50 miles per hour, the baseline hours of travel saved are calculated as 194,965 hours in 2022.

The compound annual growth rate for cargo at the Port of Oakland between 2018 and 2050 is projected to be 2.2% for the Moderate Growth scenario in the 2019-2050 Bay Area Seaport Forecast[6]. This percent is used to grow the baseline estimates to calculate reduced miles and travel time for the operational period (2027-2046). Table 5 presents the estimated vehicle miles traveled (VMT) and vehicle hours traveled (VHT) savings resulting from the Port improvements.

**Table 5 Annual VMT and VHT Reductions Resulting from the Phase 1 Outer Harbor Terminal Redevelopment Project**

| Year | VMT Reduction (miles) | VHT Reduction (hours) |
|---|---|---|
| 2027 | 10,868,791 | 217,376 |
| 2028 | 11,107,904 | 222,158 |
| 2029 | 11,352,278 | 227,046 |
| 2030 | 11,602,028 | 232,041 |
| 2031 | 11,857,273 | 237,145 |
| 2032 | 12,118,133 | 242,363 |
| 2033 | 12,384,732 | 247,695 |
| 2034 | 12,657,196 | 253,144 |
| 2035 | 12,935,654 | 258,713 |
| 2036 | 13,220,239 | 264,405 |
| 2037 | 13,511,084 | 270,222 |

[6] The Tioga Group and Hackett Associates, 2019-2050 Bay Area Seaport Forecast, Prepared for SF Bay Conservation and Development Commission, 2020 (https://www.bcdc.ca.gov/seaport/2019-2050-Bay-Area-Seaport-Forecast.pdf)

| Year | VMT Reduction (miles) | VHT Reduction (hours) |
|---|---|---|
| 2038 | 13,808,328 | 276,167 |
| 2039 | 14,112,111 | 282,242 |
| 2040 | 14,422,577 | 288,452 |
| 2041 | 14,739,874 | 294,797 |
| 2042 | 15,064,151 | 301,283 |
| 2043 | 15,395,563 | 307,911 |
| 2044 | 15,734,265 | 314,685 |
| 2045 | 16,080,419 | 321,608 |
| 2046 | 16,434,188 | 328,684 |
| **Total** | **269,406,790** | **5,388,136** |

Source: Cambridge Systematics, Inc.

# 5 Project Benefits

## Economic Competitiveness - Travel Time and Vehicle Operating Cost Savings

The Phase 1 Outer Harbor Terminal Redevelopment Project would contribute to increasing the economic competitiveness of the Port of Oakland by increasing capacity and efficiency of the port. The project will reduce the miles traveled and travel times for container shipments by diverting approximately 144,000 containers per year from the Central California areas to/from the Ports of Los Angeles, Long Beach, Seattle, and Tacoma to the Port of Oakland which reduces truck VMT by an average of 13.5 million per year. This results in an average of 269,000 hours per year worth $8.6 million per year in travel time savings for truck drivers and an average of $12.6 million per year in vehicle-operating costs (VOC) savings from fuel, maintenance, tires, and depreciation.

Travel time savings are calculated by multiplying the number of travel hours saved by the value of travel time (VOTT) of $32.00 per hour for truck drivers, per U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised). The Vehicle Operating Cost (VOC) benefit is calculated by multiplying the number of VMT saved by $0.94 per VMT for commercial trucks per U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised). The VOTT and VOC benefits are presented in Table 6. In total VOC savings are $253.2 million undiscounted and $85.2 million discounted. VOTT savings are $172.4 million undiscounted and $58.0 million discounted.

**Table 6 Annual Travel Time and Vehicle Operating Cost Savings Resulting from the Phase 1 Outer Harbor Terminal Redevelopment Project**

| | VOC Savings | | VOTT Savings | |
|---|---|---|---|---|
| Year | Nominal | Discounted ($2020) | Nominal | Discounted ($2020) |
| 2027 | $10,216,663 | $6,362,425 | $6,956,026 | $4,331,864 |
| 2028 | $10,441,430 | $6,077,007 | $7,109,059 | $4,137,537 |
| 2029 | $10,671,142 | $5,804,394 | $7,265,458 | $3,951,928 |
| 2030 | $10,905,907 | $5,544,010 | $7,425,298 | $3,774,645 |
| 2031 | $11,145,837 | $5,295,307 | $7,588,655 | $3,605,315 |
| 2032 | $11,391,045 | $5,057,760 | $7,755,605 | $3,443,581 |
| 2033 | $11,641,648 | $4,830,870 | $7,926,228 | $3,289,103 |
| 2034 | $11,897,764 | $4,614,158 | $8,100,605 | $3,141,554 |
| 2035 | $12,159,515 | $4,407,168 | $8,278,819 | $3,000,625 |
| 2036 | $12,427,024 | $4,209,463 | $8,460,953 | $2,866,017 |
| 2037 | $12,700,419 | $4,020,627 | $8,647,094 | $2,737,448 |
| 2038 | $12,979,828 | $3,840,263 | $8,837,330 | $2,614,647 |
| 2039 | $13,265,384 | $3,667,989 | $9,031,751 | $2,497,354 |
| 2040 | $13,557,223 | $3,503,444 | $9,230,450 | $2,385,324 |
| 2041 | $13,855,482 | $3,346,280 | $9,433,519 | $2,278,318 |
| 2042 | $14,160,302 | $3,196,167 | $9,641,057 | $2,176,113 |
| 2043 | $14,471,829 | $3,052,787 | $9,853,160 | $2,078,493 |
| 2044 | $14,790,209 | $2,915,840 | $10,069,930 | $1,985,253 |
| 2045 | $15,115,594 | $2,785,036 | $10,291,468 | $1,896,195 |
| 2046 | $15,448,137 | $2,660,100 | $10,517,880 | $1,811,132 |
| **Total** | **$253,242,382** | **$85,191,094** | **$172,420,345** | **$58,002,447** |

Source: Cambridge Systematics, Inc.

## Crash Cost Savings

The safety benefits assessed in this analysis include a reduction in truck crashes and resulting reduction in fatalities and injuries, as well as a reduction in other property damage because of reduced VMT enabled by the Phase 1 Outer Harbor Terminal Redevelopment Project.

Safety benefits are calculated by multiplying the fatal, injury and property damage only crash rates for large trucks per 100 million miles from the Federal Motor Carrier Safety Administration[7] by the reduced VMT, multiplied by the unit cost of crashes, per U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised). This is calculated each year and then summed across the years.

Table 7 presents the unit costs and the crash rates used for the safety benefit calculations. Table 8 presents the motor vehicle crash reduction benefits. In total, the reduction in crashes reduce crash costs by $80.0 million nominal and $26.9 million discounted to 2020 dollars over the 20-year operational period.

**Table 7 Unit Costs and Rates of Large Truck Crashes by Crash Severity**

| Variable | Unit | Value | Source |
|---|---|---|---|
| Fatal Crash | $/Crash | $12,837,400 | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, (March 2022 - Revised) |
| Injury Crash | $/Crash | $302,600 | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, (March 2022 - Revised); DOT VSL Guidance - 2021 Update.pdf (transportation.gov) |
| Property Damage Only Accident (No Injury) | $/Crash | $4,600 per vehicle x 1.748 vehicles per crash = $8,041 per PDO crash | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, (March 2022 - Revised) ), May 2015[8] |
| Fatal Crash | Crashes/ 100 million Miles of Travel | 1.43 | U.S. Department of Transportation, National Highway Traffic Safety Administration, The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised), May 2015[9] |
| Injury Crash | Crashes/ 100 million Miles of Travel | 34.1 | Federal Motor Carrier Safety Administration, Large Truck; Large Truck and Bus Crash Facts[10] |
| Property Damage Only Accident (No Injury) | Crashes/ 100 million Miles of Travel | 121.2 | Federal Motor Carrier Safety Administration, Large Truck; Large Truck and Bus Crash Facts[11] |

[7] https://www.fmcsa.dot.gov/safety/data-and-statistics/large-truck-and-bus-crash-facts

[8] https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013

[9] https://www.fmcsa.dot.gov/safety/data-and-statistics/trends-table-4-large-truck-fatal-crash-statistics-1975-2019

[10] https://www.fmcsa.dot.gov/safety/data-and-statistics/trends-table-7-large-truck-injury-crash-statistics-1999-2019

[11] https://www.fmcsa.dot.gov/safety/data-and-statistics/trends-table-10-large-truck-property-damage-only-pdo-crash-statistics-6

**Table 8 Crash Reduction Benefits Resulting from the Phase 1 Outer Harbor Terminal Redevelopment Project**

| Year | Total Crash Cost | |
|---|---|---|
| | Nominal $ | Discounted ($2020) |
| 2027 | $3,229,074 | $2,010,905 |
| 2028 | $3,300,113 | $1,920,696 |
| 2029 | $3,372,716 | $1,834,534 |
| 2030 | $3,446,915 | $1,752,237 |
| 2031 | $3,522,748 | $1,673,632 |
| 2032 | $3,600,248 | $1,598,553 |
| 2033 | $3,679,453 | $1,526,842 |
| 2034 | $3,760,401 | $1,458,349 |
| 2035 | $3,843,130 | $1,392,927 |
| 2036 | $3,927,679 | $1,330,441 |
| 2037 | $4,014,088 | $1,270,757 |
| 2038 | $4,102,398 | $1,213,752 |
| 2039 | $4,192,651 | $1,159,303 |
| 2040 | $4,284,889 | $1,107,297 |
| 2041 | $4,379,157 | $1,057,624 |
| 2042 | $4,475,498 | $1,010,179 |
| 2043 | $4,573,959 | $964,862 |
| 2044 | $4,674,586 | $921,579 |
| 2045 | $4,777,427 | $880,237 |
| 2046 | $4,882,530 | $840,750 |
| **Total** | **$80,039,661** | **$26,925,455** |

Source: Cambridge Systematics, Inc.

## Environmental Sustainability Benefits

This analysis focuses on environmental sustainability as measured by reduction in motor vehicle emissions. Net change in environmental costs is estimated based on the changes in motor vehicle emissions because of reduced VMT as freight is recaptured from other, more distant ports. This analysis applies the running emission rates pertaining to Nitrogen Oxides (NOx), Particulate Matter (PM2.5), Carbon Dioxide (CO2) and Sulfur Dioxide (SO2) for trucks. Running emissions rates

(assuming 50 miles per hour travel speed) in grams per VMT for trucks are based on the Caltrans Cal-B/C 2022 INFRA/RAISE Sketch Model v8.1.12.

The environmental cost per mile for each pollutant was calculated by multiplying the pollutant emission rate by the corresponding pollutant unit emission cost shown in Table 9, per USDOT guidance. This estimation involves converting grams to metric tons for the emissions. The summation of the environmental cost per mile for each of these pollutants represents the emission cost per VMT. This value multiplied by the VMT savings resulting from the Port project

**Table 9 Unit Emission Cost Used in the Monetization of the Environmental Sustainability Benefits – Cost Per Metric Ton**

| Year | CO2 | NOX | SOX | PM2.5 |
|---|---|---|---|---|
| 2027 | $58 | $17,100 | $46,500 | $827,400 |
| 2028 | $60 | $17,400 | $47,300 | $840,600 |
| 2029 | $61 | $17,700 | $48,200 | $854,000 |
| 2030 | $62 | $18,100 | $49,100 | $867,600 |
| 2031 | $63 | $18,100 | $49,100 | $867,600 |
| 2032 | $64 | $18,100 | $49,100 | $867,600 |
| 2033 | $65 | $18,100 | $49,100 | $867,600 |
| 2034 | $66 | $18,100 | $49,100 | $867,600 |
| 2035 | $67 | $18,100 | $49,100 | $867,600 |
| 2036 | $69 | $18,100 | $49,100 | $867,600 |
| 2037 | $70 | $18,100 | $49,100 | $867,600 |
| 2038 | $72 | $18,100 | $49,100 | $867,600 |
| 2039 | $72 | $18,100 | $49,100 | $867,600 |
| 2040 | $73 | $18,100 | $49,100 | $867,600 |
| 2041 | $74 | $18,100 | $49,100 | $867,600 |
| 2042 | $75 | $18,100 | $49,100 | $867,600 |
| 2043 | $77 | $18,100 | $49,100 | $867,600 |
| 2044 | $78 | $18,100 | $49,100 | $867,600 |
| 2045 | $79 | $18,100 | $49,100 | $867,600 |
| 2046 | $80 | $18,100 | $49,100 | $867,600 |

[12] https://dot.ca.gov/programs/transportation-planning/division-of-transportation-planning/data-analytics-services/transportation-economics#:~:text=Cal%2DB/C%202022%20INFRA/%20RAISE%20Corridor%20Model%20v8.1%20(XLSM)

Overall, the Phase 1 Outer Harbor Terminal Redevelopment Project lifecycle's environmental sustainability benefits are $15.2 million in undiscounted dollars and $8.7 million in 2020 dollars at a discounted rate of seven percent (3% for CO2 emissions) over the 20-year operational period (Table 10).

**Table 10 Environmental Sustainability Benefits Resulting from the Phase 1 Outer Harbor Terminal Redevelopment Project**

| | Emissions Benefits | |
|---|---|---|
| Year | Nominal $ | 7% Discount (3% for CO2) ($2020) |
| 2027 | $726,306 | $567,244 |
| 2028 | $737,890 | $548,031 |
| 2029 | $741,479 | $529,934 |
| 2030 | $745,976 | $512,932 |
| 2031 | $746,010 | $503,229 |
| 2032 | $746,424 | $487,997 |
| 2033 | $747,201 | $473,963 |
| 2034 | $748,322 | $458,767 |
| 2035 | $749,772 | $444,596 |
| 2036 | $759,715 | $431,347 |
| 2037 | $761,782 | $418,928 |
| 2038 | $772,323 | $407,256 |
| 2039 | $766,759 | $401,237 |
| 2040 | $769,642 | $390,705 |
| 2041 | $772,773 | $385,426 |
| 2042 | $776,141 | $371,251 |
| 2043 | $787,945 | $362,230 |
| 2044 | $791,758 | $353,623 |
| 2045 | $795,776 | $345,392 |
| 2046 | $799,991 | $341,570 |
| **Total** | **$15,243,985** | **$8,735,656** |

Source: Cambridge Systematics, Inc.

## Noise Benefits

This analysis considers the noise benefit from the reduced VMT from trucks diverting from the Ports of Los Angeles/Long Beach and Seattle/Tacoma to the closer Port of Oakland as a result of the project. The noise reduction benefit is calculated by multiplying the estimated VMT saving by $0.0197 per VMT per U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised).Table 11 presents the annual noise benefits from the project.

**Table 11 Noise Reduction Benefit Resulting from the Phase 1 Outer Harbor Terminal Redevelopment Project**

| | Noise Reduction Benefits | |
|---|---|---|
| Year | Nominal $ | Discounted ($2020) |
| 2027 | $214,115 | $133,340 |
| 2028 | $218,826 | $127,359 |
| 2029 | $223,640 | $121,645 |
| 2030 | $228,560 | $116,188 |
| 2031 | $233,588 | $110,976 |
| 2032 | $238,727 | $105,998 |
| 2033 | $243,979 | $101,243 |
| 2034 | $249,347 | $96,701 |
| 2035 | $254,832 | $92,363 |
| 2036 | $260,439 | $88,220 |
| 2037 | $266,168 | $84,262 |
| 2038 | $272,024 | $80,482 |
| 2039 | $278,009 | $76,872 |
| 2040 | $284,125 | $73,423 |
| 2041 | $290,376 | $70,129 |
| 2042 | $296,764 | $66,983 |
| 2043 | $303,293 | $63,979 |
| 2044 | $309,965 | $61,109 |
| 2045 | $316,784 | $58,367 |
| 2046 | $323,754 | $55,749 |
| **Total** | **$5,307,314** | **$1,785,388** |

Source: Cambridge Systematics, Inc.

## Project Benefits Summary

The benefits of the Phase 1 Outer Harbor Terminal Redevelopment Project can be described as user benefits, such as travel time savings, and social benefits, such as emissions reductions and the reduction in damage to property and humans resulting from crash incidents. The analysis covers the following benefit categories:

- Travel Time Savings
- Vehicle Operating Cost Savings
- Crash Cost Savings
- Environmental Sustainability Benefits
- Noise Reduction Benefits

The analysis uses standardized factors provided by governmental and industry sources to efficiently determine the monetized value of user and social benefits resulting from the project improvements. Table 12 shows the Phase 1 Outer Harbor Terminal Redevelopment Project long-term benefits.

**Table 12 Project Benefits by Long-Term Outcome Category, Millions of Dollars**

| Long-Term Outcome | Benefit (Disbenefit) Category | Benefit (Disbenefit) Description | Benefits (Millions of $) | Benefits 7% Discount (Millions of $2020) |
|---|---|---|---|---|
| **Economic Competitiveness** | Travel Time Savings | Reduction in travel time due to reduced VMT | $172.4 | $58.0 |
| | Vehicle Operating Costs | Reduced VOC because of reduced VMT | $253.2 | $85.2 |
| **Safety** | Reduced Crash Incidents | Reduction in traffic fatalities/injuries and PDO crashes | $80.0 | $26.9 |
| **Environmental Sustainability** | Reduced Emissions | Enhancement of the natural environment from reduced VMT | $15.2 | $8.7 |
| **Noise** | Reduced Noise | Reduction in noise from reduced VMT | $5.3 | $1.8 |
| **Total** | | | **$526.3** | **$180.6** |

Source: Cambridge Systematics, Inc.

# 6 Project Costs

## Capital Costs

The schedule and capital costs associated with the Phase 1 Outer Harbor Terminal Redevelopment Project (Tables 13 and 14) are primarily associated with the actual construction. Construction costs will total of $34.8 million in nominal dollars.

**Table 13 Project Schedule and Costs**

| Variable | Value | Unit |
|---|---|---|
| Construction Start | 2024 | year |
| Construction End | 2026/2027 | year |
| Construction Duration | 3 | years |
| Project Opening | 2027 | year |

Source: Port of Oakland

## Residual Value of Assets

Some of the assets built under this project will have a useful life exceeding the 20-year BCA time horizon. Therefore, per USDOT guidance, assets with useful lives beyond 20 years are valued for the remaining useful life and discounted at the 20-year discount value. The calculated residual value of the "hard" assets such as Reefer Racks, Guard Booth and Office, and Storm Drainage is $2.9 million (undiscounted) and $0.5 million when discounted at seven percent.

## Operations and Maintenance

Based on data provided by the Port of Oakland, the Operations and Maintenance costs (O&M) for the assets constructed under this project will range from $900,000 to $946,000 per year. Per USDOT Guidance, O&M costs will be included in the benefit-cost numerator as a "negative" benefit. Table 14 summarizes the life-cycle project costs.

**Table 14 Phase 1 Outer Harbor Terminal Redevelopment Project – Life Cycle Project Costs**

| | Capital Costs | | Operating and Maintenance Costs | |
|---|---|---|---|---|
| Year | Undiscounted | Discounted | Undiscounted | Discounted |
| 2024 | $16,263,500 | $12,407,346 | $0 | $0 |
| 2025 | $16,263,500 | $11,595,651 | $0 | $0 |
| 2026 | $16,263,500 | $10,837,057 | $0 | $0 |
| 2027 | $0 | $0 | $900,000 | $560,475 |
| 2028 | $0 | $0 | $900,000 | $523,808 |
| 2029 | $0 | $0 | $900,000 | $489,540 |

| Year | Capital Costs | | Operating and Maintenance Costs | |
|---|---|---|---|---|
| | Undiscounted | Discounted | Undiscounted | Discounted |
| 2030 | $0 | $0 | $900,000 | $457,514 |
| 2031 | $0 | $0 | $936,000 | $444,687 |
| 2032 | $0 | $0 | $900,000 | $399,611 |
| 2033 | $0 | $0 | $900,000 | $373,468 |
| 2034 | $0 | $0 | $900,000 | $349,036 |
| 2035 | $0 | $0 | $900,000 | $326,201 |
| 2036 | $0 | $0 | $936,000 | $317,056 |
| 2037 | $0 | $0 | $900,000 | $284,917 |
| 2038 | $0 | $0 | $900,000 | $266,278 |
| 2039 | $0 | $0 | $900,000 | $248,857 |
| 2040 | $0 | $0 | $900,000 | $232,577 |
| 2041 | $0 | $0 | $946,000 | $228,471 |
| 2042 | $0 | $0 | $900,000 | $203,142 |
| 2043 | $0 | $0 | $900,000 | $189,852 |
| 2044 | $0 | $0 | $900,000 | $177,432 |
| 2045 | $0 | $0 | $900,000 | $165,824 |
| 2046 | $0 | $0 | $936,000 | $161,175 |
| **Total** | **$48,791,000** | **$34,840,411** | **$18,154,000** | **$6,399,922** |

Source: Cambridge Systematics, Inc.

# 7 Summary of Results

## Evaluation Measures

The BCA converts potential gains (benefits) and losses (costs) from the Phase 1 Outer Harbor Terminal Redevelopment Project into monetary units and compares them. The following common benefit-cost evaluation measures included in this BCA:

- Net Present Value (NPV): NPV compares the net benefits (benefits minus costs) after being discounted to present values using the real discount rate assumption. The NPV provides a perspective on the overall dollar magnitude of cash flows over time in today's dollar terms.
- Benefit Cost Ratio (BCR): The present value of incremental benefits is divided by the present value of incremental costs to yield the BCR. The BCR expresses the relation of discounted benefits to

discounted costs as a measure of the extent to which a project's benefits either exceed or fall short of the costs.

## BCA Results

Table 15 presents the evaluation results for the Phase 1 Outer Harbor Terminal Redevelopment Project. Results are presented in undiscounted and discounted at seven percent. All benefits and costs are over an evaluation period extending 20 years beyond system completion in 2026 (starting in 2027). The total benefits from the project improvements within the analysis period represent **$174.7 million** (including the O&M costs and asset residual value) when discounted at seven percent. The total capital costs, including engineering and construction, etc. are calculated to be **$34.8 million** when discounted at seven percent. The difference of the discounted benefits and costs equal a NPV of **$139.9 million**, resulting in a BCR of **5.0:1.**

Table 16 summarizes the results of the BCA by year. The full spreadsheet model is attached with the application.

**Table 15 Phase 1 Outer Harbor Terminal Redevelopment Project – Benefit-Cost Analysis Summary**

| BCA Metric | Project Lifecycle | |
|---|---|---|
| | Undiscounted | 7% Discount ($2020) |
| **Benefits** | | |
| • Travel Time Savings | $172,420,345 | $58,002,447 |
| • Vehicle Operating Cost Savings | $253,242,382 | $85,191,094 |
| • Safety Crash Cost Reductions | $80,039,661 | $26,925,455 |
| • Environmental Sustainability | $15,243,985 | $8,735,656 |
| • Noise Reductions | $5,307,314 | $1,785,388 |
| • Maintenance & Operations Costs | ($18,154,000) | ($6,399,922) |
| • Residual Asset Value | $2,937,933 | $505,899 |
| **Total Benefits** | **$511,037,621** | **$174,746,017** |
| **Total Costs** | **$48,790,500** | **$34,840,054** |
| **Benefit/Cost Ratio** | **10.5** | **5.0** |
| **Net Present Value** | **$462,247,121** | **$139,905,964** |

Source: Cambridge Systematics, Inc.

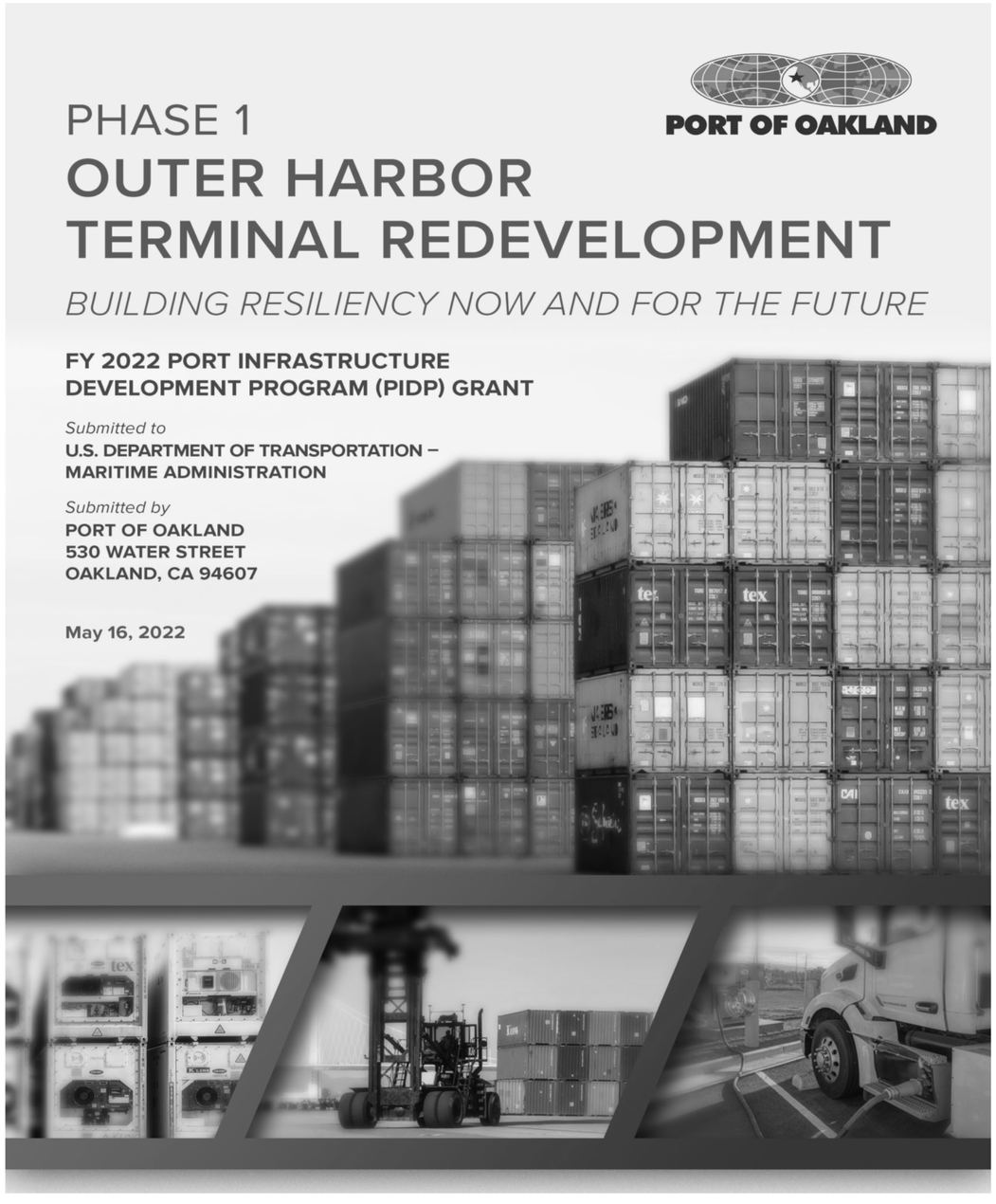
**Table 16 Phase 1 Outer Harbor Terminal Redevelopment Project – Life-Cycle Costs and Benefits**

| | Undiscounted | | Discounted 7% ($2020) | |
|---|---|---|---|---|
| Year | Costs | Benefits | Costs | Benefits |
| 2024 | $16,263,500 | $0 | $12,407,346 | $0 |
| 2025 | $16,263,500 | $0 | $11,595,651 | $0 |
| 2026 | $16,263,500 | $0 | $10,837,057 | $0 |
| 2027 | $0 | $20,442,184 | $0 | $12,845,302 |
| 2028 | $0 | $20,907,317 | $0 | $12,286,822 |
| 2029 | $0 | $21,374,434 | $0 | $11,752,894 |
| 2030 | $0 | $21,852,656 | $0 | $11,242,498 |
| 2031 | $0 | $22,300,837 | $0 | $10,743,772 |
| 2032 | $0 | $22,832,050 | $0 | $10,294,279 |
| 2033 | $0 | $23,338,510 | $0 | $9,848,553 |
| 2034 | $0 | $23,856,440 | $0 | $9,420,493 |
| 2035 | $0 | $24,386,068 | $0 | $9,011,478 |
| 2036 | $0 | $24,899,810 | $0 | $8,608,432 |
| 2037 | $0 | $25,489,551 | $0 | $8,247,106 |
| 2038 | $0 | $26,063,903 | $0 | $7,890,121 |
| 2039 | $0 | $26,634,553 | $0 | $7,553,898 |
| 2040 | $0 | $27,226,328 | $0 | $7,227,615 |
| 2041 | $0 | $27,785,307 | $0 | $6,909,306 |
| 2042 | $0 | $28,449,762 | $0 | $6,617,551 |
| 2043 | $0 | $29,090,186 | $0 | $6,332,499 |
| 2044 | $0 | $29,736,448 | $0 | $6,059,971 |
| 2045 | $0 | $30,397,050 | $0 | $5,799,403 |
| 2046 | $0 | $33,974,226 | $0 | $6,054,024 |
| **Total** | **$48,790,500** | **$511,037,621** | **$34,840,411** | **$174,746,017** |

Source: Cambridge Systematics, Inc.

**Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future**

**FY 2022 Port Infrastructure Development Program Grant**
**May 2022**



# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

| About the B/C Assessment Spreadsheet Tabs |
|---|
| **The Benefit Cost (B/C) spreadsheet provided is broken down into several tabs to make it easy to understand the assumptions that were made to calculate costs and benefits. Below follows a brief description of the intent of each tab.** |

| Tab Name | Description |
|---|---|
| Default Values | Details of various rates and parameters used for estimating economic impacts in different categories, including: |
| | - Discount rates |
| | - Value of Time (VOT) |
| | - Vehicle operating costs |
| | - Noise costs |
| | - Emission amounts and costs by emission type |
| | - Crash costs by crash severity |
| BCR Summary | This tab presents the summary of the benefit cost analysis (BCA) results in various categories and the benefit-cost ratio (BCR) |
| BCA Summary Nominal | This tab summarizes the annual benefits and costs in various categories for the study period in nominal dollars |
| BCA Summary Discounted | This tab summarizes the annual benefits and costs in various categories for the study period in 2019 discounted dollars |
| Recaptured Container Traffic | Provides the 2022 baseline of freight to be recaptured from other ports as a result of the Project and the savings in vehicle miles traveled (VMT). |
| Construction Costs | This tab provides the project cost flow and discounted flows. |
| O&M Costs | This tab presents the O&M Costs for the Project. |
| Residual Value of Assets | This tab provides the value of assets with a service life in excess of 20 years. |
| Crash Rates | This tab provides the source and generation of the crash rates for the safety benefit analysis. |
| Safety Benefits | This tab provides the safety benefits of reduced truck crashes as a result of the project. |
| VOC and VTT Reduction Benefits | This tab provides reductions in vehicle operating costs and value of reduced travel times resulting from the Project. |
| Emissions Reductions | This tab provides the source and generation of the emissions factors for the environmental benefit analysis. |
| Emissions Cost Reductions | This tab monetizes the emissions reductions calculated in the "Emissions Reductions" tab. This is an environmental benefit. |
| Noise Reductions | This tab monetizes the noise reductions from reduced truck VMT. |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

| Value of Travel Time | Vehicle Type | Value | Unit | Source Name | Source Link (if available online) |
|---|---|---|---|---|---|
| Commercial Vehicle Operators | | $32.00 | 2020$ / person hr | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised) | https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%29.pdf |
| **Per Vehicle Cost Factors** | **Vehicle Type** | **Value** | **Unit** | **Source Name** | **Source Link (if available online)** |
| Vehicle Operating Cost | Trucks | $0.94 | 2020$ / Mile | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised) | https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%29.pdf |
| **Rates** | | | **Unit** | **Source Name** | **Source Link** |
| Discount Rate | | 7% | | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised) | https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%29.pdf |
| **Value of Reduced Crashes** | **Vehicle Type** | **Value** | **Unit** | **Source Name** | **Source Link (if available online)** |
| Injury Crash | | $302,600 | per crash | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised) | https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%2 |
| Fatal Crash | | $12,837,400 | per crash | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised) | https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%2 |
| Property Damage Only Crashes | | $8,041 | per crash (1.748 vehicles per crash) x $4600 per vehicle | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised) | https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%29.pdf https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013 |
| **Value of Reduced Noise** | **Vehicle Type** | **Value** | **Unit** | **Source Name** | **Source Link (if available online)** |
| Noise | Buses and Trucks - All Lc | $0.0197 | 2020$ / Mile | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised) | https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%29.pdf |
| **Emissions Rates** | **Vehicle Type** | **Value** | **Unit** | **Source Name** | **Source Link (if available online)** |
| See Sheet "Emissions Reductions" | | | | Caltrans : Cal-B/C 2022 INFRA/RAISE Sketch Model v8.1. | https://dot.ca.gov/programs/transportation-planning/division-of-transportation-planning/data-analytics-services/transportation-economics#:~:text=Cal%2DB/C%202022%20INFRA/%20RAISE%20Corridor%20Model%20v8.1%20(XLSM) |
| **Emission Costs** | **Vehicle Type** | **Value** | **Unit** | **Source Name** | **Source Link (if available online)** |
| NOx, SOx, PM2.5 | | See Table Below | $/metric ton | U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, March 2022 (Revised) | https://www.transportation.gov/sites/dot.gov/files/2022-03/Benefit%20Cost%20Analysis%20Guidance%202022%20%28Revised%2 |

**HIGHWAY EMISSIONS FACTORS (Cost per Metric Ton)**

| Year | $CO_2$ | $NO_X$ | $SO_X$ | $PM_{2.5}$ |
|---|---|---|---|---|
| 2027 | $ 58 | $ 17,100 | $ 46,500 | $ 827,400 |
| 2028 | $ 60 | $ 17,400 | $ 47,300 | $ 840,600 |
| 2029 | $ 61 | $ 17,700 | $ 48,200 | $ 854,000 |
| 2030 | $ 62 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2031 | $ 63 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2032 | $ 64 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2033 | $ 65 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2034 | $ 66 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2035 | $ 67 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2036 | $ 69 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2037 | $ 70 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2038 | $ 72 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2039 | $ 72 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2040 | $ 73 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2041 | $ 74 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2042 | $ 75 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2043 | $ 77 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2044 | $ 78 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2045 | $ 79 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2046 | $ 80 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2047 | $ 81 | $ 18,100 | $ 49,100 | $ 867,600 |
| 2048 | $ 82 | $ 18,100 | $ 49,100 | $ 867,600 |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

| Benefits and Costs | Discounted Value (2020 dollars) |
|---|---|
| Travel Time Savings | $58,002,447 |
| Vehicle Operating Cost Savings | $85,191,094 |
| Safety Crash Cost Reduction | $26,925,455 |
| Environmental Sustainability | $8,735,656 |
| Noise Reduction | $1,785,388 |
| Maintenance & Operations Costs | ($6,399,922) |
| Residual Asset Life | $505,899 |
| ***Total Benefits*** | ***$174,746,017*** |
| | |
| ***Total Costs*** | ***$34,840,054*** |
| ***Benefit/Cost Ratio*** | ***5.0*** |
| ***NPV=*** | ***$139,905,964*** |

| Benefits and Costs | Nominal Value |
|---|---|
| Travel Time Savings | $172,420,345 |
| Vehicle Operating Cost Savings | $253,242,382 |
| Safety Crash Cost Reduction | $80,039,661 |
| Environmental Sustainability | $15,243,985 |
| Noise Reduction | $5,307,314 |
| Maintenance & Operations Costs | ($18,154,000) |
| Residual Asset Life | $2,937,933 |
| ***Total Benefits*** | ***$511,037,621*** |

$526,253,687.55

| | |
|---|---|
| ***Total Costs*** | ***$48,790,500*** |
| ***Benefit/Cost Ratio*** | ***10.5*** |
| ***NPV=*** | ***$462,247,121*** |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

| Year | 7.0% 2020 Discount Factor | Net Costs (Build - Non-Build) | | | Safety Benefits (Crash Reductions) | Vehicle Operating Cost and Travel Time Savings | | Cost of Environmental Damage | Noise Benefits | Total Costs | Total Benefits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Capital Costs | Operating & Maintenance Cost Savings - Treated as a negative benefit | Value of Residual Useful Life | Reduced cost of Injuries and Fatalities | Truck VOC Savings | Truck VOTT Savings | Emissions Reductions | Noise Reduction Benefits | | |
| **2024** | 1.311 | $16,263,500 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $16,263,500 | $0 |
| **2025** | 1.403 | $16,263,500 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $16,263,500 | $0 |
| **2026** | 1.501 | $16,263,500 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $16,263,500 | $0 |
| **2027** | 1.606 | $0 | $900,000 | $0 | $3,229,074 | $10,216,663 | $6,956,026 | $726,306 | $214,115 | $0 | $20,442,184 |
| **2028** | 1.718 | $0 | $900,000 | $0 | $3,300,113 | $10,441,430 | $7,109,059 | $737,890 | $218,826 | $0 | $20,907,317 |
| **2029** | 1.838 | $0 | $900,000 | $0 | $3,372,716 | $10,671,142 | $7,265,458 | $741,479 | $223,640 | $0 | $21,374,434 |
| **2030** | 1.967 | $0 | $900,000 | $0 | $3,446,915 | $10,905,907 | $7,425,298 | $745,976 | $228,560 | $0 | $21,852,656 |
| **2031** | 2.105 | $0 | $936,000 | $0 | $3,522,748 | $11,145,837 | $7,588,655 | $746,010 | $233,588 | $0 | $22,300,837 |
| **2032** | 2.252 | $0 | $900,000 | $0 | $3,600,248 | $11,391,045 | $7,755,605 | $746,424 | $238,727 | $0 | $22,832,050 |
| **2033** | 2.410 | $0 | $900,000 | $0 | $3,679,453 | $11,641,648 | $7,926,228 | $747,201 | $243,979 | $0 | $23,338,510 |
| **2034** | 2.579 | $0 | $900,000 | $0 | $3,760,401 | $11,897,764 | $8,100,605 | $748,322 | $249,347 | $0 | $23,856,440 |
| **2035** | 2.759 | $0 | $900,000 | $0 | $3,843,130 | $12,159,515 | $8,278,819 | $749,772 | $254,832 | $0 | $24,386,068 |
| **2036** | 2.952 | $0 | $936,000 | $0 | $3,927,679 | $12,427,024 | $8,460,953 | $759,715 | $260,439 | $0 | $24,899,810 |
| **2037** | 3.159 | $0 | $900,000 | $0 | $4,014,088 | $12,700,419 | $8,647,094 | $761,782 | $266,168 | $0 | $25,489,551 |
| **2038** | 3.380 | $0 | $900,000 | $0 | $4,102,398 | $12,979,828 | $8,837,330 | $772,323 | $272,024 | $0 | $26,063,903 |
| **2039** | 3.617 | $0 | $900,000 | $0 | $4,192,651 | $13,265,384 | $9,031,751 | $766,759 | $278,009 | $0 | $26,634,553 |
| **2040** | 3.870 | $0 | $900,000 | $0 | $4,284,889 | $13,557,223 | $9,230,450 | $769,642 | $284,125 | $0 | $27,226,328 |
| **2041** | 4.141 | $0 | $946,000 | $0 | $4,379,157 | $13,855,482 | $9,433,519 | $772,773 | $290,376 | $0 | $27,785,307 |
| **2042** | 4.430 | $0 | $900,000 | $0 | $4,475,498 | $14,160,302 | $9,641,057 | $776,141 | $296,764 | $0 | $28,449,762 |
| **2043** | 4.741 | $0 | $900,000 | $0 | $4,573,959 | $14,471,829 | $9,853,160 | $787,945 | $303,293 | $0 | $29,090,186 |
| **2044** | 5.072 | $0 | $900,000 | $0 | $4,674,586 | $14,790,209 | $10,069,930 | $791,758 | $309,965 | $0 | $29,736,448 |
| **2045** | 5.427 | $0 | $900,000 | $0 | $4,777,427 | $15,115,594 | $10,291,468 | $795,776 | $316,784 | $0 | $30,397,050 |
| **2046** | 5.807 | $0 | $936,000 | $2,937,933 | $4,882,530 | $15,448,137 | $10,517,880 | $799,991 | $323,754 | $0 | $33,974,226 |
| **Total** | | **$48,790,500** | **$18,154,000** | **$2,937,933** | **$80,039,661** | **$253,242,382** | **$172,420,345** | **$15,243,985** | **$5,307,314** | **$48,790,500** | **$511,037,621** |

## Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

| Year | 7.0% | Net Costs (Build - Non-Build) | | | Safety Benefits (Crash Reductions) | Vehicle Operating Cost and Travel Time Savings | | Cost of Environmental Damage | Noise Benefits | Total Costs | Total Benefits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2020 Discount Factor | Capital Costs | Operating & Maintenance Cost Savings - Treated as a negative benefit | Value of Residual Useful Life | Reduced cost of Injuries and Fatalities | Truck VOC Savings | Truck VOTT Savings | Emissions Reductions | Noise Reduction Benefits | | |
| **2024** | 1.311 | $12,407,346 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $12,407,346 | $0 |
| **2025** | 1.403 | $11,595,651 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $11,595,651 | $0 |
| **2026** | 1.501 | $10,837,057 | $0 | $0 | $0 | $0 | $0 | $0 | $0 | $10,837,057 | $0 |
| **2027** | 1.606 | $0 | $560,475 | $0 | $2,010,905 | $6,362,425 | $4,331,864 | $567,244 | $133,340 | $0 | $12,845,302 |
| **2028** | 1.718 | $0 | $523,808 | $0 | $1,920,696 | $6,077,007 | $4,137,537 | $548,031 | $127,359 | $0 | $12,286,822 |
| **2029** | 1.838 | $0 | $489,540 | $0 | $1,834,534 | $5,804,394 | $3,951,928 | $529,934 | $121,645 | $0 | $11,752,894 |
| **2030** | 1.967 | $0 | $457,514 | $0 | $1,752,237 | $5,544,010 | $3,774,645 | $512,932 | $116,188 | $0 | $11,242,498 |
| **2031** | 2.105 | $0 | $444,687 | $0 | $1,673,632 | $5,295,307 | $3,605,315 | $503,229 | $110,976 | $0 | $10,743,772 |
| **2032** | 2.252 | $0 | $399,611 | $0 | $1,598,553 | $5,057,760 | $3,443,581 | $487,997 | $105,998 | $0 | $10,294,279 |
| **2033** | 2.410 | $0 | $373,468 | $0 | $1,526,842 | $4,830,870 | $3,289,103 | $473,963 | $101,243 | $0 | $9,848,553 |
| **2034** | 2.579 | $0 | $349,036 | $0 | $1,458,349 | $4,614,158 | $3,141,554 | $458,767 | $96,701 | $0 | $9,420,493 |
| **2035** | 2.759 | $0 | $326,201 | $0 | $1,392,927 | $4,407,168 | $3,000,625 | $444,596 | $92,363 | $0 | $9,011,478 |
| **2036** | 2.952 | $0 | $317,056 | $0 | $1,330,441 | $4,209,463 | $2,866,017 | $431,347 | $88,220 | $0 | $8,608,432 |
| **2037** | 3.159 | $0 | $284,917 | $0 | $1,270,757 | $4,020,627 | $2,737,448 | $418,928 | $84,262 | $0 | $8,247,106 |
| **2038** | 3.380 | $0 | $266,278 | $0 | $1,213,752 | $3,840,263 | $2,614,647 | $407,256 | $80,482 | $0 | $7,890,121 |
| **2039** | 3.617 | $0 | $248,857 | $0 | $1,159,303 | $3,667,989 | $2,497,354 | $401,237 | $76,872 | $0 | $7,553,898 |
| **2040** | 3.870 | $0 | $232,577 | $0 | $1,107,297 | $3,503,444 | $2,385,324 | $390,705 | $73,423 | $0 | $7,227,615 |
| **2041** | 4.141 | $0 | $228,471 | $0 | $1,057,624 | $3,346,280 | $2,278,318 | $385,426 | $70,129 | $0 | $6,909,306 |
| **2042** | 4.430 | $0 | $203,142 | $0 | $1,010,179 | $3,196,167 | $2,176,113 | $371,251 | $66,983 | $0 | $6,617,551 |
| **2043** | 4.741 | $0 | $189,852 | $0 | $964,862 | $3,052,787 | $2,078,493 | $362,230 | $63,979 | $0 | $6,332,499 |
| **2044** | 5.072 | $0 | $177,432 | $0 | $921,579 | $2,915,840 | $1,985,253 | $353,623 | $61,109 | $0 | $6,059,971 |
| **2045** | 5.427 | $0 | $165,824 | $0 | $880,237 | $2,785,036 | $1,896,195 | $345,392 | $58,367 | $0 | $5,799,403 |
| **2046** | 5.807 | $0 | $161,175 | $505,899 | $840,750 | $2,660,100 | $1,811,132 | $341,570 | $55,749 | $0 | $6,054,024 |
| **Total** | | **$34,840,054** | **$6,399,922** | **$505,899** | **$26,925,455** | **$85,191,094** | **$58,002,447** | **$8,735,656** | **$1,785,388** | **$34,840,054** | **$174,746,017** |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

**Baseline is 2022**
**Assume 2.1% freight growth per year going forward**

**2022 Freight Lost to LA**

| | | | |
|---|---|---|---|
| 2,858,194 | TEUs | 285,819 | |
| 1,429,097 | Containers | 142,910 | |
| 61 | 63 miles less Oakland vs LB | | minus 2 miles dray at port |
| 10% | Recaptured | | |
| ***8,717,492*** | ***Miles Saved*** | | |

**2022 Freight Lost to Seattle**

| | | | |
|---|---|---|---|
| 26,773 | TEUs | | |
| 13,387 | Containers | 1,339 | |
| 770 | 772 miles less Oakland to Seattle | | minus 2 miles dray at port |
| 10% | Recaptured | | |
| ***1,030,761*** | ***Total Miles Saved*** | 1,442,484 | |

Calculations based on recapture of 10% of freight from other port locations.

***9,748,252 Total Miles Saved***

## Summary Potential Container Market for Oakland - Truck Market

| | Imports | Exports | Total | Laden Moves (tons) | Laden TEUS | Empty TEUs | Additional TEUS |
|---|---|---|---|---|---|---|---|
| Lost to LA (tons) | 13,648,678 | 9,032,759 | 22,681,436 | 1,334,202 | | | |
| *Laden TEUS Lost* | *1,429,097* | *945,783* | | | *2,374,880* | | |
| Estimated Empties (TEUS) | | | | | | *483,314* | |
| Total Lost to LA | | | | | | | 2,858,194 |
| Lost to Seattle (tons) | 39,867 | 127,848 | 167,715 | 9,866 | | | |
| *Laden TEUS* | *4,174* | *13,386* | | | *17,561* | | |
| Estimated Emptiesc(TEUS) | | | | | | *9,212* | |
| Total Lost to Seattle | | | | | | | 26,773 |
| ***Total Lost TEUS by Truck- Potential Market*** | | | | | | | ***2,884,967*** |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

moffatt & nichol

| M&N PN | ACTIVITY & LOCATION |
|---|---|
| | |
| | PROJECT |
| | Oakland PIDP Grant Support |
| | OPTION |
| | |

| QUANTITIES BY: | DATE |
|---|---|
| CS | 4/14/22 |
| ESTIMATE BY: | DATE |
| CS | 4/14/22 |
| CHECKED BY: | DATE |
| | |
| Prepared BY: | DATE |
| CS | 4/14/22 |
| APPROVED BY: | DATE |
| RK | 4/14/22 |

**Port of Oakland Off Dock Terminal**

| Item | Item Description | | Unit | Unit Cost | Quantity | Cost |
|---|---|---|---|---|---|---|
| Y01 | RTG Runway Foundation | | LF | $ 400 | 3,560 | $ 1,424,000 |
| Y02 | Reefer racks (per plug) | | Plug | $ 36,400 | 192 | $ 6,988,800 |
| Y03 | PCC Wheel Stops | | Each | $ 150 | 325 | $ 48,750 |
| Y04 | Pavement 7" Ac on 17" CMB | | Acre | $ 450,000 | 28 | $ 12,600,000 |
| Y05 | Bio-swale - Drainage for 26 Acres | | LS | $ 1,000,000 | 1 | $ 1,000,000 |
| Y06 | Equipment Charging Stations (2) | | Each | $ 250,000 | 2 | $ 500,000 |
| Y07 | Battery Backup system (Resiliency) Next to substation SSC-48 | | Each | $ 1,000,000 | 1 | $ 1,000,000 |
| Y08 | Conduit and Trancing to connect Charging Station / Reefer Racks to Substations | | LF | $ 130 | 2,255 | $ 293,150 |
| | | | | | | |
| B01 | High mast Light poles and foundation | | Each | $ 208,000 | 6 | $ 1,248,000 |
| | | | | | | |
| G01 | Entry Lanes | | Lane | $ 200,000 | 2 | $ 400,000 |
| G02 | Exit Lanes | | Lane | $ 200,000 | 3 | $ 600,000 |
| G03 | Guard House at Exit | | Each | $ 100,000 | 1 | $ 100,000 |
| G04 | Security Fence Gates for Entrance and exit (30' ft each) | | Each | $ 15,000 | 2 | $ 30,000 |
| | | | | | | |
| D01 | Demolition existing pavement large areas | | Acre | $ 34,320 | 26 | $ 892,320 |
| D02 | Demolition/Relocation of K-Rail | | LF | $ 10 | 3,300 | $ 33,000 |
| | | | | | | |
| E01 | Substation Modifications (SS-C-36) | | Each | $ 90,000 | 1 | $ 90,000 |
| E02 | Ductbank incluiding conductors (SS-C-36) | | Each | $ 255,000 | 1 | $ 255,000 |
| E03 | Trench and Backfill (SS-C-36) | | Each | $ 30,000 | 1 | $ 30,000 |
| E04 | Substation Modifications (SS-C-48) | | Each | $ 15,000 | 1 | $ 15,000 |
| E05 | Ductbank including conductors (SS-C-48) | | Each | $ 125,000 | 1 | $ 125,000 |
| E06 | Trench and Backfill (SS-C-48) | | Each | $ 40,000 | 1 | $ 40,000 |
| | | | | | | |
| P01 | Grading (including Drainage) | | Acre | $ 187,200 | 7 | $ 1,282,320 |
| | | | | | | |
| | | | | | | |
| V01 | Pavement Marking | | Acre | $ 26,000 | 28 | $ 729,040 |
| V02 | 8ft High Chain link security Fencing on Concrete K-Rail | | LF | $ 124 | 4,380 | $ 543,120 |
| V04 | Trailer Modules to be used as Office Building | | Each | $ 75,000 | 3 | $ 225,000 |
| | | | | | | |
| | Construction Cost | | | | | $ 30,492,500 |
| | Mob / Demob | | | 5% | | $ 1,525,000 |
| | Contingencies | | | 25% | | $ 7,624,000 |
| | OCIP/MAPLA | | | 1% | | $ 382,000 |
| | Design, PM, CM, Procurement / Permitting / Port Staff oversight | | | 23% | | $ 8,767,000 |
| | **TOTAL CONSTRUCTION** | | | | | **$ 48,791,000** |

Notes:

1. This cost estimate represent the 2022 cost
2. This cost estimate is an opinion of construction cost made by the Consultant. In providing opinions of construction cost, it is recognized that neither the client nor the consultant has control over the costs of labor, equipment, materials or over the Contractors' methods of determining prices and bids. This opinion of construction cost is based on the Consultant's reasonable professional judgment and experience. This estimate does not constitute a warranty, expressed or implied, that the Contractors' bids or negotiated prices of work will correspond with the Owner's budget or the opinion of construction cost prepared by the Consultant.

| | |
|---|---|
| **Total Cost** | **$ 48,790,500** |

| *FY* | *Nominal* | *Discounted* | *Discount Factor* |
|---|---|---|---|
| **2024** | **$ 16,263,500** | **$ 12,407,346** | 1.311 |
| **2025** | **$ 16,263,500** | **$ 11,595,651** | 1.403 |
| **2026** | **$ 16,263,500** | **$ 10,837,057** | 1.501 |
| **Total** | **$ 48,790,500** | **$ 34,840,054** | |

Source: Moffatt and Nichol for Port of Oakland, 2022

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

**O&M Costs for Project**

| | Year | Nominal | Discounted | Discount Value |
|---|---|---|---|---|
| 1 | 2027 | $ 900,000 | $ 560,475 | 1.606 |
| 2 | 2028 | $ 900,000 | $ 523,808 | 1.718 |
| 3 | 2029 | $ 900,000 | $ 489,540 | 1.838 |
| 4 | 2030 | $ 900,000 | $ 457,514 | 1.967 |
| 5 | 2031 | $ 936,000 | $ 444,687 | 2.105 |
| 6 | 2032 | $ 900,000 | $ 399,611 | 2.252 |
| 7 | 2033 | $ 900,000 | $ 373,468 | 2.410 |
| 8 | 2034 | $ 900,000 | $ 349,036 | 2.579 |
| 9 | 2035 | $ 900,000 | $ 326,201 | 2.759 |
| 10 | 2036 | $ 936,000 | $ 317,056 | 2.952 |
| 11 | 2037 | $ 900,000 | $ 284,917 | 3.159 |
| 12 | 2038 | $ 900,000 | $ 266,278 | 3.380 |
| 13 | 2039 | $ 900,000 | $ 248,857 | 3.617 |
| 14 | 2040 | $ 900,000 | $ 232,577 | 3.870 |
| 15 | 2041 | $ 946,000 | $ 228,471 | 4.141 |
| 16 | 2042 | $ 900,000 | $ 203,142 | 4.430 |
| 17 | 2043 | $ 900,000 | $ 189,852 | 4.741 |
| 18 | 2044 | $ 900,000 | $ 177,432 | 5.072 |
| 19 | 2045 | $ 900,000 | $ 165,824 | 5.427 |
| 20 | 2046 | $ 936,000 | $ 161,175 | 5.807 |
| **Total** | | **18,154,000** | **6,399,922** | |

## Project Annual O&M

| | 20 Years O&M | | | | |
|---|---|---|---|---|---|
| | **YEARS 1-5** | | | | |
| | **1** | **2** | **3** | **4** | **5** |
| **Pavement Option 1** | $ 900,000 | $ 900,000 | $ 900,000 | $ 900,000 | $ 900,000 |
| **Pavement Option 2** | $ 13,000 | $ 13,000 | $ 13,000 | $ 13,000 | $ 2,500,000 |
| **Gate Equip** | | | | | |
| **Striping** | | | | | $ 36,000 |
| **Option 1** | **$ 900,000** | **$ 900,000** | **$ 900,000** | **$ 900,000** | **$ 936,000** |
| **Option 2** | **$ 13,000** | **$ 13,000** | **$ 13,000** | **$ 13,000** | **$ 2,536,000** |
| | **YEARS 6-10** | | | | |
| | **6** | **7** | **8** | **9** | **10** |
| **Pavement Option 1** | $ 900,000 | $ 900,000 | $ 900,000 | $ 900,000 | $ 900,000 |
| **Pavement Option 2** | $ 13,000 | $ 13,000 | $ 13,000 | $ 13,000 | $ 260,000 |
| **Gate Equip** | | | | | |
| **Striping** | * | | | | $ 36,000 |
| **Option 1** | **$ 900,000** | **$ 900,000** | **$ 900,000** | **$ 900,000** | **$ 936,000** |
| **Option 2** | **$ 13,000** | **$ 13,000** | **$ 13,000** | **$ 13,000** | **$ 296,000** |
| | **YEARS 11-15** | | | | |
| | **11** | **12** | **13** | **14** | **15** |
| **Pavement Option 1** | $ 900,000 | $ 900,000 | $ 900,000 | $ 900,000 | $ 900,000 |
| **Pavement Option 2** | $ 13,000 | $ 13,000 | $ 13,000 | $ 13,000 | $ 2,500,000 |
| **Gate Equip** | | | | | $ 10,000 |
| **Striping** | | | | | $ 36,000 |
| **Option 1** | **$ 900,000** | **$ 900,000** | **$ 900,000** | **$ 900,000** | **$ 946,000** |
| **Option 2** | **$ 13,000** | **$ 13,000** | **$ 13,000** | **$ 13,000** | **$ 2,546,000** |
| | **YEARS 16-20** | | | | |
| | **16** | **17** | **18** | **19** | **20** |
| **Pavement Option 1** | $ 900,000 | $ 900,000 | $ 900,000 | $ 900,000 | $ 900,000 |
| **Pavement Option 2** | $ 13,000 | $ 13,000 | $ 13,000 | $ 13,000 | $ 260,000 |
| **Gate Equip** | | | | | |
| **Striping** | | | | | $ 36,000 |
| **Option 1** | **$ 900,000** | **$ 900,000** | **$ 900,000** | **$ 900,000** | **$ 936,000** |
| **Option 2** | **$ 13,000** | **$ 13,000** | **$ 13,000** | **$ 13,000** | **$ 296,000** |

Source: Moffatt and Nichol for Port of Oakland, 2022

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

**These are assets with life >20 years**

| Asset | Life | Remaining at 20yrs | Cost | Remaining Value Nominal | Remaining Value Discounted |
|---|---|---|---|---|---|
| *Reefer Racks* | 30 | 33% | $ 6,988,800 | $ 2,329,600 | $ 401,147 |
| *Guard Booth and Office* | 30 | 33% | $ 325,000 | $ 108,333 | $ 18,655 |
| *Storm Drainage* | 40 | 50% | $ 1,000,000 | $ 500,000 | $ 86,098 |
| | | | | **$ 2,937,933** | **$ 505,899** |

**2046Discount Value:** **5.807353**

| Year | Fatal Crashes Involving Large Trucks | Large Trucks Involved in Fatal Crashes | Large Truck Occupant Fatalities | Total Fatalities in Large Truck Crashes | Million Vehicle Miles Traveled by Large Trucks | Rates per 100 Million Vehicle Miles Traveled by Large Trucks | | | Large Trucks Registered |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Fatal Crashes Involving Large Trucks | Large Trucks Involved in Fatal Crashes | Fatalities in Large Truck Crashes | |
| 2015 | 3,622 | 4,074 | 665 | 4,094 | 279,844 | 1.29 | 1.46 | 1.46 | 11,203,184 |
| 2016† | 4,177 | 4,562 | 815 | 4,678 | 287,895 | 1.45 | 1.58 | 1.62 | 11,498,561 |
| 2017† | 4,367 | 4,805 | 878 | 4,906 | 297,593 | 1.47 | 1.61 | 1.65 | 12,229,216 |
| 2018† | 4,461 | 4,909 | 890 | 5,006 | 304,864 | 1.46 | 1.61 | 1.64 | 13,233,910 |
| 2019† | 4,479 | 5,005 | 892 | 5,005 | 300,050 | 1.49 | 1.67 | 1.67 | 13,085,643 |

†Beginning with data for 2016, the National Highway Traffic Safety Administration (NHTSA) implemented changes to revise vehicle classification based on gross vehicle weight rating (GVWR), which reclassified 329 light pickup trucks as large trucks. Due to this methodology change, comparisons of the 2016 (and later) Fatality Analysis Reporting System (FARS) large truck data with prior years should be performed with caution.

Notes: A large truck is defined as a truck with a GVWR greater than 10,000 pounds. The Federal Highway Administration (FHWA) implemented an enhanced methodology for estimating registered vehicles and vehicle miles traveled (VMT) by vehicle type beginning with data from 2007. As a result, involvement rates may differ, and in some cases significantly, from earlier years.

Sources: VMT and Registered Vehicles: FHWA, *Highway Statistics 2019*. Fatal Crashes, Vehicles Involved, and Fatalities: NHTSA, FARS.

https://www.fmcsa.dot.gov/safety/data-and-statistics/trends-table-4-large-truck-fatal-crash-statistics-1975-2019

| Year | Injury Crashes Involving Large Trucks | Large Trucks Involved in Injury Crashes | Persons Injured in Large Truck Crashes | Million Vehicle Miles Traveled by Large Trucks | Rates per 100 Million Vehicle Miles Traveled by Large Trucks | | | Large Trucks Registered |
|---|---|---|---|---|---|---|---|---|
| | | | | | Injury Crashes Involving Large Trucks | Large Trucks Involved in Injury Crashes | Persons Injured in Large Truck Crashes | |
| 2015 | 83,000 | 87,000 | 116,000 | 279,844 | 29.5 | 31.2 | 41.5 | 11,203,184 |
| 2016* | 97,000 | 102,000 | 134,000 | 287,895 | 33.7 | 35.5 | 46.7 | 11,498,561 |
| 2017* | 102,000 | 107,000 | 148,000 | 297,593 | 34.4 | 35.9 | 49.7 | 12,229,216 |
| 2018* | 107,000 | 112,000 | 151,000 | 304,864 | 35.0 | 36.8 | 49.4 | 13,233,910 |
| 2019* | 114,000 | 119,000 | 158,000 | 300,050 | 38.0 | 39.5 | 52.8 | 13,085,643 |

*Beginning with data for 2016, the National Highway Traffic Safety Administration (NHTSA) replaced the General Estimates System (GES) with the Crash Report Sampling System (CRSS). Comparisons of 2016 (and later) CRSS estimates with older GES estimates should be performed with caution.

Notes: "Persons Injured" includes all nonfatally injured persons in injury and fatal crashes. A large truck is defined as a truck with a gross vehicle weight rating (GVWR) greater than 10,000 pounds. The Federal Highway Administration (FHWA) implemented an enhanced methodology for estimating registered vehicles and vehicle miles traveled (VMT) by vehicle type beginning with data from 2007. As a result, involvement rates may differ, and in some cases significantly, from earlier years. The rates displayed in this table are based on unrounded GES and CRSS data.

Sources: VMT and Registered Vehicles: FHWA, *Highway Statistics 2019*. Injury Crashes, Vehicles Involved, and Persons Injured: NHTSA, GES (1999-2015) and CRSS (2016-2019).

https://www.fmcsa.dot.gov/safety/data-and-statistics/trends-table-7-large-truck-injury-crash-statistics-1999-2019

**Trends Table 10. Large Truck Property Damage Only (PDO) Crash Statistics, 1999-2019**

| Year | PDO Crashes Involving Large Trucks | Large Trucks Involved in PDO Crashes | Million Vehicle Miles Traveled by Large Trucks | Rates per 100 Million Vehicle Miles Traveled by Large Trucks | | Large Trucks Registered |
|---|---|---|---|---|---|---|
| | | | | PDO Crashes Involving Large Trucks | Large Trucks Involved in PDO Crashes | |
| 2015 | 328,000 | 342,000 | 279,844 | 117.2 | 122.0 | 11,203,184 |
| 2016* | 333,000 | 351,000 | 287,895 | 115.6 | 122.0 | 11,498,561 |
| 2017* | 344,000 | 363,000 | 297,593 | 115.5 | 122.1 | 12,229,216 |
| 2018* | 388,000 | 414,000 | 304,864 | 127.2 | 135.7 | 13,233,910 |
| 2019* | 392,000 | 414,000 | 300,050 | 130.6 | 138.0 | 13,085,643 |

*Beginning with data for 2016, the National Highway Traffic Safety Administration (NHTSA) replaced the General Estimates System (GES) with the Crash Report Sampling System (CRSS). Comparisons of 2016 (and later) CRSS estimates with older GES estimates should be performed with caution.

Notes: A large truck is defined as a truck with a gross vehicle weight rating (GVWR) greater than 10,000 pounds. The Federal Highway Administration (FHWA) implemented an enhanced methodology for estimating registered vehicles and vehicle miles traveled (VMT) by vehicle type beginning with data from 2007. As a result, involvement rates may differ, and in some cases significantly, from earlier years. The rates displayed in this table are based on unrounded GES and CRSS data.

Sources: VMT and Registered Vehicles: FHWA, *Highway Statistics 2019.* PDO Crashes and Vehicles Involved: NHTSA, GES (1999-2015) and CRSS (2016-2019).

https://www.fmcsa.dot.gov/safety/data-and-statistics/trends-table-10-large-truck-property-damage-only-pdo-crash-statistics-6

Per 100 M Miles

| Fatal Crashes Involving Large Trucks | Injury Crashes Involving Large Trucks | PDO Crashes Involving Large Trucks |
|---|---|---|
| 1.43 | 34.1 | 121.2 |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

## Lost to LA

| | |
|---|---|
| 2,858,194 | TEUs |
| 1,429,097 | Containers |
| 61 | 63 miles less Oakland vs LB x 2 |
| 10% | Recaptured |
| 8,717,492 | Total Miles |

| Type | # crashes | Rate/mmiles |
|---|---|---|
| Fatal | 0.125 | 0.014336603 |
| Injury | 2.976 | 0.341386442 |
| PDO | 10.568 | 1.212247848 |

| | Baseline | | |
|---|---|---|---|
| Fatal | $ 1,604,408 | $ 12,837,400 | USDOT |
| Injury | $ 900,548 | $ 302,600 | USDOT |
| PDO | $ 84,975 | $ 8,041 | Caltrans |
| **Total** | **$ 2,589,931** | | |

**Baseline=>**

**Annual full export containers 2015-2019 Growth**

**2.2%**

**Growth Factor**

## Lost to Seattle

| | |
|---|---|
| 26,773 | TEUs |
| 13,387 | Containers |
| 770 | 800 miles less Oakland to Seattle |
| 10% | Recaptured |
| 1,030,761 | Total Miles |

| Type | # crashes | Rate/mmiles |
|---|---|---|
| Fatal | 0.015 | 0.014336603 |
| Injury | 0.352 | 0.341386442 |
| PDO | 1.250 | 1.212247848 |

| | Baseline | | |
|---|---|---|---|
| Fatal | $ 189,706 | $ 12,837,400 | USDOT |
| Injury | $ 106,481 | $ 302,600 | USDOT |
| PDO | $ 10,048 | $ 8,041 | Caltrans |
| **Total** | **$ 306,235** | | |

**Annual full export containers 2015-2019 Growth**

**2.2%**

Per 100 M Miles

| Fatal Crashes Involving Large Trucks | Injury Crashes Involving Large Trucks | PDO Crashes Involving Large Trucks |
|---|---|---|
| 1.43 | 34.1 | 121.2 |

## Crash Reduction Benefits

| | | Discount Rate | Nominal | Discounted | 1.022 |
|---|---|---|---|---|---|
| | 2024 | | | | 1.044484 |
| | 2025 | | | | 1.067463 |
| | 2026 | | | | 1.090947 |
| 1 | 2027 | 1.606 | $2,887,638 | $1,798,276 | 1.114948 |
| 2 | 2028 | 1.718 | $2,951,166 | $1,717,605 | 1.139477 |
| 3 | 2029 | 1.838 | $3,016,092 | $1,640,554 | 1.164545 |
| 4 | 2030 | 1.967 | $3,082,446 | $1,566,959 | 1.190165 |
| 5 | 2031 | 2.105 | $3,150,259 | $1,496,666 | 1.216349 |
| 6 | 2032 | 2.252 | $3,219,565 | $1,429,525 | 1.243108 |
| 7 | 2033 | 2.410 | $3,290,395 | $1,365,397 | 1.270457 |
| 8 | 2034 | 2.579 | $3,362,784 | $1,304,146 | 1.298407 |
| 9 | 2035 | 2.759 | $3,436,765 | $1,245,642 | 1.326972 |
| 10 | 2036 | 2.952 | $3,512,374 | $1,189,763 | 1.356165 |
| 11 | 2037 | 3.159 | $3,589,646 | $1,136,390 | 1.386001 |
| 12 | 2038 | 3.380 | $3,668,619 | $1,085,412 | 1.416493 |
| 13 | 2039 | 3.617 | $3,749,328 | $1,036,721 | 1.447656 |
| 14 | 2040 | 3.870 | $3,831,814 | $990,213 | 1.479504 |
| 15 | 2041 | 4.141 | $3,916,113 | $945,793 | 1.512053 |
| 16 | 2042 | 4.430 | $4,002,268 | $903,365 | 1.545318 |
| 17 | 2043 | 4.741 | $4,090,318 | $862,840 | 1.579315 |
| 18 | 2044 | 5.072 | $4,180,305 | $824,133 | 1.61406 |
| 19 | 2045 | 5.427 | $4,272,272 | $787,163 | 1.649569 |
| 20 | 2046 | 5.807 | $4,366,262 | $751,851 | 1.68586 |
| Total | | | **$71,576,429** | **$24,078,411** | |

| | | Discount Rate | Nominal | Discounted |
|---|---|---|---|---|
| | 2024 | 1.311 | | |
| | 2025 | 1.403 | | |
| | 2026 | 1.501 | | |
| 1 | 2027 | 1.606 | $341,436 | $212,629 |
| 2 | 2028 | 1.718 | $348,947 | $203,091 |
| 3 | 2029 | 1.838 | $356,624 | $193,980 |
| 4 | 2030 | 1.967 | $364,470 | $185,278 |
| 5 | 2031 | 2.105 | $372,488 | $176,966 |
| 6 | 2032 | 2.252 | $380,683 | $169,028 |
| 7 | 2033 | 2.410 | $389,058 | $161,445 |
| 8 | 2034 | 2.579 | $397,617 | $154,203 |
| 9 | 2035 | 2.759 | $406,365 | $147,285 |
| 10 | 2036 | 2.952 | $415,305 | $140,678 |
| 11 | 2037 | 3.159 | $424,442 | $134,367 |
| 12 | 2038 | 3.380 | $433,779 | $128,340 |
| 13 | 2039 | 3.617 | $443,322 | $122,582 |
| 14 | 2040 | 3.870 | $453,076 | $117,083 |
| 15 | 2041 | 4.141 | $463,043 | $111,831 |
| 16 | 2042 | 4.430 | $473,230 | $106,814 |
| 17 | 2043 | 4.741 | $483,641 | $102,023 |
| 18 | 2044 | 5.072 | $494,281 | $97,446 |
| 19 | 2045 | 5.427 | $505,155 | $93,074 |
| 20 | 2046 | 5.807 | $516,269 | $88,899 |
| Total | | | **$8,463,232** | **$2,847,043** |

| TTL Miles | |
|---|---|
| 10,868,791 | |
| 11,107,904 | |
| 11,352,278 | |
| 11,602,028 | |
| 11,857,273 | |
| 12,118,133 | |
| 12,384,732 | |
| 12,657,196 | |
| 12,935,654 | |
| 13,220,239 | |
| 13,511,084 | |
| 13,808,328 | |
| 14,112,111 | |
| 14,422,577 | |
| 14,739,874 | |
| 15,064,151 | |
| 15,395,563 | |
| 15,734,265 | |
| 16,080,419 | |
| 16,434,188 | |
| 269,406,790 | |
| 3.86 | Fatal |
| 91.97 | Injury |
| 326.59 | PDOs |
| 422.42 | Crashes |

## Total

| | Nominal | Discounted |
|---|---|---|
| 2024 | $0 | $0 |
| 2025 | $0 | $0 |
| 2026 | $0 | $0 |
| 2027 | $3,229,074 | $2,010,905 |
| 2028 | $3,300,113 | $1,920,696 |
| 2029 | $3,372,716 | $1,834,534 |
| 2030 | $3,446,915 | $1,752,237 |
| 2031 | $3,522,748 | $1,673,632 |
| 2032 | $3,600,248 | $1,598,553 |
| 2033 | $3,679,453 | $1,526,842 |
| 2034 | $3,760,401 | $1,458,349 |
| 2035 | $3,843,130 | $1,392,927 |
| 2036 | $3,927,679 | $1,330,441 |
| 2037 | $4,014,088 | $1,270,757 |
| 2038 | $4,102,398 | $1,213,752 |
| 2039 | $4,192,651 | $1,159,303 |
| 2040 | $4,284,889 | $1,107,297 |
| 2041 | $4,379,157 | $1,057,624 |
| 2042 | $4,475,498 | $1,010,179 |
| 2043 | $4,573,959 | $964,862 |
| 2044 | $4,674,586 | $921,579 |
| 2045 | $4,777,427 | $880,237 |
| 2046 | $4,882,530 | $840,750 |
| | **$80,039,661** | **$26,925,455** |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

9,748,252 Total Miles Saved

| | # | | Per mile |
|---|---|---|---|
| **Truck VOC** | $ | 9,163,357 | $0.94 |
| Total | $ | 9,163,357 | |

2.2% Growth

**VOC Benefits**

| | | Discount Rate | Nominal | Discounted | 1.022 |
|---|---|---|---|---|---|
| | 2024 | 1.311 | | | 1.04448 |
| | 2025 | 1.403 | | | 1.06746 |
| | 2026 | 1.501 | | | 1.09095 |
| 1 | 2027 | 1.606 | $10,216,663 | $6,362,425 | 1.11495 |
| 2 | 2028 | 1.718 | $10,441,430 | $6,077,007 | 1.13948 |
| 3 | 2029 | 1.838 | $10,671,142 | $5,804,394 | 1.16454 |
| 4 | 2030 | 1.967 | $10,905,907 | $5,544,010 | 1.19016 |
| 5 | 2031 | 2.105 | $11,145,837 | $5,295,307 | 1.21635 |
| 6 | 2032 | 2.252 | $11,391,045 | $5,057,760 | 1.24311 |
| 7 | 2033 | 2.410 | $11,641,648 | $4,830,870 | 1.27046 |
| 8 | 2034 | 2.579 | $11,897,764 | $4,614,158 | 1.29841 |
| 9 | 2035 | 2.759 | $12,159,515 | $4,407,168 | 1.32697 |
| 10 | 2036 | 2.952 | $12,427,024 | $4,209,463 | 1.35617 |
| 11 | 2037 | 3.159 | $12,700,419 | $4,020,627 | 1.386 |
| 12 | 2038 | 3.380 | $12,979,828 | $3,840,263 | 1.41649 |
| 13 | 2039 | 3.617 | $13,265,384 | $3,667,989 | 1.44766 |
| 14 | 2040 | 3.870 | $13,557,223 | $3,503,444 | 1.4795 |
| 15 | 2041 | 4.141 | $13,855,482 | $3,346,280 | 1.51205 |
| 16 | 2042 | 4.430 | $14,160,302 | $3,196,167 | 1.54532 |
| 17 | 2043 | 4.741 | $14,471,829 | $3,052,787 | 1.57932 |
| 18 | 2044 | 5.072 | $14,790,209 | $2,915,840 | 1.61406 |
| 19 | 2045 | 5.427 | $15,115,594 | $2,785,036 | 1.64957 |
| 20 | 2046 | 5.807 | $15,448,137 | $2,660,100 | 1.68586 |
| **Total** | | | **$253,242,382** | **$85,191,094** | |
| | | **Average** | **$ 12,662,119** | **$ 4,259,555** | |

9,748,252 Total Miles Saved

| | # | | Per hour | |
|---|---|---|---|---|
| **Truck VTT** | | 6,238,881 | $32.00 | 50 |
| Total | $ | 6,238,881 | | |

2.2% Growth

**VTT Benefits**

| | | Discount Rate | Nominal | Discounted | 1.022 |
|---|---|---|---|---|---|
| | 2024 | 1.311 | | | 1.04448 |
| | 2025 | 1.403 | | | 1.06746 |
| | 2026 | 1.501 | | | 1.09095 |
| 1 | 2027 | 1.606 | $6,956,026 | $4,331,864 | 1.11495 |
| 2 | 2028 | 1.718 | $7,109,059 | $4,137,537 | 1.13948 |
| 3 | 2029 | 1.838 | $7,265,458 | $3,951,928 | 1.16454 |
| 4 | 2030 | 1.967 | $7,425,298 | $3,774,645 | 1.19016 |
| 5 | 2031 | 2.105 | $7,588,655 | $3,605,315 | 1.21635 |
| 6 | 2032 | 2.252 | $7,755,605 | $3,443,581 | 1.24311 |
| 7 | 2033 | 2.410 | $7,926,228 | $3,289,103 | 1.27046 |
| 8 | 2034 | 2.579 | $8,100,605 | $3,141,554 | 1.29841 |
| 9 | 2035 | 2.759 | $8,278,819 | $3,000,625 | 1.32697 |
| 10 | 2036 | 2.952 | $8,460,953 | $2,866,017 | 1.35617 |
| 11 | 2037 | 3.159 | $8,647,094 | $2,737,448 | 1.38600 |
| 12 | 2038 | 3.380 | $8,837,330 | $2,614,647 | 1.41649 |
| 13 | 2039 | 3.617 | $9,031,751 | $2,497,354 | 1.44766 |
| 14 | 2040 | 3.870 | $9,230,450 | $2,385,324 | 1.47950 |
| 15 | 2041 | 4.141 | $9,433,519 | $2,278,318 | 1.51205 |
| 16 | 2042 | 4.430 | $9,641,057 | $2,176,113 | 1.54532 |
| 17 | 2043 | 4.741 | $9,853,160 | $2,078,493 | 1.57932 |
| 18 | 2044 | 5.072 | $10,069,930 | $1,985,253 | 1.61406 |
| 19 | 2045 | 5.427 | $10,291,468 | $1,896,195 | 1.64957 |
| 20 | 2046 | 5.807 | $10,517,880 | $1,811,132 | 1.68586 |
| | | | **$172,420,345** | **$58,002,447** | |
| | | **Average** | **$ 8,621,017** | **$ 2,900,122** | |

| | |
|---|---|
| Growth Factor | 2.2% |
| Average Speed | 50 |

**Project Freight Travel Reductions**

| Year | VMT | VHT |
|---|---|---|
| 2027 | 10,868,791 | 217,376 |
| 2028 | 11,107,904 | 222,158 |
| 2029 | 11,352,278 | 227,046 |
| 2030 | 11,602,028 | 232,041 |
| 2031 | 11,857,273 | 237,145 |
| 2032 | 12,118,133 | 242,363 |
| 2033 | 12,384,732 | 247,695 |
| 2034 | 12,657,196 | 253,144 |
| 2035 | 12,935,654 | 258,713 |
| 2036 | 13,220,239 | 264,405 |
| 2037 | 13,511,084 | 270,222 |
| 2038 | 13,808,328 | 276,167 |
| 2039 | 14,112,111 | 282,242 |
| 2040 | 14,422,577 | 288,452 |
| 2041 | 14,739,874 | 294,797 |
| 2042 | 15,064,151 | 301,283 |
| 2043 | 15,395,563 | 307,911 |
| 2044 | 15,734,265 | 314,685 |
| 2045 | 16,080,419 | 321,608 |
| 2046 | 16,434,188 | 328,684 |
| **Total** | **269,406,790** | **5,388,136** |
| **Average** | **13,470,339** | **269,407** |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

**HIGHWAY EMISSIONS FACTORS (g/mi) - Model Year 2024**

| Speed | CO | $CO_2$ | $NO_X$ | $PM_{10}$ | $SO_X$ | VOC | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| 50 | 0.4953 | 798.1410 | 1.0311 | 0.0120 | 0.0075 | 0.0445 | 0.0120 |

Model Year 2044

| Speed | CO | $CO_2$ | $NO_X$ | $PM_{10}$ | $SO_X$ | VOC | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| 50 | 0.1213 | 522.1472 | 0.2387 | 0.0058 | 0.0049 | 0.0105 | 0.0058 |

CAGRs Growth Rates

| Speed | CO | $CO_2$ | $NO_X$ | $PM_{10}$ | $SO_X$ | VOC | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| 50 | -0.06793 | -0.0209933 | -0.07055 | -0.0357 | -0.02106 | -0.06966049 | -0.0357 |

*Source:* Cal-B/C 2022 INFRA/RAISE Sketch Model v8.1.

| Cost Per Metric Ton (USDOT) | | | | |
|---|---|---|---|---|
| Year | $CO_2$ | $NO_X$ | $SO_X$ | $PM_{2.5}$ |
| 2024 | $55 | $16,200 | $44,000 | $788,100 |
| 2025 | $56 | $16,500 | $44,900 | $801,700 |
| 2026 | $57 | $16,800 | $45,700 | $814,500 |
| 2027 | $58 | $17,100 | $46,500 | $827,400 |
| 2028 | $60 | $17,400 | $47,300 | $840,600 |
| 2029 | $61 | $17,700 | $48,200 | $854,000 |
| 2030 | $62 | $18,100 | $49,100 | $867,600 |
| 2031 | $63 | $18,100 | $49,100 | $867,600 |
| 2032 | $64 | $18,100 | $49,100 | $867,600 |
| 2033 | $65 | $18,100 | $49,100 | $867,600 |
| 2034 | $66 | $18,100 | $49,100 | $867,600 |
| 2035 | $67 | $18,100 | $49,100 | $867,600 |
| 2036 | $69 | $18,100 | $49,100 | $867,600 |
| 2037 | $70 | $18,100 | $49,100 | $867,600 |
| 2038 | $72 | $18,100 | $49,100 | $867,600 |
| 2039 | $72 | $18,100 | $49,100 | $867,600 |
| 2040 | $73 | $18,100 | $49,100 | $867,600 |
| 2041 | $74 | $18,100 | $49,100 | $867,600 |
| 2042 | $75 | $18,100 | $49,100 | $867,600 |
| 2043 | $77 | $18,100 | $49,100 | $867,600 |
| 2044 | $78 | $18,100 | $49,100 | $867,600 |
| 2045 | $79 | $18,100 | $49,100 | $867,600 |
| 2046 | $80 | $18,100 | $49,100 | $867,600 |

**HIGHWAY EMISSIONS FACTORS (g/mi)**

| Year | CO | $CO_2$ | $NO_X$ | $PM_{10}$ | $SO_X$ | VOC | $PM_{2.5}$ |
|---|---|---|---|---|---|---|---|
| 2024 | 0.4953 | 798.1410 | 1.0311 | 0.0120 | 0.0075 | 0.0445 | 0.0120 |
| 2025 | 0.4617 | 781.3854 | 0.9584 | 0.0116 | 0.0073 | 0.0414 | 0.0116 |
| 2026 | 0.4303 | 764.9815 | 0.8908 | 0.0112 | 0.0072 | 0.0385 | 0.0112 |
| 2027 | 0.4011 | 748.9221 | 0.8279 | 0.0108 | 0.0070 | 0.0358 | 0.0108 |
| 2028 | 0.3738 | 733.1997 | 0.7695 | 0.0104 | 0.0069 | 0.0333 | 0.0104 |
| 2029 | 0.3484 | 717.8074 | 0.7152 | 0.0100 | 0.0067 | 0.0310 | 0.0100 |
| 2030 | 0.3248 | 702.7383 | 0.6648 | 0.0096 | 0.0066 | 0.0289 | 0.0096 |
| 2031 | 0.3027 | 687.9855 | 0.6179 | 0.0093 | 0.0065 | 0.0268 | 0.0093 |
| 2032 | 0.2821 | 673.5424 | 0.5743 | 0.0090 | 0.0063 | 0.0250 | 0.0090 |
| 2033 | 0.2630 | 659.4025 | 0.5338 | 0.0087 | 0.0062 | 0.0232 | 0.0087 |
| 2034 | 0.2451 | 645.5595 | 0.4961 | 0.0083 | 0.0061 | 0.0216 | 0.0083 |
| 2035 | 0.2285 | 632.0071 | 0.4611 | 0.0080 | 0.0059 | 0.0201 | 0.0080 |
| 2036 | 0.2129 | 618.7392 | 0.4286 | 0.0078 | 0.0058 | 0.0187 | 0.0078 |
| 2037 | 0.1985 | 605.7498 | 0.3983 | 0.0075 | 0.0057 | 0.0174 | 0.0075 |
| 2038 | 0.1850 | 593.0331 | 0.3702 | 0.0072 | 0.0056 | 0.0162 | 0.0072 |
| 2039 | 0.1724 | 580.5834 | 0.3441 | 0.0070 | 0.0055 | 0.0151 | 0.0070 |
| 2040 | 0.1607 | 568.3950 | 0.3198 | 0.0067 | 0.0053 | 0.0140 | 0.0067 |
| 2041 | 0.1498 | 556.4626 | 0.2973 | 0.0065 | 0.0052 | 0.0130 | 0.0065 |
| 2042 | 0.1396 | 544.7806 | 0.2763 | 0.0062 | 0.0051 | 0.0121 | 0.0062 |
| 2043 | 0.1301 | 533.3438 | 0.2568 | 0.0060 | 0.0050 | 0.0113 | 0.0060 |
| 2044 | 0.1213 | 522.1472 | 0.2387 | 0.0058 | 0.0049 | 0.0105 | 0.0058 |
| 2045 | 0.1131 | 511.1856 | 0.2219 | 0.0056 | 0.0048 | 0.0098 | 0.0056 |
| 2046 | 0.1054 | 500.4541 | 0.2062 | 0.0054 | 0.0047 | 0.0091 | 0.0054 |

**HIGHWAY EMISSIONS BENEFITS PER VMT**

| Year | CO | $CO_2$ | $NO_X$ | $PM_{10}$ | $SO_X$ | VOC | $PM_{2.5}$ | Total |
|---|---|---|---|---|---|---|---|---|
| 2024 | | $ 0.044 | $ 0.017 | | $ 0.000 | | $ 0.009 | $ 0.070 |
| 2025 | | $ 0.044 | $ 0.016 | | $ 0.000 | | $ 0.009 | $ 0.069 |
| 2026 | | $ 0.044 | $ 0.015 | | $ 0.000 | | $ 0.009 | $ 0.068 |
| 2027 | | $ 0.043 | $ 0.014 | | $ 0.000 | | $ 0.009 | $ 0.067 |
| 2028 | | $ 0.044 | $ 0.013 | | $ 0.000 | | $ 0.009 | $ 0.066 |
| 2029 | | $ 0.044 | $ 0.013 | | $ 0.000 | | $ 0.009 | $ 0.065 |
| 2030 | | $ 0.044 | $ 0.012 | | $ 0.000 | | $ 0.008 | $ 0.064 |
| 2031 | | $ 0.043 | $ 0.011 | | $ 0.000 | | $ 0.008 | $ 0.063 |
| 2032 | | $ 0.043 | $ 0.010 | | $ 0.000 | | $ 0.008 | $ 0.062 |
| 2033 | | $ 0.043 | $ 0.010 | | $ 0.000 | | $ 0.008 | $ 0.060 |
| 2034 | | $ 0.043 | $ 0.009 | | $ 0.000 | | $ 0.007 | $ 0.059 |
| 2035 | | $ 0.042 | $ 0.008 | | $ 0.000 | | $ 0.007 | $ 0.058 |
| 2036 | | $ 0.043 | $ 0.008 | | $ 0.000 | | $ 0.007 | $ 0.057 |
| 2037 | | $ 0.042 | $ 0.007 | | $ 0.000 | | $ 0.006 | $ 0.056 |
| 2038 | | $ 0.043 | $ 0.007 | | $ 0.000 | | $ 0.006 | $ 0.056 |
| 2039 | | $ 0.042 | $ 0.006 | | $ 0.000 | | $ 0.006 | $ 0.054 |
| 2040 | | $ 0.041 | $ 0.006 | | $ 0.000 | | $ 0.006 | $ 0.053 |
| 2041 | | $ 0.041 | $ 0.005 | | $ 0.000 | | $ 0.006 | $ 0.052 |
| 2042 | | $ 0.041 | $ 0.005 | | $ 0.000 | | $ 0.005 | $ 0.052 |
| 2043 | | $ 0.041 | $ 0.005 | | $ 0.000 | | $ 0.005 | $ 0.051 |
| 2044 | | $ 0.041 | $ 0.004 | | $ 0.000 | | $ 0.005 | $ 0.050 |
| 2045 | | $ 0.040 | $ 0.004 | | $ 0.000 | | $ 0.005 | $ 0.049 |
| 2046 | | $ 0.040 | $ 0.004 | | $ 0.000 | | $ 0.005 | $ 0.049 |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

| | | | Base Year VMT Reduction | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 9,748,252 | | | | | | | | | |
| | Year | Discount Rate | VMT Reduced | Emissions Reductions | Discounted Emissions Reductions 7% Discount (3% for CO2) ($2020) | Undiscounted all but CO2 | Discounted all but CO2 | CO2 Only Undiscounted | | 3% | CO2 Discounted |
| 1 | 2027 | 1.606 | 10,868,791 | $ 726,306 | $ 567,244 | $ 287,925 | ######## | $477,116 | 2027 | 1.22987 | $ 387,939 |
| 2 | 2028 | 1.718 | 11,107,904 | $ 737,890 | $ 548,031 | $ 282,358 | ######## | $486,055 | 2028 | 1.26677 | $ 383,696 |
| 3 | 2029 | 1.838 | 11,352,278 | $ 741,479 | $ 529,934 | $ 276,788 | ######## | $495,004 | 2029 | 1.30477 | $ 379,379 |
| 4 | 2030 | 1.967 | 11,602,028 | $ 745,976 | $ 512,932 | $ 271,341 | ######## | $503,963 | 2030 | 1.34392 | $ 374,996 |
| 5 | 2031 | 2.105 | 11,857,273 | $ 746,010 | $ 503,229 | $ 266,045 | ######## | $521,625 | 2031 | 1.38423 | $ 376,833 |
| 6 | 2032 | 2.252 | 12,118,133 | $ 746,424 | $ 487,997 | $ 260,893 | ######## | $530,608 | 2032 | 1.42576 | $ 372,158 |
| 7 | 2033 | 2.410 | 12,384,732 | $ 747,201 | $ 473,963 | $ 256,701 | ######## | $539,600 | 2033 | 1.46853 | $ 367,441 |
| 8 | 2034 | 2.579 | 12,657,196 | $ 748,322 | $ 458,767 | $ 247,736 | $ 96,076 | $548,602 | 2034 | 1.51259 | $ 362,691 |
| 9 | 2035 | 2.759 | 12,935,654 | $ 749,772 | $ 444,596 | $ 239,167 | $ 86,685 | $557,614 | 2035 | 1.55797 | $ 357,911 |
| 10 | 2036 | 2.952 | 13,220,239 | $ 759,715 | $ 431,347 | $ 230,974 | $ 78,239 | $566,635 | 2036 | 1.60471 | $ 353,108 |
| 11 | 2037 | 3.159 | 13,511,084 | $ 761,782 | $ 418,928 | $ 223,140 | $ 70,640 | $575,666 | 2037 | 1.65285 | $ 348,287 |
| 12 | 2038 | 3.380 | 13,808,328 | $ 772,323 | $ 407,256 | $ 215,647 | $ 63,802 | $584,706 | 2038 | 1.70243 | $ 343,453 |
| 13 | 2039 | 3.617 | 14,112,111 | $ 766,759 | $ 401,237 | $ 208,479 | $ 57,646 | $602,488 | 2039 | 1.75351 | $ 343,591 |
| 14 | 2040 | 3.870 | 14,422,577 | $ 769,642 | $ 390,705 | $ 201,621 | $ 52,103 | $611,553 | 2040 | 1.80611 | $ 338,602 |
| 15 | 2041 | 4.141 | 14,739,874 | $ 772,773 | $ 385,426 | $ 195,057 | $ 47,109 | $629,369 | 2041 | 1.86029 | $ 338,317 |
| 16 | 2042 | 4.430 | 15,064,151 | $ 776,141 | $ 371,251 | $ 188,774 | $ 42,609 | $629,712 | 2042 | 1.91610 | $ 328,642 |
| 17 | 2043 | 4.741 | 15,395,563 | $ 787,945 | $ 362,230 | $ 182,759 | $ 38,552 | $638,806 | 2043 | 1.97359 | $ 323,678 |
| 18 | 2044 | 5.072 | 15,734,265 | $ 791,758 | $ 353,623 | $ 176,998 | $ 34,894 | $647,909 | 2044 | 2.03279 | $ 318,728 |
| 19 | 2045 | 5.427 | 16,080,419 | $ 795,776 | $ 345,392 | $ 171,479 | $ 31,595 | $657,023 | 2045 | 2.09378 | $ 313,798 |
| 20 | 2046 | 5.807 | 16,434,188 | $ 799,991 | $ 341,570 | $ 166,191 | $ 28,617 | $674,911 | 2046 | 2.15659 | $ 312,953 |
| | | **Total** | **269,406,790** | **$ 15,243,985** | **$ 8,735,656** | | | | | | |

# Benefit-Cost Analysis Spreadsheet for the Port of Oakland Phase 1 Outer Harbor Terminal Redevelopment – Building Resiliency Now and For the Future

| | | | |
|---|---|---|---|
| | | 9,748,252 | Total Miles Saved |
| | # | | Per mile |
| **Truck VOC** | $ | 192,041 | $0.0197 |
| Total | $ | 192,041 | |

2.2% Growth

**Noise Benefits**

| | | Discount Rate | Nominal | Discounted | 1.022 |
|---|---|---|---|---|---|
| | 2024 | 1.311 | | | 1.04448 |
| | 2025 | 1.403 | | | 1.06746 |
| | 2026 | 1.501 | | | 1.09095 |
| 1 | 2027 | 1.606 | $214,115 | $133,340 | 1.11495 |
| 2 | 2028 | 1.718 | $218,826 | $127,359 | 1.13948 |
| 3 | 2029 | 1.838 | $223,640 | $121,645 | 1.16454 |
| 4 | 2030 | 1.967 | $228,560 | $116,188 | 1.19016 |
| 5 | 2031 | 2.105 | $233,588 | $110,976 | 1.21635 |
| 6 | 2032 | 2.252 | $238,727 | $105,998 | 1.24311 |
| 7 | 2033 | 2.410 | $243,979 | $101,243 | 1.27046 |
| 8 | 2034 | 2.579 | $249,347 | $96,701 | 1.29841 |
| 9 | 2035 | 2.759 | $254,832 | $92,363 | 1.32697 |
| 10 | 2036 | 2.952 | $260,439 | $88,220 | 1.35617 |
| 11 | 2037 | 3.159 | $266,168 | $84,262 | 1.386 |
| 12 | 2038 | 3.380 | $272,024 | $80,482 | 1.41649 |
| 13 | 2039 | 3.617 | $278,009 | $76,872 | 1.44766 |
| 14 | 2040 | 3.870 | $284,125 | $73,423 | 1.4795 |
| 15 | 2041 | 4.141 | $290,376 | $70,129 | 1.51205 |
| 16 | 2042 | 4.430 | $296,764 | $66,983 | 1.54532 |
| 17 | 2043 | 4.741 | $303,293 | $63,979 | 1.57932 |
| 18 | 2044 | 5.072 | $309,965 | $61,109 | 1.61406 |
| 19 | 2045 | 5.427 | $316,784 | $58,367 | 1.64957 |
| 20 | 2046 | 5.807 | $323,754 | $55,749 | 1.68586 |
| **Total** | | | **$5,307,314** | **$1,785,388** | |
| | | **Average** | **265,366** | **89,269** | |

# ATTACHMENTS FORM

**Instructions:** On this form, you will attach the various files that make up your grant application. Please consult with the appropriate Agency Guidelines for more information about each needed file. Please remember that any files you attach must be in the document format and named as specified in the Guidelines.

**Important:** Please attach your files in the proper sequence. See the appropriate Agency Guidelines for details.

| | | | | |
|---|---|---|---|---|
| 1) Please attach Attachment 1 | 1234-Project Narrative_1_PIDP | Add Attachment | Delete Attachment | View Attachment |
| 2) Please attach Attachment 2 | 1235-BCA Narrative-Appendix B | Add Attachment | Delete Attachment | View Attachment |
| 3) Please attach Attachment 3 | 1236-Benefit Cost Analysis_3_ | Add Attachment | Delete Attachment | View Attachment |
| 4) Please attach Attachment 4 | | Add Attachment | Delete Attachment | View Attachment |
| 5) Please attach Attachment 5 | | Add Attachment | Delete Attachment | View Attachment |
| 6) Please attach Attachment 6 | | Add Attachment | Delete Attachment | View Attachment |
| 7) Please attach Attachment 7 | | Add Attachment | Delete Attachment | View Attachment |
| 8) Please attach Attachment 8 | | Add Attachment | Delete Attachment | View Attachment |
| 9) Please attach Attachment 9 | | Add Attachment | Delete Attachment | View Attachment |
| 10) Please attach Attachment 10 | | Add Attachment | Delete Attachment | View Attachment |
| 11) Please attach Attachment 11 | | Add Attachment | Delete Attachment | View Attachment |
| 12) Please attach Attachment 12 | | Add Attachment | Delete Attachment | View Attachment |
| 13) Please attach Attachment 13 | | Add Attachment | Delete Attachment | View Attachment |
| 14) Please attach Attachment 14 | | Add Attachment | Delete Attachment | View Attachment |
| 15) Please attach Attachment 15 | | Add Attachment | Delete Attachment | View Attachment |

OMB Number: 4040-0004
Expiration Date: 12/31/2022

## Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 05/13/2022

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

**State Use Only:**

6. Date Received by State:

7. State Application Identifier:

**8. APPLICANT INFORMATION:**

* a. Legal Name: Port Department of the City of Oakland

* b. Employer/Taxpayer Identification Number (EIN/TIN): (b)(4)

* c. UEI: (b)(4)

**d. Address:**

* Street1: 530 Water Street
Street2:
* City: Oakland
County/Parish:
* State: CA: California
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 94607-3525

**e. Organizational Unit:**

Department Name:

Division Name:

**f. Name and contact information of person to be contacted on matters involving this application:**

Prefix: Mr.
* First Name: Timothy
Middle Name:
* Last Name: Leong
Suffix:

Title: Senior Maritime Projects Administrator

Organizational Affiliation: Port of Oakland

* Telephone Number: 510-627-1537
Fax Number:

* Email: tleong@portoakland.com

## Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

C: City or Township Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Maritime Administration

**11. Catalog of Federal Domestic Assistance Number:**

20.823

CFDA Title:

Port Infrastructure Development Program

*** 12. Funding Opportunity Number:**

MA-PID-22-001

* Title:

2022 Port Infrastructure Development Program Grants

**13. Competition Identification Number:**

Title:

**14. Areas Affected by Project (Cities, Counties, States, etc.):**

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Phase 1 Outer Harbor Terminal Redevelopment-Building Resiliency Now and For the Future: Creating a container support yard with refrigeration racks, charging stations, and other utility improvements

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

## Application for Federal Assistance SF-424

**16. Congressional Districts Of:**

* a. Applicant: CA-13 | * b. Program/Project: CA-13

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

**17. Proposed Project:**

* a. Start Date: 07/01/2024 | * b. End Date: 06/30/2027

**18. Estimated Funding ($):**

| | |
|---|---|
| * a. Federal | 36,592,875.00 |
| * b. Applicant | 12,197,625.00 |
| * c. State | 0.00 |
| * d. Local | 0.00 |
| * e. Other | 0.00 |
| * f. Program Income | 0.00 |
| * g. TOTAL | 48,790,500.00 |

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

**21. *By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

**Authorized Representative:**

Prefix: Mr. | * First Name: Timothy

Middle Name:

* Last Name: Leong

Suffix:

* Title: Senior Maritime Projects Adminstrator

* Telephone Number: 510-627-1537 | Fax Number:

* Email: tleong@portoakland.com

* Signature of Authorized Representative: Timothy Leong | * Date Signed: 05/13/2022

OMB Number: 4040-0008
Expiration Date: 02/28/2025

## BUDGET INFORMATION - Construction Programs

*NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.*

| COST CLASSIFICATION | a. Total Cost | b. Costs Not Allowable for Participation | c. Total Allowable Costs (Columns a-b) |
|---|---|---|---|
| 1. Administrative and legal expenses | $ | $ | $ |
| 2. Land, structures, rights-of-way, appraisals, etc. | $ | $ | $ |
| 3. Relocation expenses and payments | $ | $ | $ |
| 4. Architectural and engineering fees | $ 8,767,000.00 | $ | $ 8,767,000.00 |
| 5. Other architectural and engineering fees | $ | $ | $ |
| 6. Project inspection fees | $ | $ | $ |
| 7. Site work | $ | $ | $ |
| 8. Demolition and removal | $ 1,525,000.00 | $ | $ 1,525,000.00 |
| 9. Construction | $ 30,492,500.00 | $ | $ 30,492,500.00 |
| 10. Equipment | $ | $ | $ |
| 11. Miscellaneous | $ 382,000.00 | $ | $ 382,000.00 |
| 12. SUBTOTAL *(sum of lines 1-11)* | $ 41,166,500.00 | $ | $ 41,166,500.00 |
| 13. Contingencies | $ 7,624,000.00 | $ | $ 7,624,000.00 |
| 14. SUBTOTAL | $ 48,790,500.00 | $ | $ 48,790,500.00 |
| 15. Project (program) income | $ | $ | $ |
| 16. TOTAL PROJECT COSTS *(subtract #15 from #14)* | $ 48,790,500.00 | $ | $ 48,790,500.00 |

### FEDERAL FUNDING

| | | |
|---|---|---|
| 17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share. | Enter eligible costs from line 16c Multiply X 75 % | $ 36,592,875.00 |

# DISCLOSURE OF LOBBYING ACTIVITIES

**Complete this form to disclose lobbying activities pursuant to 31 U.S.C.1352**

OMB Number: 4040-0013
Expiration Date: 02/28/2025

**1. * Type of Federal Action:**
- [ ] a. contract
- [x] b. grant
- [ ] c. cooperative agreement
- [ ] d. loan
- [ ] e. loan guarantee
- [ ] f. loan insurance

**2. * Status of Federal Action:**
- [x] a. bid/offer/application
- [ ] b. initial award
- [ ] c. post-award

**3. * Report Type:**
- [x] a. initial filing
- [ ] b. material change

**4. Name and Address of Reporting Entity:**

[x] Prime [ ] SubAwardee

** Name:* Port Department of the City of Oakland

** Street 1:* 530 Water Street *Street 2:*

** City:* Oakland *State:* CA: California *Zip:* 94607

Congressional District, if known: CA-13

**5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime:**

**6. * Federal Department/Agency:**

U.S. Maritime Administration (USDOT)

**7. * Federal Program Name/Description:**

Port Infrastructure Development Program

CFDA Number, *if applicable:* 20.823

**8. Federal Action Number,** *if known:*

MA-PID-22-001, PKG00272178

**9. Award Amount,** *if known:*

$

**10. a. Name and Address of Lobbying Registrant:**

*Prefix:* Mr. ** First Name:* Steve *Middle Name:*

** Last Name:* Palmer *Suffix:*

** Street 1:* Van Scoyoc Associates, 800 Maine Avenue, SW *Street 2:* Suite 800

** City:* Washington *State:* DC: District of Columbia *Zip:* 20024

**b. Individual Performing Services** (including address if different from No. 10a)

*Prefix:* ** First Name:* Geoff *Middle Name:*

** Last Name:* Bowman *Suffix:*

** Street 1:* *Street 2:*

** City:* *State:* *Zip:*

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*** Signature:** Timothy Leong

***Name:** *Prefix:* Mr. ** First Name:* Matt *Middle Name:*

** Last Name:* Davis *Suffix:*

**Title:** Director of Government Affairs **Telephone No.:** 510-627-1430 **Date:** 05/13/2022

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