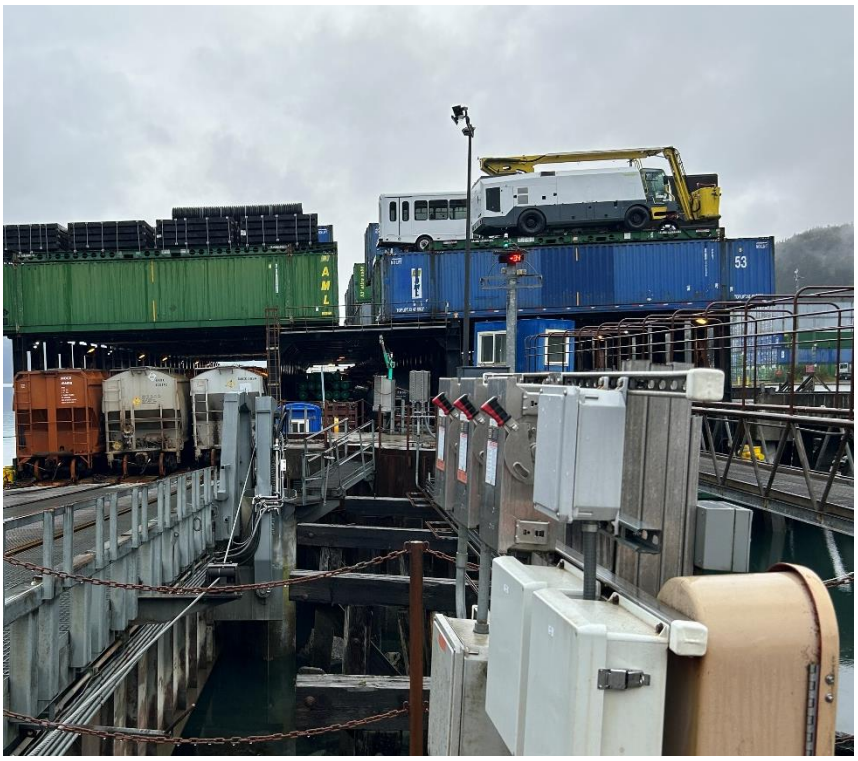
Whittier Terminal Master Plan (Draft)

Alaska Railroad Corporation

Whittier Terminal Master Plan

Whittier, Alaska
March 11, 2025



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Glossary

AML	Alaska Marine Lines
ARRC	Alaska Railroad Corporation
BCA	Benefit-cost analysis
CAGR	Compound Annual Growth Rate
COFC	Container on flat car
DOT&PF	Department of Transportation and Public Facilities
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
KPFF	KPFF Consulting Engineers
MARAD	U.S. Department of Transportation Maritime Administration
NEPA	National Environmental Policy Act
PIDP	Port Infrastructure Development Program
PND	PND Engineers, Inc.
R&M	R&M Consultants, Inc
ROW	Right-of-Way
USACE	U.S. Army Corps of Engineers
WTMP	Whittier Terminal Master Plan

Executive Summary

The Whittier Terminal Master Plan (WTMP) addresses both short-term challenges and long-term opportunities for the terminal by following the plan vision:

> *"To renew the Whittier Terminal as an efficient, resilient, and balanced facility that safely delivers customer needs and empowers economic growth for the railroad and the State of Alaska."*

It evaluates the existing conditions of the terminal's facilities, identifies critical needs for upgrades and replacements, and proposes alternatives to meet the growing demands of the region. The WTMP is a holistic analysis of the Whittier Terminal waterfront and landside transportation infrastructure. By analyzing each of these assets individually, the studies informing this plan create independent results and recommendations to compare. The resulting recommended improvements from each study work together to provide comprehensive alternatives for comparison. Of the four potential alternatives identified (No-Build Alternative, Alternative 1 – Westerly Relocation of Barge Berthing, Alternative 2A – Reconstruct Existing Berthing Facilities in Place, and Alternative 2B – In-Place Reconstruction with Wharf Expansion), the plan recommends Alternative 2A – Reconstruct Existing Berthing Facilities in Place with south terminal track realignment Option C (out of Options A, B, and C) as the recommended alternative:

- **Alternative 2A – Reconstruct Existing Berthing Facilities In-Place with Track Option C:** This alternative proposes reconstructing the transfer span, barge berthing facilities, and marginal wharf in their current locations; and replacing the deteriorating infrastructure while retaining the known operational benefits of the existing site. This alternative optimizes yard track lengths and configurations, relocates truck security gates away from the busy small boat harbor and ferry terminal, adds a second main track from the tunnel entrance to the yard, relocates passenger loading to dedicated tracks and facilities, and offers a proposed grade separation to remove the at-grade crossing conflict at Whittier Street. The alternative has a total probable construction cost of $185 million.

The key benefits of Alternative 2A include:

- **Cost-effectiveness:** The total estimated construction cost is $185 million, significantly lower than other alternatives.
- **Operational efficiency:** By retaining the current layout of barge facilities and optimizing operational features such as the yard track lengths and truck security gates, this alternative avoids the operational risks associated with relocation and ensures continued efficiency in barge loading and unloading.
- **Risk management:** The in-place reconstruction minimizes exposure to environmental risks such as increased wave action, which could hinder operations if the facilities were relocated westward. Additionally, many of the proposed improvements can be

constructed independently as funds become available, reducing the risk of funding constraints from implementing the plan.

The WTMP provides background and additional analysis supporting the choice of a recommended alternative and outlines a vision for responsibly completing the proposed improvements. Refer to Appendix B, Exhibit Drawings, for alternative layouts.

1. Introduction

The Alaska Railroad Corporation (ARRC) provides a Class II railroad in Alaska that extends from Seward to Eielson Air Force Base (in Fairbanks) and provides freight and passenger services throughout the Railbelt. In addition to the railroad track and supporting infrastructure, ARRC has significant land reserves, including a 291-acre reserve in Whittier.

The City of Whittier is located in a fjord at the head of Passage Canal in Prince William Sound. It is approximately 47 air miles, and 62 road and rail miles, southeast of Anchorage. Road and rail access to Whittier is controlled by the Anton Anderson Memorial Tunnel from Portage Valley, a 2.5-mile-long, one-lane tunnel that is shared by cars and trains traveling in both directions on a scheduled opening basis. Trains arrive in Whittier via the 12.5-mile Whittier Subdivision (F-Branch), which connects to ARRC's mainline track at the Portage Wye. The subdivision includes two tunnels: the 1-mile-long Portage Tunnel and the shared-use Anton Anderson Memorial Tunnel. The Whittier Terminal Reserve includes all active waterfront, track, yard, and reserve land areas on the Whittier side of the Anton Anderson Memorial Tunnel.

Whittier was established as a strategic military facility during World War II, when the U.S. Army constructed a terminal and railroad terminus for the transportation of fuel and other supplies. The railroad spur and two tunnels were completed in 1943, and the terminal became the entrance for troops and dependents of the Alaska Command. Following the withdrawal of the military from Whittier, much of the land reserve in Whittier was assumed by ARRC.

Whittier is ARRC's point of connection to rail systems in Canada and the Lower 48 states by way of rail barges for freight. Due to more favorable ice conditions than the Port of Anchorage, this presents opportunities for ongoing and increasing freight business at Whittier as an ice-free port.

Passenger traffic has also increased in the last several years, owing to the increasing popularity of cruise ship travel and the growing number and size of cruise ships calling at Whittier. This is a significant opportunity for ARRC, but it also generates challenges due to constrained rail facilities and potential conflicts between passenger and freight operations.

Placeholder – Add Project Location or Vicinity Map for Final

1.1. Plan Description

This Whittier Terminal Master Plan (WTMP) is a comprehensive master plan that evaluates the condition, performance, safety, efficiency, state of good repair, reliability, resiliency, intermodality, and sustainability of the Whittier Terminal. The plan identifies areas for potential rehabilitation of marine, terminal, and upland infrastructure, as well as potential operational improvements to support the terminal.

Plan objectives included the following:

- Identify and prioritize options for rehabilitation or improvement to terminal facilities in Whittier. This effort models phasing and funding strategies, and results in conceptual designs, estimates, phasing, and benefit-cost analyses (BCAs) for priority improvements.
- Explore and identify alternatives for infrastructure elements including waterfront facilities, track layouts, vehicle access, and cargo staging and integration with other area users such as the Alaska Marine Highway System. The WTMP includes a transportation study, a waterfront reconstruction study, stakeholder engagement, improvement alternatives and environmental considerations, and prioritized development options. Special emphasis is placed on operational efficiency, cost-saving alternatives, long-term sustainability, and funding strategies.
- Identify and evaluate alternatives, develop phasing plans where applicable, and develop preliminary design of critical elements or facilities. The WTMP identifies and prioritizes issues, generates alternatives to address issues, identifies impacts to other terminal operations and stakeholders, addresses environmental considerations, and recommends preferred alternatives. It addresses potential improvements including terminal rail operations, reduced conflicts with road crossings, reduced conflicts between passenger and freight trains, and improved roadway access and movement to and within the terminal.

1.2. Literature Review

As part of the WTMP development, relevant historical documents were reviewed and available data from previous studies for the ARRC's Whittier Terminal were analyzed. The following are the previous studies and available data reviewed and incorporated into the WTMP and are available in Appendix G: Reference Documents:

ARRC Whittier Terminal Reconstruction Barge Ramp – Draft Barge Ramp Alternatives Analysis – Contract No. 117853, prepared by KPFF Consulting Engineers (KPFF) on March 22, 2021. This analysis includes the previous cost discussion of the barge rail transfer span's replacement alternatives at Whittier Terminal.
Alaska Railroad Whittier Terminal Waterfront Reconstruction – Alternatives Study, prepared by ARRC with support from PND Engineers, Inc. (PND), R&M Consultants, Inc. (R&M), and KPFF on May 13, 2021. This study examined alternatives for the reconstruction of the ARRC's Whittier Terminal marine facilities.
Draft Submittal – Whittier Intermodal Development Concept and Design, prepared by PND in September 2004. This report presented a study of intermodal transportation.
2020 Structural Condition Assessment of Whittier Marine Terminal – Report of Findings and Recommendations, prepared by PND on December 10, 2020. This report assessed the structural conditions of the Whittier Marine Terminal.
Survey Report – R&M Project No. 2852.01, Task 2 – Whittier Planning Survey, Phase 1 – Whittier, Alaska, prepared by R&M in 2021. This survey report was done based on historic and

field survey information at Whittier to create a basemap of existing conditions, including site bathymetry, for planning purposes.
Port of Whittier Freight Study, prepared by ARRC with support from DOWL and PND in May 2020.
Alaska State Rail Plan, prepared for the Alaska Department of Transportation and Public Facilities (DOT&PF), prepared by HDR Engineering, Inc., in association with CDM Smith, in November 2016.
City of Whittier Comprehensive Plan, prepared by Catalyst Consulting, January 21, 2020. https://www.whittieralaska.gov/wp-content/uploads/City-of-Whittier-2020-Comprehensive-Plan.pdf
Alaska Railroad Timetable No. 143, May 2021 [CONFIDENTIAL – available upon request].
Whittier Barge Operations Report 2020-2024, prepared for Alaska Railroad providing overview of barge traffic departing Seattle, Washington and arriving in Whittier, Alaska. The transportation of Interchange and COFC to Anchorage and then on to Fairbanks. As well as freight volumes, operation times, COFC, and more.

1.3. Goals

As mentioned above, the Whittier Terminal Transportation Study (Appendix C) and the Waterfront Reconstruction Study (Appendix D) are essential elements of the WTMP. They aim to assess, enhance, and develop sustainable strategies for improving the Whittier Terminal's intermodal and waterfront infrastructure. These studies evaluate existing conditions and propose solutions to ensure the terminal's continued role in facilitating freight and passenger movements.

Both studies establish a roadmap for future investments, aligning transportation and waterfront goals to support Whittier Terminal's long-term development. By integrating infrastructure improvements with sustainable operational strategies, these efforts pave the way for enhanced efficiency, resilience, and continued economic viability and inform the WTMP's goals.

The work includes, but is not limited to the following goals:

- Assess the existing terminal intermodal facilities and waterfront infrastructure based on current and future demands.
- Review connectivity within upland transportation facilities with regard to both freight and passenger traffic (Transportation Study, Appendix C).
- Develop alternative recommendations to reconstruct the Whittier Terminal's waterfront infrastructure (Waterfront Reconstruction Study, Appendix D).
- Explore long-term expansion opportunities for the Whittier Terminal.
- Improve efficiency, reliability, and sustainability of the Whittier Terminal.

1.4. Planning Area

The project is located in the City of Whittier, Alaska. The project study limits include all facilities within the ARRC right-of-way (ROW) from the western end of the Whittier Tunnel to the eastern end of the rail terminal facilities and docks. Consideration is given to the impacts from the

planned Head of the Bay cruise terminal and proposed rail connections, and the limitations of the Portage Tunnel for current operations (second tunnel west of Whittier after the Anton Anderson Memorial Tunnel); however, improvements within these areas is outside the scope of this plan. Figure 1-1 shows the project study area and indicates ARRC ROW limits and track locations within the study area.

Figure 1-1. Project Study Area – Aerial Image of Whittier with ARRC ROW Limits

1.5. Planning Process

The WTMP followed a structured planning process incorporating data collection, stakeholder engagement, and iterative analysis to develop viable long-term solutions. The process included:

- Data collection and review
- Stakeholder engagement
- Needs assessment and issue identification
- Alternatives development
- Preliminary design and cost estimation
- Final recommendations and phasing plan

1.5.1. Economic Development

Whittier Terminal inbound and outbound cargo tonnage data was reviewed for 2004–2022. The Alaska Railroad and Alaska Marine Lines (AML) were interviewed for their input on market trends. Inbound cargo growth as reported by the U.S. Army Corps of Engineers (USACE) over this period has been healthy at an approximate compound annual growth rate (CAGR) of 5.8 percent. Outbound tonnage was more volatile and grew at a modest 1 percent CAGR. If sustained, this trend of inbound growth could result in Whittier tonnage doubling in 12 years. Alternatives developed and evaluated use this basis as a key driver for determining improvements that not only maintain existing capacity but also provide growth opportunities in the future.

1.5.2. Infrastructure Development and Improvement

The Whittier Terminal faces numerous infrastructure challenges, including aging marine facilities, limited rail capacity, and constrained landside space. To address these challenges, the WTMP evaluates a range of infrastructure improvement projects, such as:

- Marine terminal upgrades
- Rail yard expansion
- Railroad-road grade separations
- Terminal access enhancement
- Sustainability and resiliency measures

1.5.3. Intermodal Transportation Facilities

Given Whittier's role as a critical link in Alaska's freight and passenger transportation network, the WTMP examines intermodal connectivity and opportunities to improve modal integration. Key intermodal facility enhancements include:

- Barge-to-rail efficiency
- Coordination with Alaska Marine Highway System
- Rail connectivity improvements
- Cruise ship and passenger rail coordination improvements

1.5.4. Physical, Environmental, and Regulatory Barriers

Several physical, environmental, and regulatory factors impact Whittier Terminal operations and future development plans:

- Physical constraints imposed by features such as mountains, ocean, tunnels, and adjacent infrastructure.
- Environmental considerations such as local, state, and federal permitting requirements and National Environmental Policy Act (NEPA) reviews for proposed improvements.
- Regulatory challenges due to lease agreements, federal funding requirements, and federal terminal security requirements.
- Land use conflicts with leaseholders and adjacent landowners.

The WTMP incorporates mitigation strategies for these barriers, ensuring that proposed improvements are feasible and sustainable within the regulatory framework.

2. Existing Conditions

2.1. Introduction

The Whittier Terminal is a vital transportation hub for the ARRC and the state of Alaska, linking maritime and rail operations to support freight and passenger movement throughout Alaska. The terminal is the only rail connection in Alaska to the greater North American rail network via

Seattle, Washington, making its functionality crucial for economic stability and growth. This section examines the existing conditions of the terminal infrastructure, identifying deficiencies that limit operational efficiency and assessing their impacts on the region's transportation network.

The terminal faces several challenges stemming from aging infrastructure, spatial constraints, and increased operational demands. Key facilities such as the barge slip, bulkhead, and rail transfer span have exceeded or are nearing the end of their useful lives. Landside operations are further complicated by conflicts between passenger and freight movements, restricted access via the Anton Anderson Memorial Tunnel, and the presence of at-grade rail crossings. These conditions necessitate immediate attention to maintain operational continuity, improve safety, and accommodate future growth. This section provides a comprehensive analysis of the terminal's current state, focusing on transportation connectivity, terminal access, and infrastructure limitations, as well as their implications for ongoing operations and long-term development.

2.1.1. Transportation Plan Discussion

The primary objectives of the Whittier Terminal Transportation Study (Appendix C) are the identification, evaluation, and selection of landside transportation improvements. The study includes review of previous studies, assessment of recent cargo data, observation of current operations, and evaluation of future scenarios based on known information about development in the region. The study was completed in tandem with the Waterfront Reconstruction Study (Appendix D), where applicable, to best serve the transportation needs of the region during the construction of selected alternatives.

While the Whittier Terminal is needed for the safe and continued rail and cargo operations of the ARRC, it is equally important to ensure that the connections to the terminal, be they rail or road, are considered to increase the efficiency of the critical barge-to-rail modal shift that occurs at Whittier.

The study revealed several key operational conflicts that are preventing optimal yard operations and transportation movement through the area, including the at-grade crossing at Whittier Street and the north end of the yard, insufficient capacity for passenger loading and unloading operations without impacting freight operations, and inefficient yard track layouts that result in "dead space" within the terminal. The study prioritizes the development of practical solutions that could be constructed while minimizing operational impacts to rail and road operations during construction.

The WTMP Transportation Study and its proposed improvements can be found in Appendix C.

2.1.2. Waterfront Plan Discussion

The objectives of the Whittier Terminal Waterfront Reconstruction Study (Appendix D) are to assess existing conditions, review previous reports, and develop and recommend alternatives to reconstruct the Whittier Terminal waterfront. This facility is critical for maintaining safe and

continuous rail and cargo operations for ARRC and AML, continuing its role as a vital link in Alaska's transportation network.

The review of existing facilities revealed a range of conditions from poor to fair. The age and condition of the bulkhead, barge slip, mooring facilities, mechanical and electrical systems, and unloading transfer span (which is approximately 50 years old) are areas of concern. Given the harsh conditions of the marine environment, heavy use of the facilities, and critical reliance on the barge operations to keep Alaska supplied, the study prioritizes the development of practical solutions that could be constructed while minimizing operational impacts to barge and rail operations during construction.

The WTMP Waterfront Reconstruction Study and its proposed improvements can be found in Appendix D.

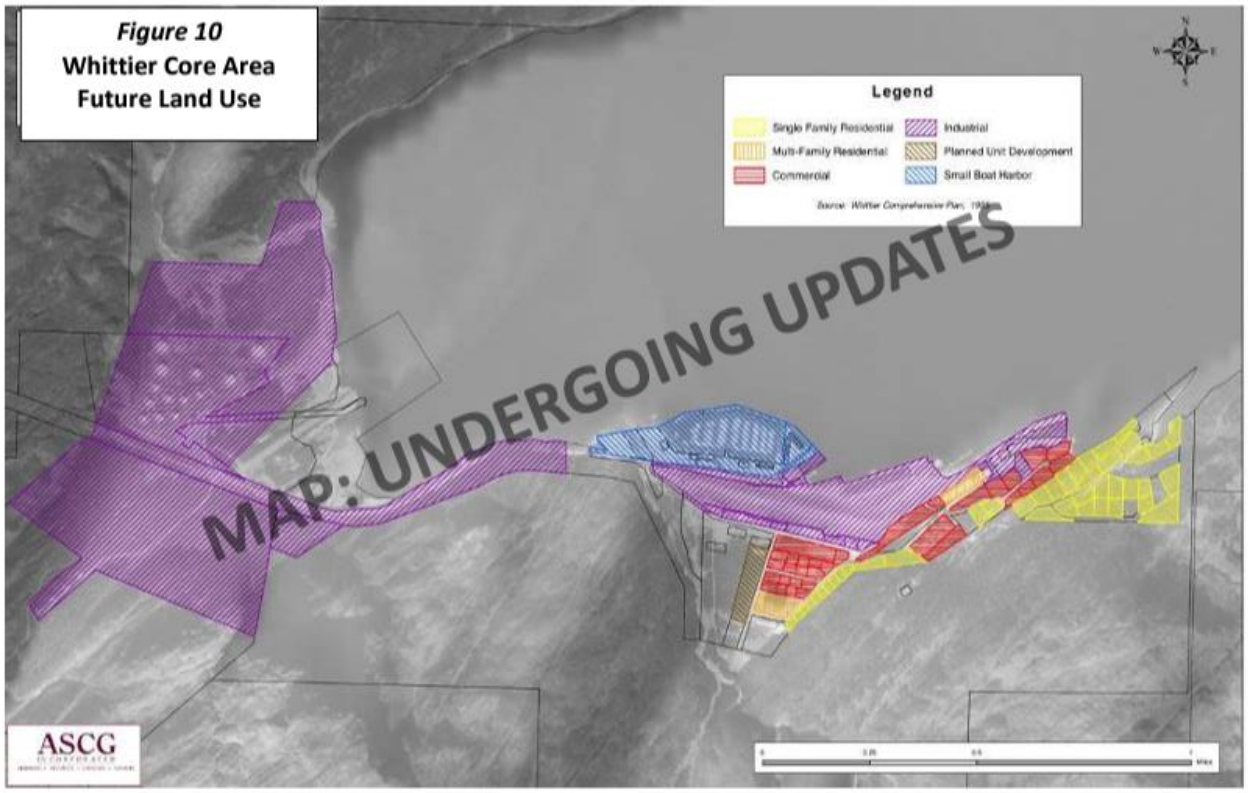
2.2. Land Use

As indicated in Figure 2-1, the terminal property is zoned for industrial use. Approximately 58 percent of the City of Whittier's developed land is used for industrial purposes. Industrial use occurs within the combined
212 acres of the Whittier Core Area and Head of Passage Canal. Major industrial land use includes the ARRC's industrial and passenger operations, the roll-on and roll-off barge next to the Whittier Small Boat Harbor, and a privately owned seafood processing plant. The ARRC leases approximately 5,000 feet of its waterfront property in the Whittier Core Area to the City.[1]

The terminal's land use is highly specialized, with designated areas for cargo handling, rail operations, and storage. The upland track configurations support barge-to-rail intermodal transfers but face challenges from spatial constraints and weather conditions. Additionally, the terminal must balance operational demands with its proximity to residential areas, which occasionally leads to conflict points at at-grade crossings.

[1] City of Whittier 2020 Comprehensive Plan, Catalyst Consulting, January 21, 2020. https://www.whittieralaska.gov/wp-content/uploads/City-of-Whittier-2020-Comprehensive-Plan.pdf.

Figure 2-1. City of Whittier Core Area Future Land Use/Zoning Map



2.3. Terminal Access

Access is critical to maintaining the terminal's role as a key intermodal hub. This section examines the waterside, landside, and rail connections that support freight and passenger operations and identifies challenges and opportunities for improvement. Access to the terminal is currently constrained by aging infrastructure and limited capacity, which impact overall operational efficiency and connectivity.

2.3.1. Waterside

The Whittier Terminal maintains and operates significant waterside infrastructure, all of which is critical to the operation of the rail barge service operated by AML and other local operations, which include:

- Whittier Boat Harbor
- Ferry terminal
- Cruise docks

More detailed information about these critical facilities can be found in Appendix C and Appendix D.

2.3.2. Landside Roads

Vehicular and pedestrian transportation in Whittier faces its own unique challenges and use cases that are critical to analyze alongside the Whittier Terminal in order to ensure efficient operations and connections with local and freight traffic. Many of these roadways and pathways share modal use, leading to conflicts at or near the Whittier Terminal. These facilities are divided by need and use case as follows:

- Residential
- Commercial
- Tourism
- Conflict points
- Pedestrian issues

Analysis and detail regarding these issues can be found in Appendix C.

2.3.3. Landside Rail

The landside rail system at Whittier Terminal is critical for connecting maritime cargo to inland destinations. The rail yard's layout, however, is constrained by limited track lengths and a lack of space for efficient switching operations. Railcars must often be moved multiple times to complete loading and unloading processes, resulting in operational inefficiencies and increased turnaround times. These constraints also hinder the terminal's ability to handle larger cargo volumes, posing a challenge to its long-term viability.

For additional information, see Appendix C.

2.3.4. At-Grade Rail Crossings

The Whittier Street at-grade rail crossing is a significant conflict point within the terminal's landside access network. This crossing, which serves as the primary connection between the terminal and the surrounding community, is often blocked by freight operations during train building and barge unloading activities. Extended delays at the crossing disrupt vehicular traffic and pedestrian movement, underscoring the need for improved infrastructure such as grade separation or alternative routing. These disruptions also impact emergency response times and local businesses, further highlighting the importance of addressing this critical issue.

For additional information, see Appendix C.

2.3.5. Tunnel Restrictions

The Anton Anderson Memorial Tunnel provides the only land access to the Whittier Terminal and is shared by highway vehicles and trains. There are significant rules and regulations regarding the tunnel that affect its operations and, by extension, operations at the terminal and rail line. More detail can be found in Appendix C.

2.4. Existing Berths

The existing berths at the Whittier Terminal are fundamental to its marine operations, supporting the transfer of cargo between barges and the rail network. A detailed assessment of the barge slip, rail transfer span, and bulkhead infrastructure and former marginal wharf that highlights their current conditions and operational limitations can be found in Appendix D.

2.5. Railyard

2.5.1. Yard Tracks and Rail Operations Within Terminal

The railyard is a central component of the Whittier Terminal's operations, serving as the primary area for railcar storage, switching, and cargo transfers. With limited track lengths and constrained spatial configurations, the yard must handle both incoming and outgoing railcars efficiently to support intermodal operations. The terminal's proximity to residential areas and other commercial activities further complicates railyard operations, requiring careful scheduling and operational precision to minimize disruptions. Additionally, snow maintenance during winter months poses significant challenges, necessitating the use of specialized equipment and strategies to maintain operational continuity.

For additional information, see Appendix C.

2.6. Existing Operations

Operations at the Whittier Terminal encompass a range of activities such as:

- Barge slip operations
- Intermodal slip operations
- Intermodal rail operations
- Delong dock operations
- Alaska ferry operations
- Passenger operations

Further detail on these operations can be found in Appendix C and Appendix D.

3. Economic Analysis and Environmental Effects

3.1. Overview

A data review of the Whittier Terminal reveals significant growth in inbound freight, with imports rising from approximately 210,000 tons in 2004 to nearly 596,000 tons in 2019, an increase of 284 percent. This growth was driven primarily by the import of manufactured equipment, machinery, and products, which accounted for over 50 percent of total inbound tonnage.

The terminal's operations face challenges due to Whittier's extreme weather, including significant snow accumulation that requires specialized snow management to maintain efficient terminal operations.

3.2. Economic Development

Trade through Alaska's Southcentral ports, including Whittier, is sensitive to local, domestic, and international economic conditions. It can be affected by slow-cycle economic trends, including population growth, job creation, disposable income, natural resource/commodities costs, mineral or other extraction output, and retail trade activity. Short-term increases or disruptions can occur due to singular events; a good example was the COVID-19 pandemic. Whittier can also be affected by large-scale project cycles such as work on Alaska's North Slope, resulting in the movement of industrial equipment either in or out of Alaska.

The Whittier Terminal has traditionally been an import-centric gateway. Imports serve consumers and the industry base in Alaska, including the mining, oil and gas, fishing, and tourism sectors. Imports account for a significant cargo volume by weight handled at the terminal.

This study relied on interviews with the ARRC and Alaska Maritime Lines, and open source reports on trade trends into Alaska. It also reviewed USACE data sources.

Recent detailed reported market cargo data has been drawn from the *United States Army Corps of Engineers (USACE) Institute for Water Resources Five-Year Cargo Reports* for 2018 to 2022. This information supplements previous USACE data gathered as part of the economic analysis completed for the *Port of Whittier Freight Study, May 2020,* for 2004–2018. These two data sets comprise nearly 20 years of cargo tonnage moved through Whittier. They include important data for years that experienced economic impacts such as the financial crisis of 2008–2009 and the COVID-19 pandemic of 2020–2022. The USACE reported amounts do not yet include calendar year 2023 or 2024. They do include imports and exports on a total terminal basis and are not data exclusively from or for ARRC operations. Refer to Figure 3-1, and Figure 3-2.

Figure 3-1. Whittier Inbound Freight Trends 2004–2022

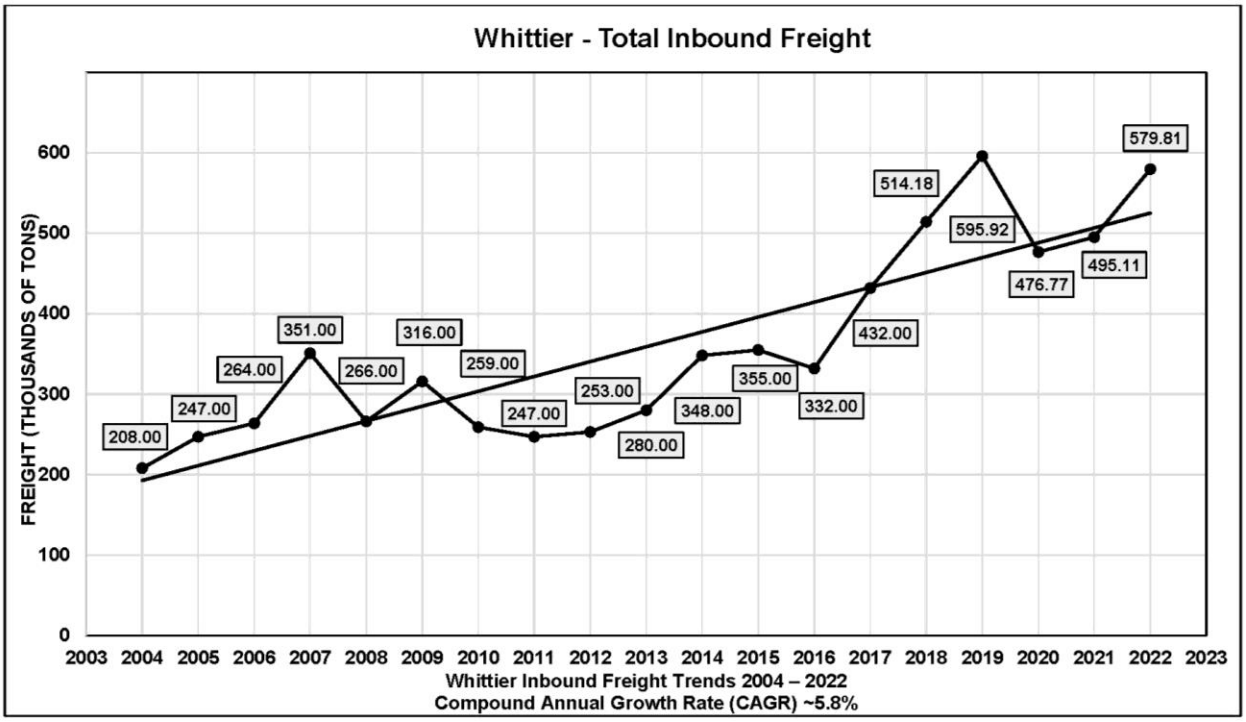
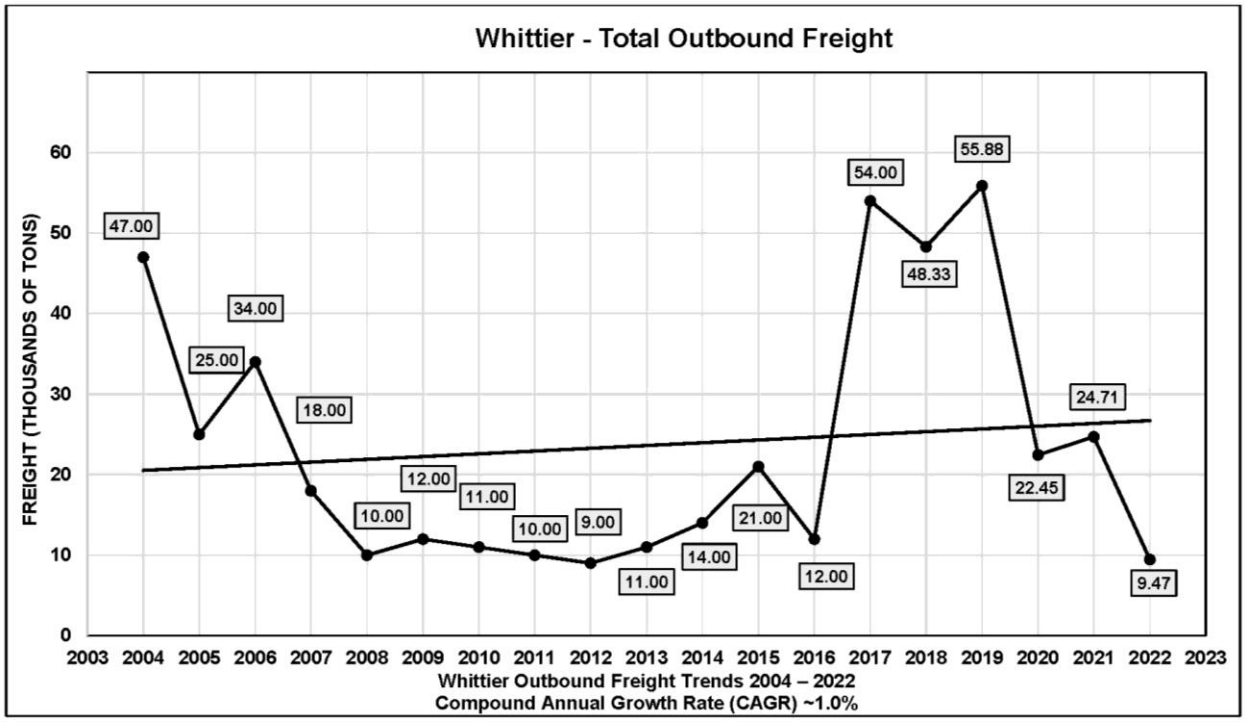


Figure 3-2. Whittier Outbound Freight Trends 2004–2022



A data review indicates that approximately 210,000 tons of goods were imported through Whittier in 2004, which grew to about 596,000 tons in 2019, an increase of 284 percent. Most of this inbound freight included manufactured equipment, machinery, and products, which amounted to more than 50 percent of the total import tonnage. The other two primary categories of imports include food other than fish (13 percent) and fish (6 percent), much of which came from other Alaska harbor origins. The year 2019 (before the COVID pandemic) saw an all-time high of just under 596,000 tons. The year 2020 saw a dip to about 477,000 tons, a decrease of 20 percent. Since then, cargo tonnage has regained ground and, in 2022, reached 580,000 tons, nearing the 2019 peak.

During the 19 years from 2004 to 2022, Whittier has seen a 276 percent import increase, or a 5.8 percent CAGR. This was driven primarily by an increase in imports of manufactured equipment, machinery, and products. A CAGR of 5.8 percent is a healthy growth rate, and if sustained, it could result in a doubling of import tonnage (resulting in over 1 million tons of cargo) in the next 12 years.

As for exports, a peak of approximately 56,000 tons of outbound freight passed through Whittier in 2019 (Figure 3-2). The main export category was manufactured equipment, machinery, and manufactured wood products. Note that peak export tonnage is only 10 percent of import tonnage, so most containers or railcars return to the Lower 48 empty.

Some interesting trends emerge from the review of the data. From 2004 to 2022, outbound freight fluctuated from a low of 10,400 tons to a high of 56,000 tons. From 2016 to 2017, Whittier experienced a 41,800-ton increase, or 329 percent. This was driven primarily by a sudden surge of manufactured equipment, machinery, and products exported from Whittier. The reasons for this are unclear but likely relate to equipment being used in extraction activities being sent out of Alaska.

Containerized trade into Whittier includes many commodities. In general, if a product can be containerized, it can usually be shipped at a lower total cost. Therefore, container growth rates over time can outpace growth in bulk and breakbulk goods. Container trade volumes are also influenced by fluctuations in economic cycles. Containerized commodities can include finished and/or semi-finished consumer, manufacturing, and food/beverage-related goods, which are sensitive to changes in local consumer behavior and shipped in smaller increments. Bulk shipments are generally made up of singular or closely related raw commodities including liquid bulk, aggregates, steel, ore, or petroleum products. These commodities can be stored in bulk rail cars (dry or wet) and are often routinely distributed in larger segments to a smaller set of end-users, which makes their demand cycles more predictable and less volatile. This is the case and an advantage when bulk cargo is shipped via rail car on barge to Whittier.

3.3. Resiliency

3.3.1. Snow Maintenance

The often-inclement weather in Whittier has a large impact on terminal operations. Whittier receives an average of 196 inches of precipitation annually, much of which comes in the form of

snow that can total 20 feet in a season. The primary issue is where to put that snow after the tracks and yard are cleared. By regulation, the snow cannot be shoved into the harbor, so both ARRC and AML have developed tactics to move the snow to locations that allow operations to proceed. Keeping switches and frogs from ice buildup is also a persistent problem, as ice can derail a train if not constantly monitored. Any redevelopment of the yard and terminal facility must take winter operations and snow removal into consideration.

4. Outreach and Engagement

ARRC recognizes that the public and other stakeholders want to be involved in decisions that affect them. ARRC also recognizes that it is responsible for safe and effective operations of its rail and waterfront infrastructure. The goal of the WTMP's public involvement activities is to keep people informed about the WTMP project and provide opportunities for stakeholders to share ideas, concerns, and opportunities related to the master plan. The goals of this effort are to:

1. Inform the public on why the project is needed and ARRC's proposed plan of action;
2. Provide opportunities for public input on terminal access, use, and community needs; and
3. Share how public input was used during project design.

4.1. Stakeholders

Our stakeholders are those who are interested or affected—directly or indirectly—by the WTMP project and eventual implementation. They include ARRC internal stakeholders, which represent engineering, operations, finance, and facilities staff, as well as external stakeholders such as the Alaska DOT&PF, Whittier's elected officials, private freight providers, and key business interests. Whittier residents and the public, local businesses, non-governmental community and economic development organizations, and others also have an interest in the project. Each stakeholder group has its own perspective on the project, with varying interests and concerns (see Appendix E: Stakeholder Engagement Report).

By consulting and involving stakeholder groups at key phases of project development, the project team was able to identify opportunities and respond to issues of concern as they arose, thereby increasing understanding, building trust, and growing support for the plan's eventual implementation. Project stakeholders had and will continue to have opportunities to participate during the planning process based on their anticipated level of interest and ability to participate meaningfully.

4.2. Objectives

Stakeholder engagement is a systematic process designed to provide clear and consistent information and engage stakeholders at appropriate and meaningful levels of project development. This project uses the "Public Participation Pillars" (IAP2 USA - IAP2 Core Values, Ethics, Spectrum) from the International Association for Public Participation (IAP2) as a guide for public engagement.

ARRC proposes an early and continuous process to engage and inform stakeholders, guided by three distinct overlapping objectives (see Table 4-1):

- **Inform** stakeholders about the project, decision-making structure, and development process.
- **Consult** stakeholders to obtain input on alternatives.
- **Involve** key internal and external stakeholders meaningfully in data collection and alternatives development.

Some stakeholders such as ARRC staff and freight providers have technical backgrounds, while others are interested in the project for quality of life, environmental, or economic reasons. The ability of individuals and/or groups to shape the future of ARRC's Whittier facility will vary depending on the subject matter and issues of concern. The project's Public Involvement Plan outlines specific objectives and strategies at each stage of plan development.

4.2.1. Internal Stakeholders

Internal stakeholders have been involved throughout the planning effort. These are primarily ARRC's technical staff representing engineering, operations, facility management, real estate, and finance departments. Internal stakeholders also include ARRC's Board of Directors.

4.2.2. External Stakeholders

External stakeholders are individuals and organizational representatives outside of ARRC. Key external partners include agency representatives, local elected officials, and ARRC customers who have an immediate or detailed connection to ARRC facilities and operations and who can provide significant substantive input into current and long-term operational needs. Other external stakeholders may not be as familiar with day-to-day operations but may also have a stake in the plan's outcome. These may include Whittier residents and visitors, seasonal small business owners, and regional organizations (including Alaska Native Corporations).

Table 4-1. Tools for Engagement

Tools to Inform—Raise Awareness and Educate	Tools to Consult—Obtain Feedback	Tools to Involve—Work Directly with Stakeholders
• Project website • E-newsletters • E-mail/listservs • Existing mechanisms (e.g., organization presentations, newsletters) • Informational materials/infographics	• Comment forms • Electronic surveys • Small group meetings and presentations • Briefings (City Council, Planning Commission) • Public open house	• One-on-one meetings • Interviews (phone or in-person) • Site visits • Subject matter/technical workshops

4.3. Stakeholder Engagement Report

A detailed stakeholder engagement report will be prepared at the conclusion of the public engagement process and incorporated as Appendix E: Stakeholder Engagement Report with

the final WTMP. A summary of engagements completed to date and planned engagements prior to finalization of the plan is included in Table 4-2.

Table 4-2. Summary of Engagements

Date	Audience	Purpose
2023–2024 Engagements		
7/13/2023	Internal Stakeholder Meeting	Brainstorm Vision statement
8/28/2023	Internal Stakeholder Meeting	Discussion: current and future potential strengths, weaknesses, and opportunities
11/21/2023	City Council Presentation	Introduce project and understand community concerns and opportunities
12/7/2023	External Stakeholder Meeting	Understand operational needs from external stakeholders
2/15/2024	Whittier P&Z Meeting	Understand local conditions and upcoming plans for development
3/18/2024	Internal Stakeholder Meeting	Review Alternative 1 with project management and engineering
4/12/2024	Internal Stakeholder Meeting	Review Alternative 1 with operations
9/30/2024	Internal Stakeholder Meeting	Review Alternative 2 with internal operations and engineering
10/15/2024	City Council Presentation	Provide update prior to final draft document for public review and comment
2025 – Planned Engagements		
2/25/2025	Internal Stakeholder Meeting	Review Draft Master Plan with internal operations and engineering
March 2025	External Stakeholder Meeting(s) – Focus Groups	Review Draft Master Plan with external stakeholders in small groups or one-on-one settings
3/18/2025	City Council Presentation	Provide update prior to start of public comment period
3/25/2025 to 4/25/2025	Public Comment Period	Post Draft Master Plan on public website for public comment
4/15/2025	Public Meeting	Hold public open house with presentation of Draft Master Plan during public comment period

5. Recommendations

A primary goal of this WTMP is to determine recommendations for how to improve the infrastructure at and around the terminal to improve its connectivity and utility to the local region. These recommendations as well as potential alternatives are discussed here with more detail than what is provided in the Transportation Study and Waterfront Reconstruction Study (Appendix C and Appendix D, respectively). These recommendations are further refined by either short- or long-term planning horizons as presented in Section 7 of this WTMP.

5.1. Proposed Alternatives for Waterfront Reconstruction

The Whittier Terminal waterfront plays a vital role in Alaska's transportation network, but its aging infrastructure requires careful consideration of reconstruction options. This section outlines alternatives for redevelopment, including a No-Build Alternative, based on a thorough review of the current facility, future growth requirements, stakeholder input, and cost evaluations.

In this planning phase, critical factors such as coastal resilience, tsunami and earthquake vulnerability, and long-term operational needs were evaluated. These considerations informed the prioritization of reconstruction efforts, selection of design concepts, and estimation of probable construction costs.

The following sections describe each alternative, beginning with the No-Build Alternative and progressing to specific reconstruction concepts. Each alternative highlights the associated costs, benefits, and potential challenges to ensure informed decision-making and alignment with the terminal's long-term goals.

5.1.1. No-Build Alternative

Under the No-Build Alternative, the facility would be left as-is with no modifications implemented. The current state of the Whittier Terminal's infrastructure is a cause for concern. The deteriorating marginal wharf, barge slip, transfer span, and associated waterfront elements would remain as they are with no upgrades or repairs. While avoiding immediate capital expenditures, this scenario also presents significant risks and challenges. Key concerns include:

- **Structural Deterioration:** The existing marginal wharf is in very poor condition, with its bulkhead failing. The transfer span is in similar poor condition and needs immediate upgrades to continue operation. Without intervention, the structural integrity of the waterfront facilities will continue to degrade, leading to safety hazards, operational inefficiencies, and, eventually, a complete loss of functionality. The failure of critical infrastructure could result in expensive emergency repairs and/or the total shutdown of operations.
- **Operational Disruption:** The deteriorating condition of the transfer span, barge slip, and mooring facilities, which are essential for ARRC and AML cargo operations, will lead to increasing operational disruptions. As the facilities age, they will become more prone to mechanical and structural failures, leading to delays in barge and rail operations, increased maintenance costs, and reduced reliability for cargo movements.
- **Safety Risks:** The declining condition of the marginal wharf bulkhead and transfer span poses significant safety risks to workers, vessels, and cargo handling operations. Without remediation, the risk of accidents or structural failures increases, putting personnel and equipment at risk.
- **Lost Opportunities for Expansion and Modernization:** The No-Build Alternative would prevent the terminal from capitalizing on opportunities to modernize and expand operations. There would be no improvements to accommodate longer trains, larger

barges, or additional waterfront storage, limiting the terminal's ability to support future freight and passenger traffic growth.

- **Environmental Concerns:** Continuing to operate with aging and deteriorating infrastructure increases the likelihood of environmental impacts (i.e., unintended spills or failures), which could affect the surrounding marine environment. Additionally, the lack of investment in more sustainable and resilient infrastructure would leave the terminal vulnerable to the long-term effects of climate change, including fluctuating sea levels and increased storm intensity.

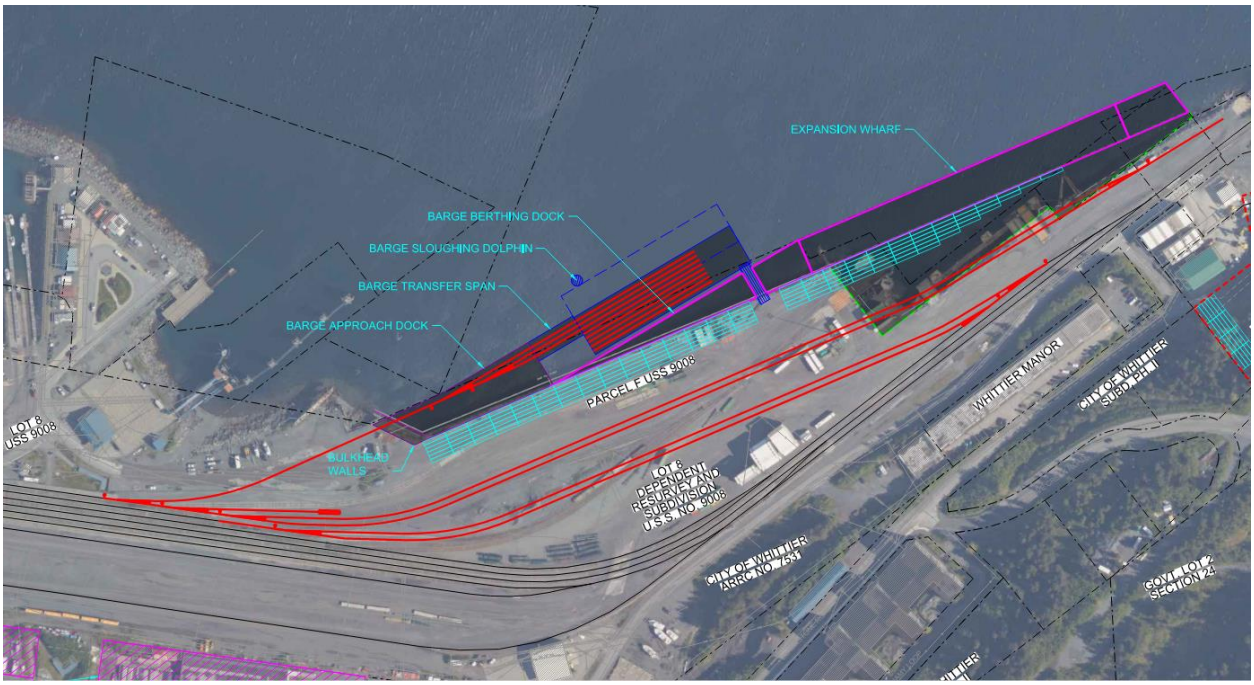
In summary, the No-Build Alternative saves costs in the short term but leads to compounding issues over time, including higher future repair costs, operational inefficiencies, safety risks, and the inability to support long-term economic growth. Given the critical role that the Whittier Terminal plays in Alaska's transportation network, the No-Build Alternative is not recommended to ensure the terminal's long-term viability and functionality.

5.1.2. Alternative 1 – Westerly Relocation of Barge Berthing

Alternative 1 proposes relocating the barge berthing operation approximately 1,000 feet westward from the existing location. This waterfront reconstruction alternative includes constructing a new shoreline bulkhead, new barge berth, and transfer span, and expanding the wharf to provide an additional 3.9 acres (170,000 square feet) of yard area for cargo handling and storage. The overall reconstruction would be carried out in two phases to minimize disruption to operations:

- **Phase 1:** This phase would prioritize the essential waterfront structures required for barge berthing operations, including the construction of a new bulkhead to replace the deteriorating existing bulkhead.
- **Phase 2:** The second phase would focus on the wharf expansion and removal of the old barge facilities, ensuring operational continuity throughout the construction process.

Figure 5-1. Alternative 1 – Westerly Barge Relocation Plan



As shown on the above figure, the barge approach would be extended from the shoreline to accommodate the new rail tracks connecting to the barge transfer span. The angle of the new berth is modified to optimize the new barge lead track alignment. The structural options considered for the new wharf configuration are a pile-supported dock and a rock-filled bulkheaded dock. The new bulkhead wall would be constructed outboard of the existing bulkhead using steel sheet pile walls with tiebacks and a reinforced concrete cap. The space between the existing and new bulkheads would be filled with well-graded rock.

The existing transfer span's dimensions are well optimized; thus, the new transfer span would maintain the same length and width to accommodate three tracks. The hydraulic lifting mechanism is recommended to be changed to a wire-rope mechanism for easier maintenance. The new barge berth and wharf expansion are planned to accommodate the largest barge size (up to 125 by 460 feet) with a 25-foot draft in consideration of the tidal ranges at Whittier.

The opinion of probable construction cost for this alternative includes:

- $40 million for the new shoreline bulkhead,
- $50 million for the new barge berth and transfer span, and
- $125 million for the wharf expansion, which includes the removal of the existing barge facility.

Total: $215 million

The total construction cost is based on a pile-supported dock with steel piles and a concrete deck and includes the cost of removing the existing barge facility. All costs are in 2024 dollars.

This alternative is not desired by the community or ARRC unless a grade separation between ARRC tracks and Whittier Street is completed prior to relocation of the barge berthing facilities. The community and ARRC have concerns that these changes would result in a potential increase in traffic during construction and after completion that would block the crossing to the terminal.

5.1.3. Alternative 2A – Reconstruct Existing Berthing Facilities in Place (Recommended Alternative)

Alternative 2A, the recommended alternative, proposes reconstructing the existing barge berth facility in its current location. To accomplish this, construction phasing would be undertaken between barge calls to the extent possible to minimize impacts on barge and yard operations. In this manner, new dolphins with fenders would be installed adjacent to the existing dolphins; a new bulkhead, new transfer span abutment, and new lifting platform would be installed outboard of the existing structures; and the side ramp would be relocated/reconstructed in its new location (to account for the shift of the transfer span). To minimize downtime, as much work as possible would be accomplished prior to replacement of the transfer span. Replacing the transfer span would require an approximate 2-week barge call outage to allow installation and commissioning of the new span and removal of existing dolphins and electrical and mechanical systems.

This alternative emerged from discussions with ARRC regarding the potential disadvantages of relocating the barge slip westward, as proposed in Alternative 1. Concerns were raised about the reduction in yard track lengths and operational difficulties in loading and unloading a barge positioned farther west. Additionally, the wind and wave conditions at the current location are more predictable and manageable for barge operations, whereas relocating westward would expose the barge to increased wave action, potentially hindering efficient operations, especially during adverse weather conditions.

Given these advantages, the reconstruction in-place Alternative 2A concept was conceived. This approach not only maintains the known benefits of the current site—such as favorable wind and wave conditions—but also replaces the deteriorating infrastructure. This option leverages existing track layouts and maintains existing operational efficiency for ARRC and AML while avoiding the operational risks associated with a relocation, reinforcing confidence in the project’s location.

The key benefits of Alternative 2A include lower costs compared to relocation, with an opinion of probable construction cost of $50 million, and reduced risks due to maintaining operations at a known and reliable site. The use of existing long tracks, which have proven value for efficient rail loading, further enhances the terminal's functionality. Although there may be temporary disruptions during construction, these would be managed through a phased approach to constructing new dolphins, abutment, transfer span, and steel sheet pile bulkhead.

The opinion of probable construction cost for this alternative includes:

- $20 million to reconstruct the marginal wharf bulkhead,

- $15 million to replace the existing transfer span in place, and
- $15 million to reconstruct the barge berthing facilities.

Total: $50 million

These costs include rock fill to support the dock pavement and environmental mitigation for in-water fill. The cost for the barge berth facility includes the construction of a slewing dolphin, berthing dock, and fenders. All costs are in 2024 dollars.

Overall, Alternative 2A stands out as the most cost-effective and low-risk option, making it the recommended alternative. Its financial viability provides reassurance about the project's feasibility and long-term benefits.

5.1.4. Alternative 2B – In-Place Reconstruction with Wharf Expansion

Alternative 2B builds upon Alternative 2A by reconstructing the existing barge berth facility in place and expanding the marginal wharf to provide additional space for waterfront storage and rail loading. This approach increases the operational capacity of the terminal, allowing for more efficient cargo handling and future growth. The wharf expansion not only creates additional space for rail operations but also enhances the overall flexibility of the terminal, retaining the advantages of the current site’s known environmental conditions. Like Alternative 2A, the construction would be phased to minimize disruptions.

The benefits of Alternative 2B include increased operational capacity and the ability to accommodate future growth while still retaining the advantages of the current site. However, the expanded scope of the wharf construction would result in higher costs ($105 million) compared to Alternative 2A, and the additional work may require temporary operational downtime during the expansion phase. While Alternative 2B offers growth potential, its increased costs and complexity make it a more expensive option than simply reconstructing the existing facilities.

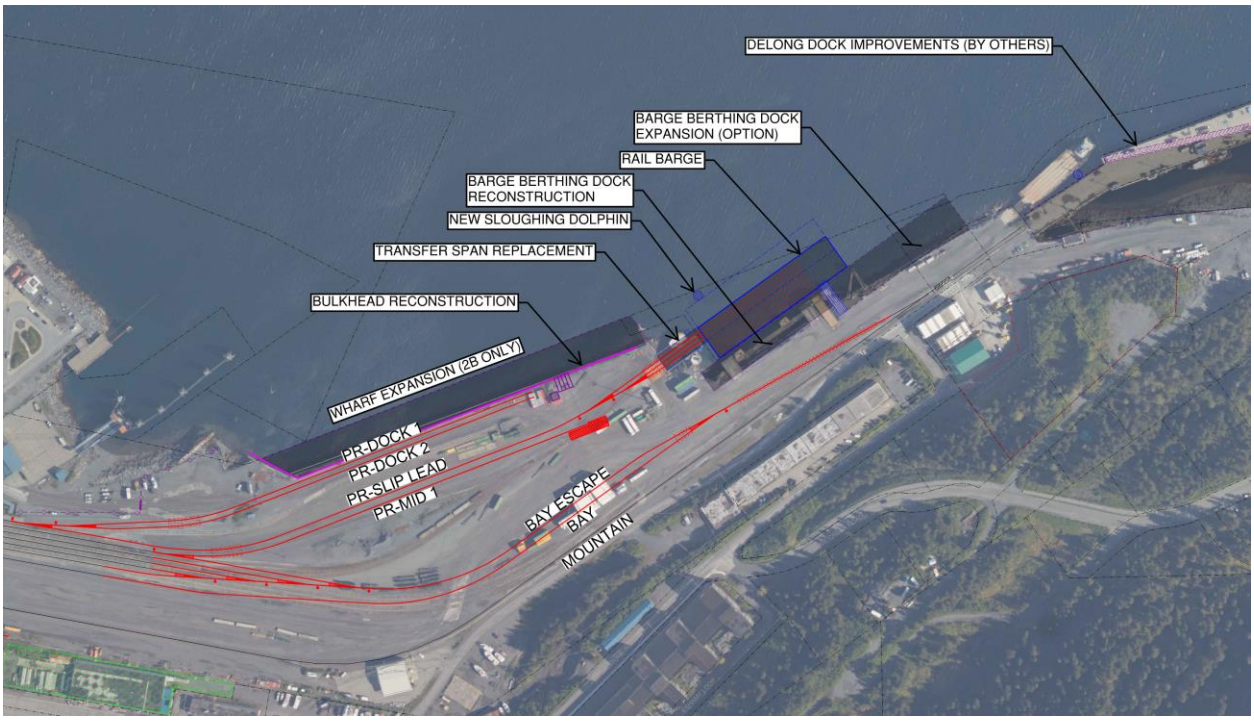
The estimated construction costs for this alternative include:

- $75 million to reconstruct the marginal wharf (including wharf expansion and bulkhead replacement),
- $15 million to replace the existing transfer span in place, and
- $15 million to reconstruct the barge berthing facilities.

Total: $105 million

These costs include rock fill to support the dock pavement and environmental mitigation for in-water fill. The cost for the barge berthing facilities includes the construction of a slewing dolphin, berthing dock, and fenders. All costs are in 2024 dollars.

Figure 5-2. Alternatives 2A and 2B – Reconstruction of Barge Berthing Facilities in Place plus Wharf Expansion



5.1.5. Other Reconstruction Considerations

Other reconstruction alternatives were reviewed and ultimately discarded, including:

- **Moving barge berth to DeLong Dock area:** This alternative was rejected due to the costs, disruption, and relocations that would be required to ongoing operations on the far east side of the waterfront.
- **Moving barge berth to mid-point of wharf:** This alternative was considered and rejected. It had all the costs of Alternative 1 but was rejected due to shorter working yard rail tracks.
- **Pile-supported concrete deck alternative:** This alternative was part of initial concepts for a new marginal wharf. It was compared to and rejected for a lower-cost sheet pile bulkhead alternative with an earthen or rock material backfill. Proximity to competent rock material and short borrow distances made the fill alternative superior.

5.1.6. Summary and Recommendations

The Whittier Terminal Waterfront Reconstruction Study (Appendix D) provides a detailed assessment of the existing conditions of the marine terminal's aging infrastructure, including the deteriorating barge slip, marginal wharf, and associated waterfront facilities. The study explores several reconstruction alternatives to modernize the terminal, improve its operational efficiency, and ensure its long-term sustainability. Each alternative was evaluated based on its ability to address current deficiencies, optimize costs, minimize operational disruptions, and support the

future growth of the terminal, which plays a vital role in Alaska's intermodal transportation network:

- **No-Build Alternative** presents significant risks and challenges that demand immediate attention. While it avoids upfront capital expenditures, it would lead to the continued deterioration of critical infrastructure, increasing the likelihood of structural failures, operational inefficiencies, and potential safety hazards. The terminal would face escalating maintenance costs, higher future repair expenses, and reduced capacity to accommodate growing freight and passenger traffic. Given the strategic importance of Whittier as a year-round ice-free port, there are other options besides the No-Build Alternative for ensuring the terminal's long-term operational viability.
- **Alternative 1 – Westerly Relocation of Barge Berthing** proposes relocating the barge berth facility approximately 1,000 feet westward; constructing a new bulkhead, barge berth, and transfer span; and expanding the wharf. This alternative would provide greater flexibility for future terminal expansion and more optimized alignment of rail tracks for barge loading. However, this option also comes with significant costs, estimated at $215 million, and introduces operational risks associated with increased exposure to wind and wave action at the new location. Additionally, reducing available yard track lengths would negatively impact overall operational efficiency. As a result, this alternative may not be the most favorable in balancing cost, risk, and operational improvements.
- **Alternative 2A – Reconstruct Existing Berthing Facilities in Place** has emerged as the recommended alternative. It proposes reconstructing the barge berth facility in its current location and replacing the deteriorating infrastructure while retaining the known operational benefits of the existing site, including more favorable wind and wave conditions. This alternative also preserves the current yard track lengths, ensuring continued operational efficiency for loading and unloading barge cargo. With an opinion of probable construction cost of $50 million, Alternative 2A is the most cost-effective option. It presents fewer operational risks than relocation, as it maintains operations at a familiar site while phasing the reconstruction to minimize disruptions. The lower costs, reduced risk, and the retention of key operational features make Alternative 2A the best solution for ensuring the long-term functionality and sustainability of the terminal.
- **Alternative 2B – In-Place Reconstruction with Wharf Expansion** builds upon Alternative 2A by expanding the marginal wharf to provide additional waterfront storage and rail loading capacity. While this alternative offers future growth potential and increased operational capacity, it comes at a higher cost, estimated at $105 million. The additional scope of work could lead to temporary operational downtime during construction. Although Alternative 2B provides more flexibility for future growth, the increased costs and complexity may not justify its advantages over Alternative 2A for the immediate needs of the terminal.

Based on the analysis conducted in the Reconstruction Study, it is recommended that Alternative 2A – Reconstruct Existing Berthing Facilities in Place be adopted as the preferred solution. This alternative strikes the best balance between cost, operational efficiency, and risk management. By addressing the immediate need for infrastructure improvements, maintaining

operational continuity, and ensuring that the terminal remains viable for future growth, Alternative 2A presents the most practical and cost-effective path forward.

Implementing this alternative would allow the ARRC and AML to continue efficiently supporting Alaska's freight and passenger movements while minimizing risks and ensuring long-term sustainability. As the preferred alternative, it not only aligns with but also advances the goals of the U.S. Department of Transportation's Port Infrastructure Development Program (PIDP), ensuring that the Whittier Terminal remains a key component of Alaska's transportation network.

To incorporate these recommendations and findings into the WTMP, the Reconstruction Study will be presented to the public and the terminal and rail partners for their input. After their input is received, it will be incorporated into the study, and any changes implemented will be analyzed and corrected for potential recommendations. The finalized study will then be implemented into the WTMP with an action plan for the investments to guide their implementation. A funding and action plan will be written to lay out the process and potential funding sources for Alternative 2A.

5.2. Proposed Alternatives for Landside Terminal

Building on the waterfront reconstruction alternatives, the proposed landside terminal improvements address multiple conflict points and opportunities to improve efficiency of rail, vehicular, and pedestrian movements within the terminal.

The aim of the alternatives is to improve the overall functionality, safety, and longevity of the terminal's infrastructure while maintaining efficient operations. Each alternative presents distinct approaches for critical landside transportation elements. The following sections present benefits and challenges for several landside terminal alternatives, focusing on operational efficiency, construction feasibility, and cost considerations based on the preferred waterfront reconstruction Alternative 2A, reconstructing existing facilities in place. Each improvement first identifies the need or challenge as presented by current conditions and is followed by a proposed solution. Some solutions have multiple options or alternatives to address the needs.

5.2.1. South Terminal Track Realignments

Need/Challenge: Existing track alignments within the terminal are not optimized for increases in container handling volumes, resulting in insufficient and unusable track length for loading and unloading trains and storing cargo. Provide for truck and lift equipment routes within the terminal to allow side handling of containers.

Proposed Solution: Realignment and installation of additional working tracks within the terminal to maximize track lengths available for freight and intermodal operations.

There are four options (A, B, C, and D; Figure 5-3 through Figure 5-6) presented to realign terminal tracks. Any of the four options presented can be combined with Alternative 2A or 2B as recommended in the Waterfront Reconstruction Study and Section 5.1 of this plan.

The four options were created by increasing the available track lengths accessible by side handling equipment for the handling of containerized cargo. For container loading and

unloading, the tracks must provide a minimum of 55 feet of clear width to the side of the tracks to allow for the movement of 53-foot containers within the side handling equipment as it moves along the track (with containers perpendicular to the center line of track). With the use of hostlers and chassis to shuttle containers to and from the barge, it is necessary to occasionally move the containers by the top-lift equipment over both short and long distances. Where possible, additional track length was provided to reduce the requirement of switching railcars during the arrival or departure of trains within the terminal.

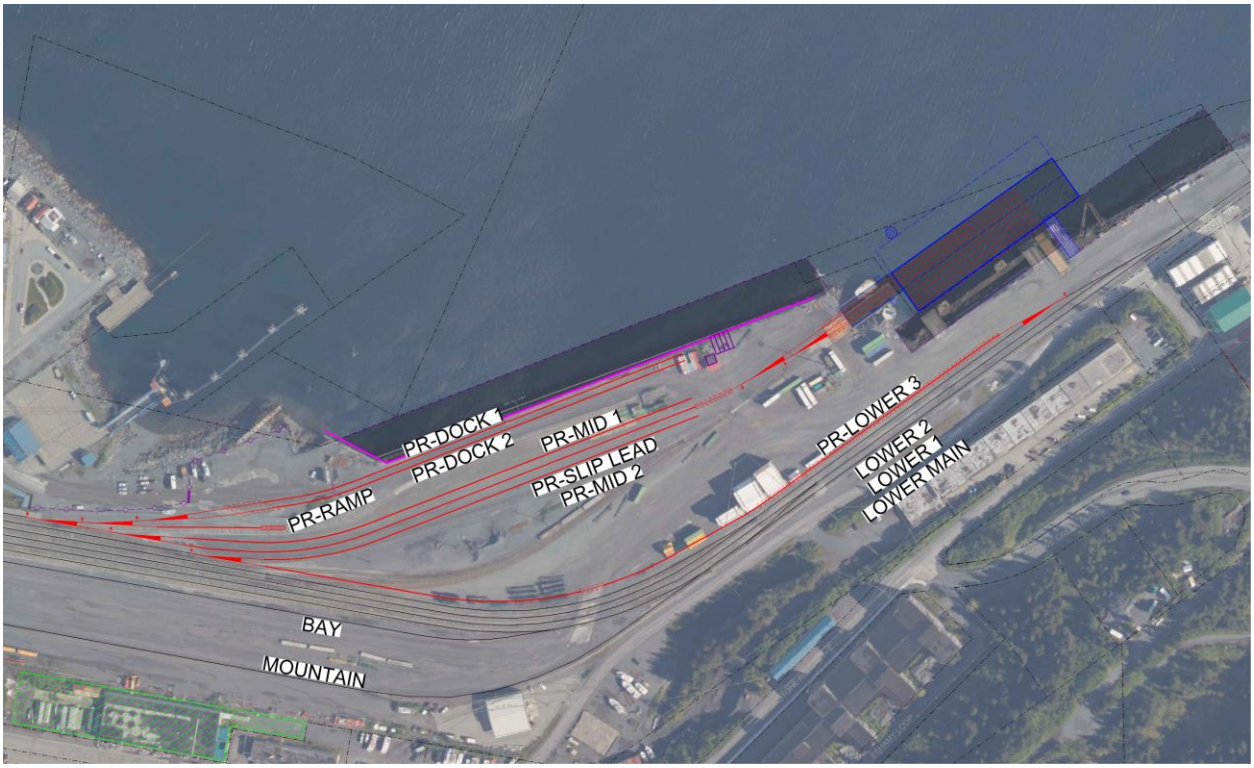
Creation of additional space within the terminal to stack containers awaiting forwarding by barge or rail was also prioritized. At present, loaded containers that arrive in the Whittier Terminal by integrated tug barge service are stacked and provided electrical power (as required for frozen seafood) for later transfer onto southbound barges to the mainland. Additionally, surplus empty containers are occasionally stacked within the terminal when an interim imbalance in container volumes require doing so.

Provision of tracks nearer the barge was favored where possible to limit the travel distance of the side handling equipment when containers are moved directly to/from railcars. The placement of tracks adjacent to the proposed wharf also provides for additional utility when the movement of non-containerized cargo is considered following the construction of a marginal wharf. The track in proximity allows for the discharge of dimensional break bulk cargo like steel or pipe into railcars.

Option A

- Add a pair of dock tracks to the railroad east (geographic north) of the barge slip.
- Realign the slip lead and add working tracks on either side.
- Relocate the ramp track to provide for circus loading of vehicles to flat cars.
- Add a full length of additional Lower 3 track (1,680 feet).
- Extend the Oil Track an additional 500 feet.
- Net gain of 3,720 feet in intermodal working track length.
- **Estimated Cost: $15 million**

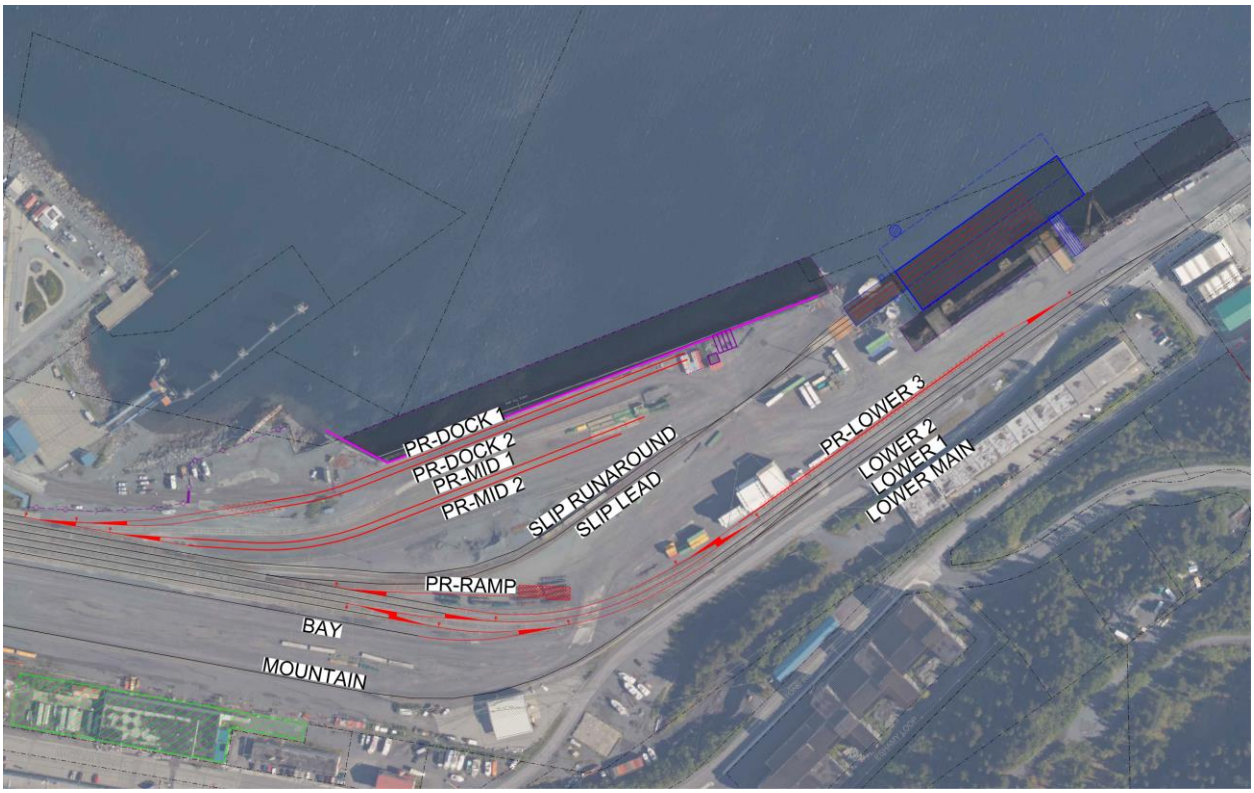
Figure 5-3. Option A – Conceptual Track Layout



Option B

- Add a pair of dock tracks to the railroad east (geographic north) of the barge slip.
- Add a pair of mid-tracks to the railroad east (geographic north) between the existing slip lead and proposed dock tracks.
- Relocate the ramp track between the slip lead and lower tracks. Add side ramp loading capability.
- Add a partial length of additional Lower 3 track (685 feet).
- Extend the Oil Track an additional 500 feet.
- Net gain of 2,670 feet in intermodal working track length.
- **Estimated Cost: $11 million**

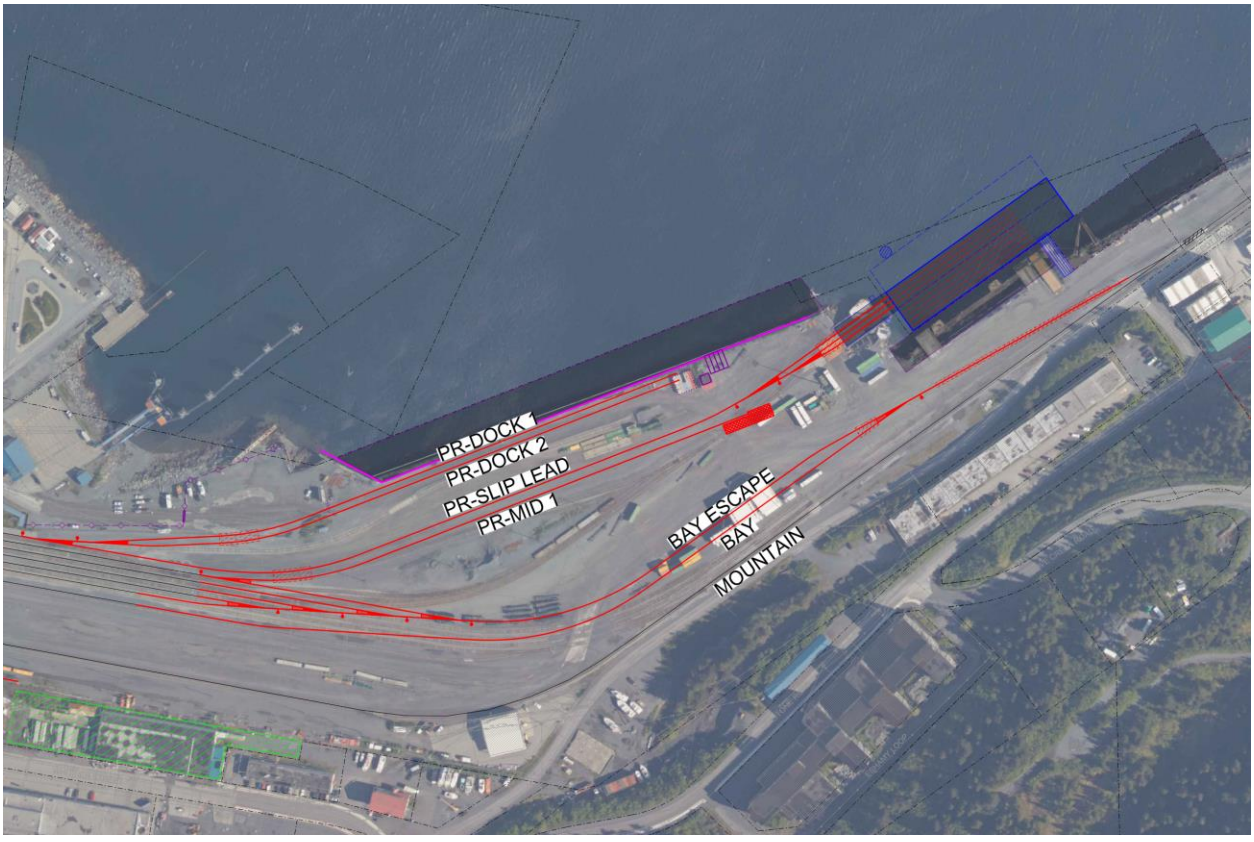
Figure 5-4. Option B – Conceptual Track Layout



Option C

- Add a pair of dock tracks to the railroad east (geographic north) of the barge slip.
- Realign the slip lead and add working track along south side.
- Relocate the ramp track to the end of the work track, near the stern ramp of the barge. Add side ramp loading capability.
- Extend the Bay track (1,020 feet) for intermodal transfer.
- Extend the working length of Mountain track (1,325 feet) for intermodal transfer.
- Reconfigure the railroad west end of freight tracks and provide a Bay escape track.
- Extend the Oil Track an additional 500 feet.
- Net gain of 1,815 feet in intermodal working track length.
- **Estimated Cost: $18 million**

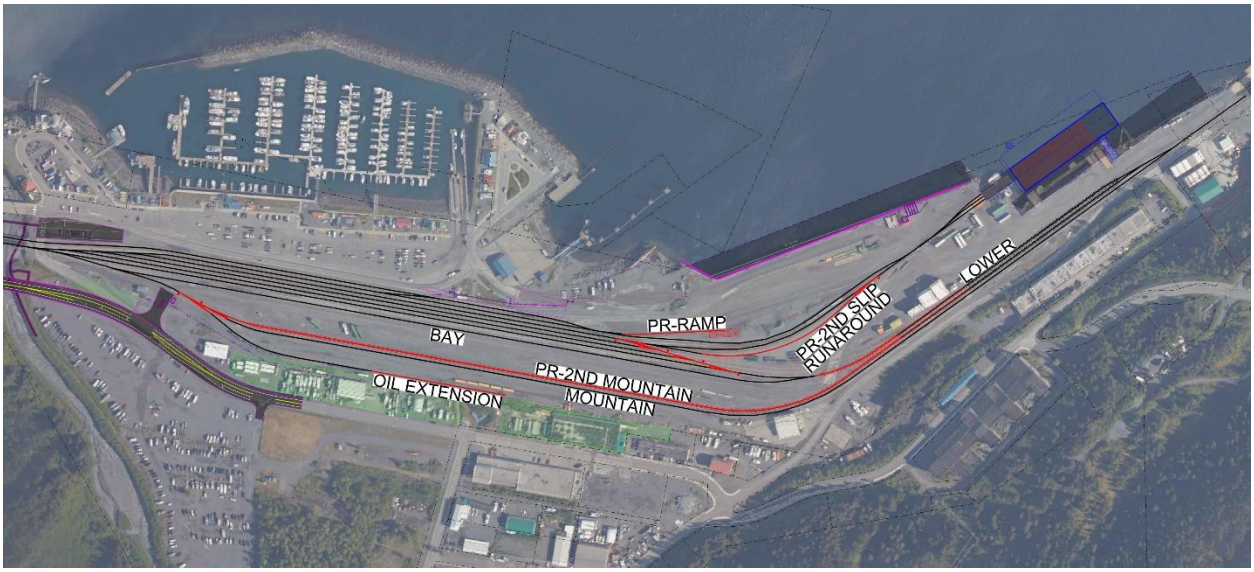
Figure 5-5. Option C – Conceptual Track Layout



Option D

- Remove Dock 5 track, utilize area for container storage.
- Relocate the ramp track to the end of a realigned Dock 4 track, near the stern ramp of the barge. Add side ramp loading capability.
- Create a second Mountain track north of the present Mountain track (2,795 feet), connect to existing Lower 1 track, provide crossing materials along the length of the track to facilitate lift operations on both Mountain tracks.
- Extend the crossing materials along the east end of Bay track (620 feet) to connect to existing Lower 2 track for intermodal transfer along adjacent tracks.
- Remove Lower 3 track and reconfigure the railroad west end of freight tracks to reduce conflict with intermodal transfer along Bay and Mountain tracks.
- Extend the Oil Track an additional 500 feet.
- Net gain of 2,820 feet in intermodal working track length.
- **Estimated Cost: $17 million**

Figure 5-6. Option D – Conceptual Track Layout



5.2.2. Second Main Track from Whittier Creek to Tunnel Entrance

Need/Challenge: Switching operations within the terminal are limited by the single main track from the Whittier Creek crossing to the Whittier Tunnel entrance. This creates a bottleneck where freight operations are hindered during days of heavy passenger traffic and vice versa. Increasing track capacity by double tracking from the tunnel entrance to the north end of the terminal would improve capacity and provide for more flexible freight and passenger operations within Whittier. Further, the installation of a new track would provide an opportunity to build a level passenger boarding platform to allow for a safer and more convenient passenger boarding experience. The addition of a second main train also allows for the building and staging of complete trains outside of the terminal itself, streamlining the departure of freight trains from

Whittier and reducing the time that the grade crossing is blocked due to trains being assembled or awaiting scheduled passage through the tunnel.

Proposed Solution: Construct a second main track from Whittier Creek to the tunnel entrance. The proposed location of the second main track would be on the railroad west (geographic south) side of the existing main track. It is anticipated that some blasting of the rock hillside may be required to provide adequate clearance along portions of the alignment. To save on other improvements costs, rock produced from blasting activities may be used as fill for new barge berthing facilities or future marginal wharf expansion.

Estimated Cost: $23 million

Figure 5-7. Proposed Second Main Track from Tunnel Entrance to Whittier Creek

5.2.3. Passenger-Level Boarding Platform

Need/Challenge: The existing passenger facilities in the Whittier Terminal are basic and focused on the processing of a single passenger train at a time. The station consists of a single spur track with asphalt pavement at top of rail, and a fabric structure is erected on the pavement north of the spur track during the operational season to provide basic shelter. The track-level pavement requires passengers to use stairs to board and disembark the high-level passenger railcars, which increases processing time and complicates the accommodation of disabled individuals. While it is possible to park a second passenger train upon the main track for loading/unloading, with pavement up to the main track to allow for passenger boarding, doing so blocks mainline access to and from the freight terminal. The increasing volume of cruise traffic through Whittier creates opportunities for additional passenger rail services, necessitating improvements in station capacity and efficiency of passenger processing.

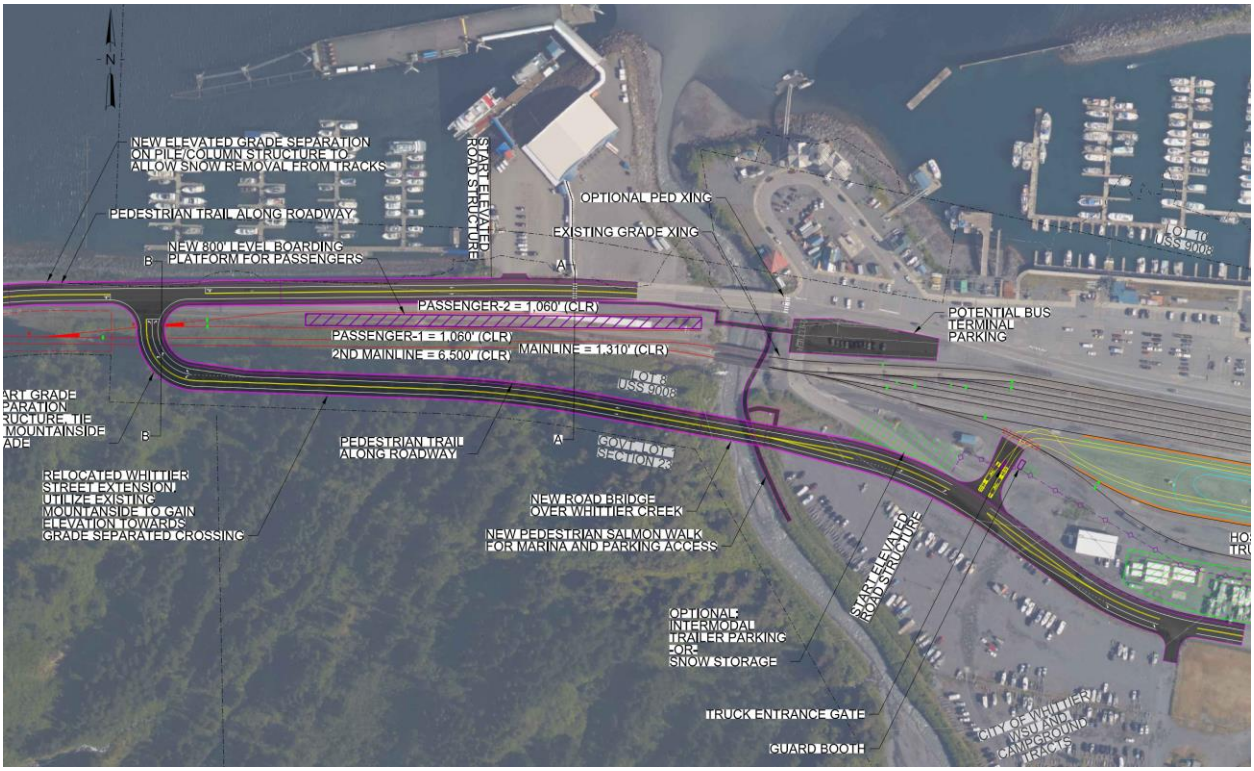
Proposed Solution: Construct a double-sided high-level station platform and dedicated passenger loading tracks to remove freight-passenger train conflicts:

- Expand the existing passenger area to the south, providing for two passenger tracks off the mainline.
- Provide cross-over at the east end of Passenger 1 track to allow for train departure into terminal
- Construct new canopy coverage of the boarding platform.

- Provide for floor-level boarding of passenger railcars, improving accessibility for all passengers.
- Relocate pedestrian crossing access to the platform to the east, in proximity to the existing intersection.

Estimated Cost: $15 million

Figure 5-8. Proposed Passenger Boarding Relocation, Grade Separation, and Security Gate Relocation



5.2.4. Grade Separation of Camp Road and Whittier Street

Need/Challenge: The existing at-grade crossing at Whittier Street is a safety concern and operations choke point for rail operations within the terminal. During barge loading and unloading, the crossing is frequently blocked, cutting off Whittier proper (including boat harbor trailer parking) from the waterfront and tunnel access. The crossing also limits the ability of residents to leave the City and for emergency vehicles to access the waterfront facilities.

Proposed Solution: Remove the current at-grade crossing at the intersection of Camp Road and Whittier Street and construct a new grade-separated crossing west of the passenger loading zone. The proposed solution must allow for snow maintenance, provide access for vehicular traffic at all times, and not block tsunami evacuation routes from the waterfront:

- Utilize the existing hillside above the current passenger loading area to the west of Whittier Creek for a new roadway (Whittier Street).

- Move the crossing to the west end of the passenger loading area and grade raise Camp Road.
- Construct the elevated portions of Camp Road on piers to allow for snow removal on the railroad tracks under and through the elevated structure.
- Construct a new pedestrian “salmon walk” to allow foot traffic from the parking area to the boat harbor/waterfront. The pedestrian path would also allow for quicker evacuation routes for pedestrians.
- Construct an alternative bus parking area on the waterfront side of Camp Road with pedestrian access directly from buses to the train passenger loading area to increase accessibility and safety.

Estimated Cost: $75 million

5.2.5. New Gates and Security Fencing

Need/Challenge: ARRC is required to maintain a secure perimeter around the terminal. Changes to the proposed track alignments and truck routing would require moving some gates and installing new fencing in certain areas. Current access is on the geographic north side of the terminal near the Ferry Terminal. During busy ferry loading, parking can overflow past the gate entrance, which inhibits truck movement in and out of the terminal.

Proposed Solution: Install new gates and fencing in strategic locations that reduce conflicts between the busy waterfront traffic areas and incoming and outgoing terminal truck traffic:

- Relocate the existing security gate and fencing geographic west towards the Ferry Terminal to allow for the new dock track locations. This gate would become a secondary gate for small pickup truck traffic for staff and an alternate exit location for freight truck traffic.
- Optional relocation of inbound truck entrance (with card access gate) on north side of terminal to a location parallel to tracks, but south of ferry terminal, to better separate inbound truck traffic from conflicting ferry traffic.
- In conjunction with the grade separation, construct a new primary truck entrance to the terminal off Whittier Street to improve traffic flow and circulation of both terminal and non-terminal traffic.
- Add new fencing as needed throughout different phases of terminal construction to maintain a secure perimeter at all times.

Estimated Cost: $2 million

5.2.6. Other Reconstruction Considerations

Snow removal and storage is a known issue in Whittier. The proposed grade separation would be column-supported to allow snow removal from tracks underneath the raised road. Future removal of the fish-packing facilities (no longer in service) on the geographic south side of the terminal along Whittier Street would provide for additional snow removal area within ARRC ROW. Any improvements impacting snow removal on adjacent Alaska DOT&PF and City of

Whittier facilities would require ongoing coordination with affected parties for future snow relocation and maintenance operations.

5.2.7. Summary and Recommendations

The proposed landside terminal improvements build upon Alternative 2A – Reconstruct Existing Berthing Facilities in Place and provide multiple improvement opportunities that can be implemented as funding becomes available. Due to the variety of projects, it is preferable that the funding plan takes a holistic approach based on applicable funding sources. All options in Alternative 2A include a version of the south terminal track realignments, second main track extension, grade separation, and reconfiguration of security gates and fencing. Of the three options presented for the south terminal track realignments, Option C is the recommended option, as it provides for the best truck traffic flow while also providing the longest lengths of working track for the Mountain and Bay tracks.

These recommendations and findings will be presented to the public and the terminal and rail partners for their input. Their input will be incorporated into the WTMP, and any recommended changes will be analyzed for potential incorporation into the final plan. A funding and action plan will be written to lay out the process and potential funding sources for the recommended alternative. Table 5-1 below summarizes the various combinations of waterfront and landside alternatives discussed to provide a total cost.

Table 5-1. Summary of Improvements Costs by Alternative and Option

Common Improvements	Cost	Waterfront Alternative	Cost	Track Realignment Option	Cost	Total Cost
Second Main Track **Passenger Level Boarding** **Grade Separation** **Security Gate Relocation & Fencing**	$115 million	Alternative 1	$215 million	N/A	$10 million	$340 million
	$115 million	**Alternative 2A (recommended)**	**$51 million**	Option A	$15 million	$181 million
				Option B	$11 million	$177 million
				Option C	$18 million	$177 million
				Option D (recommended)	**$17 million**	**$183 million**
	$115 million	Alternative 2B	$103 million	Option A	$15 million	$233 million
				Option B	$11 million	$229 million
				Option C	$18 million	$229 million
				Option D	$17 million	$235 million

6. Master Plan

6.1. Short-Term Master Plan (10-Year Horizon)

The short-term master plan focuses on optimizing terminal rail and vehicular operations and replacing existing infrastructure that is nearing the end of its useful life. The projects identified in the short-term master plan may be completed within the next 10 years, and the plan focuses on four primary projects that can be completed independently of projects identified in the long-term master plan:

1. Reconstruction of the transfer span and barge berthing facilities.
2. Reconfiguration of the existing yard tracks, truck routes, and primary access gate.
3. Reconstruction of the marginal wharf.
4. Construction of a second main line from the tunnel entrance to Whittier Creek and a new passenger-level boarding platform and associated loading tracks.

As noted in the Transportation Study and Waterfront Reconstruction Study (Appendix C and Appendix D, respectively), the transfer span and barge berthing facilities are reaching the end of their useful life, and the proposed improvements would renew the service life of these facilities. Loss of functionality of the barge berthing operation is a statewide supply chain issue that has far-reaching economic effects for the state of Alaska and is a critical piece of the terminal infrastructure. Under Alternative 2A with reconstruction in place, the transfer span replacement and associated barge berthing facility improvements may be completed before any other proposed improvements if necessary. It is recommended that both the transfer span replacement and berthing facility upgrades be completed together, as the new transfer span would likely be constructed prior to the existing span, which would have cascading effects with other berthing facilities such as the existing mooring dolphins and A-frame ramp utilized by the forklifts for non-railcar container cargo. It is recommended to complete this first phase of the master plan within a 5-year horizon.

Reconfiguration of the yard tracks within the terminal to optimize train loading and unloading operations during barge arrivals and departures provides immediate benefits to terminal operations and efficiency. Due to the relatively short, expected track outage durations needed to complete the track realignments compared with the transfer span replacement and berthing facility improvements, this portion of the master plan could feasibly be completed simultaneously with the transfer span and berthing facility reconstruction within the same 5-year horizon. To fully utilize the reconfigured tracks and vehicular traffic patterns, the primary security entrance gate, which is currently located on the north side of the rail yard, also needs to be relocated to the southwest end of the rail yard to allow access from Whittier Street instead of routing trucks along the congested waterfront area to the north. This would reduce conflicts with traffic from the ferry terminal and small boat harbor and allow trucks to access the yard through the new gate. A smaller access gate would remain on the north side of the rail yard for ARRC pickups going to the control chalet, and a secondary truck exit would be allowed when required. Other minor relocations of equipment and control buildings and security fencing would be completed at this time to accommodate the changes in track configuration.

The third component of the short-term master plan is the reconstruction of the marginal wharf. The marginal wharf provides critical support to the landside operations of the existing terminal, but the supported land is currently unusable due to the condition of the existing bulkhead wall. At a minimum, the wall should be reinforced by adding a new retaining wall structure outboard of the existing bulkhead to allow renewed use of the supported land. This could be accomplished by constructing a new bulkhead wall outboard of the original location of the existing bulkhead. The area between the proposed and existing walls could be filled with rock or a structural grout. A drilled tie back system may be needed for full stability. Due to the condition of the existing wall, the new bulkhead is included in the short-term master plan, as it has the potential to limit terminal operations should it be allowed to continue to degrade.

The fourth component of the short-term master plan is the construction of a second mainline track from the tunnel entrance to the Whittier Creek bridge crossing and construction of the passenger-level boarding area with dedicated passenger loading tracks. The existing bridge over Whittier Creek already has capacity for a second track. The addition of the second track adds approximately 6,500 feet of storage track on the tunnel side of the terminal, which would provide increased capacity for rail car storage west of the tunnel. This would help reduce the amount of movement required through the tunnel and across the at-grade crossing at Whittier Street, which are both sources of conflict for rail and vehicular operations between the public and ARRC. In the final configuration with the construction of an at-grade separation and dedicated passenger loading tracks, the second main track would allow for the completion of train building activities within the terminal without interruption to public traffic and without the need to complete as many switching operations, which would improve both vehicular traffic flow in Whittier and train operations within the terminal.

The construction of a new passenger-level boarding platform with dedicated passenger loading tracks would remove conflicts between passenger and freight train movements within the terminal. Similar projects are currently underway in Seward and Denali National Park. With tourism through Whittier expected to continue to grow, the new level boarding platform would allow for increased passenger train capacity in the future should additional passenger carriages be acquired by ARRC. The covered shelter on the boarding platform would also be permanent, unlike than the seasonal tent covering that is currently provided. Completing this project concurrently with the second mainline track expansion is recommended to ensure that proper space for the new facilities is provided with the necessary main track realignments and to minimize the number of contractor mobilizations required to complete the construction work.

6.2. Long-Term Master Plan (20-Year Horizon)

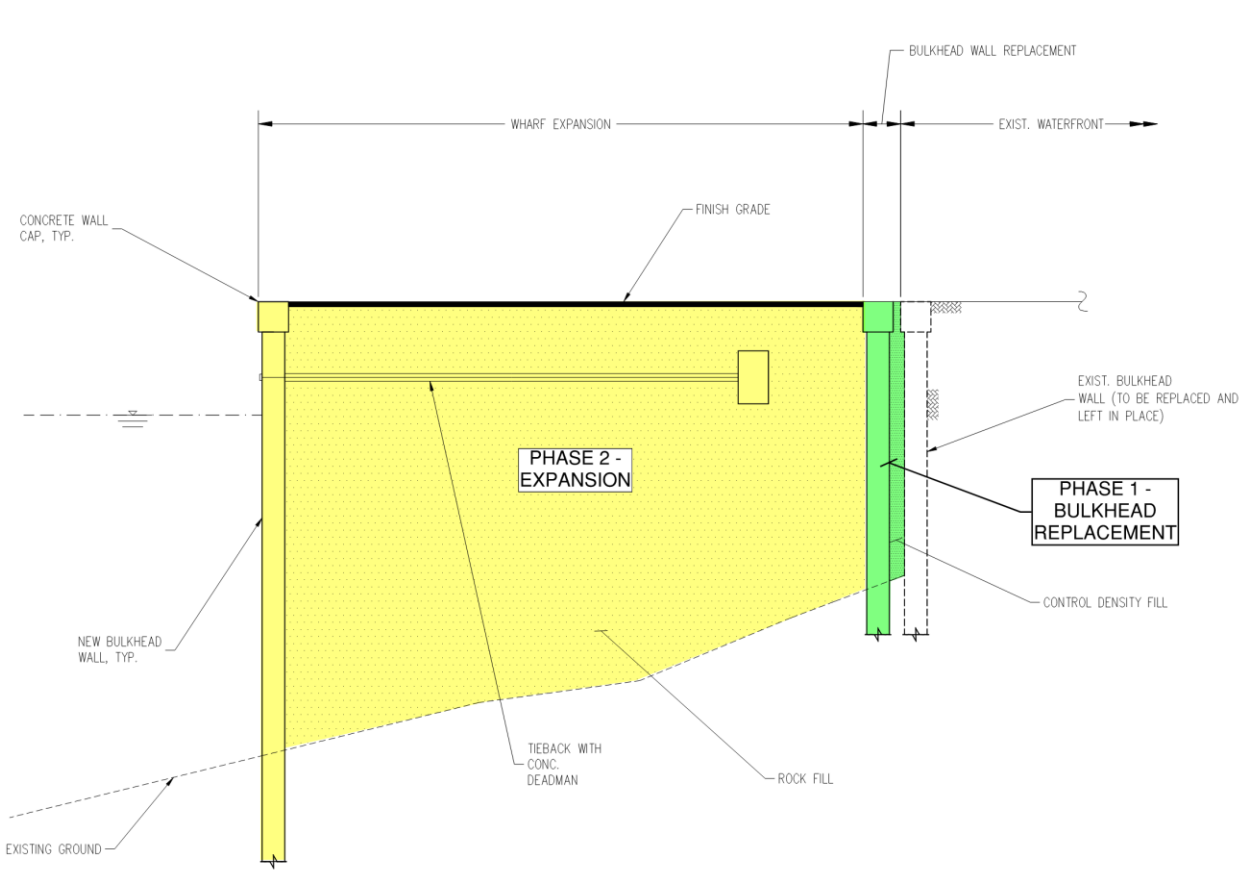
Whereas the short-term master plan is focused on maintaining serviceable infrastructure to maintain operations and reduce conflicts within the terminal, the long-term master plan is focused on improving the capacity and user experience of the terminal. The projects identified within the long-term master plan may be completed anytime within the next 20+ years and focus on two primary projects that can be completed independently of projects identified in the short-term master plan:

1. Construction of a grade separation and associated facilities to remove the Whittier Street at-grade crossing.
2. Expansion of the marginal wharf to previous limits.

The largest of the proposed improvements from a cost perspective is the proposed grade separation from Camp Road to Whittier Street, which removes the current at-grade rail crossing at Whittier Street. The master plan has been developed with this component as a key aspect, providing the largest benefit to the community while not preventing other operations or projects within the terminal from advancing if it is not completed. This project requires the collaboration of ARRC, Alaska DOT&PF, and the City of Whittier to develop improvements that can be constructed and maintained in the future. The proposed location of the grade separation takes advantage of natural grade features surrounding the area to limit the amount of roadway on structure required to complete a project of this type. Other alternatives to the proposed grade separation may be explored if agencies agree to pursue this project.

Finally, the long-term plan includes the expansion of the marginal wharf discussed in Alternative 2B to a location close to the historical limits of the wharf. This would expand the working area capacity of the terminal and provide opportunities for additional non-rail barge calls along the deeper face of an extended wharf. As discussed in Section 5.1, the cost of expanding the wharf is a significant barrier to completing the project due to the amount of fill required as well as the larger structural system in deeper water. This expansion could be completed as phase two of the wharf reconstruction or incorporated in the initial phase to reconstruct the bulkhead (see Figure 6-1). Constructing the expanded wharf in two phases allows for immediate replacement of the failing bulkhead wall to maintain infrastructure integrity while deferring costs for expansion to the future. However, the overall cost could be reduced by constructing the expansion at the same time as the bulkhead replacement since the interior bulkhead wall would not need to be as robust (or possibly not needed at all) and a single contractor mobilization could be utilized. Section 6.3 illustrates the result of deferring the expansion wharf cost by maintaining relatively uniform capital costs year over year throughout the 20-year master plan timeframe.

Figure 6-1. Marginal Wharf Expansion Phasing



6.3. Projects and Capital Expenditure Timeline

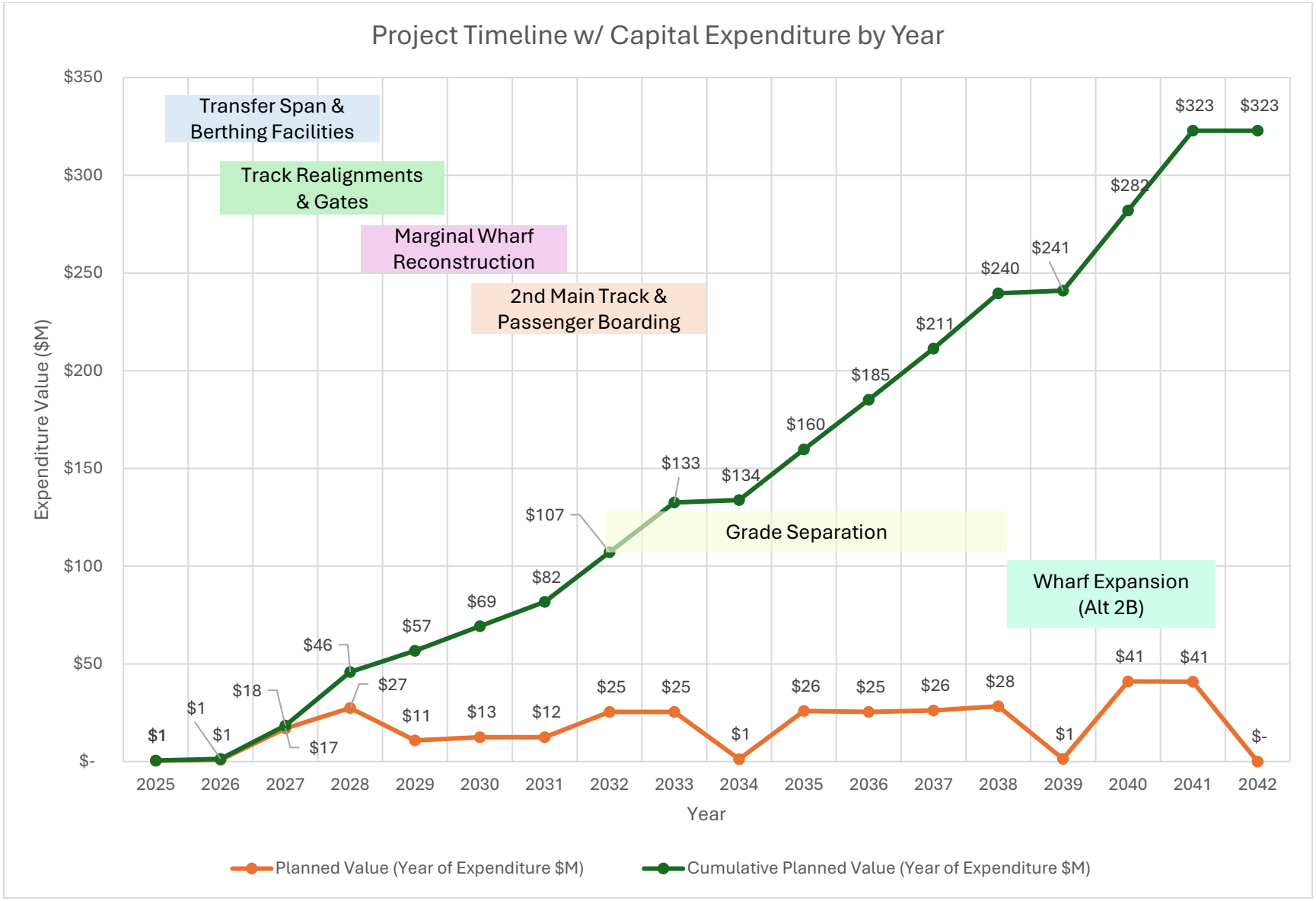
To evaluate the costs of the proposed improvements over time, the project durations were estimated and overlaid with anticipated capital expenditures for the given durations. The results are shown in Figure 6-2. The initial years 2025 through 2027 would have lower spending, as project funding is secured through a combination of internal capital program funds from ARRC, programmatic federal funding support, and discrete grant funding obtained through a variety of federal grant programs for transportation and port infrastructure, depending on the project (see Section 7 for additional information on grant funding). Once grant funding is secured, preliminary engineering and environmental permitting would be completed. If federal funds are used to fund the projects, the project would go through a NEPA review by the federal funding agency prior to the completion of final engineering. Construction bidding and award would occur after final engineering would and then construction would commence, at which point capital expenditures would increase significantly. The timeline for the expenditures is based on the anticipated high-level project schedules, which can be found in Figure 27 of Appendix A.

To complete the evaluation, each project schedule was estimated based on complexity of project and recommended priority level to maintain critical infrastructure. Funding was split between project planning/engineering and construction. Project planning and engineering is estimated at 5 percent of the total cost of construction. The goal of the analysis is to maintain a

relatively even capital expenditure rate year over year and minimize spikes in expenditures. As noted in the graph, once projects are in construction, the expenses per year are consistently in the $11–$28 million range for the Alternative 2A projects. A spike to approximately $41 million per year is noted for the wharf expansion in 2040 as part of Alternative 2B if pursued in future years and is included in Figure 6-2 for illustration purposes.

Project costs are based on concept level opinions of probable construction cost noted in Appendix A for each project completed in 2024 dollars and escalated by 3 percent each year for expenditures into the future. The total expense for Alternative 2A with Track Option C, assuming all projects are complete by the end of 2038, is estimated at nearly $240 million in investments to the Whittier Terminal (estimated as $185 million in 2024 dollars without escalation). This represents a major investment in Whittier and will need to be weighed with other priority infrastructure improvements throughout the ARRC Railbelt. Comparatively, if only the short-term (10-year) improvements are completed, the estimated cumulative cost in 2033 is approximately $133 million (estimated as $110 million in 2024 dollars without escalation).

Figure 6-2. Project Timeline with Capital Expenditure by Year (Alternatives 2A and 2B)



7. Grant Funding and BCAs

Grant funding is a key component of ARRC's capital improvements program. ARRC utilizes a combination of revenue generated from freight and passenger rail business, federal formula funds, and discrete grant funding through recent programs such as the PIDP, Consolidated Rail Infrastructure & Safety Improvements (CRISI), and Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grants. Grants are administered through a variety of federal agencies such as the U.S. Department of Transportation Maritime Administration (MARAD), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA), depending on the type of program and project being completed. As a terminal facility that supports both rail and passenger operations, the Whittier Terminal qualifies for funding through all three agencies, depending on the project. Yard improvements, transfer span replacement, barge berth facility upgrades, and marginal wharf projects may focus on MARAD and FRA grants, while passenger boarding platforms and grade-separation projects may focus on FRA and FTA grants. Recent grant programs such as the FRA Rail Crossing Elimination Grant program present great fits for the proposed improvements. The grade separation project in particular would require coordination with the City of Whittier and Alaska DOT&PF, which could unlock further grant opportunities through the Federal Highway Administration (FHWA) and other local, state, or federal funds for cities and municipalities.

The state of federal grant funding in the near future is uncertain, and therefore specific recommendations cannot be made at this time. As projects progress, grant opportunities will be continually re-evaluated for fit with project goals and grant goals to determine the appropriate opportunities to pursue that provide the best chance of success for the project. To support the priority needs of the WTMP, a BCA has been completed for the proposed transfer span replacement and barge berth facility improvements, which are necessary to ensure the continued operation of the rail barge service in Whittier. BCAs for other lower-priority projects should be completed closer to the time of the proposed projects after grant funding opportunities have been identified. Refer to Appendix F: MARAD PIDP Grant Requirements for the Whittier Terminal Master Plan Project.

7.1. Benefit-Cost Analysis for Priority Projects

This section presents the sketch-level BCA conducted for the priority projects identified in the WTMP (i.e., the Transfer Span and Berthing Facility Reconstruction). In particular, this section discusses the scenarios considered for the BCA, key assumptions, methodologies, and the findings of the analysis.

The BCA was developed to align with the latest U.S. Department of Transportation's Benefit-Cost Analysis Guidance for Discretionary Grant Programs (November 2024) and understandably may not reflect the actions that would be taken if the priority projects do not proceed as planned.

Results of the BCA are under continued development and are subject to change as the project progresses from draft to final status. Results of the BCA analysis will be provided as further definition of scenarios is obtained.

7.1.1. Scenario Definitions

The No-Build scenario is defined as the case in which the prioritized projects do not proceed as planned. As such, the Whittier Terminal's rail barge infrastructure continues to deteriorate and risk complete failure. It is assumed that there is currently a **X percent chance** that the structure will fail, and that it will **completely fail by XXXX**. If the rail barge infrastructure fails, both container and bulk/breakbulk volumes would be barged from Seattle to Anchorage (approximately **1,427 nautical miles**). While the Port of Alaska can process container volumes, it cannot process railcars directly from barges. As such, bulk/breakbulk volumes would require additional transload moves to both load and offload the commodities from the barge, as well as additional transload moves to load the goods into railcars in Alaska.

The Build scenario is defined as the case in which the prioritized projects proceed as planned. In the Build scenario, the reconstruction of the rail barge mitigates the risk of failure, allowing for bulk/interchange railcars and container volumes to continue to be barged from Seattle to Whittier (approximately **1,238 nautical miles**) before continuing by rail to Anchorage (approximately **61.5 miles**). In this scenario, the longer barge trip from Seattle to Anchorage is avoided, reducing safety costs, emissions, and transloading costs. These benefits are partially offset by the emissions and accidents incurred by the additional rail trip between Whittier and Anchorage. The ongoing maintenance expenses required to sustain operations on the deteriorated wharf are reduced due to the reconstruction of the transfer span and berthing facility.

Table 7-1 highlights the assumptions related to the project cost and schedule.

Table 7-1. Project Cost and Schedule (2023 Dollars)

Project Cost	2025	2026	2027	2028	Total
Planning & Engineering	$0.5 M	$0.5 M	$0.5 M	$0.0 M	$1.5 M
Construction	$0.0 M	$0.0 M	$14.3 M	$14.3 M	$28.7 M
Total Cost	**$0.5 M**	**$0.5 M**	**$14.8 M**	**$14.3 M**	**$30.2 M**

Note: M = million.

7.1.2. Methodology

Demand

Demand was projected over the analysis period to estimate the benefits of the priority projects. The total 2023 bulk and container on flat car (COFC) volumes to Whittier were provided by ARRC. The volumes were grown at a rate of 6.4 percent based on the historical growth in inbound freight volumes at Whittier from 2004 to 2023. AML provided information on the railcar

and container capacity of the barges. The assumptions used to estimate demand for freight transportation to the Whittier Terminal rail barge are provided in Table 7-2.

Table 7-2. Demand Assumptions

Parameter	Unit	Value	Source
Northbound Bulk Railcar Volume (2023)	Railcars/year	2,951	Data provided by ARRC
Northbound Bulk Railcar Tonnage (2023)	Tons/year	361,389	
COFC Railcars (2023)	Railcars/year	8,600	
COFC Tonnage (2023)	Tons/year	315,094	
Freight Growth Rate	%	6.4%	CAGR based on inbound freight volumes at Whittier from 2004–2023
Average Containers per COFC Railcar	Containers/railcar	2	Reasoned assumption
Average Barge Capacity - Railcars	Railcars/barge	48	Data provided by AML
Average Barge Capacity - COFC	Containers/barge	264	

Avoided Transportation Safety Costs

As the new transfer span and barge berthing facility will prevent the need to divert freight to an alternative location, it will also avoid potential increases in the likelihood of fatalities and injuries associated with freight transportation to and from Alaska.

The expected injuries and fatalities associated with freight transportation were estimated in both the No-Build and Build scenarios based on the mode of transport. For barge, expected injuries and fatalities were estimated based on the ton-miles barged and the corresponding accident rate, by severity, per ton-mile. Meanwhile, for rail, the expected injuries and fatalities were estimated based on the total train miles traveled and the corresponding accident by severity per train mile. The avoided transportation safety cost benefit is the difference between total injury and accident costs in the Build and No-Build scenarios. The injury and fatality rates by mode, as well as the values of injuries and fatalities, are presented in Table 7-3.

Table 7-3. Avoided Transportation Safety Costs Assumptions

Parameter	Unit	Value	Source
Fatalities - Barge	Fatalities/billion ton-mile	0.037	Estimated based on 2003–2022 safety and operational data from the Bureau of Transportation Statistics' National Transportation Statistics.
Injuries - Barge	Injuries/billion ton-mile	0.32	
Fatalities - Freight Rail	Fatalities/million train-miles	0.72	Based on the 10-year accident/incident overview data for Alaska Railroad (2015–2024). Data obtained from the FRA.
Injuries - Freight Rail	Injuries/million train-miles	42.61	
Cost of Injury (Unknown Severity)	2023$/injury	$229,800	US Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, November 2024.
Cost of Fatality	2023$/fatality	$13,200,000	

Avoided Freight Transportation Costs

As the new transfer span and berthing facility reconstruction would allow railcar barge operations to continue, it would avoid the situation in which bulk/breakbulk railcar volumes are diverted to an alternative facility. While other ports in Alaska could handle the volumes, the Port of Whittier is the only port in Alaska that can process railcar barges. If diverted to an alternative facility, railcars would require additional transload moves that otherwise could be avoided. From Seattle, the commodity would be transloaded to a storage facility before being transloaded to a barge. Once the barge reaches Anchorage, the commodities would be transloaded from the barge to a storage facility before being loaded onto a railcar so the commodity can reach its final destination. The additional transload moves are expected to translate into additional freight transportation costs that could otherwise be avoided. The assumptions used to estimate the avoided freight transportation costs are presented in Table 7-4.

Table 7-4. Avoided Freight Transportation Costs Assumptions

Parameter	Unit	Value	Source
Transload Cost	2023$/carload	$50	Reasoned assumption
Transloads per Interchange Barge Trip (Build)	Transloads/trip	0	
Transloads per Interchange Barge Trip (No-Build)	Transloads/trip	4	

Reduced Emissions

Completing the priority projects would avoid the events in which the barge volumes destined for Whittier are diverted to an alternative port. Not only is the alternative port expected to be farther away, but additional barges are required to transport bulk/breakbulk commodities, as the alternative ports do not have the capability to process railcars from barges. In turn, this would avoid any potential increase in emissions associated with freight transportation to and from Alaska.

The expected emissions, by pollutant, associated with freight transportation were estimated in the No-Build and Build scenario by mode. Emissions from barge transportation were estimated based on the ton-miles barged and the emissions factors (i.e., carbon dioxide [CO_2], nitrogen oxides [NO_X], and particulate matter less than 2.5 micrometers in diameter [$PM_{2.5}$]) per ton-mile. For rail, the emissions were estimated based on the ton-miles railed, the fuel efficiency of trains, and the emissions factors (i.e., CO_2, NO_X, and $PM_{2.5}$) per gallon of fuel burned. The emissions costs were then monetized using the U.S. Department of Transportation's social value for pollutants (CO_2, NO_X, and $PM_{2.5}$) from their 2024 November Benefit-Cost Analysis Guidance.

The emissions factors used to estimate the reduced emissions are presented in Table 7-5, and the social values of pollutants, which increase over time, are presented in Table 7-6.

Table 7-5. Emissions Factors

Parameter	Unit	Value	Source
Rail Emissions Factor			
CO_2	g/ton-mile	21.57	Texas A&M Transportation Institute. A Modal Comparison of Domestic Freight Transportation Effects on the General Public: 2001–2019. January 2022.
NO_X	g/ton-mile	0.22	
$PM_{2.5}$	g/ton-mile	0.0049	
Barge Emissions Factor			
CO_2	g/ton-mile	15.08	Texas A&M Transportation Institute. A Modal Comparison of Domestic Freight Transportation Effects on the General Public: 2001–2019. January 2022.
NO_X	g/ton-mile	0.15	
$PM_{2.5}$	g/ton-mile	0.0037	

Notes: g/ton-mile = greenhouse gases per ton-mile.

Table 7-6. Social Cost of Pollutants

Parameter	Unit	Value	Source
Social value of CO_2	2023$/metric ton	$241–$375	U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, November 2024.
Social value of NO_X	2023$/metric ton	$20,800–$22,900	
Social value of $PM_{2.5}$	2023$/metric ton	$998,300–$1,108,000	

O&M Cost Savings

The O&M cost savings reflect the changes in O&M costs to ensure that the rail barge infrastructure is operational between the No-Build and Build scenarios. The assumptions used to estimate the O&M cost savings are presented in Table 7-7.

Table 7-7. O&M Cost Savings Assumptions

[placeholder]

Residual Value of Capital Assets

The residual value of capital assets is calculated in line with the U.S. Department of Transportation's BCA Guidance, based on an estimated useful life of XX years for the new rail barge infrastructure. Table 7-8 highlights the assumptions used in the estimation of the residual value of capital assets.

Table 7-8. Residual Value of Capital Assets Assumptions

Parameter	Unit	Value	Source
Operational Period (years)	Years	20	Analysis period
Useful Life of Wharf	Years	50	Reasoned assumption

7.1.3. Results

Table 7-9 summarizes the BCA findings, while Table 7-10 presents the key quantified impacts of the priority projects. Annual costs and benefits are computed over the lifecycle of the Project (24 years). With a 2.0 percent discount rate for CO_2-related impacts and a 3.1 percent discount rate for all other impacts (aligned with U.S. Department of Transportation's BCA Guidance), the $XX million investment would result in $XX million in total benefits for a net present value of $XX million and a benefit-cost ratio of XX.[2]

Table 7-9. Benefit-Cost Analysis Results (2023 Dollars)

Impact Category	Value Over Analysis Period	
	Undiscounted	Discounted
Benefits		
Avoided Transportation Safety Costs		
Avoided Freight Transportation Costs		
Reduced Greenhouse Gas Emissions		
Reduced Criteria Air Contaminant Emissions		
O&M Cost Savings		
Residual Value of Capital Assets		
Present Value of Benefits		
Costs		
Project Capital Costs		
Present Value of Costs		
Net Present Value		
Benefit Cost Ratio		
Internal Rate of Return		

Table 7-10. Key Quantified Impacts

Impact Category	Total	Average Annual
Safety		
Avoided Fatalities		
Avoided Injuries		
Emissions		
Avoided CO_2 Emissions (metric tons)		
Avoided NO_x Emissions (metric tons)		
Avoided $PM_{2.5}$ Emissions (metric tons)		

[2] All monetized values are presented in 2023 dollars, in line with U.S. Department of Transportation's November 2024 Benefit-Cost Analysis Guidance for Discretionary Grant Programs.