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Appendix G. Reference Documents

G.1. 2004 Master Plan Recommendations

Conclusions from site visits, review of existing information, and evaluation of facilities are summarized below:

- **Market Analysis:** Since the tunnel conversion, tour companies, freight carriers, government agencies, and the military have expressed increased interest in the use of Whittier as a part of call, creating opportunities for development of infrastructure and services. The 2025 revenues for major revenue sources in Whittier were forecasted to increase from an estimated $6.5 million in 2004 to $17.6 million in 2025.
- **Phase I Environmental Site Assessment (ESA):** Because of historical contamination, there is a medium level of risk associated with development of new facilities.
- **Marginal Wharf:** This facility, damaged during the 1964 earthquake and suffering from age, is no longer in use. Its location at the end of the Whittier access road, near the ARRC tracks, and close to the town of Whittier is ideal for intermodal transfer of passengers between land, sea, and rail modes of transportation.
- **DeLong Dock:** At this dock, which primarily serves the fishing industry, improvements have enhanced safety and service. Additional improvements to protect the structure and enhance dock service are needed.
- **Transit Shed:** This structure was demolished because of structural deficiencies.
- **Barge Slip:** This facility is essential to barge traffic for Southcentral Alaska. Recent improvements include a side-loading facility to improve loading and unloading of barges.
- **Rail Yard Storm Drain System:** The existing storm drain system does not always effectively handle standing water and flooding that occurs during tides.
- **Rail Yard Track Layout and Alignment:** The Rail Yard currently operates at capacity for freight operations and provides no available unutilized track for maneuvering of passenger rail cars.
- **Security:** Concerns about security at marine and rail transportation facilities are resulting in new requirements for on-site security and control of access points. The Alaska Railroad Corporation (ARRC) has added year-round contract security personnel to augment its system-wide force.

The recommendations for future intermodal development by the ARRC are summarized below:

- **Market Analysis:**
    - Continue development of land lease relationships with port users that include private and government entities.
    - Consider strategies to increase rail ridership, such as the use of train sets that carry passengers to and from the Ted Stevens Anchorage International Airport or downtown to carry passengers south to Whittier, as a means of maximizing opportunities resulting from growth in Whittier cruise ship and other tourism traffic.

  - Promote leasing of land or building space for retail shops adjacent or close to the cruise shipping docks.
  - Increase capacity and frequency of train service to better meet the needs of day tour operations and create additional demand for retail and office space.

- **Phase 1 ESA:** Consult historical information in determining locations for development and conduct testing at those sites to identify whether remediation would be required.
- **Marginal Wharf:** Replace the existing facility with a modern dock facility that will accommodate tourism ventures, provide for additional freight operations, and service military deployment and response purposes.
- **DeLong Dock**: Provide upgrades consisting of water connection, safety ladders, and a cathodic protection system.
- **Barge Slip:** Provide repair and maintenance to extend the serviceability of the slip and improve efficiency of operations.
- **Rail Yard Storm Drain System:** develop a plan for addressing runoff control of storm water, including management of snow removal and reduction of sedimentation, and coordinate improvements with proposed track alignment upgrades.
- **Rail Yard Track Layout and Alignment:** Realign tracks in the Rail Yard to improve the offloading of barge freight and improve the ability of equipment to maneuver.
- **Security:** Prepare a detailed analysis to identify security needs and means to address them.
- **Potential Improvements:**

  - Advance passenger terminal concepts to provide a facility to handle loading and offloading of large cruise ships that would include space for passenger staging, baggage handling, office and counter space for cruise lines and airlines, accommodations for vehicle parking and bus staging, and an adjacent passenger loading facility.
  - Advanced proposed pedestrian enhancements consisting of a small visitor center that accommodates informational kiosks, outdoor viewing platforms, and restroom facilities for the U.S. Forest Service. ARRC must complete all mitigation activities specified in the Maritime Administration Record of Categorical Exclusion, issued on September 2, 2022, ensuring that the project complies with federal and state environmental regulations.

G.2. ARRC Whittier Terminal Reconstruction Barge Ramp – Draft Barge Ramp Alternatives Analysis – Contract No. 117853

On-Call Marine Structural Engineering Services
ARRC Whittier Terminal Reconstruction
Barge Ramp
DRAFT Barge Ramp Alternatives Analysis
Contract No. 117853

Prepared by KPFF Consulting Engineers

DRAFT Barge Ramp Alternatives Analysis

March 22, 2021

kpff 60 YEARS

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1.0 EXECUTIVE SUMMARY

The following alternatives analysis provides background on the existing Whittier Terminal Barge Rail Transfer Ramp and the overall alternatives analysis currently being undertaken by the Alaska Railroad Company (ARRC). It then focuses on six main alternatives for the rail transfer span, lift structures and foundations based on the number of rail tracks provided in each alternative, the type of deck system utilized, and whether the lift mechanics are elevated and mechanically coupled, or lower and electronically coupled. The alternatives are broken down into sub-alternatives based on the potential lift mechanisms, and discussion of reusing the existing ramp in a temporary location is also provided. The report closes with a discussion of lift span infrastructure costs.

As will be described in more detail below, it is anticipated that to replace the current rail barge transfer span with an updated two track system that provides sufficient overhead and width clearance for transfer of a 60-foot-wide container, the baseline cost for ramp, lift mechanism, and support foundation costs is approximately $8.2M. To further minimize in-water contact and mechanically couple the system utilizing an overhead bridge structure would increase this baseline cost to approximately $9.9M. Furthermore, it is anticipated that the cost will increase by $1M to $2.5M for each additional track added to the transfer span up to six tracks total depending on the lift system utilized.

2.0 PROJECT DESCRIPTION AND BACKGROUND

The Alaska Railroad Company's (ARRC) Whittier Terminal is almost 50 years old and reaching its service life expectancy. ARRC has invested over the last two years to extend the life of the Barge Slip including electrical, structural, and mechanical rehabilitations. The next phase is planning for reconstruction. This effort will likely include the barge slip, the old marginal wharf area, and potentially other areas to facilitate construction. R&M Engineering has recently begun pre-engineering efforts including survey and geotechnical support and PND Engineering will be assisting ARRC in marine engineering. KPFF has been contracted to provide engineering services for development of alternatives for the new transfer span ramp, specifically providing structural and mechanical engineering input and preliminary rough order of magnitude (ROM) cost estimates for ramp specific elements such as abutments, lift structures, mechanical systems, and the ramp itself.

This alternatives analysis describes the alternatives evaluated including variations of ramp width, deck system, mechanical lift system/coupling, and location. It then provides a discussion of the costs of these elements followed by a summary of our conclusions.

Alternatives Figures, Rough Order of Magnitude (ROM) Construction Cost Worksheets, and a Basis of Design (BOD), are included as appendixes to this report.

The BOD in Appendix 6.3 articulates the project requirements and desires related to location, safety, operational ease, durability, cost, and constructability as they pertain to the mechanical and structural systems for the ramp. This is a preliminary level BOD and intended to serve as a starting point for a design level BOD when appropriate. The information provided is intended to be the baseline assumptions that KPFF utilized in evaluation of the alternatives.

3.0 ALTERNATIVES EVALUATED

3.1 Introduction to Alternatives

KPFF evaluated three main track configuration alternatives for the lift span assuming that the spacing between the rails would be equivalent to the current rail spacing on the existing ramp but providing for the Whittier Tunnel clearance diagram along the outside rails with respect to height and width. Furthermore, KPFF evaluated width and height clearances associated with carrying a 60-foot wide container across the ramp utilizing a container handler and still providing adequate clearance to the lift towers on each side of the ramp. It should be noted, that in all cases this container width drives the overall width clearance on the ramp itself.

Alternatives 1 through 3 include these three main track configurations supported on a through girder deck system and hoisted by elevated towers with a mechanically coupled lift system running across an elevated spanning bridge. Given that elevated structures and machinery houses may pose ice management concerns, Alternatives 4 through 6 include the same three main track configurations but utilize a mechanically decoupled hoist mechanism employing multiple motors and electronic coupling.

In addition to the six main alternatives, KPFF also evaluated mechanical lift sub-alternatives. Two of these mechanisms stood out as being feasible and a net benefit in terms of operation, maintenance, and cost to ARRC. These were a counterweighted wire rope lift mechanism and an overhead hydraulic lift mechanism. These are referred to in our cost sheets as sub-alternatives A and B respectively. Other potential lift mechanisms are discussed below. These were not found to be of net benefit to ARRC but are discussed briefly below for completeness.

These alternatives and the associated costs discussed in 4.0 Rough Order of Magnitude Construction Costs, assume that the ramp will be constructed in a new location. The end of this section discusses the implications of temporarily relocating the existing ramp and constructing the new ramp in the existing ramp location.

1.1 Span Length Discussion

For each alternative, a 120’ bridge length was assumed based on the existing bathymetry of the slope, anticipated tidal range changes over the various design vessel freeboards, and track slope requirements. Based on the proposed geometry, there is little benefit to extending the length further – for each additional 5’ of span length added, approximately 16” of additional operational tidal range change can be accommodated. However, the proposed bridge length will accommodate all design vessels as articulated in the Basis of Design. The cost for increasing span length is discussed in 4.0 below.

3.2 Alternative 1: Two Track Through Girder with Elevated, Coupled Hoist System

Alternative 1 is a two-track configuration. The upland abutment consists of a cast-in-place (CIP) concrete abutment supported on steel pipe piles driven to approximate bedrock. Alternate foundation solutions such as concrete piles or shafts are possible, but for the purposes of this alternatives analysis and cost estimating, the specific foundation type would not significantly alter the solution within the fidelity of the level of design represented in a conceptual alternatives analysis. All alternatives utilize these same abutment configurations.

The span from the upland abutment to the rail barge consists of two deep built-up steel plate girders at the outer extents of the width with the bridge deck supported at the bottom of the girders. This will be referred to as a through-girder system. The span deck consists of floor beams supporting stringers which support deck beams, grating and the rail.

The bridge is hoisted utilizing an outboard built up plate girder lifting beam. The purpose of this system is to limit, as much is practically possible, the amount of structure that is subject to immersion and splash zone effects, while providing maximum overhead clearance and limiting the height that a container needs to be picked by a container handler when traversing the ramp.

The lifting beam would be hoisted by one of the mechanical lift mechanisms described below. The figures in Appendix 6.1 show the counterweight wire rope system described below. The other lift mechanisms are not shown in the figures for clarity, as the fundamental support system does not change from one sub-alternative to another. The lift mechanism is hung from two steel trussed lift towers which are supported on concrete dolphin structures. Though not shown as such, the trussed towers could be cladded to prevent ice buildup if desired by ARRC. Cost for cladding has been included in the estimate numbers provided. The dolphins are assumed to be supported on temporarily (either left in place or removed) cased cast-in-place concrete drilled shafts. As with the abutments, preliminary structural modeling was performed to estimate the foundation costs for these elements, but other foundation types are also possible within a similar cost range as that presented below. All alternatives utilize these same tower and concrete dolphin structure configurations.

The lift towers support the lift mechanism along with an equipment support bridge that runs between the towers. The equipment support bridge is supported on built up steel plate girders sized primarily for deflection control. The equipment support bridge provides access between the two towers in addition to supporting three steel framed machinery houses to house counterweight sheaves, drums, motors, or hydraulic equipment as required based on the lift mechanism. Though not shown in the figures, a stair system has been included in the cost estimates on the shoreside lift tower.

The distance between the lift towers (gauge) is shown on the figures and for Alternative 1 is based completely on providing sufficient width clearance between the towers and a 60-foot container width being carried down the center of the span by a container handler.

3.3 Alternative 2: Three Track Through Girder with Elevated, Coupled Hoist System

The only significant difference between the two-track and three-track configurations is the overall width of the bridge span itself. The gauge between the lift towers is equivalent between the two because it is driven by the lifted container width. This will be discussed further in Section 4.0 below.

3.4 Alternative 3: Four Track Through Girder with Elevated, Coupled Hoist System

Alternative 3 is a four-track alternative and represents a significant increase in footprint and, to a lesser degree, cost from the two and three-track alternatives. The biggest reason for this increase is the need to provide a third girder. The span between the exterior girders becomes too large to provide a reasonable deck system for a four-track alternative. To maintain the goal of having as much structure out of the water as possible, it is necessary to place the third through girder above the deck in the midspan of the deck.

With the central girder, the need to carry the 60-foot container down one side or the other of the central girder results in needing to significantly widen the gauge between the lift towers. There are two possible options for narrowing the gauge in the four-track through girder configuration.

- The first option would be to offset the central girder so there would be three tracks between one outside girder and the middle girder, and a single rail only line between the other outside girder and the middle girder. This would provide some cost savings from the four-track alternative shown in Appendix 6.1, but would limit container handler access to one side of the barge.
- The second option would be to utilize four girders with rail only tracks between the central girders and the outside girders and providing one central two-track zone where container handlers could operate. This provides less cost savings than the first option but would allow for more coverage on the barge by container handlers with slewing.

See Section 4.0 for the cost discussion associated with these intermediate options.

3.5 Alternative 4: Two Track Deck Girder with Lowered, De-coupled Hoist System

Alternative 4 is the first of three alternatives (4-6) that utilize a deck-girder system (see below) and a de-coupled hoist system thus eliminating the need for an overhead bridge structure to couple the mechanical systems. The downside to this type of system is that the mechanical system is not physically coupled, and thus failure of one side of the system may result in the structure needing to be hoisted or held in an elevated position via one side of the span or the other. This will result in an increase in span structure cost. However, the level of analysis to determine the exact increase is beyond the scope of this alternatives analysis study. The cost increase is not expected to be significant relative to the delta-costs discussed in this report.

The span from the upland abutment to the rail barge consists of steel plate deck girders beneath the deck. The deck consists of steel wide flange deck beams on top of the deck girders. These deck beams support the grating and rail. This will be referred to as a deck-girder system. To limit the amount of structure in the water, the lift beam runs through, or integrally with the deck girders. However, the net surface area of steel within the water on average is increased from the through-girder system.

Note that Figures for Alternatives 4 through 6 all show machinery houses at the top of the individual towers. These were included for conservativism in the costing. However, it may also be possible to locate these within the cladded truss towers as part of a final design.

3.6 Alternative 5: Three Track Deck Girder with Lowered, De-coupled Hoist System

Alternative 5 is identical to Alternative 4 with the exception that it includes three tracks versus two.

3.7 Alternative 6: Four Track Deck Girder with Lowered, De-coupled Hoist System

Alternative 6 is identical to Alternatives 4 and 5 with the exception that it includes four tracks. It should be noted that the gauge between towers in Alternatives 4 through 6 remains constant and is set by the clearance required for the 60' container width. Furthermore, it is less than it is for Alternative 3, because the container can still be driven down the center of the deck without the need for a deeper intermediate through-girder.

3.8 Lift Mechanism Alternatives

3.8.1 Sub-Alternative A: Counterweight Wire Rope System

The Counterweight Wire Rope System drives two wire rope subsystems off one or two motor and reducer combinations. In Alternatives 1 through 3, both subsystems are always in sync mechanically, because a single motor is utilized in the centrally located machinery house and mechanically coupled to the subsystems. In Alternatives 4 through 6 two motors would be utilized (one at each tower) and electronically coupled. Each subsystem includes a counterweight, drum, drive shaft, shaft support bearings, counterweight sheaves, hoist sheaves, sheave mounting brackets, counterweight wire rope, hoist wire rope, and associated components that connect the wire rope to the structure.

The benefits to this type of system are as follows:

- Reduction in power requirements
- Easier to operate manually if there is a loss of power

The downsides to this type of system are as follows:

- Added complexity due to the counterweight
- Significant total dead weight increase due to the counterweight

Maintenance is low to moderate with this type of system (see cost discussion below). The bearings, for both the shafts and sheaves, will need to be greased every month. An automatic grease system could be added to reduce maintenance but would increase the cost of the system. The wire rope will need to be inspected annually and replaced approximately every 20 years. The motor and reducer will typically need maintenance annually. This system has a life of approximately 50 years with the maintenance mentioned here.

3.8.2 Sub-Alternative A (Alternate): Non-Counterweight Wire Rope System

The Non-Counterweight Wire Rope System drives two wire rope subsystems off one or two motor and reducer combinations. In Alternatives 1 through 3, both subsystems are always in sync mechanically, because a single motor is utilized in the centrally located machinery house and mechanically coupled to the subsystems. In Alternatives 4 through 6 two motors would be utilized (one at each tower) and electronically coupled. Each subsystem includes a drum, drive shaft, shaft support bearings, hoist sheaves, sheave mounting brackets, hoist wire rope, and associated components that connect the wire rope to the structure.

The benefits to this type of system are as follows:

- Reduction in system complexity
- Reduction in maintenance
- Minimal increase to dead weight

The downsides to this type of system are as follows:

- Large power requirements
- Harder to operate manually if power failure occurs

There are a few options to keep the wire rope from going slack while connected to the vessel.

- The lift system could be separate from the lift beam so that the beam can move independently.
- A take up counterweight system could be implemented.
- A feedback control system could provide constant torque to the motors.

Maintenance is low with this type of system. The bearings, for both the shafts and sheaves, will need to be greased every month. An automatic grease system could be added to reduce maintenance but would increase the cost of the system. The wire rope will need to be inspected annually and replaced approximately every 20 years. The motor and reducer will typically need maintenance annually. This system has a life of approximately 50 years with the maintenance mentioned here.

A Non-Counterweight Wire Rope system would be a good option if not increasing the lift tower dead weight was a driving requirement. If increasing the lift tower dead weight is not a concern (which we currently do not believe it to be), then a Counterweight Wire Rope system would be beneficial because the power required to operate the lift system goes down significantly which decreases the cost and complexity of the drive system. As noted below, the non-counterweight lift system is approximately $100k more with respect to initial cost.

3.8.3 Sub-Alternative B: Hydraulic System

The Hydraulic system uses two cylinders to raise and lower the ramp. The system is composed of two hydraulic cylinders and one or two Hydraulic Power Unit(s) (HPU) with control valves. This system also requires a "float circuit" that allows the rod end and blind end of the cylinder to exchange fluid when the ramp is connected to the barge and moving with the tide.

The benefits to this type of system are as follows:

- Less annual and overall maintenance
- Easier solution for float system when supported by the vessel

The downsides to this type of system are as follows:

- It requires custom cylinders

- It adds the need for spare components
- There are environmental challenges with oil over water
- Technician availability for maintenance and repairs (see maintenance cost discussion below)

Maintenance is generally low for this type of system if the materials are selected carefully. The components would need to be inspected monthly. Monthly inspections would identify any components that need servicing or replacement. Typical components have a life of 10 years up to the life of the system, depending on the component. This system has a life of approximately 50 years.

3.8.4 Other Potential Lift Systems

A bascule system and a buoyant lift system were also considered. The bascule system would be beneficial because the counterweight and foundation would be entirely on land, so no piles or caissons would be required in the water. However, this system was not moved forward due to complexity of the supporting structure and the likely need for deep excavation on the land side if the counterweight is below ground or a high structure if the counterweight is above ground. The buoyant system was reviewed but not moved forward due to the high levels of maintenance required for corrosion control and the complexity of buoyancy control with the ballast system.

3.9 Ramp Physical Location Alternatives

Based on what is known now, the physical location of the final ramp has little effect on the cost or construction of the abutment, lift system, mechanical systems, or the ramp itself. However, ARRC's overall alternatives do include scenarios where the existing ramp is temporarily moved to a new location, and the new ramp is constructed within the footprint of the existing location. If this occurs there are additional elements of construction that will need to occur.

- Construction of a new abutment and caissons in the temporary location.
- Disconnecting, transferring, and reconnecting the existing rail span at the new temporary location.
- Installation of new mechanical lift mechanism (to match the existing) and electrical rerouting.
- Demolition of the existing ramp infrastructure at the existing location to allow for construction of the new ramp.

The most cost-effective method for lifting the ramp at the alternate location is to utilize the currently designed hydraulic system. Any other system would require a complete design effort which would not be beneficial from a cost perspective as the temporary ramp would be decommissioned after the new ramp is complete. The hydraulic system would be able to use all the existing components except for the hydraulic tubes from the hydraulic power unit to the connection point on the ramp. This option would cause a shutdown of approximately 2 weeks. If this is not acceptable, hydraulic tubing would have to be added between the two sites to operate both systems using the same hydraulic power unit or all new components could be procured. However, there will likely also be at least a two-week shutdown just to physically move the bridge. These two activities could occur concurrently.

The cost implications of these elements are discussed in the next section.

4.0 ROUGH ORDER OF MAGNITUDE CONSTRUCTION COSTS

4.1 Introduction to Cost Estimates

Cost estimate sheets are provided in Appendix 6.2 and provide a detailed line-item breakdown of assumptions that were made and what has been included in each of the alternative estimates. Given the preliminary nature of the design for this alternative's analysis, we have applied a design and construction aggregate contingency of 40% to reflect that the design is at an approximately 10% level.

Quantities were based on basic structural and mechanical analysis techniques including simplified finite element analysis models. However, very little geotechnical information was available for the site, so broad assumptions had to be made consistent with the level of design and contingency assigned.

The assigned unit costs have not been inflated by additional contingency but are values that would be utilized for developing cost for more advanced levels of design. The intent with this approach is to group the contingency associated the design and construction into one location for comparative analysis purposes.

The intent of this alternatives analysis was to focus on the ramp structural and mechanical costs. Per discussion with ARRC, other aspects of the overall alternatives are being calculated by others. Therefore, these estimates do not include the following elements:

- Upland infrastructure costs including regrading, rail connections, etc.
- Demolition costs of the existing lift span and foundations except for the discussion in Section 4.5 provided below.
- Furnishing and constructing other upland infrastructure such as bulkhead walls, piers, transverse barge ramps, or abutment.
- Furnishing and constructing mooring and berthing structures including upland structures or mooring/berthing dolphins utilized to moor and/or slew the barges.
- Berth deepening or dredging required for barge operations.

4.2 Alternatives Cost Discussion

Table 1: Summary of Alternative Costs below provides a summary of each alternative and sub alternative. Alternative 1A can be considered a baseline cost for the through girder with elevated, coupled hoist systems, and Alternative 4A can be considered a baseline cost for the deck girder with lowered, decoupled hoist systems. To increase from a two-track to a three-track span increases the overall ramp and lift structure cost by approximately $2M regardless of whether the system is coupled or de-coupled. The increase from a three-track to a four-track span is an additional approximately $2.5M for the elevated, coupled hoist system, but only about $1.1M for the lowered, decoupled system. However, with some of the other four track options discussed in Section 3.4, this number could likely be in the $2M increase range with slightly reduced functionality. Furthermore, it is also feasible that increasing to a six-track configuration could also be achieved within the lift span gauge of the four-track Alternative 3 with a similar $2M to $2.5M per track increase. Though the gauge of the towers would need to increase, going from the four track Alternative 6 structure to a six-track structure would likely have a similar order of magnitude cost increase of around $1M.

Table 1: Summary of Alternative Costs

	Sub-Alternative A (Counterweight Wire Rope Lift System)	Sub-Alternative B (Overhead Hydraulic Lift System)
Alternative 1: Two-Track Elevated, Coupled	$9.9M	$10.5M
Alternative 2: Three-Track Elevated, Coupled	$11.9M	$12.5M
Alternative 3: Four-Track Elevated, Coupled	$14.4M	$15.2M
Alternative 4: Two-Track Lowered, De-Coupled	$8.2M	$8.7M
Alternative 5: Three-Track Lowered, De-Coupled	$10.5M	$11.0M
Alternative 6: Four-Track Lowered, De-Coupled	$11.6M	$12.3M

Overall long term maintenance costs are very difficult to anticipate for the structural elements on the project, but it is anticipated that the elements depicted would be designed for a minimum of a 50 year design life with limited maintenance over that period of time, with the exception of potential recoating of select steel elements. However, it is anticipated that that maintenance cost would be approximately equivalent in Alternatives 1 through 3 but would be slightly higher for Alternatives 4 through 6 given that more of the structure would be subjected to tidal influences.

4.3 Through Girder vs. Deck Girder Cost Discussion

As seen in Table 1: Summary of Alternative Costs, the cost of the decoupled deck girder systems is less than the through girder overhead coupled systems. The largest portion of this decrease comes from eliminating the need for the overhead bridging structure, though it does slightly increase the cost of the mechanical system. A portion of this cost decrease is also accounted for in going from a through-girder to a deck-girder system which ranges from an approximately $500k to $1M depending on the number of tracks. However, it should be noted, that this savings comes at the cost of additional maintenance since more of the deck-girder system structural steel is in the water than the through-girder systems. Either deck system could be utilized with either tower or hoisting configuration.

It should also be noted that within the deck-girder alternatives, there is little cost variation between alternate solutions that use fewer deeper girders versus more shallow girders, at least that can be registered at the fidelity of this level of analysis. There is likely an optimal balance between number of girders and individual girder depths, but this optimization would be a task for final design of the span system when competing design requirements such as tortional span rigidity could be thoroughly evaluated. Finally, it appears that the cost to increase the span length, if desired for any reason, is approximately $100k/5 feet for a two-track configuration and up to $150k/5 feet for a four-track configuration. This would be expected to hold true for up to an approximately 10-foot increase.

4.4 Lift Mechanisms Cost Discussion

The order of the proposed systems in terms of least maintenance cost over time would be the Hydraulic System, Non-Counterweight Wire Rope System, and then the Counterweight Wire Rope System. Although the Non-

Counterweight system would have the least amount of maintenance cost for the wire rope systems, the delta between the maintenance costs for the wire rope systems is low, whereas the initial cost for the non-counterweight system is approximately $100K more than for a counterweight system. Table 2: Lift Mechanism Maintenance Costs, below provides an estimate of monthly, yearly, and 20-year maintenance costs for the various lift options. Much of the monthly cost is associated with inspections which we have assumed would need to be performed by non-local companies.

Table 2: Lift Mechanism Maintenance Costs

	Counterweight Wire Rope Lift System	Non-Counterweight Wire Rope Lift System	Hydraulic Lift System
Monthly	$10k	$10k	$10k
Yearly	$35k	$25k	N/A
20-Year	$135k	$100k	N/A

4.5 Physical Location Alternatives Cost Discussion

As described in Section 3.9, if the existing span needs to be relocated to a new location so that the new span can be installed in the existing footprint, it is anticipated that an additional cost of $1.6M in new construction, translation, and demolition costs would be required. This cost would apply to any of the alternatives and sub-alternatives listed above. A cost worksheet is included for this estimate as well in 6.2.

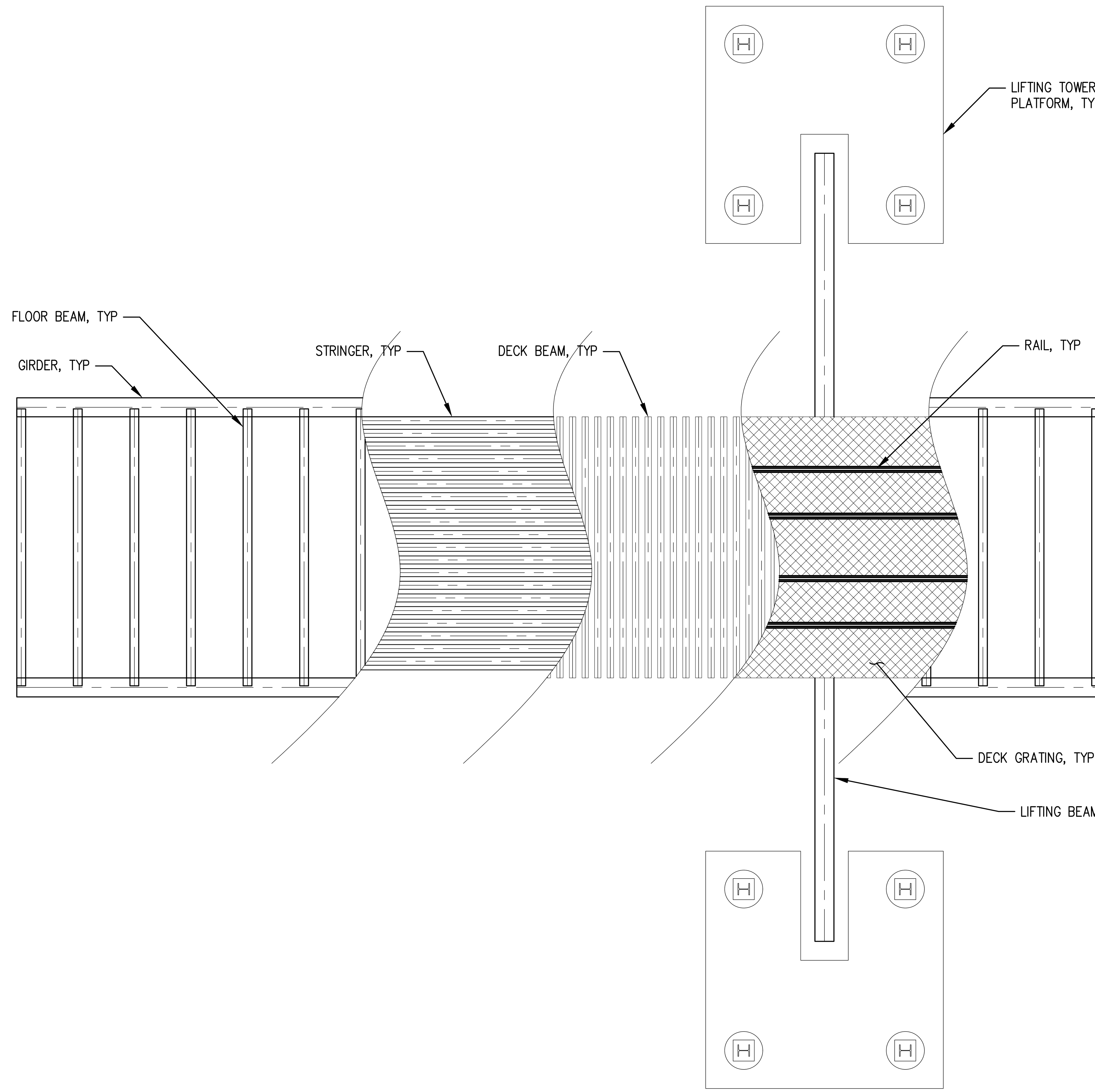
5.0 CONCLUSION

Based on this alternatives analysis study, it is anticipated that to replace the current rail barge transfer span with an updated two track system that provides sufficient overhead and width clearance for transfer of a 60-foot-wide container, the baseline cost for ramp, lift mechanism, and support foundation costs is approximately $8.2M. To further minimize in-water contact and mechanically couple the system utilizing an overhead bridge structure would increase this baseline cost to approximately $9.9M. Furthermore, it is anticipated that the cost will increase by $1M to $2.5M for each additional track added to the transfer span up to six tracks total depending on the lift system utilized.

The following three appendixes include figures, cost estimate work sheets and the basis of design which forms the assumptions utilized in the production of this alternative's analysis report.

6.0 APPENDIXES

6.1 Alternatives Figures



OPTION 1 - PLAN
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NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 1

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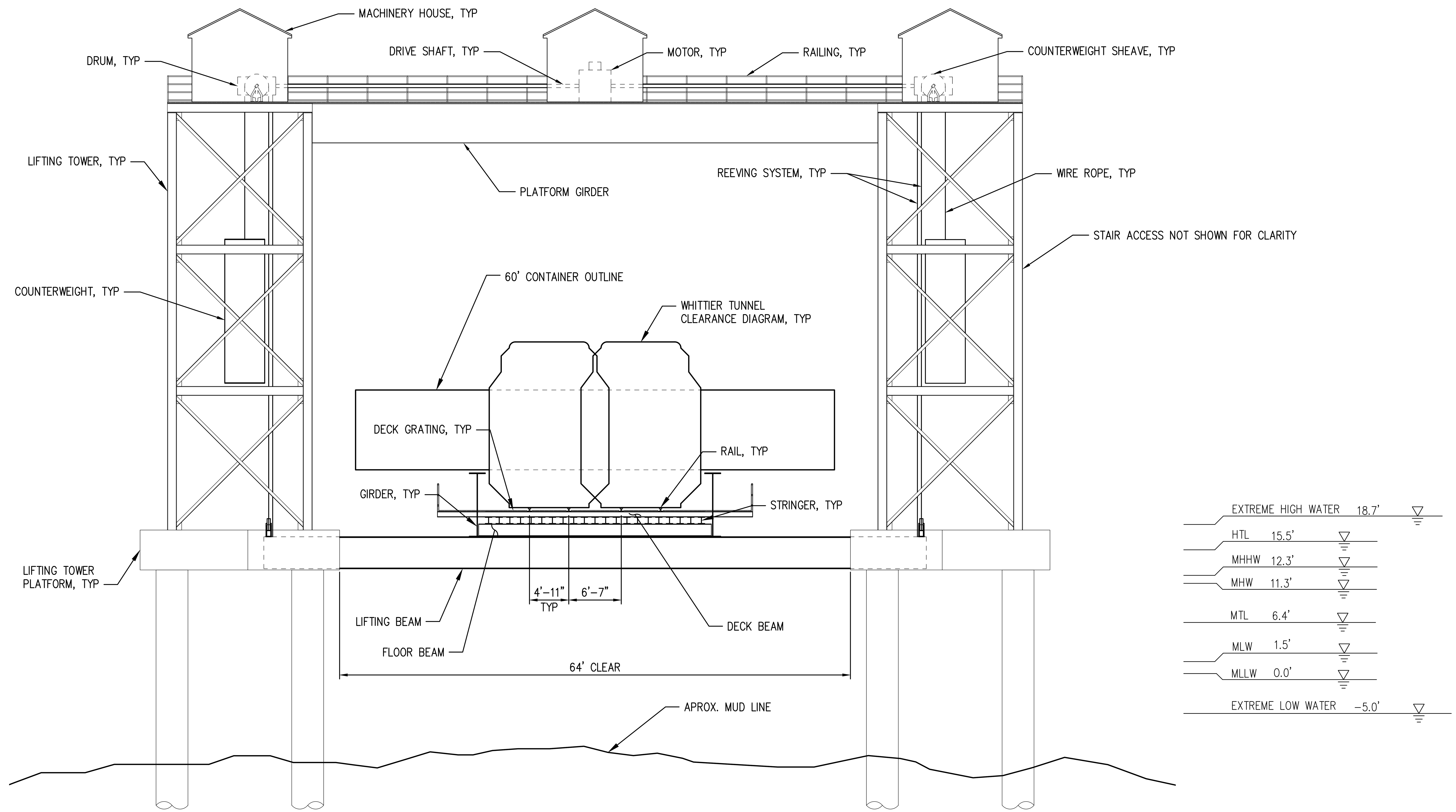
SHEET NO.		01 OF 14



OPTION 1 - SECTION

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NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 1

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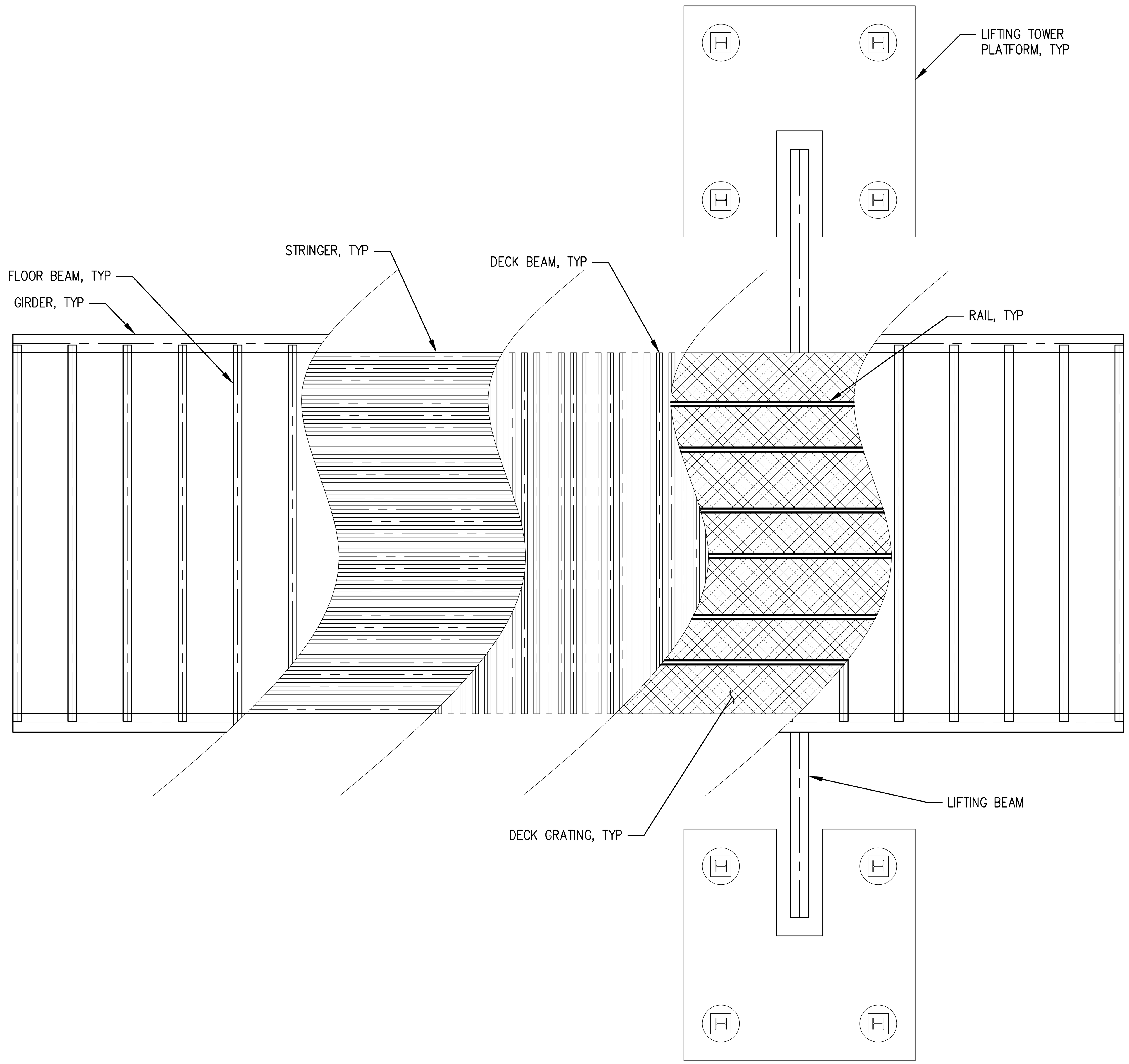

OPTION 2 - PLAN
SCALE: 1/8" = 1'-0"

Plotted: Mar 22, 2021 - 2:28pm sstory Layout: OPTION 2A
N:\2020\2000176 ARRC Whittier Terminal Reconstruction Transfer Span\Drawings\Current\ARRC Preferred Alternative 1-3.dwg

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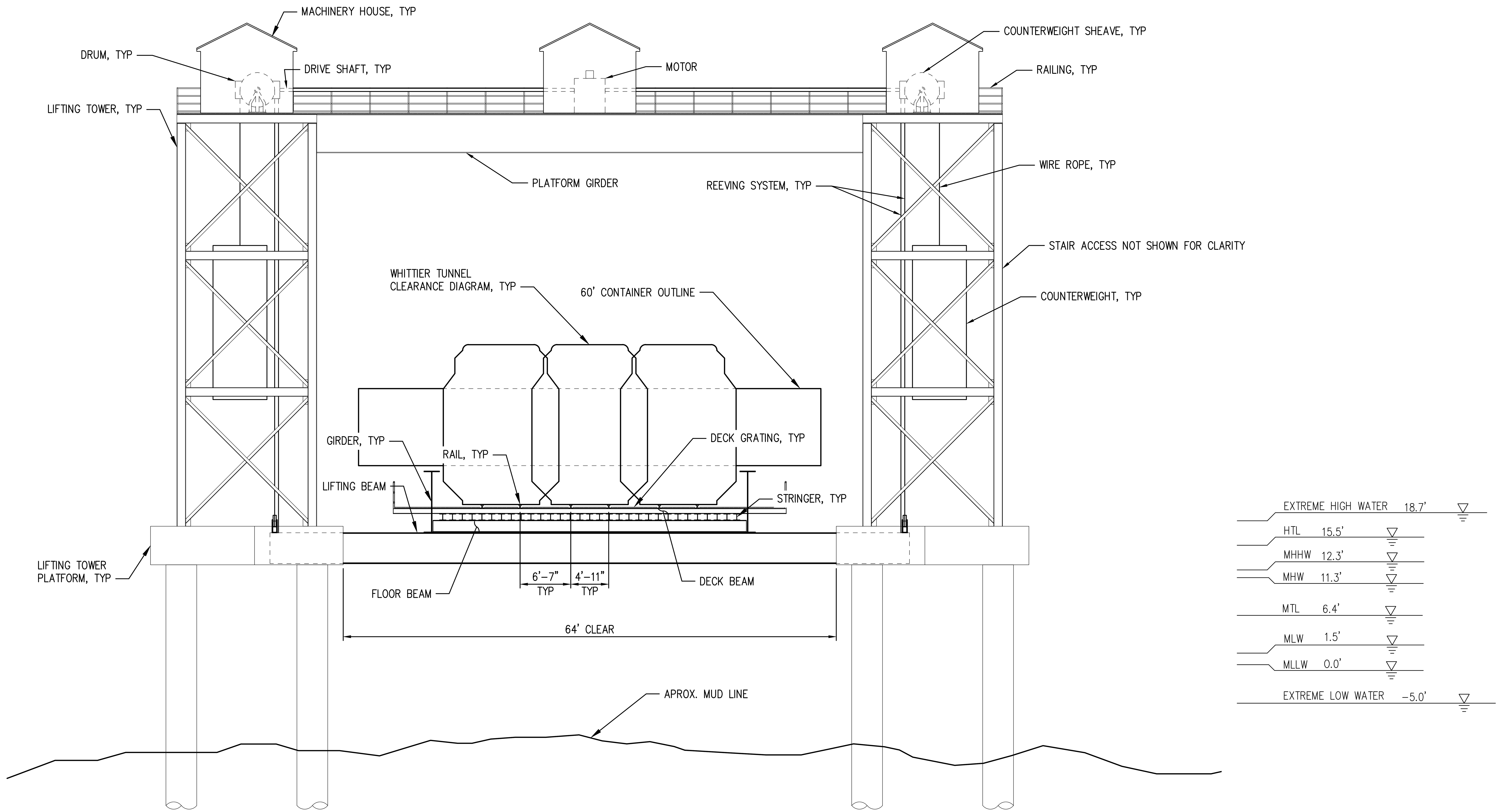
NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 2

DRAWN:	TRL	PROJECT NO.:
DESIGN:	SMS	SCALE: AS SHOWN
CHECKED:	AWB	DATE: 02/19/2021
DRAWING NO.		S2.1
SHEET NO.		03 OF 14



OPTION 2 - SECTION

SCALE: 1/8" = 1'-0"

Plotted: Mar 22, 2021 – 2:28pm sstory Layout: OPTION 2B
N:\2020\2000176 ARRC Whittier Terminal Reconstruction Transfer Span\Drawings\Current\ARRC Preferred Alternative 1-3.dwg

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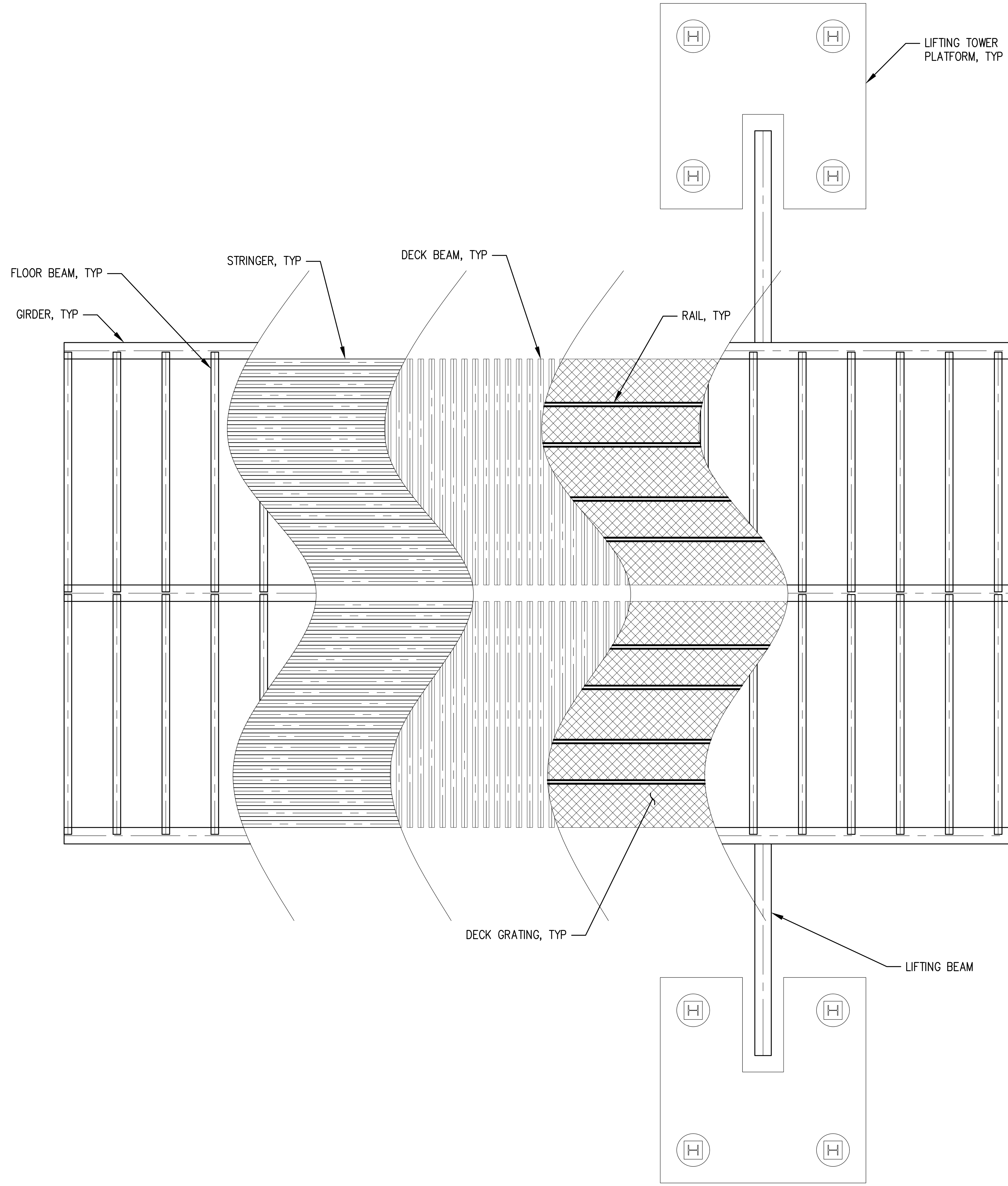
RECONSTRUCTION BARGE RAMP

OPTION 2

DRAWN: TRL	PROJECT NO.:
DESIGN: SMS	SCALE: AS SHOWN
CHECKED: xxxAWB	DATE: 02/19/2021
DRAWING NO.	**S2.2**
SHEET NO.	**04** OF 14



OPTION 3 - PLAN

SCALE: 1/8" = 1'-0"

Plotted: Mar 22, 2021 – 2:29pm sstory Layout: OPTION 3A
N:\2020\2000176 ARRC Whittier Terminal Reconstruction Transfer Span\Drawings\Current\ARRC Preferred Alternative 1-3.dwg

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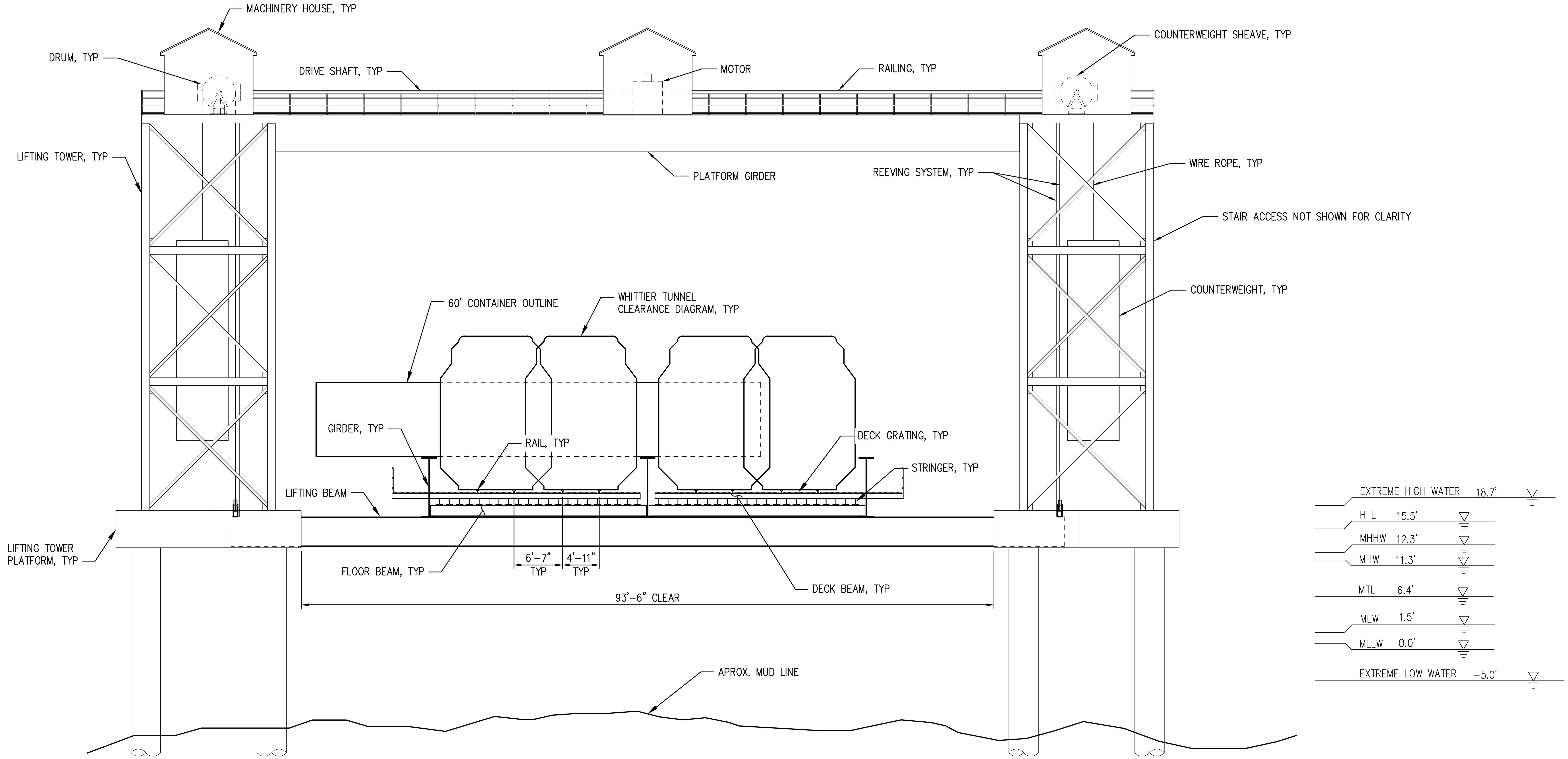
RECONSTRUCTION BARGE RAMP

OPTION 3

DRAWN:	TRL	PROJECT NO.:	
DESIGN:	SMS	SCALE: AS SHOWN	
CHECKED:	AWB	DATE:	02/19/2021
DRAWING NO.		S3.1	
SHEET NO.		05 OF 14	



OPTION 3 - SECTION

SCALE: 1/8" = 1'-0"

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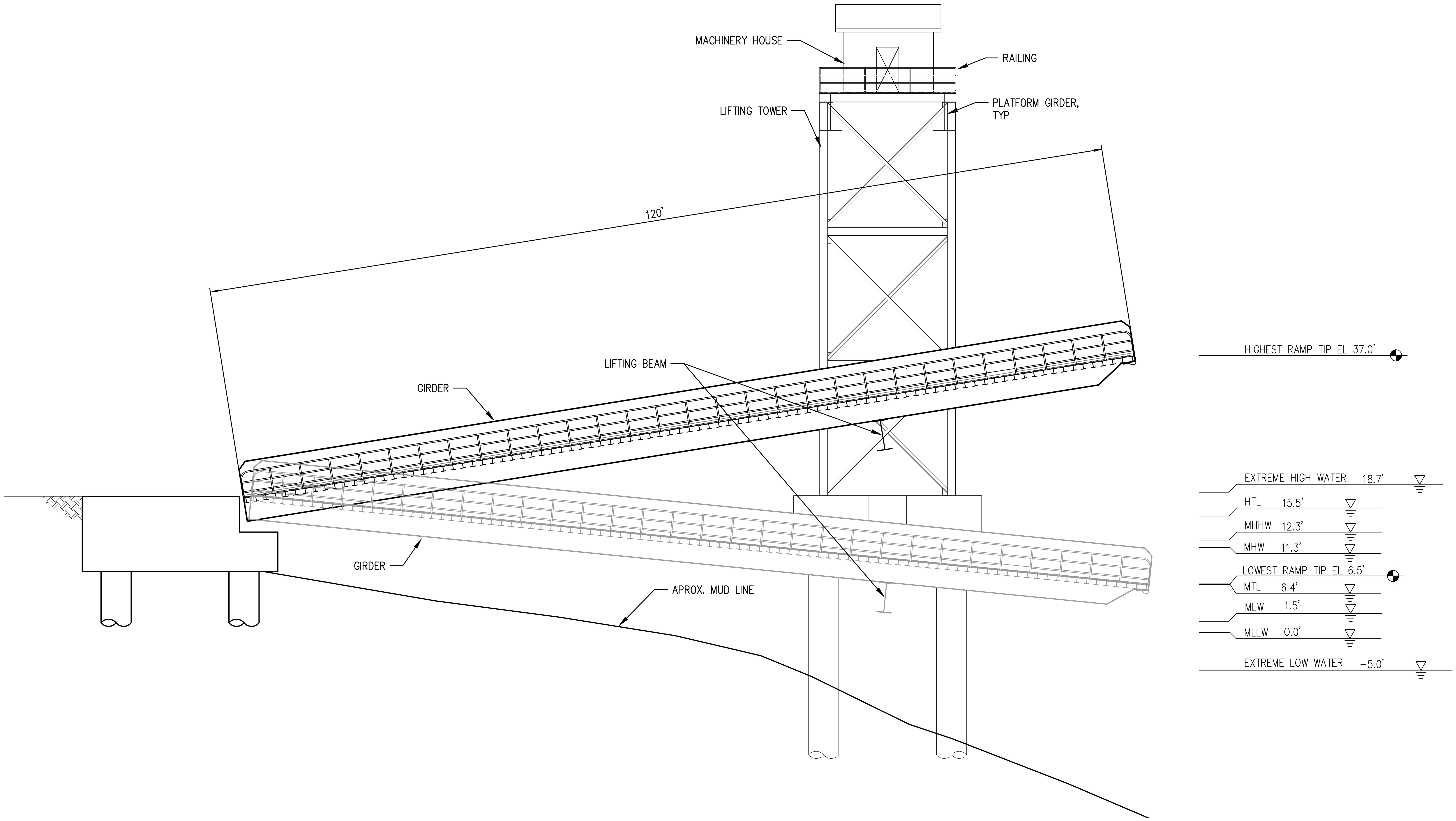
NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 3

DRAWN: TRL	PROJECT NO.:
DESIGN: SMS	SCALE: AS SHOWN
CHECKED: AWB	DATE: 02/19/2021
DRAWING NO.	S3.2
SHEET NO.	06 OF 14

Plotted: Mar 22, 2021 – 2:29pm sstory Layout: OPTION 3B
N:\2020\2000176 ARRC Whittier Terminal Reconstruction Transfer Span\Drawings\Current\ARRC Preferred Alternative 1-3.dwg



TYPICAL - ELEVATION

SCALE: 1/8" = 1'-0"

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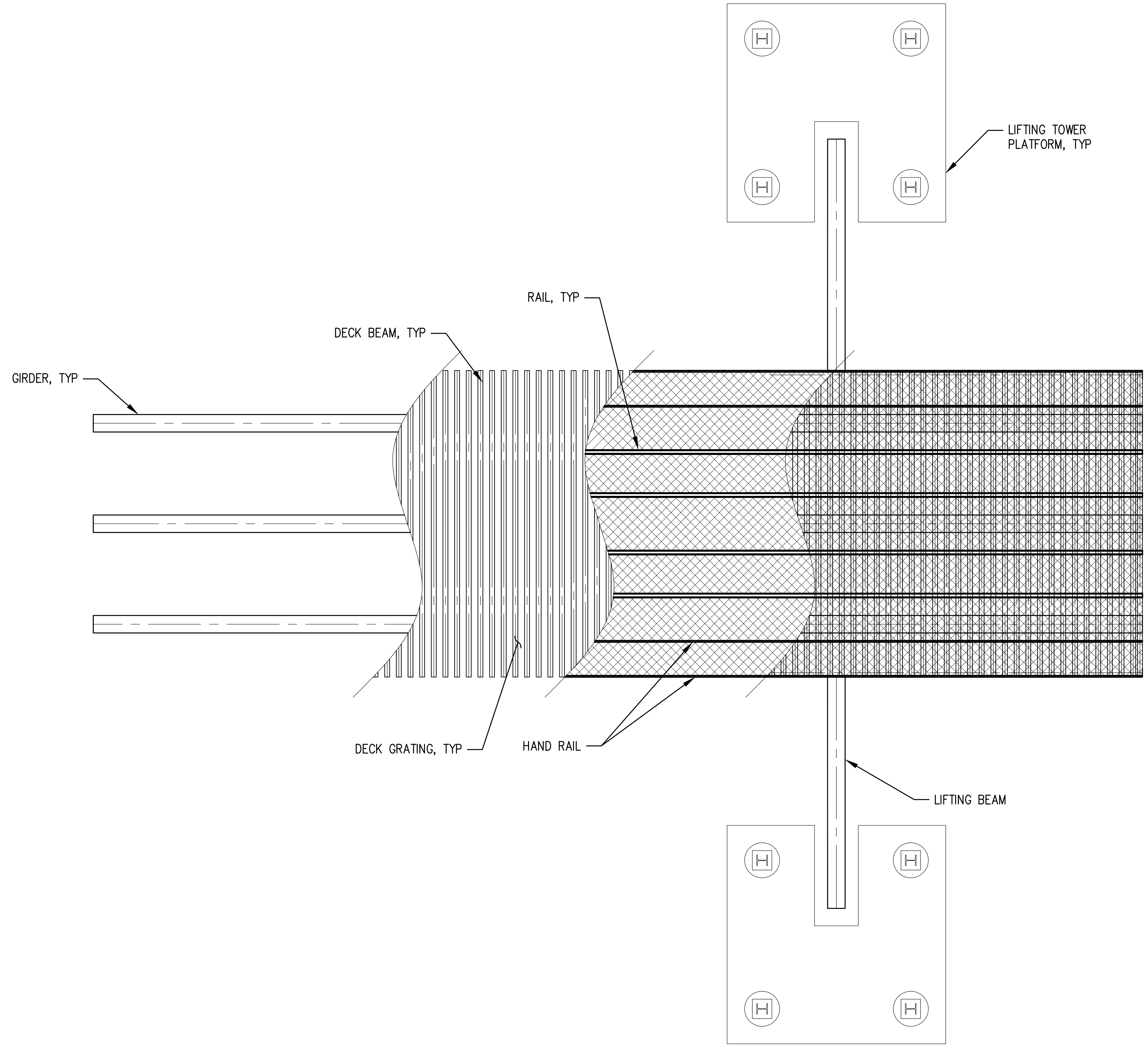
NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTIONS 1-3
ELEVATION

DRAWN:	TRL	PROJECT NO.:
DESIGN:	SMS	SCALE: AS SHOWN
CHECKED:	AWB	DATE: 02/19/2021
DRAWING NO.		**S4.1**
SHEET NO.		**07** OF 14



OPTION 4 - PLAN
SCALE: 1/8" = 1'-0"

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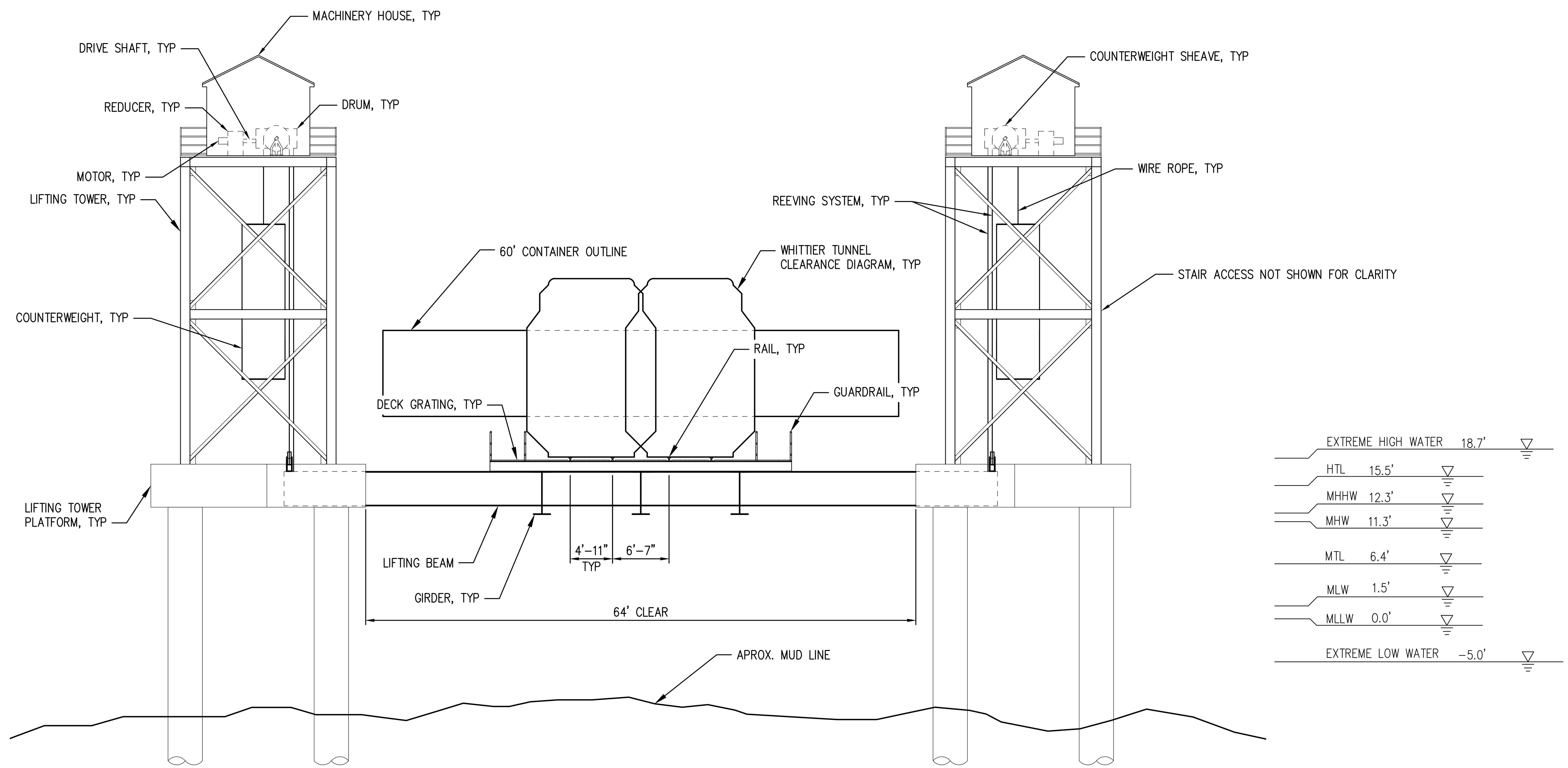
ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 4

DRAWN:	TRL	PROJECT NO.:	
DESIGN:	SMS	SCALE: AS SHOWN	
CHECKED:	AWB	DATE:	02/19/2021
DRAWING NO.		**S5.1**	
SHEET NO.		**08** OF 14	



OPTION 4 - SECTION

SCALE: 1/8" = 1'-0"

Plotted: Mar 22, 2021 – 12:35pm sstory Layout: OPTION 4B
C:\Users\sstory\Desktop\Drawings\Current\ARRC Preferred Alternative 4-6.dwg

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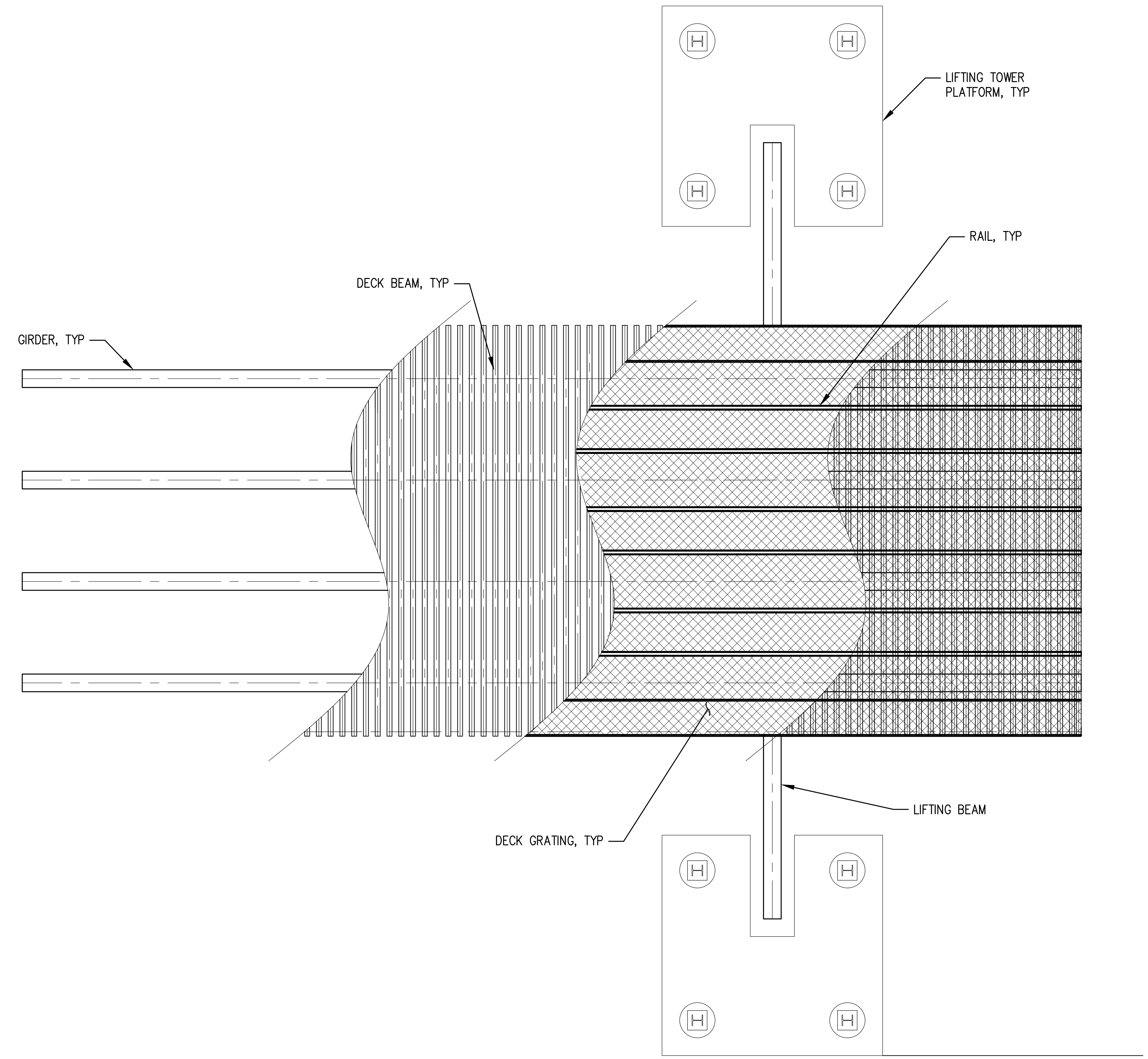
NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 4

DRAWN:	TRL	PROJECT NO.:	
DESIGN:	SMS	SCALE: AS SHOWN	
CHECKED:	AWB	DATE:	02/19/2021
DRAWING NO.		**S5.2**	
SHEET NO.		**09** OF **14**	



OPTION 5 - PLAN

SCALE: 1/8" = 1'-0"

Plotted: Mar 22, 2021 – 12:36pm sstory Layout: OPTION 5A
C:\Users\sstory\Desktop\Drawings\Current\ARRC Preferred Alternative 4-6.dwg

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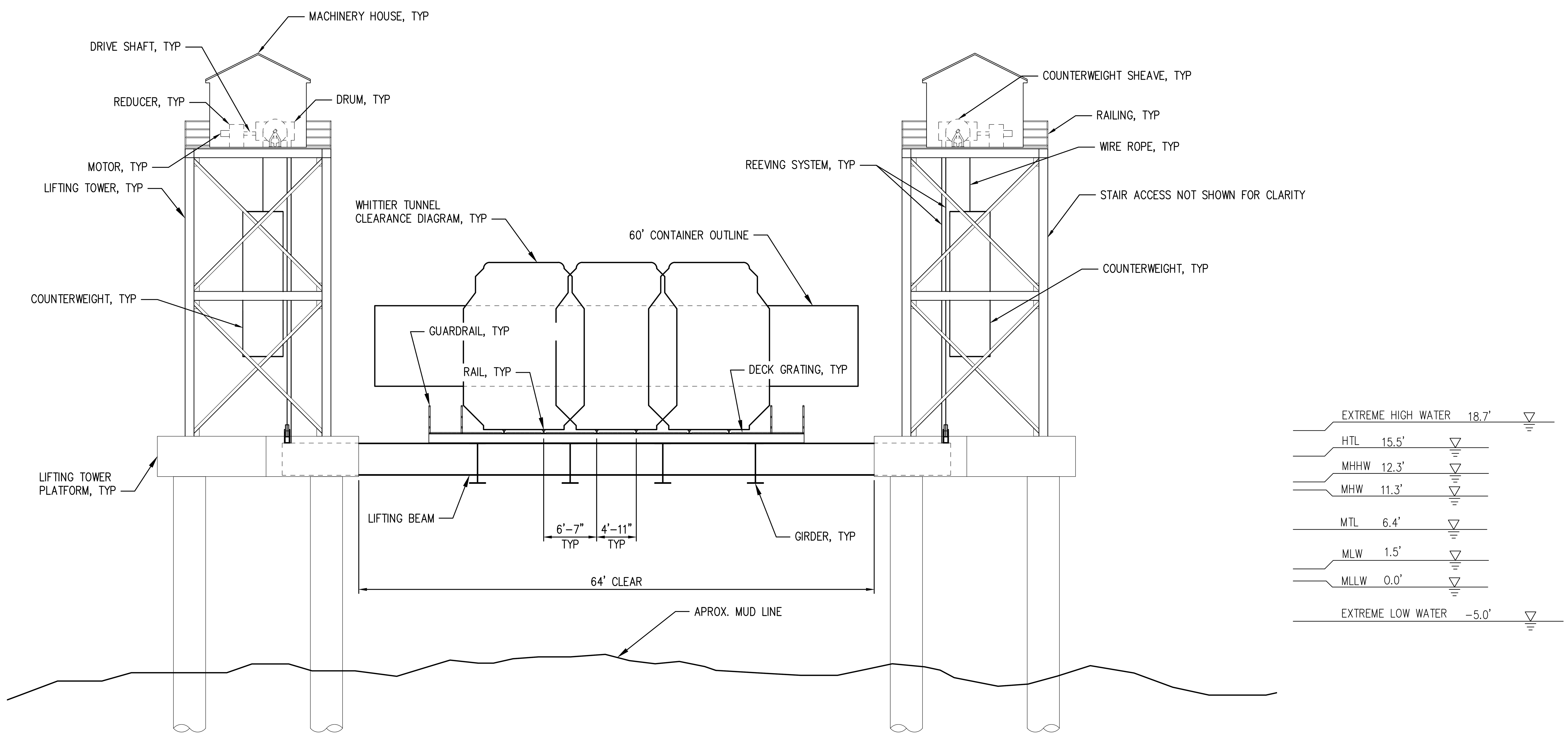
NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 5

DRAWN:	TRL	PROJECT NO.:
DESIGN:	SMS	SCALE: AS SHOWN
CHECKED:	AWB	DATE: 02/19/2021
DRAWING NO.		**S6.1**
SHEET NO.		10 OF 14



OPTION 5 - SECTION

SCALE: 1/8" = 1'-0"

Plotted: Mar 22, 2021 – 12:36pm sstory Layout: OPTION 5B
C:\Users\sstory\Desktop\Drawings\Current\ARRC Preferred Alternative 4-6.dwg

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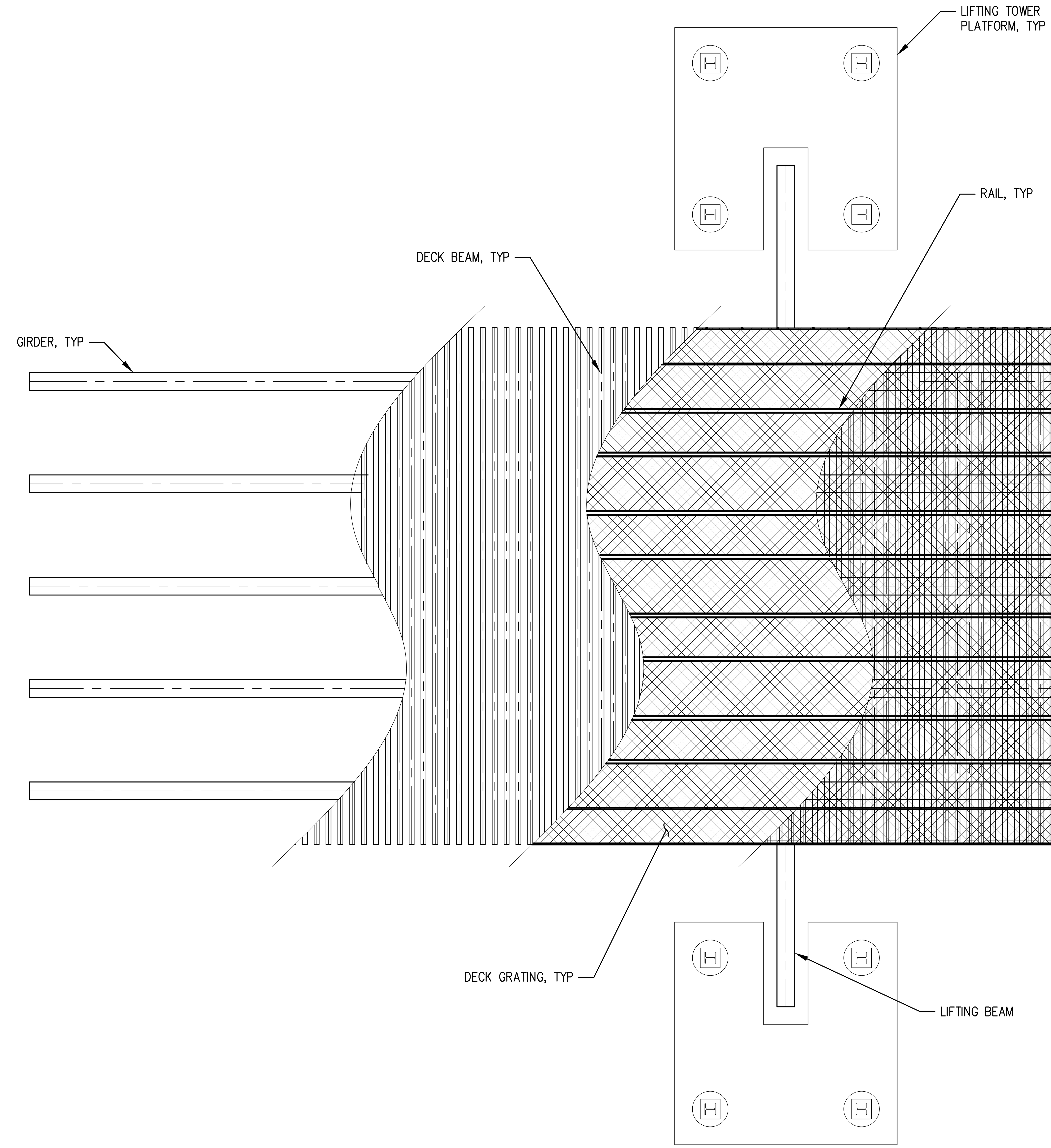
NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 5

DRAWN: TRL	PROJECT NO.:
DESIGN: SMS	SCALE: AS SHOWN
CHECKED: xxxAWB	DATE: 02/19/2021
DRAWING NO.	S6.2
SHEET NO.	11 OF 14



OPTION 6 - PLAN

SCALE: 1/8" = 1'-0"

Plotted: Mar 22, 2021 – 12:37pm sstory Layout: OPTION 6A
C:\Users\sstory\Desktop\Drawings\Current\ARRC Preferred Alternative 4-6.dwg

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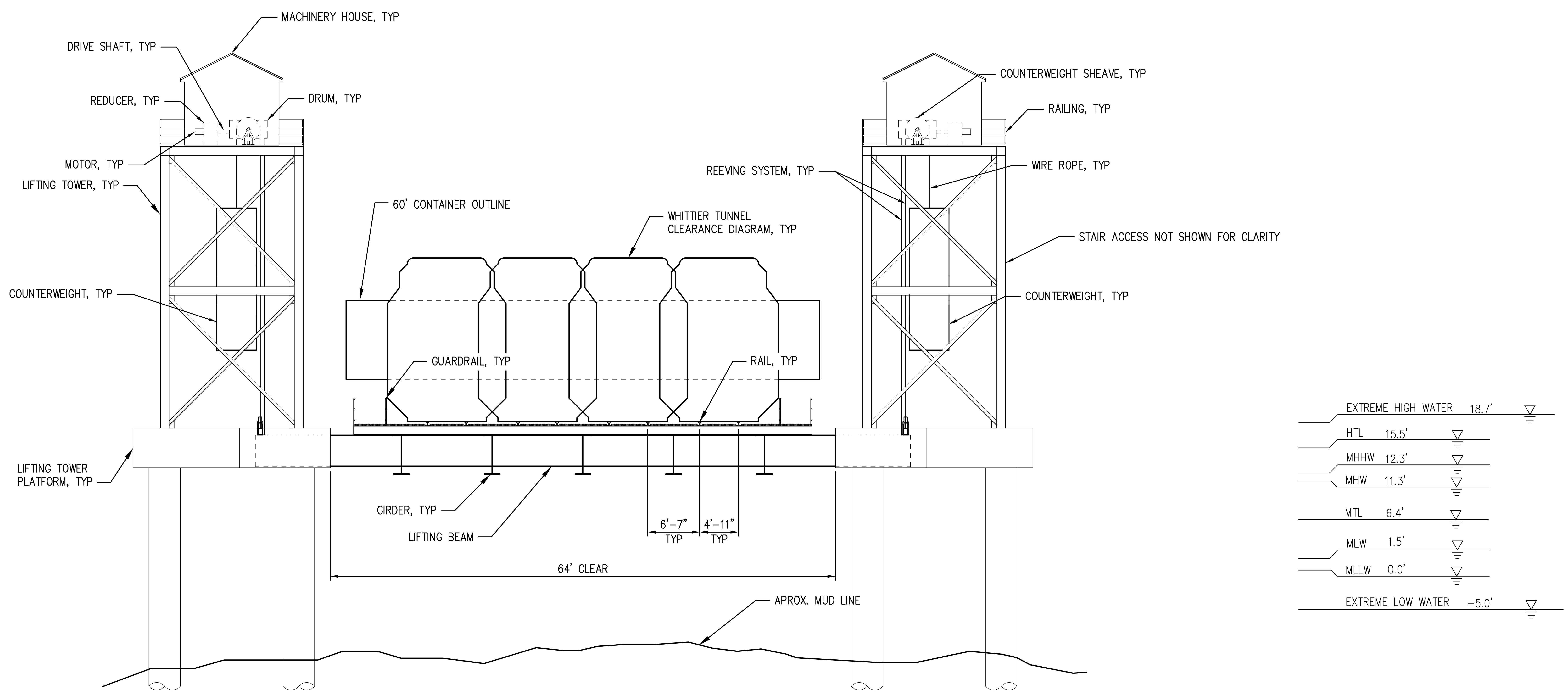
NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 6

DRAWN: TRL	PROJECT NO.:
DESIGN: SMS	SCALE: AS SHOWN
CHECKED: AWB	DATE: 02/19/2021
DRAWING NO.	**S7.1**
SHEET NO.	12 OF 14



OPTION 6 - SECTION

SCALE: 1/8" = 1'-0"

Plotted: Mar 22, 2021 – 12:37pm sstory Layout: OPTION 6B
C:\Users\sstory\Desktop\Drawings\Current\ARRC Preferred Alternative 4-6.dwg

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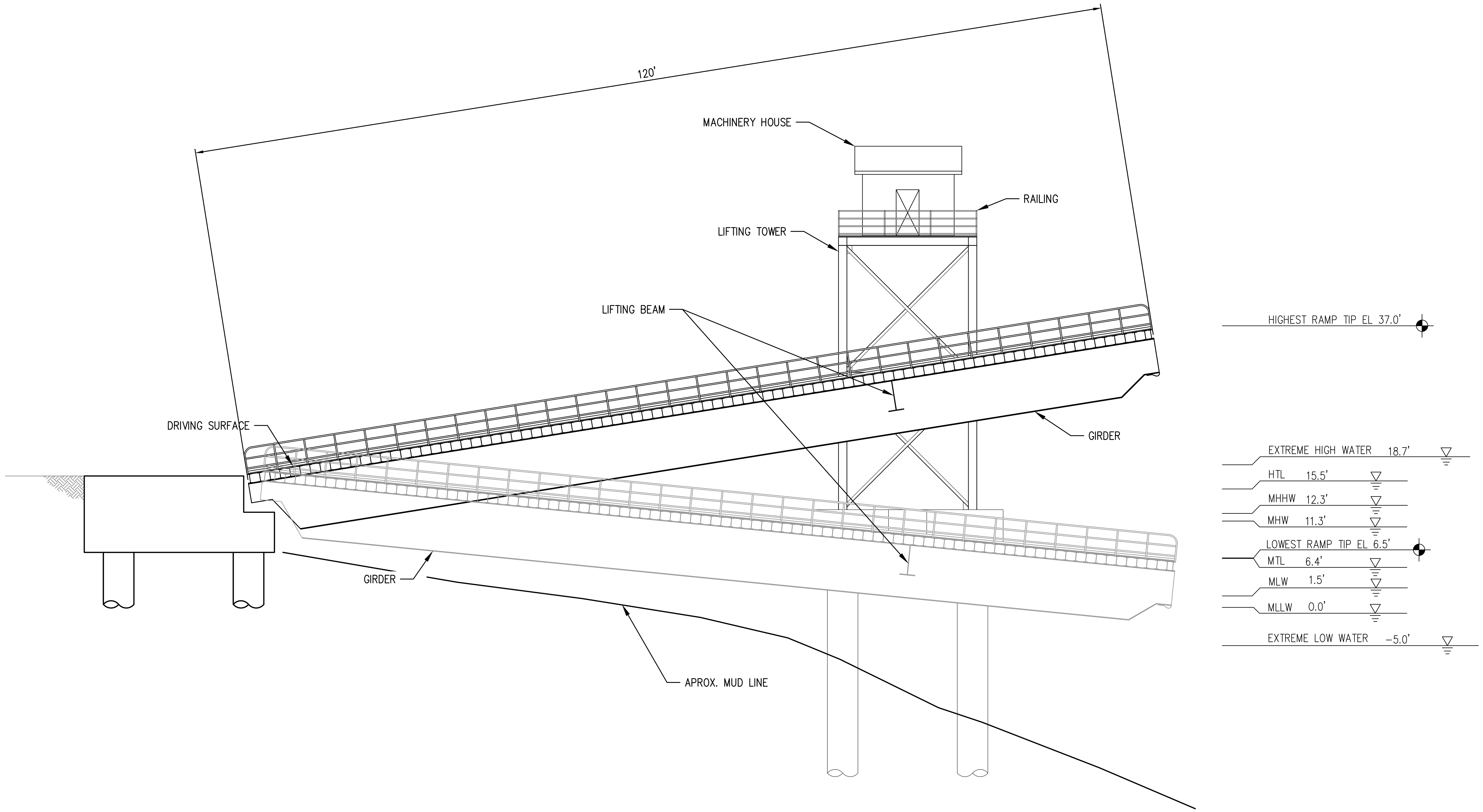
NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTION 6

DRAWN:	TRL	PROJECT NO.:
DESIGN:	SMS	SCALE: AS SHOWN
CHECKED:	AWB	DATE: 02/19/2021
DRAWING NO.		S7.2
SHEET NO.		13 OF 14



TYPICAL - ELEVATION

SCALE: 1/8" = 1'-0"

Plotted: Mar 22, 2021 – 2:25pm sstory Layout: ELEVATION 4-6
C:\Users\sstory\Desktop\Drawings\Current\ARRC Preferred Alternative 4-6.dwg

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NO.	DATE	BY	REVISION

ARRC WHITTIER TERMINAL
RECONSTRUCTION BARGE RAMP

OPTIONS 4-6
ELEVATION

DRAWN:	TRL	PROJECT NO.:
DESIGN:	SMS	SCALE: AS SHOWN
CHECKED:	AWB	DATE: 02/19/2021
DRAWING NO.		S8.1
SHEET NO.		14 OF 14

6.2 Alternatives Rough Order of Magnitude (ROM) Construction Cost Worksheets

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 1A: (2) Track Through Girder with Elevated, Coupled Hoist System
Counterweight Wire Rope Lift Mechanism with One Motor Driving Two Drums

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$167,750.00	$167,800	
2	De-Mobilization & Contractor Closeout	1	LS	$329,425.00	$329,400	
	Subtotal - Mobilization & Site Preparation				**$497,200**	7.0%
Bridge Seat						
3	Furnish and Install (8) 24" Steel Pipe Piles	800	LF	$340.00	$272,000	
4	CIP Concrete for Abutment and Wingwalls	285	CY	$900.00	$256,700	
	Subtotal - Bridge Seat				**$528,700**	7.5%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	65	TON	$11,000.00	$711,700	
6	Wide Flange Floor Beam	58	TON	$9,000.00	$521,300	
7	Wide Flange Stringer	86	TON	$9,000.00	$771,100	
8	Wide Flange Deck Beam	48	TON	$9,000.00	$427,900	
9	Deck Grating	3300	SF	$60.00	$198,000	
10	Rail & Accessories	480	LF	$40.00	$19,200	
11	Built Up Lift Beam	13	TON	$11,000.00	$142,100	
12	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
13	Bridge Seat Pin Fabrication	2	EA	$10,000.00	$20,000	
14	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
	Subtotal - Ramp				**$2,826,300**	39.9%
Lifting Tower						
15	(8) Concrete Drilled Shafts	760	VLF	$1,275.00	$969,000	
16	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
17	Machinery Housing - (3) Houses	432	SF	$150.00	$64,800	
18	Wide Flange Columns	14	TON	$9,000.00	$122,400	
19	Wide Flange Beams	13	TON	$9,000.00	$117,500	
20	Angle Braces	8	TON	$9,000.00	$70,000	
21	Built Up Tower Cross Beams	30	TON	$9,000.00	$269,400	
22	Wide Flange Deck Support Stringers	6	TON	$9,000.00	$56,900	
23	Tower Deck Grating	2220	SF	$35.00	$77,700	
24	Tower Wall Cladding	7040	SF	$30.00	$211,200	
25	Stairs	100	VLF	$2,500.00	$250,000	
26	Handrail	2940	LB	$4.50	$13,200	
	Subtotal - Lifting Tower				**$2,748,000**	38.8%
Mechanical Components						
27	Motor	1	EA	$10,000.00	$10,000	
28	Reducer	1	EA	$50,000.00	$50,000	
29	Drum	2300	LB	$9.00	$20,700	
30	Drive Shaft	10000	LB	$9.00	$90,000	
31	Bearing	10	EA	$3,000.00	$30,000	
32	CW Sheave	4	EA	$5,500.00	$22,000	
33	Hoist Sheave	10	EA	$1,050.00	$10,500	
34	CW Sheave Bracket	4000	LB	$5.00	$20,000	
35	Hoist Sheave Bracket	5000	LB	$5.00	$25,000	
36	CW Wire Rope	330	FT	$22.00	$7,300	
37	Hoist Wire Rope	605	FT	$13.00	$7,900	
38	Counterweight	130500	LB	$0.20	$26,100	
39	Beam Connection	6	EA	$500.00	$3,000	
40	CW Connection	4	EA	$750.00	$3,000	
41	Electrical	1	EA	$100,000.00	$100,000	
	Subtotal - Mechanical Components				**$425,500**	6.0%
Mechanical Components Installation						
42	Labor	480	HR	$100.00	$48,000	
43	Equipment	24	HR	$500.00	$12,000	
	Subtotal - Mechanical Components Installation				**$60,000**	0.8%
	Total Construction Cost				**$7,085,700**	100.0%

Alaska State Sales Tax 0.0%	**$0**
Total Estimate of Probable Construction Cost	**$7,085,700**
Design/Construction Contingency 40%	**$2,834,280**
Total Cost	**$9,919,980**

Notes

1	Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.
2	Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.
3,15	Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.
G1	Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 1B: (2) Track Through Girder with Elevated, Coupled Hoist System
Hydraulic Lift System

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$167,750.00	$167,800	
2	De-Mobilization & Contractor Closeout	1	LS	$347,450.00	$347,500	
	Subtotal - Mobilization & Site Preparation				**$515,300**	6.9%
Bridge Seat						
3	Furnish and Install (8) 24" Steel Pipe Piles	800	LF	$340.00	$272,000	
4	CIP Concrete for Abutment and Wingwalls	285	CY	$900.00	$256,700	
	Subtotal - Bridge Seat				**$528,700**	7.1%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	65	TON	$11,000.00	$711,700	
6	Wide Flange Floor Beam	58	TON	$9,000.00	$521,300	
7	Wide Flange Stringer	86	TON	$9,000.00	$771,100	
8	Wide Flange Deck Beam	48	TON	$9,000.00	$427,900	
9	Deck Grating	3300	SF	$60.00	$198,000	
10	Rail & Accessories	480	LF	$40.00	$19,200	
11	Built Up Lift Beam	13	TON	$11,000.00	$142,100	
12	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
13	Bridge Seat Pin Fabrication	2	EA	$10,000.00	$20,000	
14	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
	Subtotal - Ramp				**$2,826,300**	37.9%
Lifting Tower						
15	(8) Concrete Drilled Shafts	760	VLF	$1,275.00	$969,000	
16	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
17	Machinery Housing - (3) Houses	432	SF	$150.00	$64,800	
18	Wide Flange Columns	14	TON	$9,000.00	$122,400	
19	Wide Flange Beams	13	TON	$9,000.00	$117,500	
20	Angle Braces	8	TON	$9,000.00	$70,000	
21	Built Up Tower Cross Beams	30	TON	$9,000.00	$269,400	
22	Wide Flange Deck Support Stringers	6	TON	$9,000.00	$56,900	
23	Tower Deck Grating	2220	SF	$35.00	$77,700	
24	Tower Wall Cladding	7040	SF	$30.00	$211,200	
25	Stairs	100	VLF	$2,500.00	$250,000	
26	Handrail	2940	LB	$4.50	$13,200	
	Subtotal - Lifting Tower				**$2,748,000**	36.8%
Mechanical Components						
1	Hydraulic Cylinder	5000	LB	$60.00	$300,000	
2	Hydraulic Power Unit with Control Valves	1	EA	$250,000.00	$250,000	
3	Electrical	1	EA	$100,000.00	$100,000	
	Subtotal - Mechanical Components				**$650,000**	8.7%
Mechanical Components Installation						
4	Labor	960	HR	$200.00	$192,000	
5	Equipment	8	HR	$500.00	$4,000	
	Subtotal - Mechanical Components Installation				**$196,000**	2.6%
	Total Construction Cost				**$7,464,300**	100.0%
	Alaska State Sales Tax 0.0%				**$0**	
	Total Estimate of Probable Construction Cost				**$7,464,300**	
	Design/Construction Contingency 40%				**$2,985,720**	
	Total Cost				**$10,450,020**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 2A: (3) Track Through Girder with Elevated, Coupled Hoist System
Counterweight Wire Rope Lift Mechanism with One Motor Driving Two Drums

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$227,905.00	$227,900	
2	De-Mobilization & Contractor Closeout	1	LS	$394,735.00	$394,700	
				Subtotal - Mobilization & Site Preparation	**$622,600**	7.3%
Bridge Seat						
3	Furnish and Install (8) 24" Steel Pipe Piles	800	LF	$340.00	$272,000	
4	CIP Concrete for Abutment and Wingwalls	381	CY	$900.00	$342,900	
				Subtotal - Bridge Seat	**$614,900**	7.2%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	65	TON	$11,000.00	$711,700	
6	Wide Flange Floor Beam	111	TON	$9,000.00	$999,600	
7	Wide Flange Stringer	126	TON	$9,000.00	$1,138,300	
8	Wide Flange Deck Beam	67	TON	$9,000.00	$606,900	
9	Deck Grating	4680	SF	$60.00	$280,800	
10	Rail & Accessories	720	LB	$40.00	$28,800	
11	Built Up Lift Beam	13	TON	$11,000.00	$142,100	
12	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
13	Bridge Seat Pin Fabrication	2	EA	$10,000.00	$20,000	
14	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
				Subtotal - Ramp	**$3,943,200**	46.3%
Lifting Tower						
15	(8) Concrete Drilled Shafts	760	EA	$1,275.00	$969,000	
16	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
17	Machinery Housing - (3) Houses	432	SF	$150.00	$64,800	
18	Wide Flange Columns	14	TON	$9,000.00	$122,400	
19	Wide Flange Beams	13	TON	$9,000.00	$117,500	
20	Angle Braces	8	TON	$9,000.00	$70,000	
21	Built Up Tower Cross Beams	30	TON	$9,000.00	$269,400	
22	Wide Flange Deck Support Stringers	8	TON	$9,000.00	$72,800	
23	Tower Deck Grating	2220	SF	$35.00	$77,700	
24	Tower Wall Cladding	7040	SF	$30.00	$211,200	
25	Stairs	100	VLF	$2,500.00	$250,000	
26	Handrail	2940	LB	$4.50	$13,200	
				Subtotal - Lifting Tower	**$2,763,900**	32.5%
Mechanical Components						
27	Motor	1	EA	$10,000.00	$10,000	
28	Reducer	1	EA	$50,000.00	$50,000	
29	Drum	2300	LB	$9.00	$20,700	
30	Drive Shaft	10000	LB	$9.00	$90,000	
31	Bearing	10	EA	$3,000.00	$30,000	
32	CW Sheave	8	EA	$5,500.00	$44,000	
33	Hoist Sheave	10	EA	$1,050.00	$10,500	
34	CW Sheave Bracket	8000	LB	$5.00	$40,000	
35	Hoist Sheave Bracket	5000	LB	$5.00	$25,000	
36	CW Wire Rope	660	FT	$22.00	$14,500	
37	Hoist Wire Rope	605	FT	$13.00	$7,900	
38	Counterweight	295500	LB	$0.20	$59,100	
39	Beam Connection	10	EA	$500.00	$5,000	
40	CW Connection	8	EA	$750.00	$6,000	
41	Electrical	1	EA	$100,000.00	$100,000	
				Subtotal - Mechanical Components	**$512,700**	6.0%
Mechanical Components Installation						
42	Labor	480	HR	$100.00	$48,000	
43	Equipment	24	HR	$500.00	$12,000	
				Subtotal - Mechanical Components Installation	**$60,000**	0.7%
				Total Construction Cost	**$8,517,300**	100.0%
				Alaska State Sales Tax 0.0%	**$0**	
				Total Estimate of Probable Construction Cost	**$8,517,300**	
				Design/Construction Contingency 40%	**$3,406,920**	
				Total Cost	**$11,924,220**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 2B: (3) Track Through Girder with Elevated, Coupled Hoist System
Hydraulic Lift System

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$227,905.00	$227,900	
2	De-Mobilization & Contractor Closeout	1	LS	$415,900.00	$415,900	
	Subtotal - Mobilization & Site Preparation				**$643,800**	7.2%
Bridge Seat						
3	Furnish and Install (8) 24" Steel Pipe Piles	800	LF	$340.00	$272,000	
4	CIP Concrete for Abutment and Wingwalls	381	CY	$900.00	$342,900	
	Subtotal - Bridge Seat				**$614,900**	6.9%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	65	TON	$11,000.00	$711,700	
6	Wide Flange Floor Beam	111	TON	$9,000.00	$999,600	
7	Wide Flange Stringer	126	TON	$9,000.00	$1,138,300	
8	Wide Flange Deck Beam	67	TON	$9,000.00	$606,900	
9	Deck Grating	4680	SF	$60.00	$280,800	
10	Rail & Accessories	720	LB	$40.00	$28,800	
11	Built Up Lift Beam	13	EA	$11,000.00	$142,100	
12	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
13	Bridge Seat Pin Fabrication	2	EA	$10,000.00	$20,000	
14	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
	Subtotal - Ramp				**$3,943,200**	44.0%
Lifting Tower						
15	(8) Concrete Drilled Shafts	760	EA	$1,275.00	$969,000	
16	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
17	Machinery Housing - (3) Houses	432	SF	$150.00	$64,800	
18	Wide Flange Columns	14	TON	$9,000.00	$122,400	
19	Wide Flange Beams	13	TON	$9,000.00	$117,500	
20	Angle Braces	8	TON	$9,000.00	$70,000	
21	Built Up Tower Cross Beams	30	TON	$9,000.00	$269,400	
22	Wide Flange Deck Support Stringers	8	TON	$9,000.00	$72,800	
23	Tower Deck Grating	2220	SF	$35.00	$77,700	
24	Tower Wall Cladding	7040	SF	$30.00	$211,200	
25	Stairs	100	VLF	$2,500.00	$250,000	
26	Handrail	2940	LB	$4.50	$13,200	
	Subtotal - Lifting Tower				**$2,763,900**	30.8%
Mechanical Components						
27	Hydraulic Cylinder	7500	LB	$60.00	$450,000	
28	Hydraulic Power Unit with Control Valves	1	EA	$250,000.00	$250,000	
29	Electrical	1	EA	$100,000.00	$100,000	
	Subtotal - Mechanical Components				**$800,000**	8.9%
Mechanical Components Installation						
30	Labor	960	HR	$200.00	$192,000	
31	Equipment	8	HR	$500.00	$4,000	
	Subtotal - Mechanical Components Installation				**$196,000**	2.2%
	Total Construction Cost				**$8,961,800**	100.0%

Alaska State Sales Tax 0.0%	**$0**
Total Estimate of Probable Construction Cost	**$8,961,800**
Design/Construction Contingency 40%	**$3,584,720**
Total Cost	**$12,546,520**

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 3A: (4) Track Through Girder with Elevated, Coupled Hoist System
Counterweight Wire Rope Lift Mechanism with One Motor Driving Two Drums

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$299,915.00	$299,900	
2	De-Mobilization & Contractor Closeout	1	LS	$474,600.00	$474,600	
				Subtotal - Mobilization & Site Preparation	**$774,500**	7.5%
Bridge Seat						
3	Furnish and Install (10) 24" Steel Pipe Piles	1000	LF	$340.00	$340,000	
4	CIP Concrete for Abutment and Wingwalls	531	CY	$900.00	$477,900	
				Subtotal - Bridge Seat	**$817,900**	8.0%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	97	TON	$11,000.00	$1,067,600	
6	Wide Flange Floor Beam	116	TON	$9,000.00	$1,042,600	
7	Wide Flange Stringer	171	TON	$9,000.00	$1,542,200	
8	Wide Flange Deck Beam	95	TON	$9,000.00	$855,900	
9	Deck Grating	6600	SF	$60.00	$396,000	
10	Rail & Accessories	960	LF	$40.00	$38,400	
11	Built Up Lift Beam	18	TON	$11,000.00	$192,700	
12	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
13	Bridge Seat Pin Fabrication	3	EA	$10,000.00	$30,000	
14	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
				Subtotal - Ramp	**$5,180,400**	50.5%
Lifting Tower						
15	(8) Concrete Drilled Shafts	760	VLF	$1,275.00	$969,000	
16	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
17	Machinery Housing - (3) Houses	432	SF	$150.00	$64,800	
18	Wide Flange Columns	14	TON	$9,000.00	$122,400	
19	Wide Flange Beams	13	TON	$9,000.00	$117,500	
20	Angle Braces	8	TON	$9,000.00	$70,000	
21	Built Up Tower Cross Beams	41	TON	$9,000.00	$365,200	
22	Wide Flange Deck Support Stringers	10	TON	$9,000.00	$89,100	
23	Tower Deck Grating	2800	SF	$35.00	$98,000	
24	Tower Wall Cladding	7040	SF	$30.00	$211,200	
25	Stairs	100	VLF	$2,500.00	$250,000	
26	Handrail	3695	LB	$4.50	$16,600	
				Subtotal - Lifting Tower	**$2,899,700**	28.2%
Mechanical Components						
27	Motor	1	EA	$10,000.00	$10,000	
28	Reducer	1	EA	$50,000.00	$50,000	
29	Drum	2300	LB	$9.00	$20,700	
30	Drive Shaft	10000	LB	$9.00	$90,000	
31	Bearing	10	EA	$3,000.00	$30,000	
32	CW Sheave	12	EA	$5,500.00	$66,000	
33	Hoist Sheave	10	EA	$1,050.00	$10,500	
34	CW Sheave Bracket	12000	LB	$5.00	$60,000	
35	Hoist Sheave Bracket	5000	LB	$5.00	$25,000	
36	CW Wire Rope	990	FT	$22.00	$21,800	
37	Hoist Wire Rope	605	FT	$13.00	$7,900	
38	Counterweight	130500	LB	$0.20	$26,100	
39	Beam Connection	14	EA	$500.00	$7,000	
40	CW Connection	12	EA	$750.00	$9,000	
41	Electrical	1	EA	$100,000.00	$100,000	
				Subtotal - Mechanical Components	**$534,000**	5.2%
Mechanical Components Installation						
42	Labor	480	HR	$100.00	$48,000	
43	Equipment	24	HR	$500.00	$12,000	
				Subtotal - Mechanical Components Installation	**$60,000**	0.6%
				Total Construction Cost	**$10,266,500**	100.0%
				Alaska State Sales Tax 0.0%	**$0**	
				Total Estimate of Probable Construction Cost	**$10,266,500**	
				Design/Construction Contingency 40%	**$4,106,600**	
				Total Cost	**$14,373,100**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 3B: (4) Track Through Girder with Elevated, Coupled Hoist System
Hydraulic Lift System

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$299,915.00	$299,900	
2	De-Mobilization & Contractor Closeout	1	LS	$503,700.00	$503,700	
				Subtotal - Mobilization & Site Preparation	**$803,600**	7.4%
Bridge Seat						
3	Furnish and Install (10) 24" Steel Pipe Piles	1000	LF	$340.00	$340,000	
4	CIP Concrete for Abutment and Wingwalls	531	CY	$900.00	$477,900	
				Subtotal - Bridge Seat	**$817,900**	7.5%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	97	TON	$11,000.00	$1,067,600	
6	Wide Flange Floor Beam	116	TON	$9,000.00	$1,042,600	
7	Wide Flange Stringer	171	TON	$9,000.00	$1,542,200	
8	Wide Flange Deck Beam	95	TON	$9,000.00	$855,900	
9	Deck Grating	6600	SF	$60.00	$396,000	
10	Rail & Accessories	960	LF	$40.00	$38,400	
11	Built Up Lift Beam	18	TON	$11,000.00	$192,700	
12	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
13	Bridge Seat Pin Fabrication	3	EA	$10,000.00	$30,000	
14	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
				Subtotal - Ramp	**$5,180,400**	47.6%
Lifting Tower						
15	(8) Concrete Drilled Shafts	760	EA	$1,275.00	$969,000	
16	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
17	Machinery Housing - (3) Houses	432	SF	$150.00	$64,800	
18	Wide Flange Columns	14	TON	$9,000.00	$122,400	
19	Wide Flange Beams	13	TON	$9,000.00	$117,500	
20	Angle Braces	8	TON	$9,000.00	$70,000	
21	Built Up Tower Cross Beams	41	TON	$9,000.00	$365,200	
22	Wide Flange Deck Support Stringers	10	TON	$9,000.00	$89,100	
23	Tower Deck Grating	2800	SF	$35.00	$98,000	
24	Tower Wall Cladding	7040	SF	$30.00	$211,200	
25	Stairs	100	VLF	$2,500.00	$250,000	
26	Handrail	3695	LB	$4.50	$16,600	
				Subtotal - Lifting Tower	**$2,899,700**	26.7%
Mechanical Components						
27	Hydraulic Cylinder	10500	LB	$60.00	$630,000	
28	Hydraulic Power Unit with Control Valves	1	EA	$250,000.00	$250,000	
29	Electrical	1	EA	$100,000.00	$100,000	
				Subtotal - Mechanical Components	**$980,000**	9.0%
Mechanical Components Installation						
30	Labor	960	HR	$200.00	$192,000	
31	Equipment	8	HR	$500.00	$4,000	
				Subtotal - Mechanical Components Installation	**$196,000**	1.8%
				Total Construction Cost	**$10,877,600**	100.0%
				Alaska State Sales Tax 0.0%	**$0**	
				Total Estimate of Probable Construction Cost	**$10,877,600**	
				Design/Construction Contingency 40%	**$4,351,040**	
				Total Cost	**$15,228,640**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 4A: (2) Track Deck Girder with Lowered, De-coupled Hoist System
Counterweight Wire Rope Lift Mechanism with Two Motors Driving Two Drums

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$142,235.00	$142,200	
2	De-Mobilization & Contractor Closeout	1	LS	$272,680.00	$272,700	
	Subtotal - Mobilization & Site Preparation				**$414,900**	7.1%
Bridge Seat						
3	Furnish and Install (8) 24" Steel Pipe Piles	800	LF	$340.00	$272,000	
4	CIP Concrete for Abutment and Wingwalls	285	CY	$900.00	$256,700	
	Subtotal - Bridge Seat				**$528,700**	9.0%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	75	TON	$11,000.00	$825,600	
6	Wide Flange Floor Beam	116	TON	$9,000.00	$1,042,600	
7	Deck Grating	4191	SF	$60.00	$251,500	
8	Rail & Accessories	480	LF	$40.00	$19,200	
9	Built Up Lift Beam	13	TON	$11,000.00	$142,100	
10	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
11	Bridge Seat Pin Fabrication	2	EA	$10,000.00	$20,000	
12	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
	Subtotal - Ramp				**$2,316,000**	39.5%
Lifting Tower						
13	(8) Concrete Drilled Shafts	760	VLF	$1,275.00	$969,000	
14	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
15	Machinery Housing - (2) Houses	288	SF	$150.00	$43,200	
16	Wide Flange Columns	9	TON	$9,000.00	$81,600	
17	Wide Flange Beams	9	TON	$9,000.00	$78,300	
18	Angle Braces	5	TON	$9,000.00	$46,700	
19	Tower Deck Grating	256	SF	$35.00	$9,000	
20	Tower Wall Cladding	4608	SF	$30.00	$138,200	
21	Stairs	67	VLF	$2,500.00	$166,700	
22	Handrail	1636	LB	$4.50	$7,400	
	Subtotal - Lifting Tower				**$2,066,000**	35.2%
Mechanical Components						
23	Motor	2	EA	$10,000.00	$20,000	
24	Reducer	2	EA	$50,000.00	$100,000	
25	Drum	2300	LB	$9.00	$20,700	
26	Drive Shaft	600	LB	$9.00	$5,400	
27	Bearing	4	EA	$3,000.00	$12,000	
28	CW Sheave	4	EA	$5,500.00	$22,000	
29	Hoist Sheave	10	EA	$1,050.00	$10,500	
30	CW Sheave Bracket	4000	LB	$5.00	$20,000	
31	Hoist Sheave Bracket	5000	LB	$5.00	$25,000	
32	CW Wire Rope	330	FT	$22.00	$7,300	
33	Hoist Wire Rope	605	FT	$13.00	$7,900	
34	Counterweight	130500	LB	$0.20	$26,100	
35	Beam Connection	6	EA	$500.00	$3,000	
36	CW Connection	4	EA	$750.00	$3,000	
37	Electrical	1	EA	$200,000.00	$200,000	
	Subtotal - Mechanical Components				**$482,900**	8.2%
Mechanical Components Installation						
38	Labor	480	HR	$100.00	$48,000	
39	Equipment	24	HR	$500.00	$12,000	
	Subtotal - Mechanical Components Installation				**$60,000**	1.0%
	Total Construction Cost				**$5,868,500**	100.0%
	Alaska State Sales Tax 0.0%				**$0**	
	Total Estimate of Probable Construction Cost				**$5,868,500**	
	Design/Construction Contingency 40%				**$2,347,400**	
	Total Cost				**$8,215,900**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 4B: (2) Track Deck Girder with Lowered, De-coupled Hoist System
Hydraulic Lift System **March 22, 2021**

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$142,235.00	$142,200	
2	De-Mobilization & Contractor Closeout	1	LS	$287,835.00	$287,800	
				Subtotal - Mobilization & Site Preparation	**$430,000**	7.0%
Bridge Seat						
3	Furnish and Install (8) 24" Steel Pipe Piles	800	LF	$340.00	$272,000	
4	CIP Concrete for Abutment and Wingwalls	285	CY	$900.00	$256,700	
				Subtotal - Bridge Seat	**$528,700**	8.5%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	75	TON	$11,000.00	$825,600	
6	Wide Flange Floor Beam	116	TON	$9,000.00	$1,042,600	
7	Deck Grating	4191	SF	$60.00	$251,500	
8	Rail & Accessories	480	LF	$40.00	$19,200	
9	Built Up Lift Beam	13	TON	$11,000.00	$142,100	
10	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
11	Bridge Seat Pin Fabrication	2	EA	$10,000.00	$20,000	
12	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
				Subtotal - Ramp	**$2,316,000**	37.4%
Lifting Tower						
13	(8) Concrete Drilled Shafts	760	VLF	$1,275.00	$969,000	
14	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
15	Machinery Housing - (2) Houses	288	SF	$150.00	$43,200	
16	Wide Flange Columns	9	TON	$9,000.00	$81,600	
17	Wide Flange Beams	9	TON	$9,000.00	$78,300	
18	Angle Braces	5	TON	$9,000.00	$46,700	
19	Tower Deck Grating	256	SF	$35.00	$9,000	
20	Tower Wall Cladding	4608	SF	$30.00	$138,200	
21	Stairs	67	VLF	$2,500.00	$166,700	
22	Handrail	1636	LB	$4.50	$7,400	
				Subtotal - Lifting Tower	**$2,066,000**	33.4%
Mechanical Components						
1	Hydraulic Cylinder	5000	LB	$60.00	$300,000	
2	Hydraulic Power Unit with Control Valves	1	EA	$250,000.00	$250,000	
3	Electrical	1	EA	$100,000.00	$100,000	
				Subtotal - Mechanical Components	**$650,000**	10.5%
Mechanical Components Installation						
4	Labor	960	HR	$200.00	$192,000	
5	Equipment	8	HR	$500.00	$4,000	
				Subtotal - Mechanical Components Installation	**$196,000**	3.2%
				Total Construction Cost	**$6,186,700**	100.0%
				Alaska State Sales Tax 0.0%	**$0**	
				Total Estimate of Probable Construction Cost	**$6,186,700**	
				Design/Construction Contingency 40%	**$2,474,680**	
				Total Cost	**$8,661,380**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 5A: (3) Track Deck Girder with Lowered, De-coupled Hoist System
Counterweight Wire Rope Lift Mechanism with Two Motors Driving Two Drums

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$212,510.00	$212,500	
2	De-Mobilization & Contractor Closeout	1	LS	$347,315.00	$347,300	
	Subtotal - Mobilization & Site Preparation				**$559,800**	7.5%
Bridge Seat						
3	Furnish and Install (8) 24" Steel Pipe Piles	800	LF	$340.00	$272,000	
4	CIP Concrete for Abutment and Wingwalls	381	CY	$900.00	$342,900	
	Subtotal - Bridge Seat				**$614,900**	8.2%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	100	TON	$11,000.00	$1,096,000	
6	Wide Flange Floor Beam	222	TON	$9,000.00	$1,999,200	
7	Deck Grating	5569.2	SF	$60.00	$334,200	
8	Rail & Accessories	720	LB	$40.00	$28,800	
9	Built Up Lift Beam	13	TON	$11,000.00	$142,100	
10	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
11	Bridge Seat Pin Fabrication	2	EA	$10,000.00	$20,000	
12	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
	Subtotal - Ramp				**$3,635,300**	48.4%
Lifting Tower						
13	(8) Concrete Drilled Shafts	760	EA	$1,275.00	$969,000	
14	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
15	Machinery Housing - (2) Houses	288	SF	$150.00	$43,200	
16	Wide Flange Columns	9	TON	$9,000.00	$81,600	
17	Wide Flange Beams	9	TON	$9,000.00	$78,300	
18	Angle Braces	5	TON	$9,000.00	$46,700	
19	Tower Deck Grating	256	SF	$35.00	$9,000	
20	Tower Wall Cladding	4608	SF	$30.00	$138,200	
21	Stairs	67	VLF	$2,500.00	$166,700	
22	Handrail	1636	LB	$4.50	$7,400	
	Subtotal - Lifting Tower				**$2,066,000**	27.5%
Mechanical Components						
23	Motor	2	EA	$10,000.00	$20,000	
24	Reducer	2	EA	$50,000.00	$100,000	
25	Drum	2300	LB	$9.00	$20,700	
26	Drive Shaft	600	LB	$9.00	$5,400	
27	Bearing	4	EA	$3,000.00	$12,000	
28	CW Sheave	8	EA	$5,500.00	$44,000	
29	Hoist Sheave	10	EA	$1,050.00	$10,500	
30	CW Sheave Bracket	8000	LB	$5.00	$40,000	
31	Hoist Sheave Bracket	5000	LB	$5.00	$25,000	
32	CW Wire Rope	660	FT	$22.00	$14,500	
33	Hoist Wire Rope	605	FT	$13.00	$7,900	
34	Counterweight	295500	LB	$0.20	$59,100	
35	Beam Connection	10	EA	$500.00	$5,000	
36	CW Connection	8	EA	$750.00	$6,000	
37	Electrical	1	EA	$200,000.00	$200,000	
	Subtotal - Mechanical Components				**$570,100**	7.6%
Mechanical Components Installation						
38	Labor	480	HR	$100.00	$48,000	
39	Equipment	24	HR	$500.00	$12,000	
	Subtotal - Mechanical Components Installation				**$60,000**	0.8%
	Total Construction Cost				**$7,506,100**	100.0%
	Alaska State Sales Tax 0.0%				**$0**	
	Total Estimate of Probable Construction Cost				**$7,506,100**	
	Design/Construction Contingency 40%				**$3,002,440**	
	Total Cost				**$10,508,540**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 5B: (3) Track Deck Girder with Lowered, De-coupled Hoist System
Hydraulic Lift System

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$212,510.00	$212,500	
2	De-Mobilization & Contractor Closeout	1	LS	$365,610.00	$365,600	
	Subtotal - Mobilization & Site Preparation				**$578,100**	7.3%
Bridge Seat						
3	Furnish and Install (8) 24" Steel Pipe Piles	800	LF	$340.00	$272,000	
4	CIP Concrete for Abutment and Wingwalls	381	CY	$900.00	$342,900	
	Subtotal - Bridge Seat				**$614,900**	7.8%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	100	TON	$11,000.00	$1,096,000	
6	Wide Flange Floor Beam	222	TON	$9,000.00	$1,999,200	
7	Deck Grating	5569.2	SF	$60.00	$334,200	
8	Rail & Accessories	720	LB	$40.00	$28,800	
9	Built Up Lift Beam	13	EA	$11,000.00	$142,100	
10	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
11	Bridge Seat Pin Fabrication	2	EA	$10,000.00	$20,000	
12	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
	Subtotal - Ramp				**$3,635,300**	46.1%
Lifting Tower						
13	(8) Concrete Drilled Shafts	760	EA	$1,275.00	$969,000	
14	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
15	Machinery Housing - (2) Houses	288	SF	$150.00	$43,200	
16	Wide Flange Columns	9	TON	$9,000.00	$81,600	
17	Wide Flange Beams	9	TON	$9,000.00	$78,300	
18	Angle Braces	5	TON	$9,000.00	$46,700	
19	Tower Deck Grating	256	SF	$35.00	$9,000	
20	Tower Wall Cladding	4608	SF	$30.00	$138,200	
21	Stairs	67	VLF	$2,500.00	$166,700	
22	Handrail	1636	LB	$4.50	$7,400	
	Subtotal - Lifting Tower				**$2,066,000**	26.2%
Mechanical Components						
23	Hydraulic Cylinder	7500	LB	$60.00	$450,000	
24	Hydraulic Power Unit with Control Valves	1	EA	$250,000.00	$250,000	
25	Electrical	1	EA	$100,000.00	$100,000	
	Subtotal - Mechanical Components				**$800,000**	10.1%
Mechanical Components Installation						
26	Labor	960	HR	$200.00	$192,000	
27	Equipment	8	HR	$500.00	$4,000	
	Subtotal - Mechanical Components Installation				**$196,000**	2.5%
	Total Construction Cost				**$7,890,300**	100.0%
	Alaska State Sales Tax 0.0%				**$0**	
	Total Estimate of Probable Construction Cost				**$7,890,300**	
	Design/Construction Contingency 40%				**$3,156,120**	
	Total Cost				**$11,046,420**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 6A: (4) Track Deck Girder with Lowered, De-coupled Hoist System
Counterweight Wire Rope Lift Mechanism with Two Motors Driving Two Drums

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$245,480.00	$245,500	
2	De-Mobilization & Contractor Closeout	1	LS	$381,350.00	$381,400	
	Subtotal - Mobilization & Site Preparation				**$626,900**	7.6%
Bridge Seat						
3	Furnish and Install (10) 24" Steel Pipe Piles	1000	LF	$340.00	$340,000	
4	CIP Concrete for Abutment and Wingwalls	531	CY	$900.00	$477,900	
	Subtotal - Bridge Seat				**$817,900**	9.9%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	125	TON	$11,000.00	$1,377,100	
6	Wide Flange Floor Beam	232	TON	$9,000.00	$2,085,200	
7	Deck Grating	6732	SF	$60.00	$403,900	
8	Rail & Accessories	960	LF	$40.00	$38,400	
9	Built Up Lift Beam	13	TON	$11,000.00	$142,100	
10	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
11	Bridge Seat Pin Fabrication	3	EA	$10,000.00	$30,000	
12	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
	Subtotal - Ramp				**$4,091,700**	49.6%
Lifting Tower						
13	(8) Concrete Drilled Shafts	760	VLF	$1,275.00	$969,000	
14	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
15	Machinery Housing - (2) Houses	288	SF	$150.00	$43,200	
16	Wide Flange Columns	9	TON	$9,000.00	$81,600	
17	Wide Flange Beams	9	TON	$9,000.00	$78,300	
18	Angle Braces	5	TON	$9,000.00	$46,700	
19	Tower Deck Grating	256	SF	$35.00	$9,000	
20	Tower Wall Cladding	4608	SF	$30.00	$138,200	
21	Stairs	67	VLF	$2,500.00	$166,700	
22	Handrail	1636	LB	$4.50	$7,400	
	Subtotal - Lifting Tower				**$2,066,000**	25.0%
Mechanical Components						
23	Motor	2	EA	$10,000.00	$20,000	
24	Reducer	2	EA	$50,000.00	$100,000	
25	Drum	2300	LB	$9.00	$20,700	
26	Drive Shaft	600	LB	$9.00	$5,400	
27	Bearing	4	EA	$3,000.00	$12,000	
28	CW Sheave	12	EA	$5,500.00	$66,000	
29	Hoist Sheave	10	EA	$1,050.00	$10,500	
30	CW Sheave Bracket	12000	LB	$5.00	$60,000	
31	Hoist Sheave Bracket	5000	LB	$5.00	$25,000	
32	CW Wire Rope	990	FT	$22.00	$21,800	
33	Hoist Wire Rope	605	FT	$13.00	$7,900	
34	Counterweight	130500	LB	$0.20	$26,100	
35	Beam Connection	14	EA	$500.00	$7,000	
36	CW Connection	12	EA	$750.00	$9,000	
37	Electrical	1	EA	$200,000.00	$200,000	
	Subtotal - Mechanical Components				**$591,400**	7.2%
Mechanical Components Installation						
38	Labor	480	HR	$100.00	$48,000	
39	Equipment	24	HR	$500.00	$12,000	
	Subtotal - Mechanical Components Installation				**$60,000**	0.7%
	Total Construction Cost				**$8,253,900**	100.0%

Alaska State Sales Tax 0.0% **$0**

Total Estimate of Probable Construction Cost $8,253,900
Design/Construction Contingency 40% $3,301,560
Total Cost $11,555,460

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.
2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.
3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.
G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Alternative 6B: (4) Track Deck Girder with Lowered, De-coupled Hoist System
Hydraulic Lift System **March 22, 2021**

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$245,480.00	$245,500	
2	De-Mobilization & Contractor Closeout	1	LS	$407,580.00	$407,600	
	Subtotal - Mobilization & Site Preparation				**$653,100**	7.4%
Bridge Seat						
3	Furnish and Install (10) 24" Steel Pipe Piles	1000	LF	$340.00	$340,000	
4	CIP Concrete for Abutment and Wingwalls	531	CY	$900.00	$477,900	
	Subtotal - Bridge Seat				**$817,900**	9.3%
Ramp						
5	Built Up Plate Girders, Including Stiffeners and Appurtenances	125	TON	$11,000.00	$1,377,100	
6	Wide Flange Floor Beam	232	TON	$9,000.00	$2,085,200	
7	Deck Grating	6732	SF	$60.00	$403,900	
8	Rail & Accessories	960	LF	$40.00	$38,400	
9	Built Up Lift Beam	13	TON	$11,000.00	$142,100	
10	Bridge Seat Transition Plate Fabrication	1	EA	$10,000.00	$10,000	
11	Bridge Seat Pin Fabrication	3	EA	$10,000.00	$30,000	
12	Ramp to Barge Connection Assembly	1	EA	$5,000.00	$5,000	
	Subtotal - Ramp				**$4,091,700**	46.5%
Lifting Tower						
13	(8) Concrete Drilled Shafts	760	EA	$1,275.00	$969,000	
14	CIP Concrete for Dolphin Pile Cap	210	CY	$2,500.00	$525,900	
15	Machinery Housing - (2) Houses	288	SF	$150.00	$43,200	
16	Wide Flange Columns	9	TON	$9,000.00	$81,600	
17	Wide Flange Beams	9	TON	$9,000.00	$78,300	
18	Angle Braces	5	TON	$9,000.00	$46,700	
19	Tower Deck Grating	256	SF	$35.00	$9,000	
20	Tower Wall Cladding	4608	SF	$30.00	$138,200	
21	Stairs	67	VLF	$2,500.00	$166,700	
22	Handrail	1636	LB	$4.50	$7,400	
	Subtotal - Lifting Tower				**$2,066,000**	23.5%
Mechanical Components						
23	Hydraulic Cylinder	10500	LB	$60.00	$630,000	
24	Hydraulic Power Unit with Control Valves	1	EA	$250,000.00	$250,000	
25	Electrical	1	EA	$100,000.00	$100,000	
	Subtotal - Mechanical Components				**$980,000**	11.1%
Mechanical Components Installation						
26	Labor	960	HR	$200.00	$192,000	
27	Equipment	8	HR	$500.00	$4,000	
	Subtotal - Mechanical Components Installation				**$196,000**	2.2%
	Total Construction Cost				**$8,804,700**	100.0%
	Alaska State Sales Tax 0.0%				**$0**	
	Total Estimate of Probable Construction Cost				**$8,804,700**	
	Design/Construction Contingency 40%				**$3,521,880**	
	Total Cost				**$12,326,580**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.
2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.
3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.
G1 Mooring and slewing dolphin structures and hardware are not included in this estimate.

ARRC Whittier Terminal Reconstruction Transfer Span
Alternative Analysis
Order of Magnitude Estimate of Probable Construction Cost
Relocation of Existing Ramp & Lift System

March 22, 2021

Item		Quantity	Unit	Unit Cost	Total Cost	% of Total
Mobilization & Site Preparation						
1	Mobilization	1	LS	$51,890.00	$51,900	
2	De-Mobilization & Contractor Closeout	1	LS	$51,890.00	$51,900	
	Subtotal - Mobilization & Site Preparation				**$103,800**	9.1%
Bridge Seat						
3	Furnish and Install (8) 24" Steel Pipe Piles	800	LF	$340.00	$272,000	
4	CIP Concrete for Abutment and Wingwalls	208	CY	$900.00	$187,500	
	Subtotal - Bridge Seat				**$459,500**	40.3%
Ramp Relocation						
5	Partial Dissasembly of Ramp	7	DAYS	$7,000.00	$49,000	
6	Derrick Barge Ramp Transport & Crew	3	DAYS	$20,000.00	$60,000	
7	Partial Ramp Reassembly	7	DAYS	$7,000.00	$49,000	
8	Relocation of Reusable Mechanical Equipment	1	EA	$45,000.00	$45,000	
	Subtotal - Ramp Relocation				**$203,000**	17.8%
Ramp Lift System						
9	Furnish and Install (2) 36" x 3/4" Lift Piles	160	LF	$360.00	$57,600	
10	Furnish and Install Caisson Wall Plating	22	LF	$7,500.00	$165,000	
11	Caisson Concrete	3	CY	$900.00	$2,700	
12	New Non-Salvagable Mechanical and Connection Hardware	1	EA	$150,000.00	$150,000	
	Subtotal - Ramp Lift System				**$375,300**	32.9%
	Total Construction Cost				**$1,141,600**	100.0%
	Alaska State Sales Tax 0.0%				**$0**	
	Total Estimate of Probable Construction Cost				**$1,141,600**	
	Design/Construction Contingency 40%				**$456,640**	
	Total Cost				**$1,598,240**	

Notes

1 Assumes 5% of Subtotal Consruction Cost for mobilization. This item only reflects mobilization for the barge ramp and associated structures.

2 Assumes 5% of Subtotal Consruction Cost for demobilization. This item only reflects demobilization for the barge ramp and associated structures.

3,15 Site specific geotechnical information has not been provided for this Alternatives Analysis. It has been assumed that ground improvement is not required and loading due to kinematic effects can be neglected.

6.3 Basis of Design

On-Call Marine Structural Engineering Services
ARRC Whittier Terminal Reconstruction
Barge Ramp
Draft Mechanical/Structural Basis of Design
Contract No. 117853

Prepared by KPFF Consulting Engineers

Draft Basis of Design

March 3, 2021

TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION

The Alaska Railroad Company's (ARRC) Whittier Terminal is almost 50 years old and reaching its service life expectancy. ARRC has invested over the last two years to extend the life of the Barge Slip including electrical, structural, and mechanical rehabilitations. The next phase is planning for reconstruction. This effort will likely include the barge slip, the old marginal wharf area, and potentially other areas to facilitate construction. R&M Engineering has recently begun pre-engineering efforts including survey and geotechnical support and PND Engineering will be assisting ARRC in marine engineering. KPFF has been contracted to provide engineering services for development of alternatives for the new transfer span ramp, specifically providing structural and mechanical engineering input and preliminary rough order of magnitude (ROM) cost estimates.

This basis of design document (BOD) articulates the project requirements and desires related to location, safety, operational ease, durability, cost, and constructability as they pertain to the mechanical and structural systems for the ramp. This is a preliminary level BOD and intended to serve as a starting point for a design level BOD when appropriate. The information provided here is intended to be the baseline assumptions that KPFF will be utilizing as we evaluate various alternatives. Upon receiving consensus from AARC on this BOD, KPFF will progress with the development of conceptual alternatives and cost estimates. A final version of this preliminary BOD will be included as an appendix to the final alternative analysis report provided by KPFF to AARC.

2.0 PROJECT GOALS AND LESSONS LEARNED FROM CURRENT FACILITIES

2.1 Corrosion Prevention

Waterfront and overwater structures are inherently subject to section loss and degradation due to corrosion from the marine environment, particularly in the splash zone where areas are exposed to an abundance of sea water and oxygen. The alternatives described in Section 12 below will seek to mitigate the effects of corrosion by minimizing the amount of structure directly in-contact with seawater by elevating as much structure as practical above the extreme water level. Sacrificial thickness to in-water steel piling and ramp elements subject to tide cycles may also be assumed to extend the service life of the structure, as well as implementing corrosion inhibiting coatings such as galvanizing, epoxy paint, passive galvanic anodes, or a combination thereof. Crack control provisions for concrete elements exposed to aggressive environmental conditions will also be assumed to mitigate corrosion of reinforcing steel exposed to chlorides.

2.2 Mechanical Systems

Bridge operating machinery must be robust, reliable, easy to maintain and hardened to withstand both the marine environment and the extreme winter conditions experienced at the site. Typical types of operating machinery for large transfer bridges are built around wire rope or hydraulic cylinder primary hoists.

Each type of primary hoist has inherent features that are not ideal for either the marine environment or for operating in extreme cold weather.

Both hoist types are degraded by exposure to the marine corrosion environment. On cylinders this can be mitigated by using corrosion resistant materials for the cylinder rods, and the careful selection of rod wipers and seals. Similarly, the impact on wire rope systems can be mitigated through the selection of special corrosion resistant materials or through protective coatings. Both measures substantially increase the capital cost of the operating machinery.

The site's extreme winter environment has a more wide-spread impact on the machinery and can be only partially mitigated through design measures. Critical routine maintenance of the hoist machinery becomes more difficult and, in some cases, impossible to complete.

For this study, we propose looking at both hydraulic and wire rope-based hoist systems. Rather than focusing on traditional hoist configurations with exposed hoist machinery, our alternatives will prioritize configurations that that keep critical mechanical components separated from the marine water and splash zone, and that can be hardened against cold weather via climate controlled machinery houses or enclosures. While these hardening provisions add a capital construction cost item to the project, we believe that this cost increase will be more than offset by reduced initial machinery costs and by reduced ongoing operations and maintenance (O&M) costs over the life of the project.

Additional systems such as bascule or swing systems will be considered as part of the alternatives analysis, but it is unlikely that such systems will prove to be advantageous from a cost or maintenance perspective. However, these alternate systems will be discussed.

3.0 DESIGN CRITERIA DOCUMENTS AND REFERENCES

3.1 Applicable Codes and Standards

- International Building Code (IBC), 2018 Edition
- American Society of Civil Engineers (ASCE), 2016, Minimum Design Loads for Buildings and Other Structures, ASCE Standard No. 7-16
- ASCE, 2014, Seismic Design of Pile-Supported Piers and Wharves, ASCE Standard No. 61-14.
- American Concrete Institute (ACI) Building Code Requirements for Structural Concrete, ACI 318-14
- American Institute of Steel Construction (AISC) Steel Construction Manual, 14th Edition
- American Association of State Highway & Transportation Officials (AASHTO) – Standard Specifications for Highway Bridges 2015
- American Society for Testing and Materials (ASTM) – Standards in Building Codes current editions
- American Welding Society – Structural Welding Code (AWS D1.1)
- American Railway Engineering and Maintenance-Of-Way Association (AREMA)
- AASHTO Movable Bridge Code (AASHTO MBC)

3.2 Reference Documents

- Drawings "AARC Whittier Barge Slip Dual Use Conversion", Dated March 26, 2010
- Drawings "AML Barge Loading Facility Whittier", Dated September 30, 2009
- ARRC e-mail input regarding various design parameters and operational desires

4.0 DESIGN LOADS

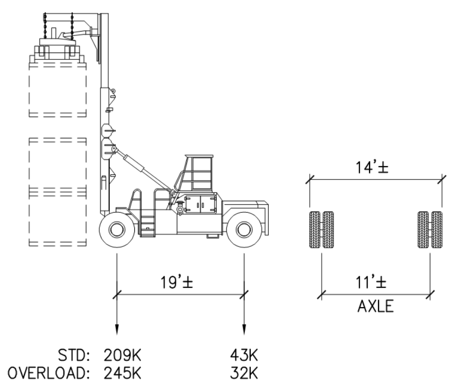
4.1 Dead Loads

Permanent loads will include the cumulative weight of all structures, including the weight of all structural components, utilities, and other permanent attachments. The following unit weights are assumed for design:

- Steel: 490 pounds-per-cubic-foot (pcf)
- Concrete: 150 pcf

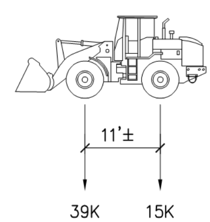
4.2 Live Loads

Per communications with AARC, the following design vehicles and their corresponding loading diagrams are considered for the preliminary design of the barge ramp. The COOPER E70 Single Locomotive Vehicle has been increased to a COOPER E80 based on email correspondence. Dynamic amplification effects due to impact are included where noted in the axle loads shown and appropriate live load reductions based on speed and the number of loaded tracks will be considered:



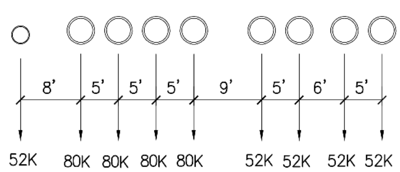
CONTAINER HANDLER

STD GVW= 252K IMPACT=20%
OVERLOAD GVW= 277K IMPACT=10%



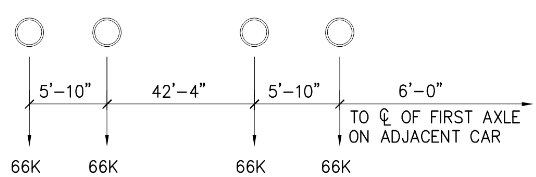
CAT 966 LOADER

GVW= 54K IMPACT=33%



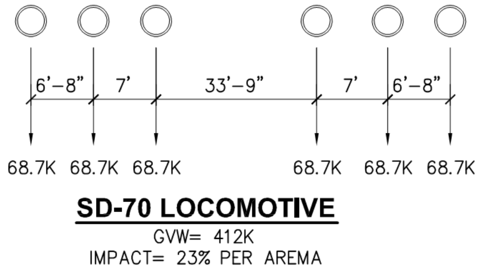
COOPER E80 SINGLE LOCOMOTIVE

GVW= 568 K NO IMPACT PER ORIGINAL DESIGN CRITERIA



CEMENT SHORT CAR

GVW= 264K PER CAR
IMPACT= 23% PER AREMA



4.3 Earth Loads

Final design will require a geotechnical report for the site, which will characterize the subsurface profile for the site for the design of both on grade and in-water structures subject to earth loading. Soil loading and stability for shallow foundations and walls will be based on the respective active/passive pressures acting on the structural member, as well as friction between the structure and soil. Lower-bound soil resistances and allowable bearing pressures may be assumed for the alternative analysis based on recommendations in the IBC. Deep foundations, including caissons/piling, will eventually need to be analyzed for their subjected demands based on the respective resistance provided from each soil layer they penetrate to account for soil-structure interaction (SSI) effects. These analyses are typically performed in structural analysis software such as LPILE or SAP2000 through the form of lateral (PY) and axial (TZ/Q) soil springs applied to a representative model of the structure. The final lengths required for deep foundations will typically be based on the geotechnical vertical capacities provided from the geotechnical study for the site.

For the alternatives analysis, in the absence of geotechnical information, KPFF will utilize broad assumptions based on experience to approximate required pile size, quantity and depth for preliminary cost estimating purposes. KPFF can also incorporate preliminary input from R&M regarding site geotechnical assumptions if they become available during this study. For gravity load capacity of shafts and foundations, KPFF will assume that these elements reach bedrock for costing purposes. Furthermore, we will assume that fixity on pile or shaft elements can be reached at approximately 10 times the diameter of the foundation element. It will be assumed that there is no additional lateral kinematic earth pressure on foundation elements due to lateral spreading and that there is not significant down-drag due to liquefaction. Lateral earth pressure value minimums per ASCE 7 will be utilized where needed.

4.4 Seismic Loads

Seismic loading on the ramp and its supporting structures will be preliminarily based on an assumed ASCE 7, Site Class D classification and its respective response spectra for the project site. Site Class D does not require an analysis to be performed to consider the effects of soil-liquefaction and slope failure due to ground shaking. As mentioned previously, for final design a geotechnical study will be required to verify this assumption. The assumed response spectra will be based on AASHTO provisions utilizing a response modification factor (R-Factor) of (1) one for the barge framing. Provisions from ASCE-61 will be adopted when there is a lack of applicable provisions from the AASHTO specifications or ASCE 7. The seismic performance criteria will be defined as life-safety under a design level event for each alternative.

The analysis will assume that lateral spreading producing kinematic loading on the piling will not occur at the site, or that suitable ground improvements will be incorporated to prevent such loading. Costs for ground improvement will not be included in the alternatives analysis study and will need to be evaluated by others responsible for the overall site design and evaluation. This cost should be relatively consistent for all structural/mechanical alternatives, and thus should not inhibit ARRC from deciding regarding the optimal alternative. However, it will eventually affect the overall project cost if it is required. If ARRC desires the structure to be able to withstand lateral spreading forces without ground improvement, geotechnical input will need to be provided as this is highly site specific and not a structural demand that can be easily assumed based on past experience or anecdotal information.

4.5 Wind Loads

Wind loading will be in accordance with ASCE 7-16 for a Risk Category II structure, corresponding to a 160mph basic wind speed for the project site. This loading will be considered for all exposed elements in both their nominal condition and conditions that reflect potential ice-buildup and increased sail areas.

4.6 Snow and Ice Loads (Arctic Conditions)

Snow and ice buildup loading will be considered as additional vertical loading on exposed structures in accordance with ASCE 7-16 and accepted practice. Ice flow acting on piling due to the ice crushing force will also be assumed.

4.7 Ocean/Coastal Loads

Climatological and/or coastal reports near the project site are not available or pending from AARC, though it is not anticipated these loads will govern the design of any alternative given that the intent of the alternatives will be to limit the amount of structure that is in the water.

4.8 Machinery Design Loads

The Transfer Bridge Hoist Machinery and other mechanical elements shall be designed to carry both the anticipated ***Bridge Operational Loads*** and the ***Bridge Holding Loads***.

Bridge Operational Loads govern the size, speed, and power requirements of the hoist system. Operational Loads include bridge and machinery Dead Load, Snow and Ice Loads, Wind Loads, and any other primary load that the bridge would experience while it is being moved.

Bridge Holding Loads include all loads that the mechanical system would encounter while the bridge is stationary and supporting vessel loading and unloading.

All bridge machinery shall be designed to meet the Service, Fatigue and Fracture, and Overload limit states established by ASHTO Movable Bridge Code.

Where mechanical components serve as critical structural elements of the Bridge, these components will also be designed to carry Seismic and other Extreme Loads.

It should also be noted that there are many nuances to the mechanical design of this type of ramp including how the bearing assemblies at both the abutment and the barge respond to vessel motion. While developing details for these elements is not in the scope of the alternatives analysis, they are elements that will need to be considered in final design.

It is understood that the existing transfer span is used to slew the barges using two upland winches with fairleads at each of the two corners at the face of the span. The alternatives analysis will assume that this function will be served by onshore and offshore structures specifically designed to this purpose and will not be integrated into the ramp system.

5.0 TIDAL DATUMS AND RANGES

5.1 Current Tidal Information

For the purposes of this alternative analysis, the vertical elevation datum is 0.0 Mean Lower Low Water. It will be assumed that mudline elevations will be set based on dredging activity as needed to accommodate the ramp operations. Dredge quantities and costs will not be included in the alternatives analysis as they will be the same for all alternatives and are assumed to be part of the overall site project costs being developed by others.

It will also be assumed that the top of rail elevation at the bulkhead will be raised from the +18-foot MLLW elevation where the existing rail sits. The new elevation will be based on the current extreme high-water elevation identified below and projected sea level rise for the site. It is assumed that the upland implications associated with this assumption will be addressed by others on the project team.

Assumed water levels are in accordance with the General Notes on Sheet 18 of 21 of the AARC Whittier Barge Slip Dual Use Conversion Drawings:

Tidal Data	Mean Lower Low Water Datum
Extreme High Water	+18.7 ft
High Tide Line (HTL)	+15.5 ft
Mean Higher High Water (MHHW)	+12.3 ft
Mean High Water (MHW)	+11.3 ft
Mean Tide Line (MTL)	+06.4 ft
Mean Low Water (MLW)	+01.5 ft
Mean Lower Low Water (MLLW)	+00.0 ft
Extreme Low Water	-05.0 ft

5.2 Projected Tidal Information

Potential sea-level rise will be in accordance with a 50-year projection for the project location. The amount of rise will be extrapolated from historically recorded sea-level change data for the site if the information is not provided in a coastal report within the vicinity of the project. At a minimum two (2) feet of sea-level rise will be considered for each of the alternatives.

6.0 VESSEL CRITERIA

6.1 Current or Future Vessels

Based on correspondence with AARC, the following barge/vessel characteristics will be considered for the different alternatives:

- Barge: Dimensions up to 460'x125'
- CN 400'x76'x20' DP
- AML 420'x100'x24' DP
- Existing Dock Design Vessel: LOA 656', Beam 106', Displacement 44,000 tons

7.0 SERVICE LIFE CRITERIA

7.1 Structural Systems Service Life and Maintenance

A predicted minimum service life of 50 years may be assumed by implementing corrosion-inhibiting measures as discussed in Section 2.1, including sacrificial thickness, epoxy coatings to steel members, passive cathodic protection, as well as crack-control criteria for the design of concrete elements.

A monitoring program will be assumed to periodically assess the structural integrity of any coatings or the development of concrete cracks so that any minor issues can be addressed before causing accelerated corrosion. The alternatives analysis will consider options for removable decking and other elements that will make periodic inspection and routine maintenance easier than it is with the current facility.

7.2 Mechanical Systems Service Life and Maintenance

Bridge Mechanical systems shall be designed in accordance with AASHTO Movable Bridge Code to provide reliable bridge operation for the design life of the facility.

Design Life for the Machinery is assumed to be 50 years and could be extended to 75 years with minimal refurbishment after 50 years of operation.

Design life assumes that routine maintenance is completed for all mechanical systems for the life of the project.

8.0 OPERATIONAL CRITERIA

8.1 Ramp Design Range of Motion and Operational Slopes

The alternatives analysis will assume that rail cars will be up to 89-foot in length and that ramp angles will be as follows to match closely to current operations. The ramp upward angle will be assumed to be such that it can be stowed in a condition such that most of the structure will remain out of the water during stowage.

- Train Loading Condition
    - Max upward angle of +5.0 degrees
    - Max downward angle of -4.5 degrees

- Barge Engaged Maximums
  - Max upward angle of +6.5 degrees
  - Max downward angle of -4.5 degrees
- Ramp Angle Maximums (Not Operating or Stowed)
  - Max upward angle as required to keep ramp out of water as much as practical during stowage
  - Max downward angles of approximately -7.0 degrees

8.2 Lift/Hoist Mechanisms

Both Hydraulic Cylinder and Wire Rope type hoist systems could provide excellent service for this new Transfer Bridge.

Cylinder based systems have the load capacity to manage the transfer bridge without the need for a counter-weight system. This minimizes the machinery dead weight that the marine structures carry and eliminates an entire mechanical system that must be maintained. The trade-off is that the un-counterweighted system requires more power to operate at the same speed as a system with counterweights. Another major advantage to cylinder systems is that, if properly designed and fabricated they can operate for the full design life of the facility without refurbishment or replacement.

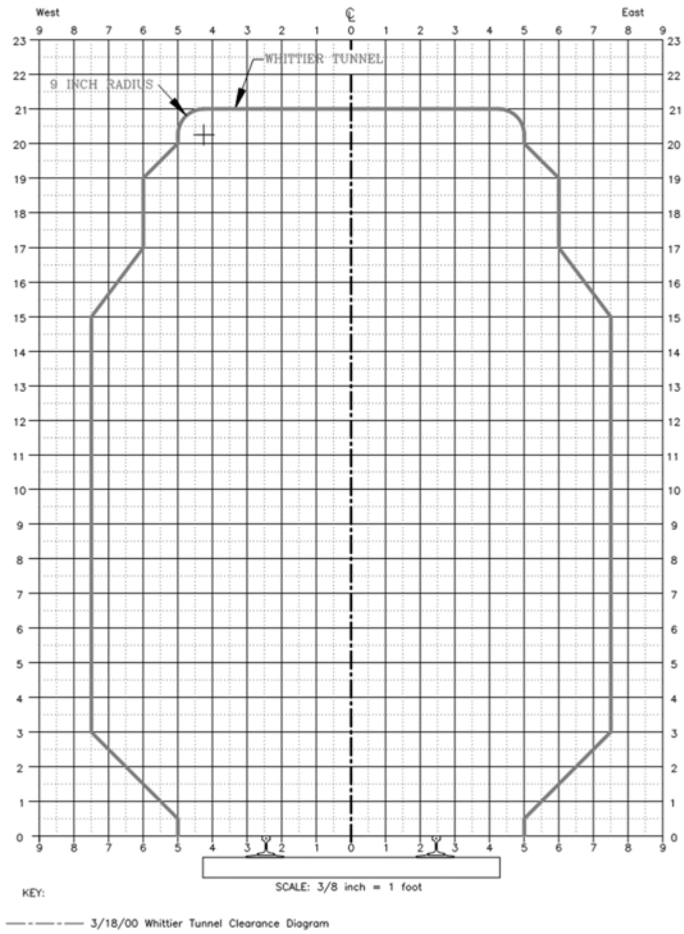
Wire rope hoist systems generally need to be combined with a counterweight system to operate large transfer bridges. These systems can operate the bridge using minimal power. The systems are relatively simple and robust, require less technical expertise to maintain and eliminate the need to manage hydraulic fluid over environmentally sensitive marine waters. On the negative side, these systems nearly double the system dead weight that the marine structures have to carry and require replacement of both the hoist and counterweight wire ropes approximately every 20 years.

As mentioned above, both types of systems can be packed and hardened for this study in a way that mitigates the impact of both the marine corrosion environment and extreme winter environment at the site.

As both types of hoist arrangements have merit for this application, and both types can be readily hardened to withstand the unique site conditions, we will be looking at both approaches as part of this alternatives study.

8.3 Lane Configuration and Throughput

The alternatives to be investigated in the analysis consist of two-track, three-track, and four-track configurations. Some discussion will also be provided for larger numbers of tracks, but these will not be included as full alternatives for evaluation. Based on information provided by ARRC to KPFF, we understand that the maximum container width dimension that is desired for transfer over the barge and/or side ramp correspond to a 60-foot Conex container. This width will be assumed along with the current spacing between tracks. Outside tracks will accommodate the Whittier Tunnel clearance diagram shown below. Structural and mechanical members will be analyzed for the operational configuration that produces the maximum load demands to a given element under consideration.



9.0 ELECTRICAL DEMAND

It is assumed that electrical load demand may moderately increase in some scenarios. Cost estimates will not include costs for additional sub stations or transformers that may be required for new equipment. Such issues would need to be evaluated by an electrical engineer. However, the alternatives analysis will investigate the power requirements for the equipment needed in each alternative.

10.0 PHASING AND CONSTRUCTION SCHEDULE

10.1 Possible Ramp Locations and Phasing Considerations

The alternatives analysis will discuss two potential sub-alternatives related to each of the main alternatives discussed in Section 12 below.

One sub-alternative will be to construct the new ramp in a completely new location to the south of the existing ramp location. This sub-alternative would leave the existing ramp in place during construction. The existing ramp could then be removed/decommissioned after the new ramp comes online. The exact location of the new ramp will need to be coordinated with the overall design team, as its positioning is mostly related to upland considerations.

The second sub-alternative will be to construct foundations and a modified hoist mechanism in a location to the south of the existing ramp, and then move the existing ramp structure to that location. This modified ramp would then be utilized as a temporary ramp while the new ramp is constructed in the footprint of the existing structure. The modified ramp could then be decommissioned or rehabilitated as a secondary ramp for ARRC's purposes in the future. There will be some down time associated with the movement of the ramp, such that the Whittier Terminal would be without a barge ramp for a period. The alternatives analysis will investigate the potential duration of this shut down.

10.2 Construction Seasons Assumptions and Maintaining Operations

It will be assumed that substantial concrete work cannot be easily achieved in the winter months. However, many construction activities are possible in the winter, which will be considered when evaluating timelines for the various alternatives. KPFF will provide some discussion of these timelines in the alternatives analysis document.

10.3 Typical Vessel Schedules

KPFF currently has no hard data on typical vessel schedules. However, this information will be something to consider when evaluating the second sub alternative described above. For now, based on discussions with ARRC, it is assumed that there are typically 2 to 3 regular vessel calls weekly, but these calls can be impacted by weather.

11.0 ANALYSIS APPROACH AND ASSUMPTIONS

A brief description of the limits of the alternatives analysis that will be performed and things to consider in final design are described below.

11.1 Assumed Material Properties

Concrete:

The following concrete strengths will be used unless otherwise noted:
Class A: f'_c = 5,000 psi; miscellaneous cast-in-place concrete (mostly for abutments).

Reinforcement:

All reinforcement shall conform to ASTM A615 or A706 Grade 60, fy = 60 ksi except where noted otherwise.

Structural Steel and Anchor Bolts:

- Rolled Shapes: ASTM A992, f_y = 50 ksi unless otherwise noted
- Plate: ATSM A36, f_y = 36 ksi
- Square and Rectangular Tube: ASTM A500 Grade B, f_y = 46ksi
- Anchor Bolts: ASTM A307, f_u = 60 ksi unless otherwise noted
- High Strength Bolts: ASTM A325, f_u = 105/120 ksi

11.2 Preliminary Structural Analysis Assumptions and Procedures

Preliminary structural analysis for each alternative will include preliminary simplified analytical models generated in SAP2000 to determine basic load demands to the primary members. Gross member dimensions will be determined from the governing demands of all load combinations and loading configurations in order to determine a feasible framing concept for each alternative to allow for comparative cost estimates to be produced. Foundation elements will be sized utilizing assumed geotechnical capacities and/or geotechnical information from adjacent projects as available. Based on input from AARC, it is assumed bolted connections will be utilized as much as possible for ease of future maintenance – detailing of miscellaneous connections will be performed during final design, but KPFF will consider conceptually where bolted connections are feasible.

11.3 Preliminary Mechanical Analysis Assumptions and Procedures

Transfer Bridge Hoist Machinery will be sized for each alternative based on a combination of simplified 3D Kinematic Models and Hand Calculations based on Engineering First Principles. Analysis will focus on establishing overall component sizes and power requirements for each alternative to a level of detail appropriate to estimate the ROM relative cost.

12.0 ALTERNATIVES TO BE EVALUATED

Three main alternatives have been identified for investigation in the alternatives analysis. The alternatives have been selected to reflect a range in both capacity and overall estimated construction costs. In each alternative the barge ramp structure will consist of built-up steel plate girders and miscellaneous rolled steel member bracing and decking with bolted connections where possible. Any dredging required to accommodate future vessels at low tide will be coordinated with other members of the project team. These alternatives have been selected as they will effectively bound the relative cost. The following alternatives will be evaluated:

- Two-track through girder
- Three-track through girder
- Four-track through girder

Sub alternatives to each of these main alternatives will be evaluated based on the selected lift system, either a cable lift system or a hydraulic lift system.

A discussion will be included related to utilizing the existing span as a temporary span, other potential lift systems, and the potential cost implications of providing additional tracks to the alternatives.

G.3. Alaska Railroad Whittier Terminal Waterfront Reconstruction – Alternatives Study

WORKING DRAFT

ALASKA RAILROAD
WHITTIER TERMINAL WATERFRONT RECONSTRUCTION

Alternatives Study

May 13, 2021

Prepared with support from

PND Engineers

R&M

KPFF

Updated xxxx

Table of Contents

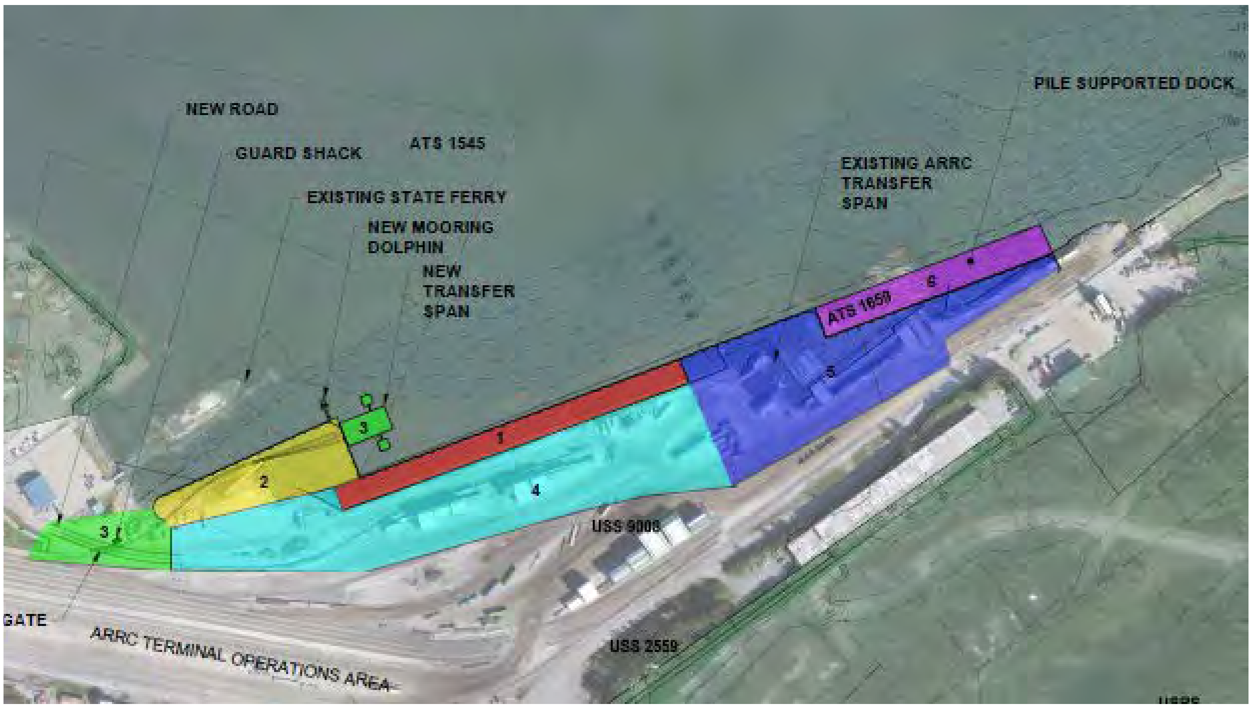
List of Tables and Figures

Appendices

1 Executive Summary

The Study examined alternatives for the reconstruction of the Alaska Railroad Corporation's "ARRC" Whittier Terminal marine facilities. Alternatives were developed with considerations for current needs, future expansion, and the potential for financing.

The recommended Alternative 7 will allow for a phased development………



2 Project Overview

2.1 Purpose of the Study

The purpose of the Alaska Railroad Whittier Terminal Waterfront Reconstruction Alternatives Study is to explore options to replace the marine terminal's deteriorating docks and barge slip with new berthing infrastructure. The Study addresses continuing the functionality of the aging facilities, improving operations, reducing maintenance requirements, providing for future development, and optimizing the cost/benefit of the restoration project.

2.2 Project Location

The Alaska Railroad's Whittier Terminal is located in an ice-free fjord at the head of Passage Canal, at east end of developed Whittier waterfront. The railroad terminal and marine facilities were originally constructed by the U.S. Army during World War II. Since then, the waterfront has developed servicing rail, freight, commercial/fisheries, marine passengers and public boating needs.

Figure 1- ARRC Whittier Terminal

3 Existing Conditions

3.1 Waterfront Facilities

The Railroad Terminal's Waterfront includes: the sheet-pile wall "bulkhead" retaining the primary roadway; the "Barge Slip" consisting of the rail-ferry unloading dock "transfer span", two "pass-pass" docks, a loading ramp and associated mooring and berthing facilities; the barge "ITB" ramp; the DeLong Dock which was transferred to the City of Whittier; and the Smitty's Cove ramp which is leased by the City of Whittier. In addition to the functional waterfront structures, remains of the old Marginal Wharf exist on the west end of the waterfront

Figure 2 - Waterfront Structures

The Marginal Wharf berth was originally constructed by the U.S. Army Corps of Engineers in 1958, and restored after the 1964 earthquake. The concrete marginal wharf, transfer span, and associated facilities were demolished in 2005. The berth consisted of a concrete wharf 60’x1100’ deck on a steel piling, and a transfer span operated from tower supported on breasting dolphins. Piling was removed to mudline.

Figure 3 - Marginal Wharf Bulkhead Wall

The remaining structures include the bulkhead seawall, and portions of the transfer span docks, and west abutment. The bulkhead is failing and requires replacement in the near future.

The Barge Slip was constructed in 1970 with a 120 ft 3-track transfer span and circular cell berthing dolphins. The transfer span was originally was elevated from towers structures. In 2003, a side-loading facility was constructed, additional fill placed, two 34-foot wide dock “pass-pass” structures installed long the side of the barge slip, and the lifting system converted to hydraulics. A side ramp was later added for more efficient side loading.

Most of the original elements of the barge slip berth are past their service life and require significant rehabilitation or replacement in the next few years. Extensive deterioration has been documented on the steel sheet piling and timber elements.

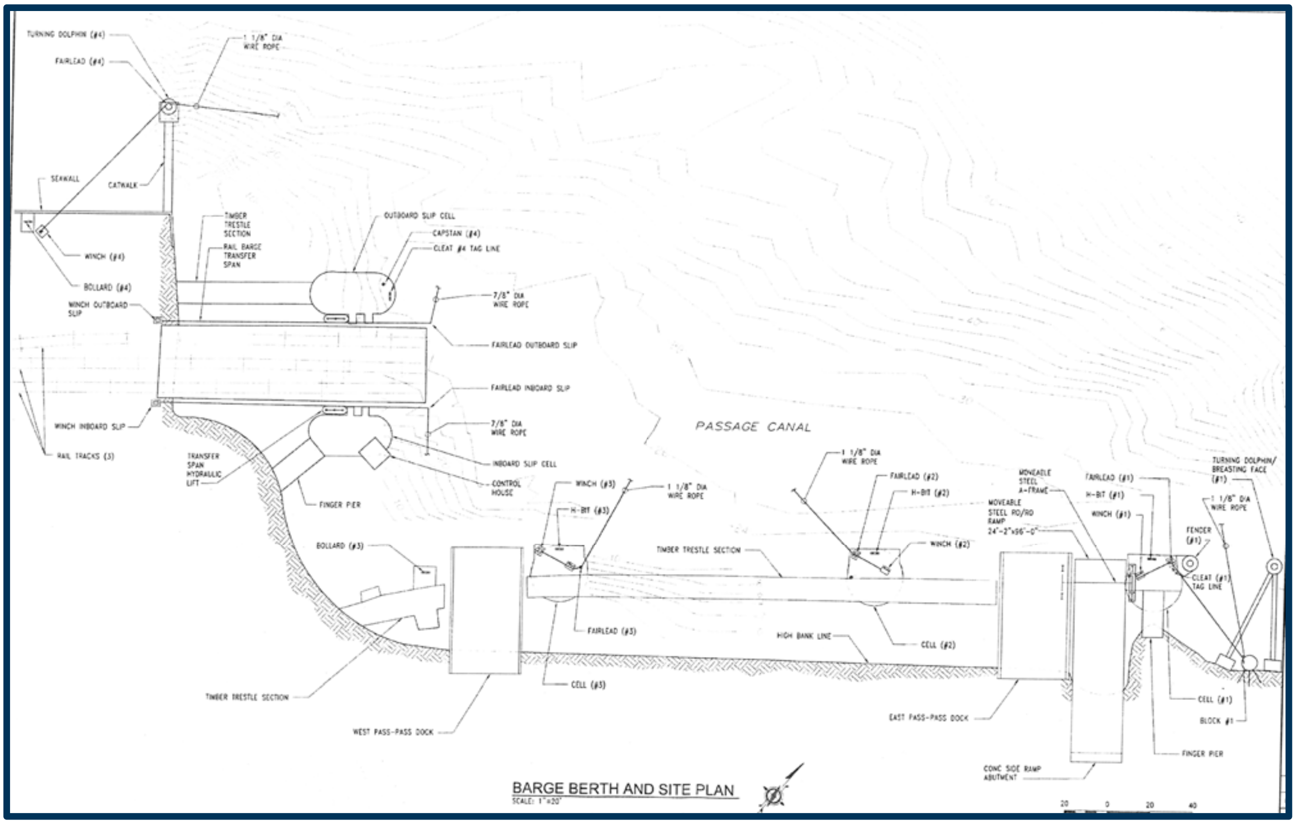


Figure 4 - Barge Berth Site Plan

In 2019-2020, electrical, structural, and mechanical repairs were completed on the barge transfer span and mooring facilities to extend the life of the facility 5-10 years. Additional repairs are anticipated on the side docks and facilities to maintain safe operations.

At the far eastern end of the Terminal waterfront is the integrated tug-barge "ITB" ramp. Barge cargo is rolled on/off the ITB into the terminal.

Figure 5 - Sheet piling highly corroded and damaged

The DeLong Dock consists of two steel barges supported by steel caissons. It was constructed in 1953 by the US Army Corps of Engineers and is beyond the typical service life of this type of facility. The dock was originally part of the Railroad Terminal, but the dock and associated property rights were sold to the City of Whittier in 2018.

Adjacent to the DeLong dock is Smitty's Cove which is leased to the City. The City maintains and operates the uplands and a deteriorating launch ramp into Smitty's Cove.

3.2 Terminal Operations

Alaska Marine Lines ""AML" (Lynden) is the primary operator of Whittier marine Terminal, with ARRC operating the rail car operations. Marine vessels which call on the terminal are almost exclusively AML operated or in partnership with AML. The Canadian National ferried trains from Prince Rupert until spring 2021.

Currently AML's rail-ferry barges sail from Seattle WA. These bare are 420'x100'x24' (draft) with eight tracks and 48-car capacity. They are equipped with cargo racks which are loaded over the train tracks. The barges need to be slewed to three locations at the Whittier barge slip to unload the eight tracks.

AML typically load cargo off the side of the barges via a ramp. Occasionally the docks are also used for load transfers. The integrated tug-barge "ITB" ramp is operated exclusively and maintained by AML.

3.3 Uplands Track and Cargo

The Whittier Railroad Terminal has a single main track, a series of yard tracks, and associates yard service tracks.

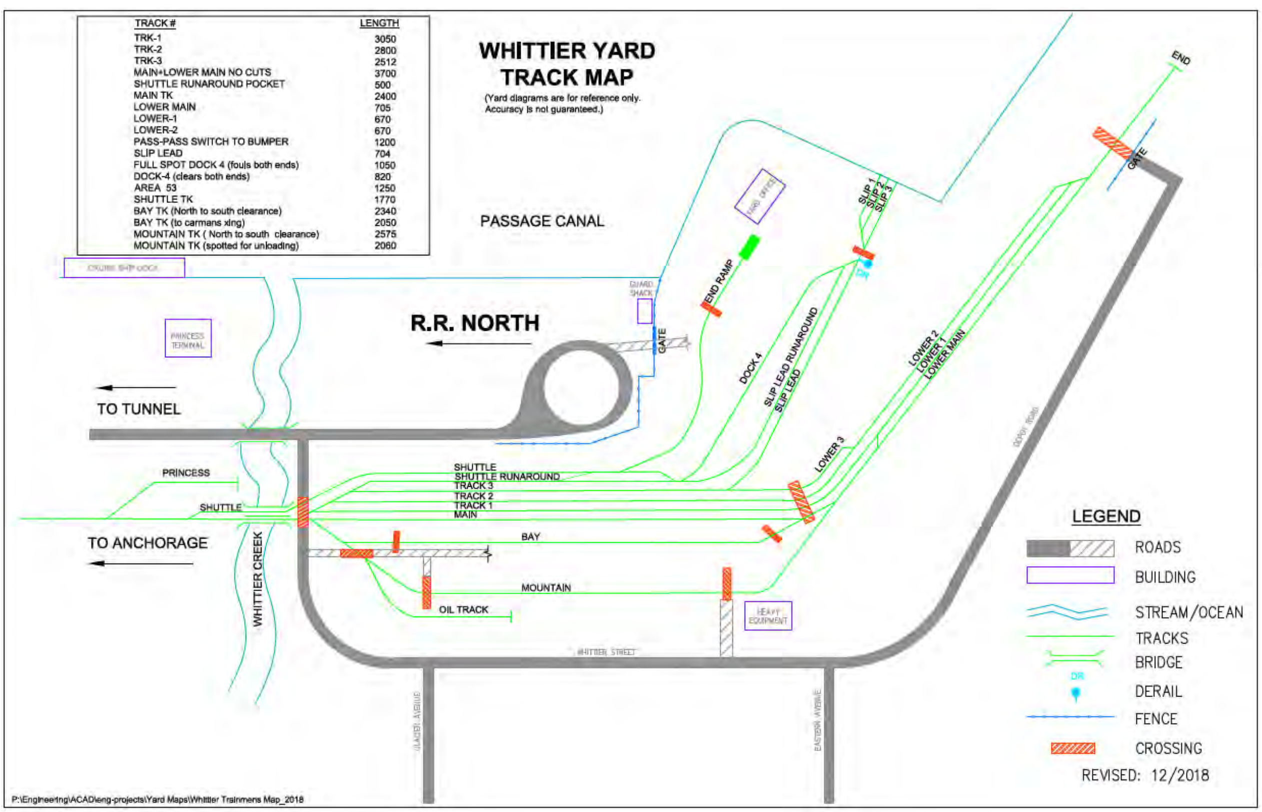


Figure 6 – Whittier Terminal Track Map

The track lengths and layouts limit arrangement and movements, and segment the uplands for freight storage and operations. Ideally, the tracks would be extended and realigned to created longer trains and more efficient switching, and additional uplands would be developed for cargo.

3.4 Climate

Whittier is located at the northern end of the world's northernmost temperate rainforest, the Tongass, and is one of the wettest cities in the United States, receiving an annual precipitation of approximately 200 inches, and is often in a form other than rain. Temperatures generally range from 23 to 31 degrees Fahrenheit in the winter and 51 to 61 in the summer months. Whittier often experiences high winds with speeds of 50+ miles per hour. The terminal is somewhat shielded from long fetch waves with maximum waves approximately 2.5m.

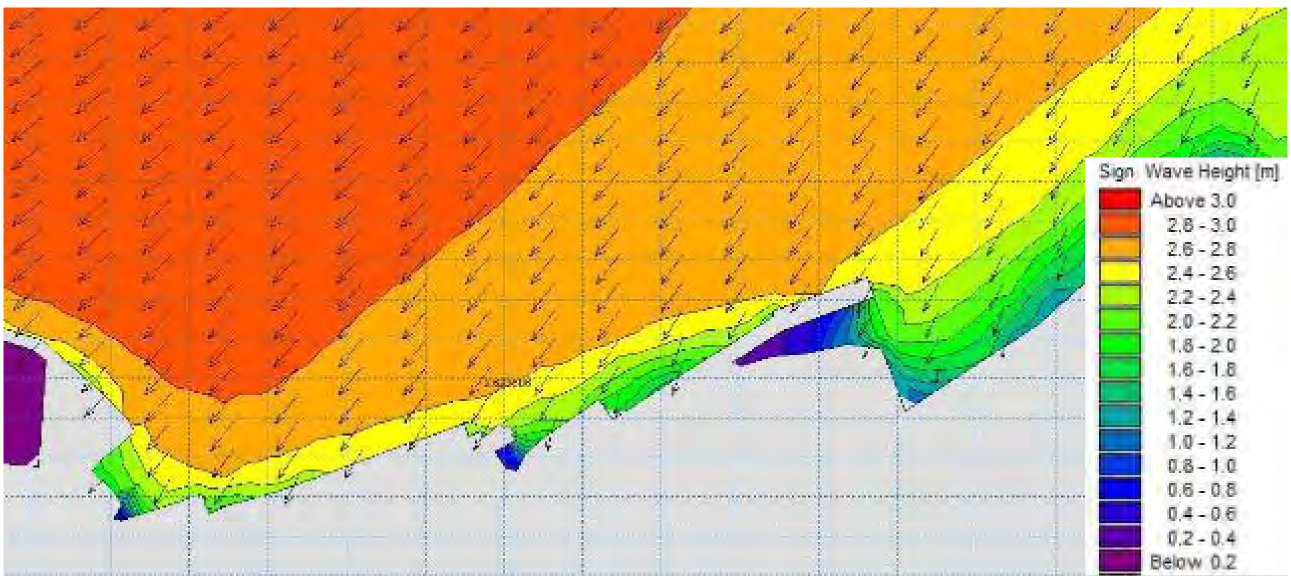


Figure 7 – Potential Significant Wave Heights

3.5 Geology and Geotechnical Considerations

ARRC contracted with R&M Consultants to preform geotechnical investigation to support the planning and design of future improvements at Whittier Terminal Waterfront. The following excerpt summaries the general findings:

The landside of the project site is interpreted to consist of relatively thick, coarse-grained fill embankments placed over tideland and seabed. The fill material primarily consists of sand and gravel with silt containing occasional to frequent cobbles and occasional boulders. Various debris was observed or interpreted sporadically occurring within the fill across the site, including concrete, wood, and iron materials. Marine deposits, primarily consisting of fine-grained soils, were interpreted both underlying the fill and interbedded within alluvial deposits within the central western portion of the site. Alluvial deposits, primarily consisting of sand and gravel and containing occasional *cobbles and possible boulders, were interpreted underlying the fill across the western portion of the project site. This unit extended from the base of the fill to depths of over 100 feet at the far western portion of the project, thinning and becoming more intermixed with marine deposits to the east.*

Bedrock is deep (>100 feet) under the western portion of the site, and may occur at shallow depths (<20 to 50 feet) on the eastern portion of the site. The depth of bedrock underlying the eastern portion of the site appears to be highly erratic. Observed bedrock consisted of high quality graywacke. Thin to thick (0 to 20+ feet) deposits of very coarse-grained soils including frequent cobbles and boulders were observed overlying the bedrock.

Geologic hazards at this site include earthquake induced ground shaking, liquefaction, dynamic settlement of fill materials and soils, lateral spreading, and tsunamis; and erosive wave and tidal action, landslide induced tsunamis, seawater inundation, and mass slope wasting. The existing fill material embankment and underlying soil deposits along the majority of the ARRC Whittier Yard waterfront landside are both of good quality and favorable for installation of piles and embankment stability, if properly retained. However, pile installation may be challenging within the eastern portion of the project site due to shallow bedrock and frequent boulders. (Ref 2)

4 Environmental Screening

4.1 Location Considerations

The environmental setting of Whittier has been summarized in several documents including the Whittier Comprehensive Plan (2020), Whittier Coastal Management Plan (2007 Plan Amendment), and the Prince William Sound Area Plan (as amended in 2007). The 2020 Whittier Comprehensive Plan describes the environmental setting as follows:

The City of Whittier is located near the head of Passage Canal, a fjord in western Prince William Sound. Of the 17 square miles within Whittier city limits, 20% is covered by glacier and much of the remaining land has grades in excess of 33%, making developable land relatively scarce. Due to its location at the junction between the Chugach and Kenai Ranges, Whittier is subject to high winds and frequent cloud cover. Temperatures are moderated by coastal processes, but winter snowfall is significant.

Forests in the area are typically dominated by Sitka spruce with western hemlock and are populated by bald eagles, black bears, occasional wolves, coyotes, ptarmigan, and small mammals typical to most similar settings in Alaska. Mountain goats are common above forested elevations. In 2012, European black slugs, which have been invasive in other parts of Prince William Sound, were reported by the U.S. Forest Service (USFS) in Whittier.

Prince William Sound is home to important fisheries for rockfish, flounder, halibut, and all five Pacific salmon species, as well as crab, shrimp, and clams. These fisheries are important to local residents as well as the tourist industry. The Sound is also home to whales, porpoises, sea lions, and sea otters at various seasons. Passage Canal and Portage Pass are also important corridors for bird migration, and some waterfowl remain in Whittier year-round. A large sea bird rookery on the north side of Passage canal is a popular destination for tour boats and recreational boaters.

4.2 Whittier Comprehensive Plan

Proposed alternatives for this project are consistent with goals in the 2020 Comprehensive Plan's Focus Area 3: Harbor District, Focus Area 4: Head of the Bay, and Focus Area 5: Business Development. The project will improve access and quality of existing amenities, expand waterfront services, and improve safety features. Maintenance or expansion of the rail yard facilities supports other industry and future business development in the community. According to the 2020 Plan, the Railroad owns 70% of Whittier's total waterfront area, making it a significant driver in meeting these goals.

4.3 Prince William Sound Area Plan

The proposed reconstruction alternatives are consistent with the 2007 Prince William Sound Area Plan, which predicts expansion of the developed portion of the City along the southern coast of Passage Canal. Improvement and maintenance of railroad facilities is consistent with the designated "shoreline development" use of tidelands in the "Head of Passage Canal" unit. Area Plan guidelines for shoreline development include:

- Siting of nearshore infrastructure will be planned to the extent feasible to "minimize impacts on longshore transport, circulation, and mixing" and to "optimize flushing to avoid concentration of pollutants".
- Siting of nearshore infrastructure will account for "upland demands, such as parking, support facilities, and increased traffic flow".
- To the extent feasible and prudent, pilings preferred over fill. Bulkheads will be utilized to prevent erosion or to reduce fill footprints and will be designed so as to minimize erosion and protect water quality.
- Development will "maintain tideland and streambank access and protect adjacent fish habitat, public water supplies, and public recreation".
- Bonding may be required for tideland facilities in the event of abandonment or improper clean-up.

4.4 Whittier Coastal Management Plan

Although Alaska no longer participates in the National Coastal Management Program, Whittier has a Coastal Management Plan (CMP) that was updated in 2007. The plan emphasizes the need to prioritize water-dependent activities in the coastal areas due to limited developable waterfront. Plan goals emphasize balanced development of industrial, commercial, and recreational infrastructure in the waterfront district while maintaining environmental quality and coastal habitat. Objectives include:

- Efficient utilization of waterfront areas and cooperative usage;
- Protection of natural circulation patterns, water quality, and natural resources;
- Maintenance of safe navigation;
- Support of public access; and
- Innovative development.

The plan also recommends limiting fill placement to projects with no practicable alternatives to fill placement and to the minimum amount of material feasible.

The City of Whittier coastal district and Passage Canal are identified as at risk from earthquakes, high winds, avalanches, and landslides. The port was extensively damaged during the 1964 earthquake and the City experiences occasional avalanches during typical winters. In order to minimize risks to the project from natural hazards, the plan recommends:

- Development designed and constructed to minimize seismic, flood, snow, and wind damage and
- Response planning for seismic and tsunami events.

5 Approvals and Permits

5.1 Federal Approvals

5.1.1 <u>NEPA</u>

Assessment of project potential impacts and possible mitigation for the environmental consequences identified in the studies is mandated under the National Environmental Policy Act (NEPA) of 1970 for all Federal actions, including funding or permitting of the actions of other non-Federal agencies.

Based on past consultation and experience, the Railroad anticipates the lead agency of the NEPA process to be the United States Maritime Administration (MARAD). With MARAD’s assistance, the project team will consult with the U.S. Army Corps of Engineers (USACE), U.S. Fish & Wildlife Service (USFWS), National Marine Fisheries

Service (NMFS), U.S. Coast Guard (USCG), and Federal Emergency Management Agency (FEMA).

The Railroad anticipates that an Environmental Assessment (EA) will determine the proper level of environmental documentation and has conservatively allocated 24 months for the entire NEPA and permitting processes, consistent with other projects the Railroad has completed in recent years. The Railroad has completed environmental assessments for projects in Nenana, Port MacKenzie, North Pole, and South Wasilla, among others, which were all completed within 17 to 24 months.

5.1.2 Protected Species Requirements

Endangered Species Act (ESA) Section 7 and Marine Mammal Protection Act (MMPA) consultation with USFWS and NMFS may require an Incidental Harassment Authorization (IHA) for incidental take of protected species resulting from permitted project activities. IHA processing may take 9 to 18 months, on average, and will likely require the implementation of a comprehensive protected species observer program during construction. Should the project be developed without the need for an IHA, informal Section 7 consultation can be anticipated to require 3 to 9 months, on an average. Preparation of request for consultation in either permitting process will require the preparation of a Biological Assessment (BA).

Potential impacts of the project to fisheries or Essential Fish Habitat (EFH) protected by a Fisheries Management Plan (FMP) under the Magnuson–Stevens Fishery Conservation and Management Act (MSA) will need to be assessed by the lead agency or its designee. EFH assessments may be incorporated into the project’s BA.

5.1.3 USACE Requirements

U.S. Army Corps of Engineers (USACE), Alaska District Regulatory Division approval will be required for issuance of a Department of the Army Permit (DAP). Regulatory jurisdiction for this permit is established under Section 10 of the Rivers and Harbors Act (RHA) of 1899 for the project’s structural improvements that impact a navigable waterway and under Section 404 of the Federal Water Pollution Control Act (CWA) as amended (1972) for dredge and fill in waters of the United States.

USACE review of a DAP application will require coordination with other Federal permitting timelines and issuance of the permit may not occur until the completion of any USFWS and NMFS protected species consultations and permitting.

5.1.4 USCG Requirements

Approval may be required from the USCG for the addition navigational devices to review compliance and facilitate the appropriate charting of nautical features.

5.2 State and Local Approvals

The relevant state agency is the Alaska Department of Natural Resources (ADNR) and the 2017 Master Plan indicates that no permits will be required. The Railroad will consult with this agency as part of the NEPA process.

5.2.1 ADEC Requirements

Issuance of a Section 404 CWA permit by USACE would necessitate the completion of a Section 401 review and certification. Additional water quality information may be requested by the State of Alaska Department of Environmental Conservation (ADEC) Division of Water to complete the Antidegradation review, but processing will typically mirror the USACE process and be completed slightly in advance of the DAP issuance.

In addition to the ADEC Antidegradation review, construction of water or wastewater facilities, fuel storage, or other potential environmental or health hazardous activities may require coordination with the appropriate divisions of the ADEC.

5.2.2 ADNR Requirements

Generally speaking, tidelands within State waters are owned by the State (unless otherwise assigned or leased) and require permission from the Alaska Department of Natural Resources (ADNR) for all but exempted types of development. If a project alternative is selected that requires expansion or relocation beyond existing tideland leases, additional coordination with the ADNR Division of Mining, Land, and Water would be required.

5.2.3 Local requirements

The project will fall within the City of Whittier and building or zoning permits may be required, as well as coordination with the City's Port & Harbor Commission.

6 Planning Considerations

6.1 Marine Terminal Requirements

The planning criteria was separated into three categories: elements which must, should and could be integrated into the design, should be considered, and could be incorporated if the cost-benefit analysis justifies the component.

"Must" – Elements which need to be part of the design and are not subject to scrutiny

- Provide for existing barges and barge traffic
- No interruption in barge or cargo transport
- Address the failing marginal wharf bulkhead.
- Be "permitable" in regards to land use rights and environmental considerations

“Should” be incorporated as best possible be considered and integrated

- Maintain or improve the current operational efficiency
- Provide for future expansion of cargo
- Provide for larger and varied vessels
- Avoid impacts to the City’s DeLong dock
- Provide for a fair return on investment over the life of the facility.
- Be phased to allow for anticipated funding

“Could” be incorporated if the cost-benefit analysis justifies.

- Improve cargo and rail operations
- Improvements to the yard/
- More uplands,
- track reconfiguration,
- Include provisions for future development of future alternative shipping such as cruise ships or material handling.
- Include property “swaps”
- Utilize property and material outside of the Terminal

6.2 Considerations - Merit Criteria

- Operations
- Constructability
- Staging
- Business/ Financial justification
- Cost
- Maintenance

6.3 Cost-effectiveness analysis

Cost-effectiveness analysis (CEA) is used rather than cost benefit analysis as the availability of funds and provisions for future development are difficult to assign monetary value.

The elements being considered are broken down into four primary categories:

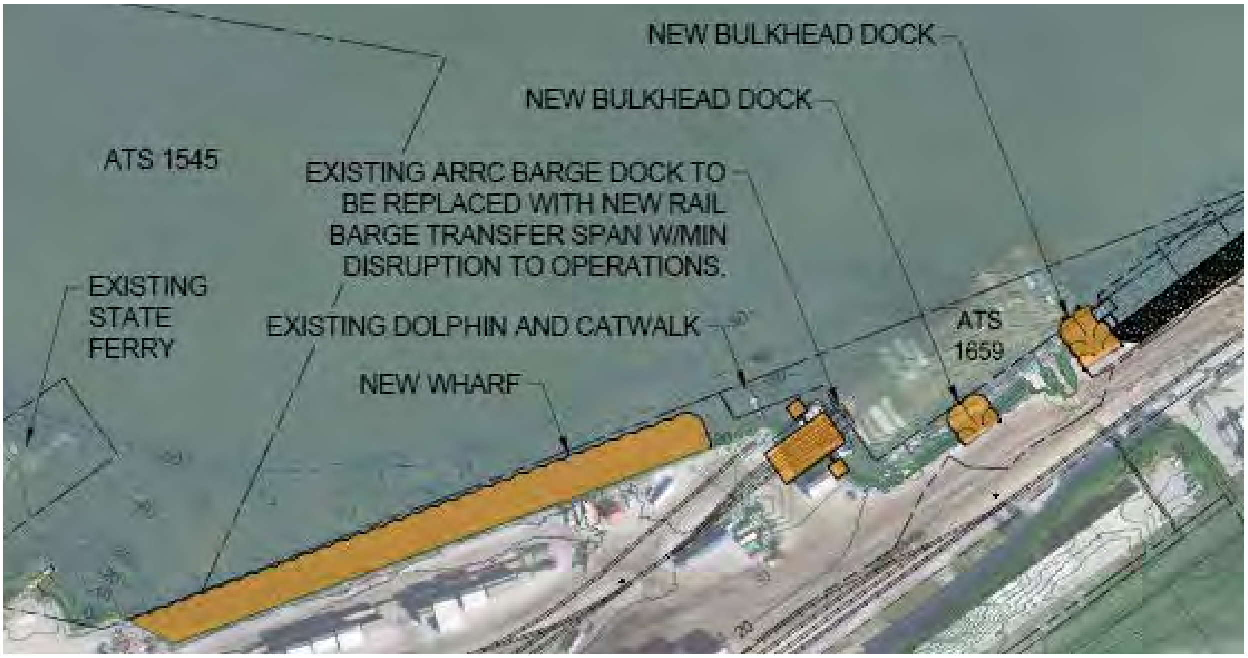
- Cost vs Finance-ability
- Operational Effectiveness and Future Business/Development Opportunities

7 Alternatives Considered

7.0 Alternative 0 – No Build

The original elements of the transfer span will require significant investment to maintain including potential reconstruction of some of the cell structures. No build on the Bulkhead Sea-wall could result in failure and loss of uplands facilities included the access road.

7.1 Alternative 1 – Reconstruct in existing location – during operations.



The final configuration has the new marginal wharf and barge rail slip constructed in the same location as the prior/existing facilities.

A new 60' marginal wharf will replace the demolished wharf in the same footprint. A new barge slip breasting dock would be constructed in alignment of the existing breasting face Lay-out-Line. A new transfer span would be construction in a close location to the existing transfer span. The existing transfer span will be kept operational while the towers for the transfer span are constructed inboard of the existing cells. Unless temporary relocation of service is provided elsewhere, a temporary loss of service will be required while the transfer span is installed and new side docks and ramps are put into service.

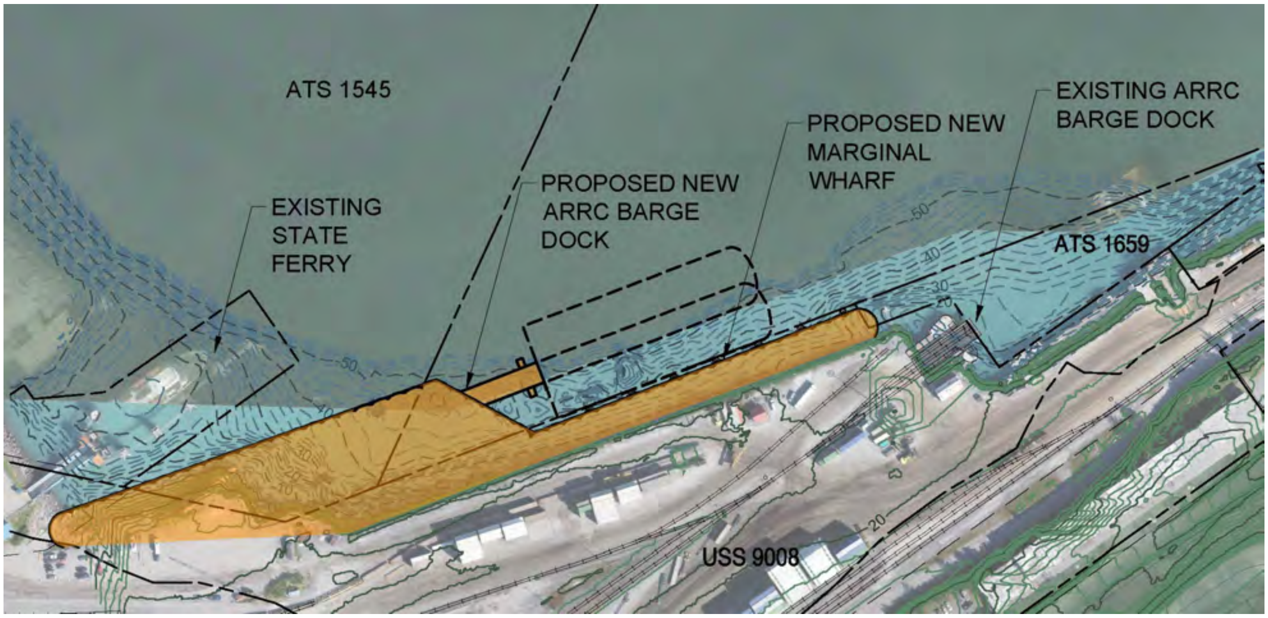
The track will be reconfigured to unload the slip tracks onto the Dock track. The marginal wharf and slip replacement can be constructed in two phases.

Construction is:

1. Marginal Wharf
2. Side Dock structures around the existing
3. Transfer Span towers and utilities
4. Install Transfer Span, Side Dock mooring/berthing devices, and track during temporary outage.

Estimated Cost: $XXM

7.2 Alternative 2 – Relocate transfer span to West end of terminal



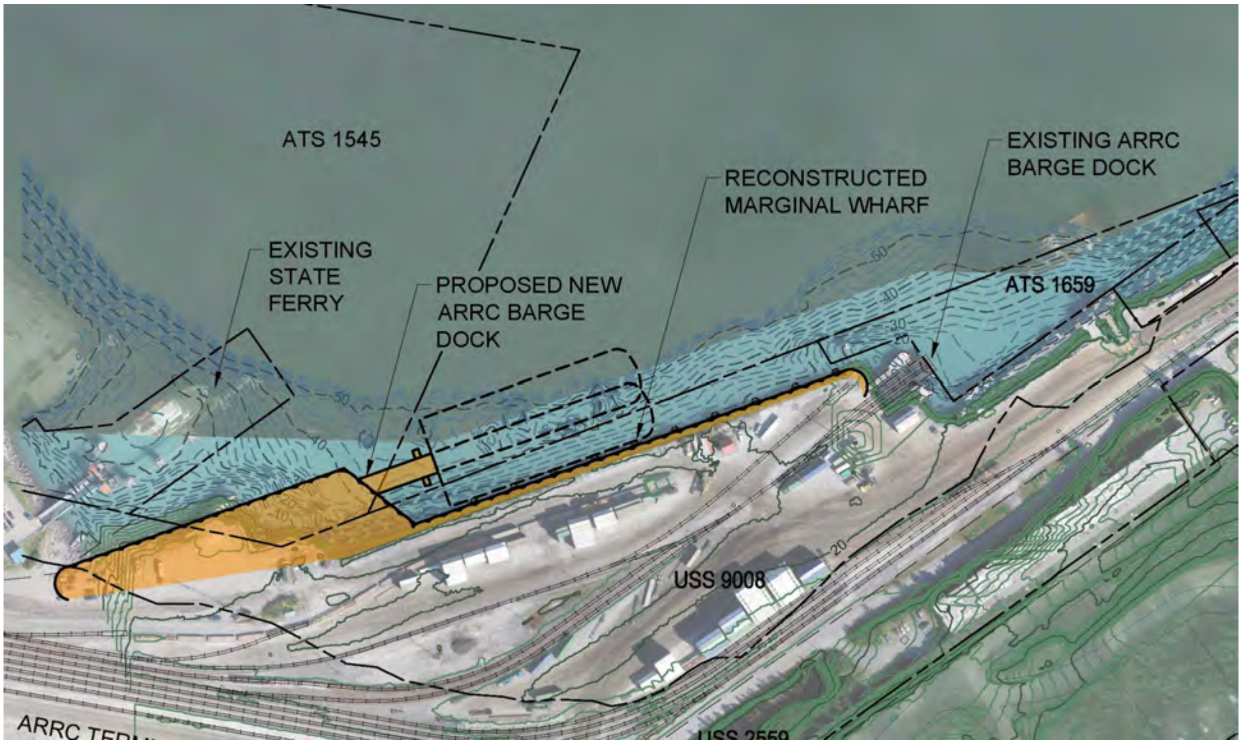
This alternative is similar to the Alternative in the 2020 Port of Whittier Freight Study (PND). A new approach fill will take advantage of more working yard and moderate track configuration. It will allow for future development on the east end of the waterfront. Additional Tidelands lease would be needed

Construction is:

1. New Abutment and transfer span facilities outside of tidelands lease
2. New wall and fill similar footprint to the old marginal wharf
3. New Transfer span
4. Permanent track
5. Uplands

Estimated Cost: $95M

7.3 Alternative 3 – Relocate existing transfer span bridge



The relocated and refurbished existing bridge would be used for operations until funding is available to replace the bridge or reconstruct a new transfer span east of this location. Construction will include a new abutment, approach fill, relocation of the hydraulic rams, a new bulkhead in front of existing wall, and dredging.

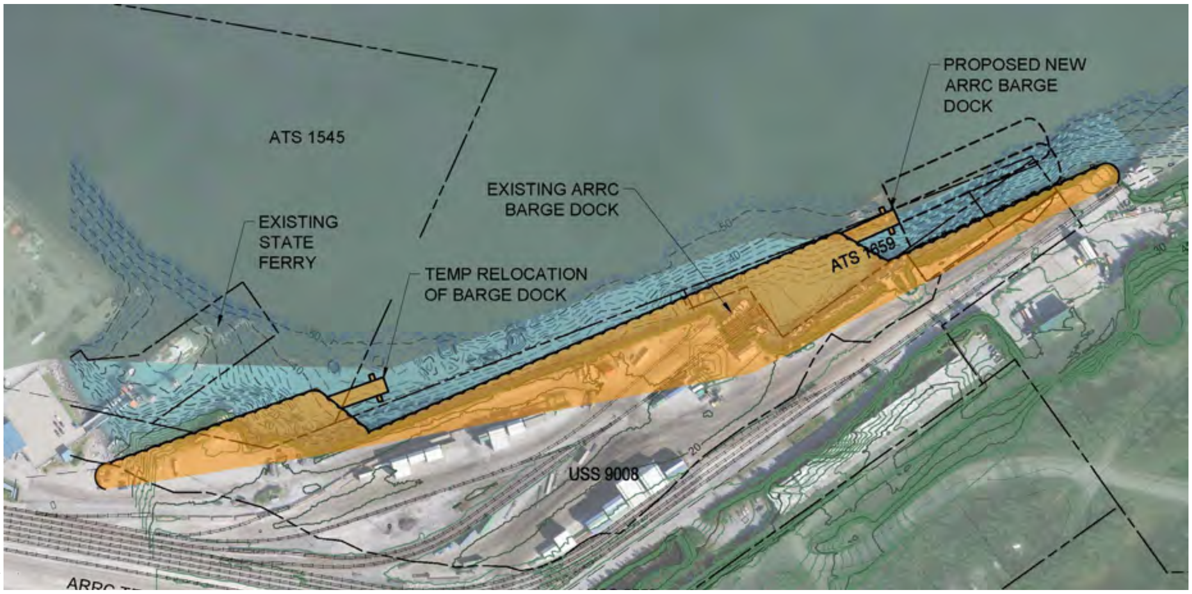
Inside tidelands

Construction is:

1. Abutment inside of tidelands lease
2. Transfer span support outside of tidelands lease
3. New wall off in front of existing sea wall
4. Permanent track
5. Uplands

Estimated Cost: $66M

7.4 Alternative 4 – Relocate transfer span to East end of waterfront



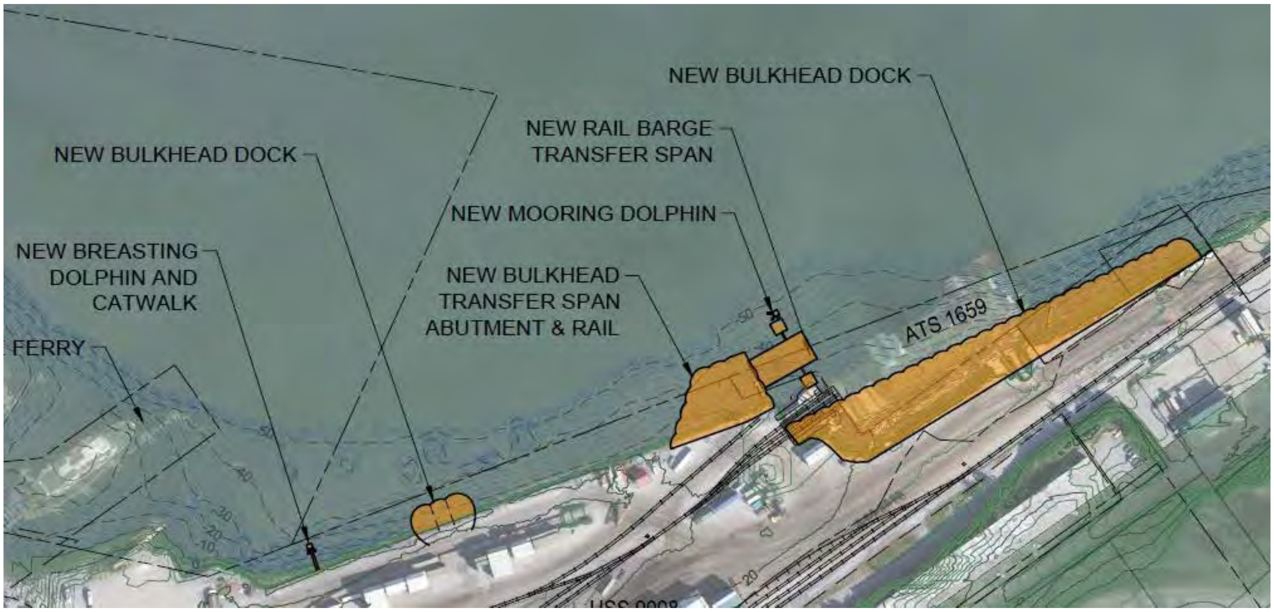
A temporary relocation of the transfer span, similar to Alternative 3, but the alignment of the new seawall is constructed for permanent facilities at the far-east end of the waterfront. The ITD ramp would be eliminated.

Construction is:

1. New wall aligned to maximize uplands in front of existing bulkhead
2. West Abutment inside of tidelands lease
3. Old transfer span support outside of tidelands lease
4. Temporary track
5. Extend wall
6. New Barge Slip on the east end of the yard

Estimated Cost: $106M

7.5 Alternative 5 – New Transfer Span Constructed North of existing



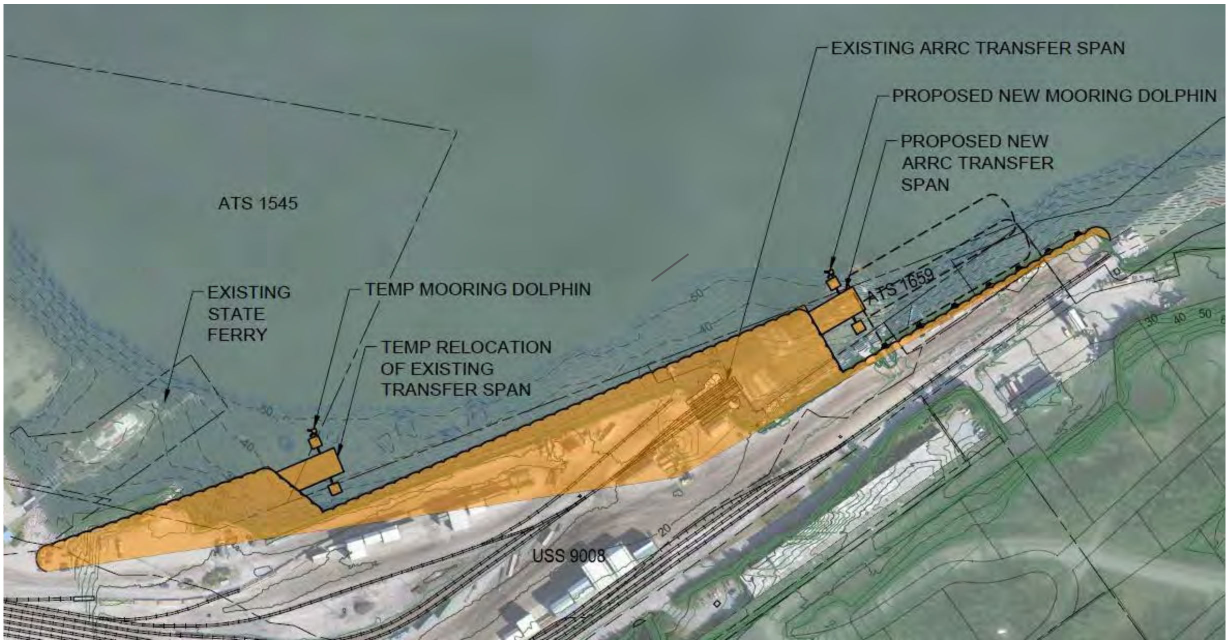
A New Barge Slip north of the existing transfer span, with a side dock and additional uplands. A new side unloading facility would be built for unloading during construction, but can be used after construction as an auxiliary dock. Some construction will be outside of the Tidelands Lease.

Construction is:

1. Side unloading dock and breasting dolphin on the west end of the former marginal wharf area.
2. New abutment north of the existing bridge abutment
3. New transfer span bridge support towers north of existing Barge Slip, and Install Bridge.
4. New track
5. Temporary stern unloading at new transfer span, side unload on west berth.
6. Demolish old barge slip and construct new fill and side dock

Estimated Cost: $59M

7.6 Alternative 6 – Extended Marginal Wharf



A temporary relocation of the transfer span, similar to Alternative 3, but the alignment and details of the new 20' fill dock and seawall is constructed for a future 40' marginal wharf structure in the same footprint as the old wharf. A future project will construct a new barge slip and transfer span generally in the same location as the existing barge slip

Construction is:

1. Construct new wall and fill (20'?) proud of existing bulkhead in the alignment of old dock.
2. Dredging
3. Construct New Abutment and fill in tidelands lease
4. Relocate existing transfer span
5. Construct temporary track
6. New Transfer span Barge Slip in existing location

   Future

7. New Barge Slip in approximate location as the existing
8. New marginal Wharf structure (40 ft. wide) in footprint of the old marginal wharf

Cost = $xxM

7.7 Alternative 7 – New Barge Slip on west end of waterfront

Similar to Alternative 3, with a new barge slip constructed on the west end of the waterfront. All fill in this alternative is inside tidelands lease. Full project development will include a marginal wharf along the extent of the waterfront. Work can be phased for partial construction is elements which provide benefit to the operations of the Terminal.

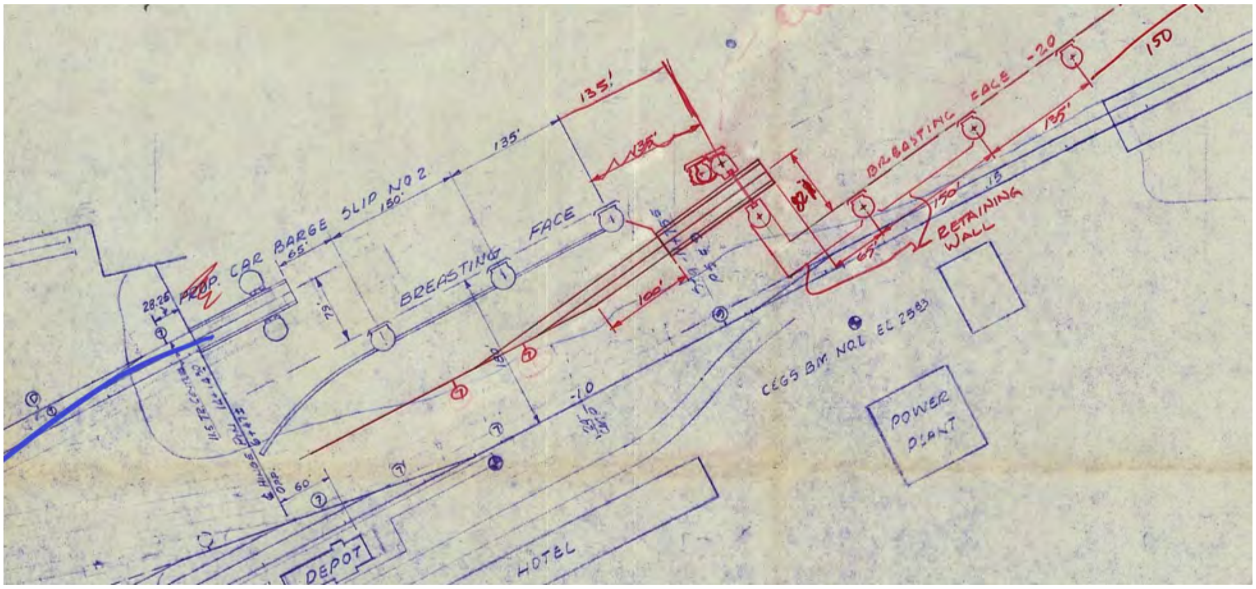
1. New 60 ft. side unloading marginal wharf
2. New Abutment and approach uplands
3. New Transfer span and facilities
4. Uplands and track
5. Construct remainder of the 60 ft. marginal wharf in foot print of the old wharf
6. Demolish old barge slip and extend marginal wharf

Conceptually this alternative could be incorporated into the City's reconstruction of Delong Dock, or into a land swap with Smitty's Cove development.

Estimate = $68M

7.8 Alternative 8 – New Barge Slip on east end of waterfront

NOTE: THIS ALTERNATIVE WAS NOT DEVELOPED AND MAY BE REMOVED



A new barge slip constructed on the east end of the waterfront.. Full project development will include a marginal wharf along the extent of the waterfront. Work can be phased for partial construction is elements which provide benefit to the operations of the Terminal. This would require a lease from the City and removal of the ITB Dock.

1. New 60 ft. side unloading marginal wharf
2. New Abutment and approach uplands
3. Remove some fill and realign unloading face
4. New Transfer span and facilities
5. Uplands and track

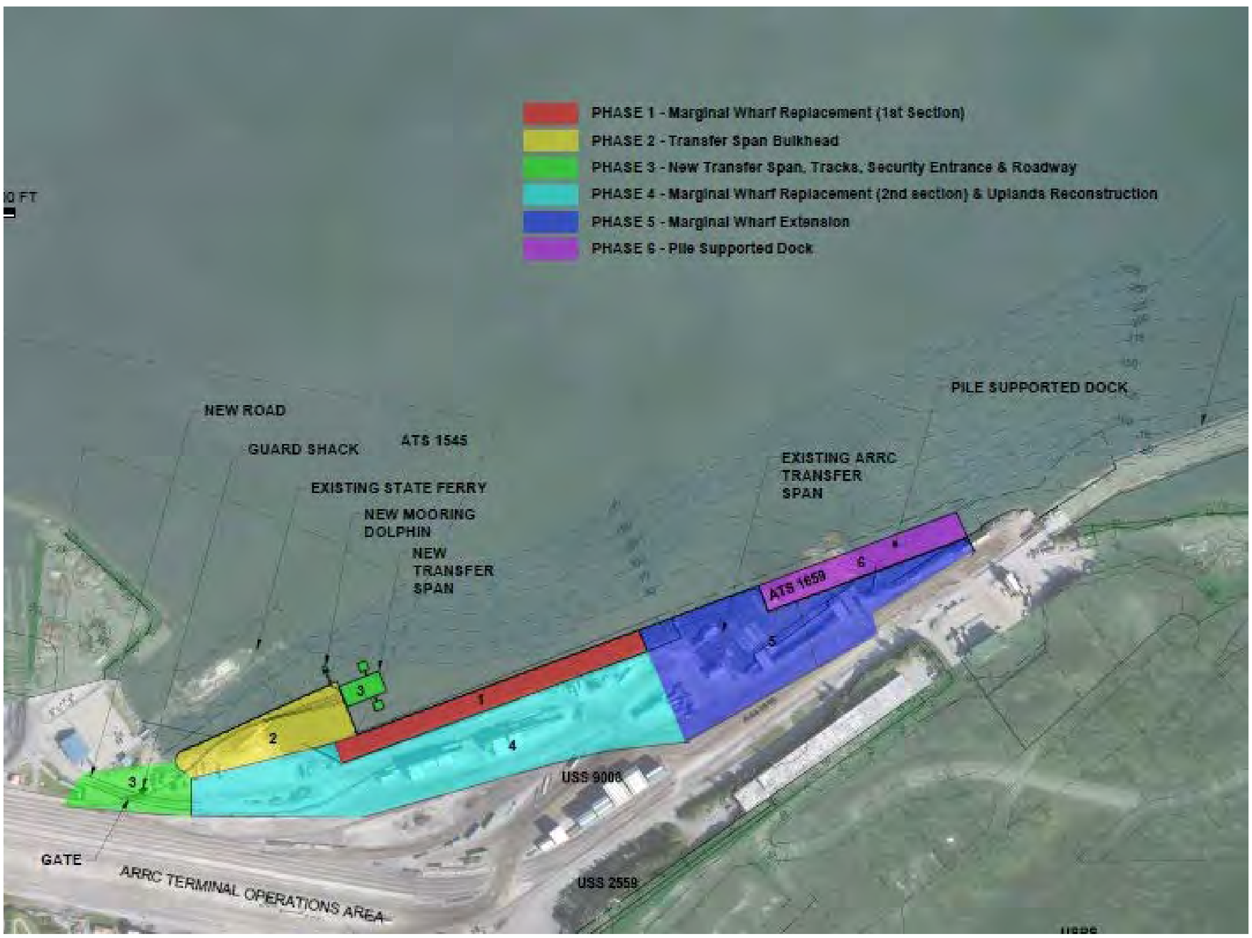
8 Recommended Alternative

8.1 Selected Alternative

Alternative 7, divided up into phases, is the preferred alternative. This Alternative provides minimal impact to existing operations, and the best opportunities for future cargo, vessels changes and new transportation commerce such as passengers. The full build out also provides additional uplands for increased operational efficiency.

Some less desirable elements of this alternative include:

- In the ultimate build out the, marginal wharf bulkhead is replaced; however, an interim risk of wall failure will need to be mitigated. Alternative might include a new waler beam along the face, or rock protection.
- In water dolphins and one tower support will require permits/tidelands leases.
- The Port entry approach road is substantially shorter.



Stages of Alternative 7

Initial Construction

1. New side unloading dock on west end of the Terminal. This can be a marginal wharf or partial facilities for loading and berthing.
2. New Abutment and approach uplands

3. New Transfer span and facilities
4. Uplands and track

Estimate = $xxM

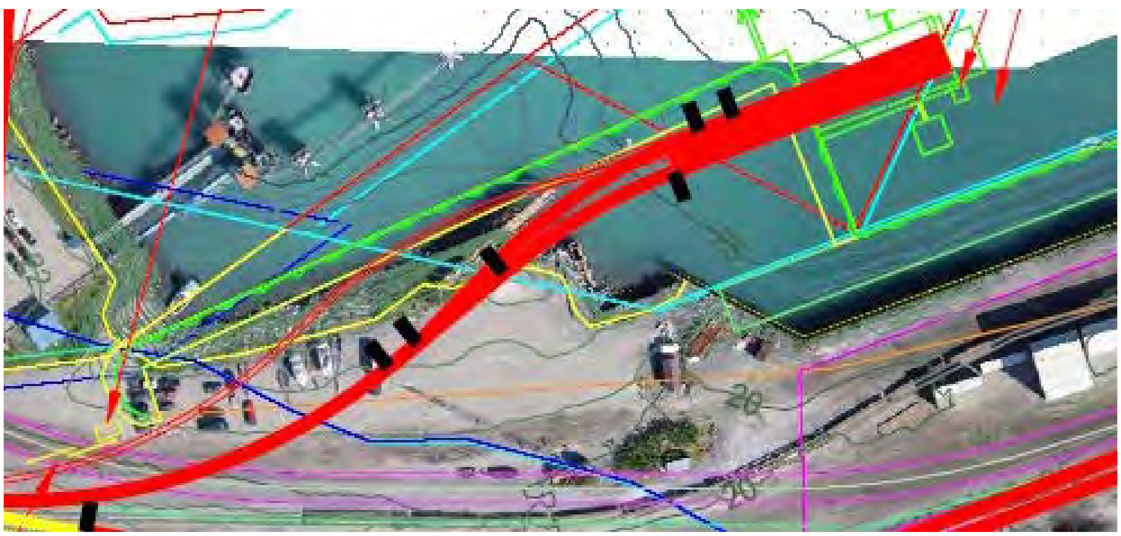
Future Construction

5. Construct remainder of the 60 ft. marginal wharf in foot print of the old wharf
6. Demolish old barge slip
7. Fill old barge slip and extend marginal wharf fill
8. Construct marginal wharf structure on the east end of the waterfront.
9. Relocate operations & Demo existing slip

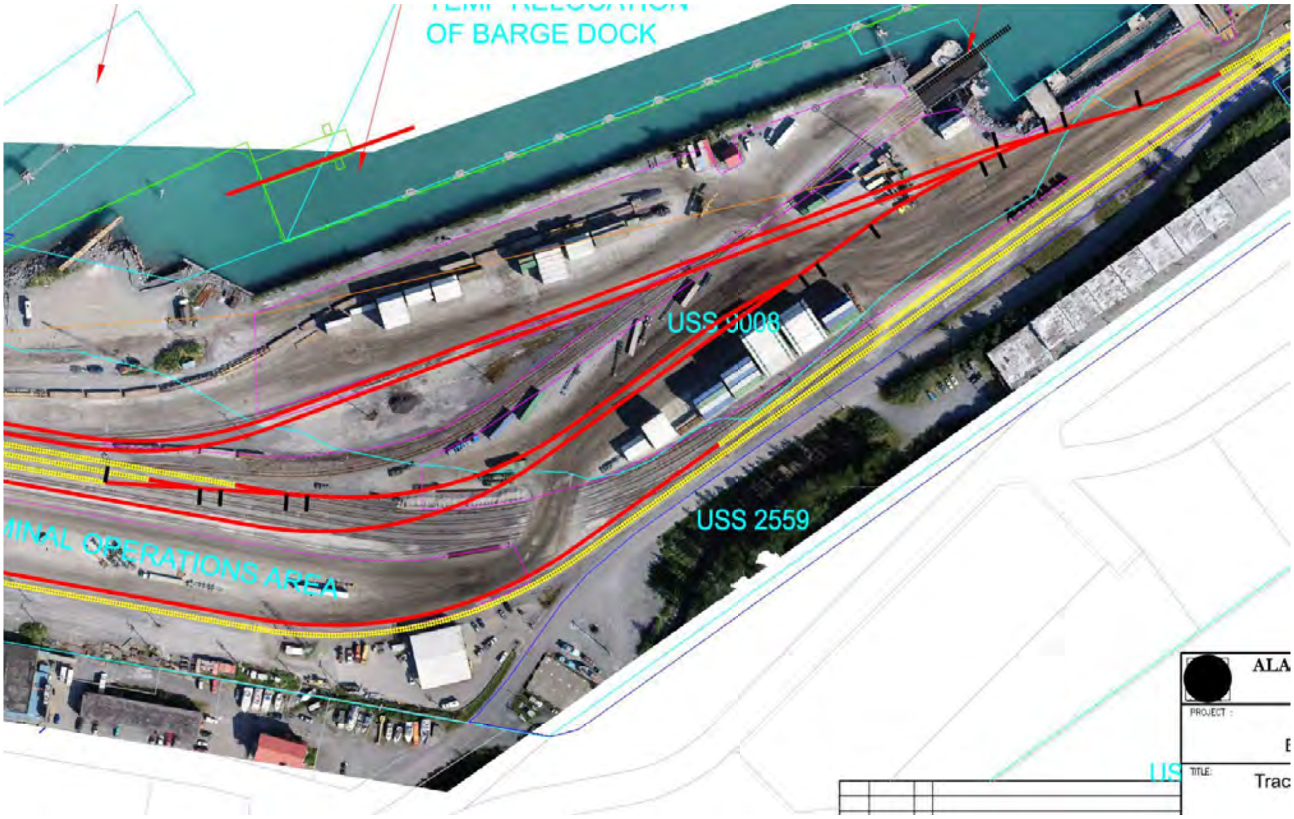
Estimate = $xxM

8.2 Track reconfiguration

A minor track reconfiguration can be constructed to accommodate the slip tracks and avoid interferenace with the Whittier Pedestrian tunnel. The trackwork for Phase 1 would include termination of the north Shuttle Track, adding a turnout for the new lead slip track, and reconfigurations of the ramp track connection.



Track reailgnments to improve overal Port operations can be made in the ultimate layout……



8.3 Project Schedule

			2021				2022				2023				2024				2025				2026				2027			
Project Schedule		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pre-Construction	Technical Studies	■	■	■	■	■																								
	Alternative Report		■	■																										
	Alternative Approval			*																										
	Secure Funding				■	■	■	■	■	■																				
	Environmental, Permits										■	■	■	■	■	■	■													
	Preliminary Design										■	■	■																	
	Final Design													■	■	■	■													
	Procurement																	■	■											
Construction	Contract Execution																		*											
	Materials																			■	■	■								
	Site Mobilization																						■							
	Construction																							■	■	■	■	■	■	
	Project Close Out																												*	

9 Reference Documents

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2. “Geotechnical Data Report Whittier Waterfront Improvements Landside (Onshore) Investigation Whittier, Alaska” (Draft). R&M Consultants, Inc. February 2021
3. “ARRC Whittier Terminal Reconstruction DRAFT Barge Ramp Alternatives Analysis”. KPFF Consulting Engineers. April 2021
4. City of Whittier “Whitter Comprehensive Plan 2020”, Catalyst Consulting. 2020.
5. “ARRC Whittier Master Plan”, ARRC. 2006
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Appendix A

Appendix B

G.4. Draft Submittal – Whittier Intermodal Development Concept and Design

NEEDS AND PURPOSE REPORT

Draft Submittal

Whitter Intermodal Development Concept and Design

Alaska Railroad Corporation

September, 2004

Copy 2 of 3 Rcv'd 5/16/05

P | N | D CONSULTING ENGINEERS
Incorporated

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ABBREVIATIONS

ARRC	Alaska Railroad Corporation
CP	cathodic protection
DCED	Department of Community and Economic Development
ESA	environmental site assessment
MLLW	mean lower low water
PCB	polychlorinated biphenyl
PND	Peratrovich, Nottingham & Drage, Inc.
psf	pounds per square foot

EXECUTIVE SUMMARY

The Alaska Railroad Corporation (ARRC) contracted with Peratrovich, Nottingham & Drage, Inc., to participate in a study of intermodal transportation development needs and possibilities in Whittier, Alaska. The study was requested to provide updated analysis of business opportunities in Whittier, the condition of ARRC current facilities, and the best use of ARRC Whittier assets in meeting the corporation's long-term strategic objectives. The community of Whittier has been significantly changed by the 2000 opening of the tunnel to vehicle access. Railroad operations and demand for service also have been affected. The ARRC Whittier assets include a rail yard, other rail facilities, and real estate.

The ARRC desires to develop its Whittier facilities in a manner that promotes passenger safety, achieves operational goals and objectives, and provides economic benefits to the corporation. This Needs and Purpose Report discusses results of a market analysis, Phase I Environmental Site Assessment (ESA), and evaluation of several facilities.

Conclusions from the site visits, review of existing information, and evaluation of facilities are summarized below:

- Market analysis: Since the tunnel conversion, tour companies, freight carriers, government agencies, and the military have expressed increased interest in the use of Whittier as a port of call, creating opportunities for development of infrastructure and services. The 2025 revenues for major revenue sources in Whittier are forecast to increase from an estimated $6.5 million in 2004 to $17.6 million in 2025.

- Phase I Environmental Site Assessment: Because of historical contamination, there is a medium level of risk associated with development of new facilities.

- Marginal Wharf: This facility, damaged during the 1964 earthquake and suffering from age, is no longer in use. Its location, at the end of the Whittier access road, near the ARRC tracks, and close to the town of Whittier, is ideal for intermodal transfer of passengers between land, sea, and rail modes of transportation.

- DeLong Dock: At this dock, which primarily serves the fishing industry, improvements have enhanced safety and service. Additional improvements to protect the structure and further improve service are needed.
- Transit Shed: This structure has been demolished because of structural deficiencies.
- Barge Slip: This facility is essential to barge traffic for South-central Alaska. Recent improvements include a side-loading facility to improve loading and unloading of barges.
- Rail Yard — storm drain system: The existing storm drain system does not always effectively handle standing water and flooding that occurs during tides.
- Rail Yard — track layout and alignment: The rail yard currently operates at capacity for freight operations and provides no available unutilized track for maneuvering of passenger rail cars.
- Security: Concerns about security at marine and rail transportation facilities are resulting in new requirements for onsite security and control of access points. The ARRC has added year-round contract security personnel to augment its system-wide force.

The recommendations for future intermodal development by the ARRC are summarized below:

- Market analysis
  - Continue development of land lease relationships with port users that include private and government entities.
  - Consider strategies to increase rail ridership, such as the use of train sets that carry passengers to and from the Anchorage International Airport or downtown to carry passengers south to Whittier, as a means of maximizing opportunities resulting from the growth in Whittier cruise ship and other tourism traffic.
  - Promote leasing of land or building space for retail shops adjacent or close to the cruise ship docks.

  - Increase capacity and frequency of train service to take advantage of and foster day tour operations and fuel demand for retail and office space.

- Phase I ESA: Consult historical information in determining locations for development and conduct testing at those sites to identify whether remediation would be required.
- Marginal Wharf: Replace the existing facility with a modern dock facility that will accommodate tourism ventures, provide for additional freight operations, and serve military deployment and response purposes.
- DeLong Dock: Provide upgrades consisting of water connection, safety ladders, and a cathodic protection system.
- Barge Slip: Provide repair and maintenance to extend the serviceability of the slip and improve efficiency of operations.
- Rail Yard — storm drain system: Develop a plan for addressing runoff control of storm water, including management of snow removal and reduction of sedimentation, and coordinate improvements with proposed track alignment upgrades.
- Rail Yard — track layout and alignment: Realign tracks in the rail yard to improve the offloading of barge freight and improve the ability of equipment to maneuver.
- Security: Prepare a detailed analysis to identify security needs and means to address them.
- Potential improvements
  - Advance passenger terminal concepts to provide a facility to handle loading and offloading of large cruise ships that would include space for passenger staging, baggage handling, office and counter space for cruise lines and airlines, accommodations for vehicle parking and bus staging, and an adjacent passenger loading facility.

- Advance proposed pedestrian enhancements consisting of a small visitor center that accommodates informational kiosks, outdoor viewing platforms, and restroom facilities for the U.S. Forest Service.

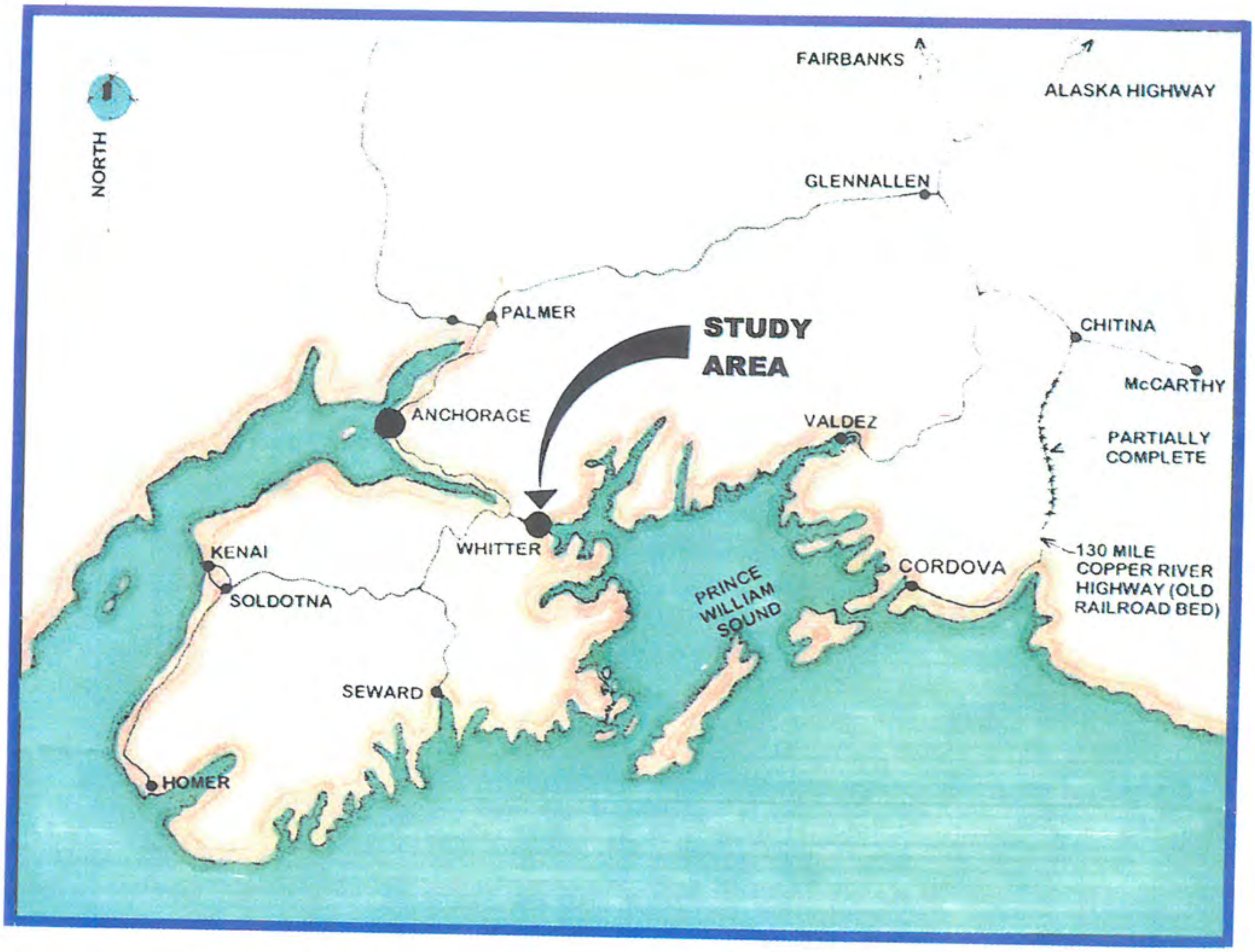
1. INTRODUCTION

1.1 STUDY BACKGROUND

The Alaska Railroad Corporation (ARRC) contracted with Peratrovich, Nottingham & Drage, Inc. (PND), to participate in a study of intermodal transportation development needs and possibilities in Whittier, Alaska, approximately 65 miles southeast of Anchorage (Figure 1). The introduction of road access to Whittier in 2000 has brought change to the South-central Alaska community and has affected rail and other transportation operations. To address the current conditions and plan future capital investment, the ARRC needs an updated analysis of business opportunities in Whittier, the condition of its current facilities, and the best use of its assets there in meeting the corporation's long-term strategic objectives. The ARRC Whittier assets include a rail yard, other rail facilities, and real estate.

The ARRC desires that development of its Whittier facilities and properties meet the primary goals of providing passenger safety, operating efficiency, and economic benefits to the corporation. In support of these goals, the ARRC has identified the following objectives for Whittier developments:

- Increasing rail passenger and pedestrian safety
- Increasing passenger service to and from Whittier
- Providing docking facilities for day cruise boats and cruise ships to stimulate rail passenger travel to and from Whittier
- Providing a suitable passenger terminal to accommodate future growth
- Enhancing snow removal operations
- Enhancing drainage within the rail yard.
- Providing for development of businesses that promote rail passenger travel
- Providing safe and efficient setting for freight operations



SOUTH-CENTRAL ALASKA

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OFFICE OF THE CHIEF ENGINEER
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PROJECT:

WHITTIER INTERMODAL DEVELOPMENT

TITLE:

FIGURE 1
STUDY AREA LOCATION MAP

- Promoting connections of transportation modes to create and improve intermodal opportunities
- Increasing freight handling capacity
- Providing facilities that enable Whittier to serve as a back-up port for Anchorage in case of a catastrophe

The ARRC also identified the following four types of development as those that are most complementary to its rail operations in Whittier:

1. Passenger-related amenities to facilitate growth in tourism
2. Freight-handling facilities to expedite movements of cargo by rail and improve delivery time
3. Waterfront development on ARRC properties, either through construction of ARRC-owned facilities or through land lease options private or public entities, to participate in expanded or new Whittier business opportunities
4. Dock-front facilities on ARRC property to facilitate loading and unloading of container freight shipped on barges or container ships

1.2 Study Activities

The scope of work developed for the study specified completion of the following tasks:

1. Review of potential market forces such as day boat use, freight operations, rail passenger traffic, and cruise ship passenger traffic that could influence development decisions by the ARRC
2. Review of the structural integrity and suitability for potential improvements of existing ARRC facilities at the Marginal Wharf, DeLong Dock, and Transit Shed
3. Evaluation of the rail yard and Barge Slip for potential improvements

4. Performance of and reporting on the results of a Phase I Environmental Site Assessment (ESA) of the study area

5. Presentation of conclusions and recommendations for modification of existing facilities or construction of new facilities to best meet the needs of the ARRC, local residents, and visitors to Whittier

To complete the study of potential development options, PND and its subcontractors gathered information, assessed existing facilities, and identified economic opportunities. Conclusions from the study findings were used to prepare conclusions and recommendations for the future development of ARRC assets in Whittier that meet the needs and purposes of the facilities and are consistent with ARRC goals and objectives.

The study began in 1999 when three activities were conducted simultaneously: (1) a market analysis, (2) a Phase I ESA, and (3) a structural investigation of existing facilities. Subsequent activities included an independent review of track layout and alignment in 2000; a site visit to the rail yard in 2001; and an update of the market analysis in December 2003. These activities are briefly described below.

1.2.1 Market Analysis

The market analysis, completed by Northern Economics Inc., consisted of identifying market forces that could affect future economic conditions in the Whittier area and be indicative of community and business opportunities. The 1999 analysis also provided estimates of potential revenues from development of ARRC properties targeted to meet the projected market demands. The update for this analysis, completed in 2003, described recent changes in the Whittier market and infrastructure that are relevant to potential development opportunities.

1.2.2 Phase I Environmental Site Assessment

The Phase I ESA of the study area, conducted by subconsultant Larsen Consulting Group, was intended to identify the level of risk for potential contamination. The work consisted primarily of a review of historical documents, interviews with persons having knowledge of the site, and general observations of the site and surrounding parcels. No environmental testing or sampling was performed in conjunction with the ESA.

1.2.3 Facility Evaluation

Selected team members from PND visited the project site in October 1999 to perform structural and architectural inspections. Existing ARRC facilities consisting of the Marginal Wharf, DeLong Dock, and Transit Shed were inspected to provide information useful in assessing condition of the facilities and the potential for improvements.

In 2001, PND visited the rail yard and observed the storm drain system.

An international rail design firm, Hatch Mott MacDonald, was subcontracted by the ARRC to review the track layout at the Whittier rail yard. Representatives of the firm met with the ARRC to discuss proposed improvements for freight handling and rail car maneuvering.

Additional facility information was provided by the ARRC, which inspected the Barge Slip and provided information about security operations in Whittier.

1.3 Report Organization

The information gathered through research and inspection, as well as the conclusions and recommendations prepared from the findings, are documented in this Needs and Purpose report. The report is organized as follows:

- Executive Summary
- Introduction
- Study Area Background
- Market Analysis Findings
- Phase I Environmental Site Assessment Findings
- Facility Evaluation Findings

- Conclusions
- Recommendations

The following documents are provided as appendices:

- Appendix A, market analysis
- Appendix B, Phase I ESA (The main body of the report is provided; the report appendices are not included.)

2. STUDY AREA BACKGROUND

2.1 COMMUNITY DESCRIPTION

The City of Whittier lies in a fjord at the head of Passage Canal in Prince William Sound. The port remains free of ice year-round. It serves a variety of marine activity and provides access for freight and visitors traveling to and from South-central Alaska.

According to the State of Alaska, Department of Community and Economic Development (DCED), the second-class city area encompasses 12.5 square miles of land and 7.2 square miles of water. Winter temperatures range from 17°F (Fahrenheit) to 28°F; summer temperatures average 49°F to 63°F. Average annual precipitation includes 66 inches of rain and 80 inches of snowfall. The DCED reports that the resident population was estimated at 178 people in 2003.

Whittier was established as a strategic military facility during World War II. A port and railroad terminus were constructed by the U.S. Army for transport of fuel and other supplies. The railroad spur and two tunnels were completed in 1943, and the Whittier Port became the entrance for troops and dependents of the Alaska Command.

Formerly rail cars provided the sole means of transporting passengers, vehicles, and freight by land in and out of Whittier. The railroad track extends 12 miles to and from the Portage Station, east of Girdwood. As part of a $70 million road connection completed in the summer of 2000, the Anton Anderson Memorial Tunnel was reconstructed. Today road vehicles can reach Whittier by using the same tunnel traveled by the railroad. In particular, increased access to Whittier has boosted marine passenger traffic, which consists of (1) travelers arriving and departing by cruise ship and (2) customers of day boat operators who provide fishing, sightseeing, marine taxi, kayaking, and other scheduled and charter activities.

Currently operated Whittier marine facilities include the following:

- Barge Slip, owned and operated by the ARRC, which serves barge traffic
- DeLong Dock, an ARRC general service facility that primarily serves the fishing industry

- Prince William Sound Cruises dock, operated on waterfront property leased from the ARRC
- Whittier Ferry Terminal serving the Alaska Marine Highway System ferries, located on ARRC land
- Small-boat harbor with 360 slips, owned and operated by the City of Whittier
- 600-foot floating dock, owned by Whittier Dock Enterprises (whose partners include Princess Cruise Lines) and serving cruise ship traffic

A privately owned condominium-type marina with 150 slips is in the planning stage.

2.2 Characteristics of the Study Area

The study area, shown in Photographs 1 and 2, consists of approximately 50 acres of ARRC-owned property. Passage Canal borders the area on the north, and properties owned by the ARRC, private entities, the City of Whittier, and the federal government abut the south, east, and west sides of the study area.

The majority of the study area was developed by the U.S. Army Corps of Engineers in the mid-1940s. Site infrastructure elements include buried and above-grade utilities consisting of electrical, sewer, water, storm sewer, natural gas, telephone, and cable, as well as fuel lines.

The study area slopes south to north, which the exception of the rail yard, which is generally flat. Recent site investigations have shown that groundwater depth is approximately 12 feet below grade.

The 1964 earthquake in South-central Alaska caused significant damage to the ARRC facilities in Whittier. One harmful impact of the earthquake was widespread land mass subsidence, including local settlement of approximately 5.5 feet.

LEGEND

▪▪▪▪▪▪▪▪▪ STUDY AREA BOUNDARY

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PROJECT:
WHITTIER INTERMODAL DEVELOPMENT

TITLE:
PHOTO ONE
WHITTIER STUDY AREA BOUNDARY

ALASKA RAILROAD CORPORATION
OFFICE OF THE CHIEF ENGINEER
P.O.BOX 107500, ANCHORAGE, ALASKA 99510-7500 (907) 265-2456

PROJECT:

WHITTIER INTERMODAL DEVELOPMENT

TITLE:

PHOTO TWO
STUDY AREA - COMPOSITE PHOTOGRAPH

3. MARKET ANALYSIS

The market analysis conducted by Northern Economics identified potential market forces relevant to the development of the ARRC properties in Whittier and estimated revenues that could be derived by tapping the resulting economic opportunities. The goal was to help planners better understand the various market forces, as well as the complementary nature or points of conflict between those forces. The complete report is provided in Appendix A. This section summarizes the findings about market forces and potential revenues. (Note that since preparation of the report in December 2003, some potential developments in Whittier have occurred, notably completion of a private-sector cruise ship dock and the Inn at Whittier.)

Total ARRC annual revenues from various activities in the Whittier area are significant and have the potential to increase substantially in future years. Estimates of potential annual freight transport, passenger rail, dockage and boat fees, parking lot, and land lease revenues for the ARRC in Whittier for 2004 through 2025 are shown in Table 1.

Table 1. Summary of Annual Gross Revenues for Major Revenue Items

Year	Freight Transport Revenue ($)	Passenger Rail Revenue ($)	Dockage and Boat Fee Revenue ($)	Parking Lot Revenue ($)	Land Lease Revenue ($)	Total Annual Revenue ($)
2004	4,807,000	1,473,000	17,000	6,000	218,000	6,521,000
2005	4,860,000	2,602,000	17,000	14,000	1,249,000	8,742,000
2006	4,914,000	2,777,000	58,000	17,000	1,311,000	9,077,000
2008	5,022,000	3,046,000	69,000	25,000	1,446,000	9,608,000
2010	5,134,000	3,530,000	69,000	56,000	1,594,000	10,383,000
2015	5,590,000	4,443,000	117,000	91,000	2,034,000	12,275,000
2020	6,088,000	5,637,000	151,000	195,000	2,596,000	14,667,000
2025	6,630,000	7,247,000	164,000	261,000	3,314,000	17,616,000

The revenue estimates in Table 1 are based on illustrative scenarios that take into account the considerable uncertainty associated with looking 25 years into the future. They are designed to show potential impacts of various markets on ARRC revenues. Because of uncertainties surrounding the type of equipment that might be used and other factors, no attempt is made to estimate costs or net revenues the ARRC might earn in the different markets.

Freight revenues are generated by barge traffic in and out Whittier. Barge traffic consists of a weekly ARRC/Alaska Railroad Marine Services rail barge and a Canadian National barge that calls in Whittier every 11 or 13 days.

Passenger rail revenue is attributable to both cruise ship and day tour customers who may choose to use the train for transportation into or out of Whittier.

Dockage and boat fee revenues are from day passenger boats that land and sail from DeLong Dock. Currently the DeLong Dock is the only dock owned and operated by the ARRC. (The City of Whittier also owns a portion of DeLong Dock.)

Parking lot revenues come from the new parking lot being developed by Alaska Recreation Inc. on ARRC-owned land. Land lease revenues come from 25 acres of ARRC land managed by the City of Whittier and leased to private entities. The ARRC also leases 5 acres directly to the City. The majority of residents in Whittier live in a large condominium complex that sits on these 5 acres.

The new market forces in play in Whittier are the result of infrastructure development, Whittier's proximity to Anchorage, policy decisions by the City of Whittier, entrepreneurship, and continued growth in the cruise industry.

4. PHASE I ENVIRONMENTAL SITE ASSESSMENT FINDINGS

During the 1999 Phase I ESA of the study area and surrounding properties, historical records were reviewed and interviews were conducted with persons who had knowledge of the study area. Findings show that the study area has experienced significant environmental degradation over the years, particularly as a result of the 1964 earthquake.

Many past uses that could have contributed potential contamination are related to operations during ownership of the study area by the federal government, before the state assumed ownership of the railroad in 1985. Historical cleanup operations to address the presence of hazardous wastes and contamination have included removal of (1) transformers containing polychlorinated biphenyls (PCBs) from a site adjacent to the Transit Shed in the late 1980s and (2) solvents and other hazardous substances from the Transit Shed. In addition, soils contaminated with fuel, PCBs, or debris have been found during excavation activities. A spill of about 10 million gallons occurred as a result of the 1964 earthquake in an area referred to as the Harbor Expansion Area, an ARRC property adjoining the north side of the study area.

Considerable groundwater flow was reported to occur throughout the study area. Because of the groundwater flow, the potential exists for migration of contamination onto study area properties from upgradient properties.

During the site visit, the study area was observed to be relatively clean and free of solid waste and to have minimal signs of contamination. In addition, sources of contamination were not observed.

Interviews with ARRC officials identified the existence of established policies for hazardous and solid waste prevention and cleanup.

5. FACILITY EVALUATION FINDINGS

In October 1999, a team consisting of an architect, a structural engineer, and two environmental engineers visited Whittier to inspect these ARRC properties: Marginal Wharf, DeLong Dock, and Transit Shed. The inspection of each structure primarily assessed structural integrity. Staff from PND also visited the rail yard in 2001. In 2000, the track layout was assessed by Hatch Mott MacDonald. Information for the Barge Slip and security operations evaluations was provided by the ARRC.

This section presents the results of the facility reviews. For the sites inspected in 1999, relevant historical information and the investigation findings are described. For all facilities evaluated, the recent improvements and current status are discussed.

5.1 MARGINAL WHARF

The ARRC closed the Marginal Wharf in 2002. The facility had been constructed by the U.S. Army Corps of Engineers in the 1940s and was condemned in 2002. The Marginal Wharf consisted of a dock on a steel pile foundation and a concrete deck approximately 60 feet wide and 1,000 feet long. The steel piles and concrete pile caps of the wharf had been periodically submerged in seawater because of land subsidence from the 1964 earthquake. Figure 2 shows the Marginal Wharf.

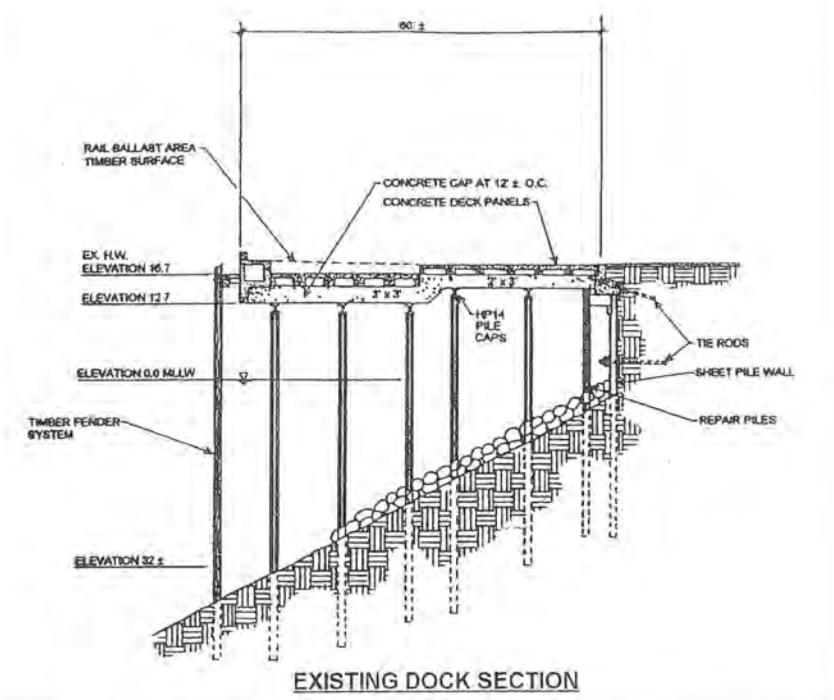


Figure 2. Cross Section View of the Marginal Wharf

5.1.1 Evaluation of Structure

Past Investigations. The ARRC contracted with several engineering firms to perform condition surveys of the dock structure in the past 10 years and in previous decades. Studies revealed a gradual deterioration of both the steel piles and the concrete pile caps. As long ago as the late 1950s, a cathodic protection (CP) system was recommended because of rapid corrosion observed in the steel members, but was not installed.

One effect of the 1964 earthquake, which caused significant damage to the Marginal Wharf, was a permanent lateral displacement that is most prominent on the east end of the dock. After the earthquake, batter piles were added to strengthen the east end of the dock.

The earthquake also caused widespread land mass subsidence, including local settlement of approximately 5.5 feet. The subsidence from the earthquake resulted in immersion of the concrete caps during high tides. In 1975, a structural inspection indicated that extensive corrosion had occurred in support piles and various other structural members. In 1978, the results of another structural inspection indicated that the strength of the dock had been compromised. Demolition of the structure was recommended.

In 1980, supplemental piling and subcaps were installed to bolster the dock and an active CP system was installed to protect the new piling. The rail spur and ballast were also removed to decrease the load on the outer piles. In 1991, the firm completing an inspection and assessment suggested limiting live loads to 100 pounds per square foot (psf) over the old rail bed and 250 psf between the building and the rail bed.

In 1993, PND inspected the dock and verified the 1991 report findings and recommendations. The 1993 report indicated an almost total loss of capacity for the original steel H piles. Furthermore, the CP system was determined to be inoperative. It was recommended that the eastern 200 feet of the dock be removed.

Findings of the Current Study. The 1999 inspection focused on degradation and corrosion of concrete and piles. The steel thicknesses of existing elements were measured at accessible locations, typically where absent or broken fender piles allowed access under the dock. Inspection of the east end of the dock was limited to visual inspection.

Measurements and visual inspection of members indicated an advanced state of corrosion on virtually all steel members (Photograph 3). The large web sections of many H piles were completely missing or pitted. Only flanges remained on most of the channel bracing. The concrete caps had many areas of exposed and corroding reinforcement steel and a number of large cracks (larger than 1/8 inch) (Photograph 4). Areas of concrete slabs, particularly near the dock face, were observed to be pitted down to the steel reinforcing bars (Photographs 5 and 6). In addition, the CP system did not appear to be functional. Several fender piles were missing or broken along the face of the dock, particularly at the east end of the wharf.

Considering the level of corrosion, the concrete cap capacity was determined to be controlling the vertical capacity of the dock. The estimated dock capacity was found to be on the order of 100 psf over the rail bed and 250 psf between the rail bed and the location of the former Transit

Photo 3: Marginal Wharf: corroded piles and damaged cap

Photo 4: Marginal Wharf: crack in sheet pile cap

Photo 5: Marginal Wharf: exposed reinforcement in pile cap

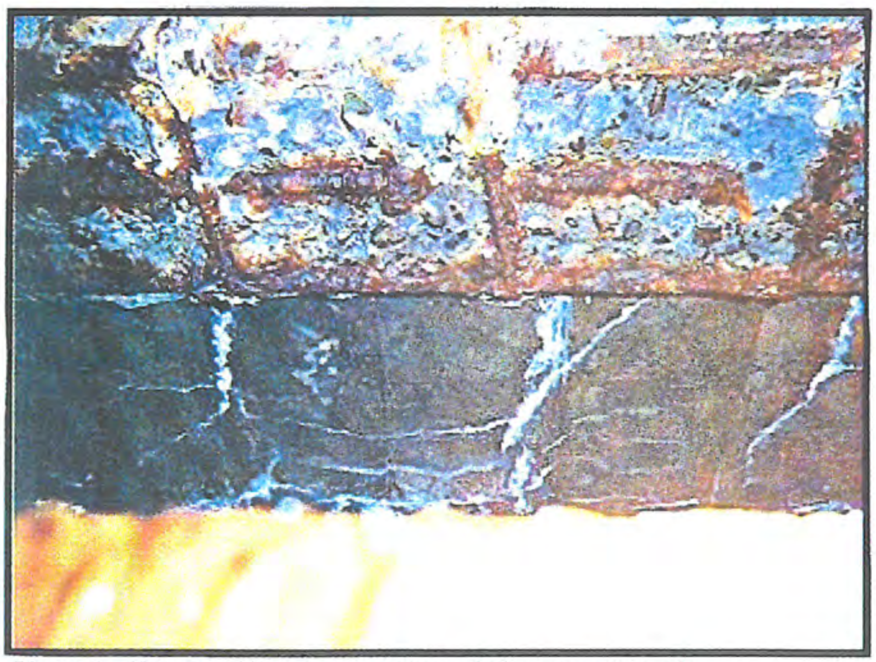


Photo 6: Marginal Wharf: corroded reinforcement in pile

Shed. It was noted that future expectancy was that cracks in the caps would enlarge and the reinforcing would deteriorate, causing the cap shear capacity to diminish and creating the potential for nonductile and sudden failure.

The seismic capacity of the wharf also was determined to be inadequate. At least one crack in a pile cap exposed No. 3 reinforcing steel, placed at 12 inches on center. This structural configuration was considered to be insufficient at that particular location.

5.1.2 Current Status

The ARRC stopped use of the Marginal Wharf in 2002. The existing facility is expected to be replaced.

5.2 DeLong Dock

The DeLong Dock, which primarily serves the fishing industry, consists of two steel barges that bear on a number of 6-foot-diameter steel piles. The barges measure 60 feet by 250 feet and 90 feet by 427 feet and are equipped with active CP systems. The original timber cap planks were replaced with concrete more than a decade ago. Four fuel lines that are 14 inches in diameter extend from the dock to a tank farm near the west end of Passage Canal. These fuel lines are no longer used.

5.2.1 Evaluation of the Structure

In 1999, both barges supporting the dock were observed to have a number of leaks in the bottom of the hulls. The leaks were undoubtedly causing internal corrosion damage to the barges. Furthermore, the barges were slowly filling with seawater, which caused significant loading of the piles during low tide.

At the time of the 1999 inspection, the CP system appeared to be operational. Even in areas where external coatings had failed, corrosion was found to be relatively light. There were some areas of moderate pitting on the bottoms of the barges. The barge fendering appeared to be fairly intact with some maintenance required at the rub railing. The cap slab appeared to be in excellent condition.

5.2.2 Recent Improvements

To address the seawater entrapment in the barges observed in 1999, the ARRC cut larger holes in the bottom of the barges. The holes allow trapped water to escape from the barges at low tides.

Minor repairs and improvements also have been made to the DeLong Dock recently to accommodate users. In early 2003, a local construction company installed a fender system along the dock face to accommodate vessel moorage. In conjunction with the fendering project, the contractor also demolished and removed an abandoned fuel piping manifold and a hydraulic boom crane.

To serve the fish processing companies displaced from Marginal Wharf, the existing water and electrical systems were enhanced. Use of DeLong Dock has increased since the Marginal Wharf was closed.

5.3 TRANSIT SHED

The U.S. Army Corps of Engineers built this 100-foot-wide by 830-foot-long building in 1958. The building, which was demolished in 2002 and 2003, was located immediately south of Marginal Wharf and lay in an east-west direction.

The building consisted of perimeter precast concrete panels placed between cast-in-place piers with rolled steel beams and girders ledgered off the walls. Interior framing consisted of steel columns and bearing walls constructed similarly to the perimeter walls. A flat roof was formed of metal decking spanning between steel beams or precast wall panels. The north foundation wall of the Transit Shed rested directly atop the retaining wall that provided lateral support to the Marginal Wharf.

In 1999, the Transit Shed was used for maintenance and storage. A rail track inside the building permitted repair of equipment. A wood-framed pedestrian access was used to transfer passengers from the wharf to the passenger train.

5.3.1 Evaluation of the Structure

The 1999 inspection revealed several structural deficiencies, including lateral shifting of several pilasters at the stem wall construction joint, lack of footing attachments for exterior precast panels, shrinking and shear cracks in the panels, cracked interior walls of concrete masonry, 50 feet of settlement affecting the loading dock, inadequate roof support for snow loads, sagging metal decking in the roof, and damage to concrete pilasters beside several door openings that exposed steel reinforcing bar.

Other deficiencies noted included architectural faults, "unattractive" aesthetic appearance, and mechanical and electrical systems requiring significant maintenance and enhancement to meet codes.

5.3.2 Current Status

The ARRC decided to demolish the Transit Shed because it no longer met ARRC needs, had significant code deficiencies, and occupied strategically located waterfront property that could have a higher economic benefit to the ARRC. The demolition occurred in 2002 and 2003. The demolition budget was approximately $975,000 with roughly 80% of the funding provided by the Federal Transit Administration and the remaining 20% by the ARRC.

5.4 Rail Yard

The rail yard is an unpaved area containing railroad tracks used for freight operations that consist of loading and unloading barges. These barges move rail cars and other freight to and from Seattle, Washington, and Prince Rupert, British Columbia. Freight rail cars used to move the barge freight often are stored temporarily in the yard. The rail yard also contains a small rail spur that is used for winter freight operations.

Containers are loaded and unloaded onto flat cars with the use of a forklifts. The rail yard generally operates at capacity for freight operations.

5.4.1 Evaluation of Infrastructure

Storm Water Drainage System. Whittier is subject to heavy precipitation, which occurs in the form of rain and snow. The combination of inadequate grading, seasonal freezing, and heavy precipitation creates conditions in which maintenance of the rail yard is nearly a day-to-day operation. The yard is generally graded flat with a series of catch basins.

Operators at the rail yard historically have experienced significant difficulty in dealing with snow removal and drainage. Rail cars have derailed as a result of ice buildup in the yard.

Extreme snowfall often results in standing snow depths of 10 feet or more adjacent to the rail yard. The snow in storage areas adjacent to the tracks can reach 15 feet in depth. In the spring, as the snow in these storage areas melts and also during the summer months when heavy rainfall occurs, there is a significant problem with standing water in the rail yard area. Although many storm drain catch basins and large-diameter storm drain lines traverse certain portions of the rail yard, drainage remains poor in several large areas.

The existing storm drainage system can become flooded during high tides. When flooded, the storm drain pipes have reduced rate of flow and capacity and undergo increased sedimentation. Also contributing sediments to the catch basins and storm drain piping is the ongoing grading of the unpaved yard.

Track Layout. Hatch Mott MacDonald evaluated the capabilities of the current track to identify ways to enhance freight handling and rail car maneuvering. The placement of tracks was evaluated to determine ways to improve efficiency of freight transfers, facilitate maneuvering of large equipment, and move rail cars more effectively. Results?

5.4.2 Recent Improvements

Pedestrian Underpass. The pedestrian underpass, completed in June 2002, is a 300-foot-long pedestrian underpass crossing beneath the rail yard, from the waterfront area to the Whittier town site. A 10-foot-diameter corrugated pipe provides the underpass frame, enclosing a concrete pathway. Covered portal ramps at each end provide for ingress and egress, and covered pathways lead to the tunnel openings. The tunnel has significantly improved pedestrian safety in the rail yard area.

The project budget was $2.285 million for design, construction, and construction management. Funding was 80% by the Federal Transit Administration and 20% by the ARRC.

Maintenance Facility. The maintenance facility, completed in March 2003, provides a building with space for storage and maintenance of equipment. The facility can house as many as four pieces of heavy equipment. Previously the ARRC had no indoor facility for equipment repair and maintenance in Whittier; work was performed outdoors or in Anchorage. The new building permits year-round repair and maintenance of large equipment in Whittier.

The project budget of approximately $2.3 million was funded 80% by the Federal Transit Administration and 20% by the ARRC.

5.5 BARGE SLIP

The Barge Slip functions primarily as the rail link with the Lower 48 and Canada. The slip works as a bridge from land to a barge. It rests on the barge during loading and unloading operations so that tracks on the slip align with those on the barge deck. Anchored on the land end, the Barge Slip is able to move to accommodate tides and the changing freeboard of the barge.

5.5.1 Evaluation of Infrastructure

Evaluation of this structure was completed by the ARRC.

5.5.2 Recent Improvements

Side Unloading Facility. A side-loading facility was created in 2001 and 2002. These improvements were needed to facilitate pass-pass unloading, in which a forklift on a barge passes containers to a forklift on the dock or conversely from a forklift on the dock to a forklift on the barge. Containers that are not mounted on rail cars are moved onto and off the barge, which is equipped with racks that accommodate the containers.

Fill was placed and two 34-foot dock structures were installed along the side of the existing Barge Slip. A CP system and structural reinforcement were added to the slip in 2001, and the pass-pass structures were completed in 2002. The cost of approximately $2.26 million was funded entirely by the ARRC.

Additional safety improvements in 2003 included installing a fendering system on the pass-pass platforms, ramps to allow safer access to trestles, and handrails on trestles. The improvements, budgeted at $182,000, were funded by the ARRC.

5.6 SECURITY

The ARRC-owned properties where rail and barge activities are conducted are routinely patrolled by officers of the Whittier Police Department. An established Area Maritime Security Committee actively oversees security issues in Whittier. In addition, the Alaska State Defense Force of the Alaska Office of Homeland Security, in the Division of Homeland Security and Emergency Management, has assigned a unit to Whittier. Members of the force conduct monthly drills to promote both land and waterside security.

The system-wide Alaska Railroad Security Program is organized as a standard railroad police force. The program is conducted by a senior agent who oversees railroad security agents. Railroad agents are responsible for all aspects of rail security for the ARRC system, including emergency response management.

5.6.1 Evaluation of Existing Organization

Railroad agents have ultimate security responsibility at the Whittier ARRC facilities. At the Barge Slip, the facility manager, who is the employee in charge, oversees day-to-day operations and security.

5.6.2 Recent Improvements

A recent addition is the year-round use of contract security officers. Their functions are to control entry control functions to the rail yard and perform extra security functions during barge operations.

6. CONCLUSIONS

Conclusions drawn from the market analysis, Phase I ESA, and facility evaluations are discussed below.

6.1 MARKET ANALYSIS CONCLUSIONS

- Since 2000, when the tunnel opened to vehicle use and vehicles gained access to Whittier, tour companies, freight carriers, government agencies, and the military have expressed increased interest in the use of Whittier as a port of call.
- New market opportunities are being created by infrastructure development in Whittier, the attractiveness of Whittier as a port of call because of its proximity to Anchorage, and the growth of the cruise industry.
- The 2025 revenues for major revenue sources in Whittier are forecast to increase from an estimated \$6.5 million in 2004 to \$17.6 million in 2025. (See Table 1 in Section 3.)
- A projected passenger rail revenue increase of from about \$1.5 million in 2004 to about \$7.2 million in 2025 accounts for roughly 40% of total annual revenues for the ARRC in 2025.

6.2 PHASE I ENVIRONMENTAL SITE ASSESSMENT

- Because historical contamination near the study area was identified, there is a medium level of risk associated with development of new facilities.
- The ARRC has worked to minimize the contamination present in the study area from previous activities and has developed procedures for management and control of hazardous substance storage and use.
- Although contamination identified has been remediated, it is possible that hydrocarbon and other contamination is present in almost any location because of historical uses of the study area.

6.3 Evaluations of Facilities

Marginal Wharf

- The ARRC-owned Marginal Wharf was found to be unserviceable and a safety hazard because of heavy damage sustained during the 1964 earthquake, age, and deterioration. The ARRC is no longer using the facility.
- The location of the Marginal Wharf, at the end of the Whittier access road, near the ARRC tracks, and close to the town of Whittier, is ideal for intermodal transfer of passengers between land, sea, and rail modes of transportation. A replacement wharf facility is anticipated to be attractive to passenger cruise ships, freight barges, the U.S. Coast Guard, National Oceanic and Atmospheric Administration, and U.S. Navy.

DeLong Dock

- Seawater infiltration resulting from leaks in the floating barges was observed to be a cause of internal corrosion, and the infiltrating seawater was resulting in significant loading of the piles during low tide. Larger holes in the barge bottoms, cut by the ARRC, have allowed water to escape from the barges during low tides.
- Improvements in 2003 have helped to make the dock safer for users and enhance dock service. These improvements included the installation of a fender system along the dock face to accommodate vessel moorage and the demolition and removal of an abandoned fuel piping manifold and a hydraulic boom crane.

Transit Shed

- The 1999 inspection revealed several structural deficiencies resulting from age and deterioration. Subsequently, the ARRC demolished the Transit Shed.

Barge Slip

- This facility plays a key role in facilitating shipment of goods to South-central Alaska by barge.

- Recent improvements to the Barge Slip, particularly those benefiting side loading and unloading of barges, have enhanced freight handling from the slip and improved safety of personnel.

Rail Yard

- Drainage in certain portions of the rail yard does not adequately handle standing water throughout the yard. The existing storm drainage system can become flooded during high tides. Flooding of the storm pipes and ongoing yard grading of the unpaved surface contribute to sedimentation in catch basins and the storm drain piping.

- Track layout and alignment require modifications to permit expanded operations. The rail yard currently operates at capacity for freight operations and provides no available unutilized track for maneuvering of passenger rail cars.

Security

- The importance of security at marine and railroad facilities has escalated since the events of September 11, 2001. As additional security requirements are established by the Alaska Office of Homeland Security, the U.S. Department of Homeland Security, and other government departments, the number of security officers and the related equipment are expected to increase at all railroad and marine facilities.

- The ARRC has added year-round contract security personnel in Whittier to augment its system-wide force.

7. RECOMMENDATIONS

This section presents recommendations for future intermodal development by the ARRC. Recommendations were developed from review of information gathered during the market analysis, Phase I ESA, and facility evaluations and are discussed below. A final subsection describes potential new improvements to serve the needs of passenger and freight customers of the ARRC.

7.1 MARKET ANALYSIS

The market analysis identified revenue opportunities in freight and passenger services. It is recommended that the ARRC continue to develop land lease relationships with port users that include private and government entities. An example of a recent use of ARRC-owned land is the development of a new parking lot.

Potential sources of revenues related to the re-emergence of cruise ships in the Whittier area include docking, passenger transport, retail sales, and land leases. One opportunity to investigate is the use of train sets that carry passengers to and from the Anchorage International Airport or downtown to carry passengers south to Whittier. Increased train ridership, expanded services to cruise ship customers, and add-on tours to other rail destinations are strategies that can maximize the growth in Whittier cruise ship traffic, meeting the needs of visitors.

As economic activity in Whittier is bolstered by additional cruise ship traffic, retail activity should continue to grow. The ARRC should consider leasing land or building space for retail shops adjacent or close to the cruise ship docks. This approach would help meet the needs of visitors and residents.

The growth in day tours could enable the ARRC to boost ridership. To meet the needs of the day tour operators and consequently facilitate growth of that market segment, additional train capacity is recommended. The capacity enhancement would require larger trains and more frequent service. Contributing to the growth in day tour operations would also result in additional demand for retail and office space.

7.2 PHASE I ESA

The recommendations resulting from the Phase I ESA are general in nature and apply broadly to future development. They are listed below:

- Historical information should be used to determine the best locations for any new development within the study area.
- Locations where contamination is known to exist should be avoided.
- During development activities, additional environmental testing should be conducted at the sites of proposed construction projects to fully assess environmental remediation needs.

7.3 FACILITY EVALUATIONS

Recommendations are presented for each facility.

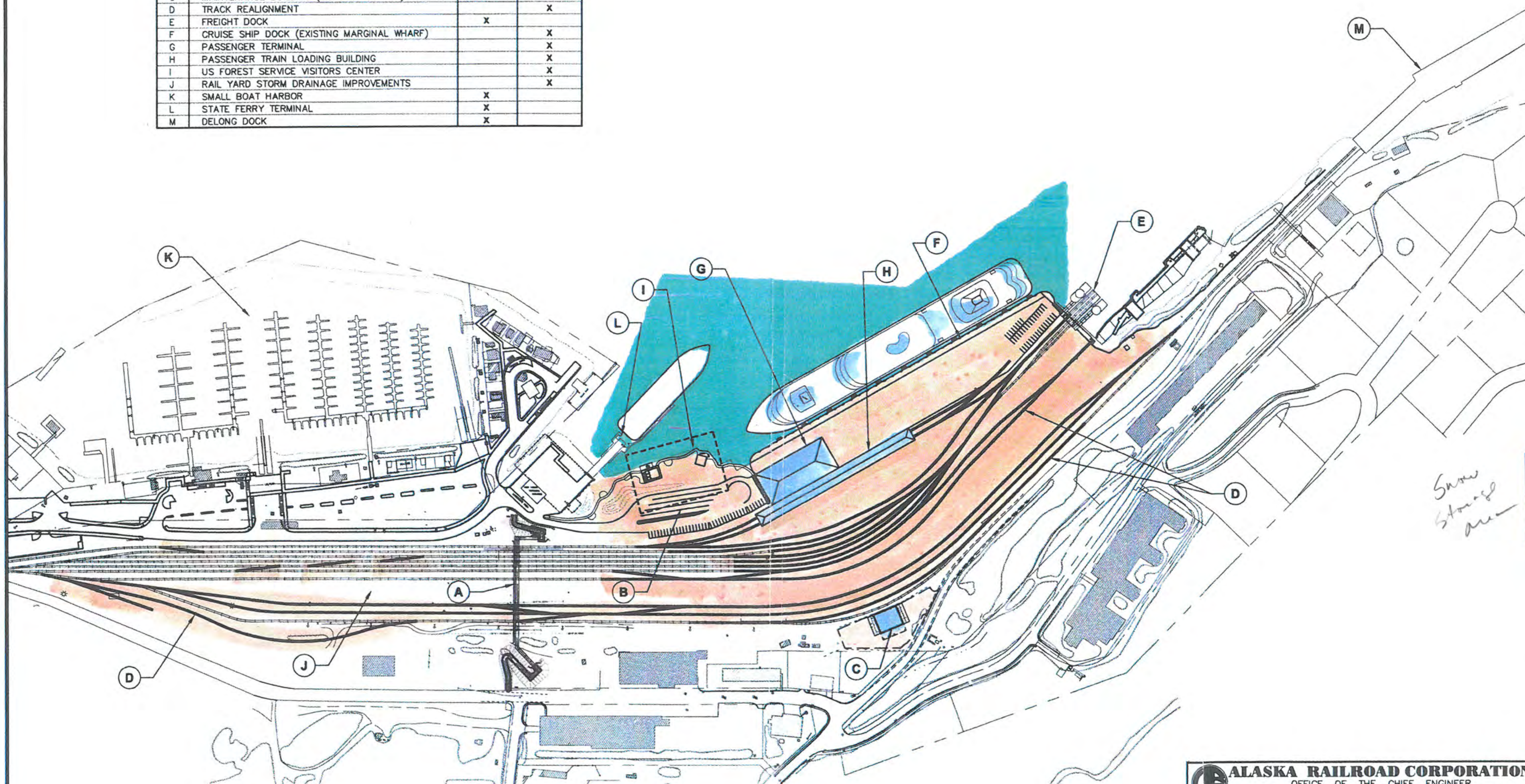
Marginal Wharf. The existing pile-supported portion of the dock should be demolished and replaced with a more modern dock facility that will accommodate the projected increase in cruise ship traffic at Whittier. The ARRC has investigated the potential of constructing a sheet pile bulkhead dock that would accommodate cruise ships up to 1,100 feet in length, as shown on Figure 3. The proposed dock would be constructed in approximately the same location as the existing Marginal Wharf and could also be used to supplement freight operations when needed. Associated costs for the proposed dock structure are provided in Table 2, which is provided at the end of this section.

The new facility at the Marginal Wharf site would meet the following current and future needs:

- Fishing and tour industries—An improved facility would provide room for expansion of day cruise and charter fishing businesses in Whittier.
- Freight — A new wharf at the Marginal Wharf site would provide more flexibility in freight operations and allow for increased freight shipments through Whittier to take advantage of the city's location close to the major population center of Anchorage.

CURRENT AND PROPOSED PROJECTS

ID	DESCRIPTION	EXISTING	PROPOSED
A	PEDESTRIAN UNDERPASS (COMPLETED 2002)	X	
B	BUS STAGING AND PARKING		X
C	MAINTENANCE BUILDING (COMPLETED 2003)	X	
D	TRACK REALIGNMENT		X
E	FREIGHT DOCK	X	
F	CRUISE SHIP DOCK (EXISTING MARGINAL WHARF)		X
G	PASSENGER TERMINAL		X
H	PASSENGER TRAIN LOADING BUILDING		X
I	US FOREST SERVICE VISITORS CENTER		X
J	RAIL YARD STORM DRAINAGE IMPROVEMENTS		X
K	SMALL BOAT HARBOR	X	
L	STATE FERRY TERMINAL	X	
M	DELONG DOCK	X	



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PROJECT :
WHITTIER INTERMODAL DEVELOPMENT

TITLE:
FIGURE 3 MASTER PLAN PROPOSED WHITTIER RAIL STATION DEVELOPMENT LAYOUT

- Passenger cruise ships — Additional docking for cruise ships would permit more cruise companies to dock vessels on or near weekend days, a stated preference of the industry. The expanded capacity may attract additional cruise ship traffic.

- U.S. government vessels — Potential users of additional docking facilities include the U.S. Coast Guard, the National Oceanic and Atmospheric Administration, and the U.S. Navy. Whittier could serve as an alternative port site for deployment of the Stryker Brigade that is being deployed in Alaska. The location near the rail line further enhances the ability of the site to efficiently serve military deployment.

DeLong Dock. Upgrades that have been identified for DeLong Dock include water connection and safety ladders. These improvements are recommended to help meet the needs of current and future users and enhance the safety of dock operations. The addition of a CP system also is recommended to maintain structural integrity and extend the useful life of the dock. The CP system will help reduce corrosion and rust where the barges meet.

The long-term arrangement for this dock is to have the ARRC operate the facility and share net revenues with the City of Whittier. It is anticipated that any future needs and improvements at the DeLong dock will be paid for out of ARRC maintenance funds.

Barge Slip. The ARRC has identified the following necessary repair and maintenance items to protect the existing facilities and improve operations:

- Filling the void under the tracks at the base of the slip

- Installation of a bracing system to tie the end of the slip to dolphins to provide lateral support during barge slewing operations as a means of preventing hinge pin damage

- Installation of CP:

  - On the tower support piles inside the sheet pile cells

  - On the sheet pile wall

- Repair of holes in the cell sheet pile walls that support the tower

- Upgrade of the tower winch motors and brakes
- Replacement of the slip support cables and sheaves
- Installation of lights and support trusses between towers to illuminate the center of barges at the slip
- Increased size of track adjustment ratchets at the end of the slip
- Installation of brackets to hold down the track at the end of the slip
- Installation of new dolphin and catwalk for the Winch No. 4 block on Marginal Wharf
- Replacement of fendering on the mooring dolphin
- Evaluation of support towers and cables to determine if the ramp is too heavy
- Reduction of ramp weight and removal of extra weights from counterweights if required
- Installation of new waler, coating, and tiebacks:
  - On tower cells
  - On bulging sheet pile wall north and south of the slip
- Electrical repairs
- Repair of the slip abutment pile cap
- Removal and replacement of all ties
- Removal and replacement of the transfer span deck
- Cleaning and coating of the transfer span steel while the deck is removed
- Addition of pressure rollers and a better tensioning system to improve the winch line performance
- Dredging of the shore end of the Barge Slip basin

- Replacement of wire ropes
- Replacement and servicing for winches
- Replacement of winch controls and feeder panels
- Replacement of Winch No. 3 underground feed
- Replacement of deteriorated conduits and wiring
- Other miscellaneous maintenance and repair

Rail Yard. The rail yard improvements discussed below are needed to improve efficiency of operations.

Storm Drainage System. Improvements are needed to accommodate storm water runoff control and snow removal within the rail yard. A conceptual study was performed in 2002 to determine general grading and possible improvements. A more detailed plan should be prepared with particular attention paid to the proposed track realignment effort and how it relates to storm water infrastructure design. Current Alaska Department of Environmental Conservation requirements must be followed in the preparation of drainage improvements.

Paving of the rail yard offers the potential of reducing sedimentation problems; however, some type of treatment would be required to deal with increased runoff before the storm water could be discharged to a water body. Other means of reducing sedimentation in the storm drain system might include (1) the use of a more durable aggregate in the surfacing material or (2) providing a concrete apron around catch basins. Either option would help reduce the amount of sediments pushed into the catch basins during grading operations. Any upgrades or changes to the existing storm drainage system within the rail yard must be thoroughly coordinated with proposed track alignment upgrades.

Track Layout and Realignment. Realignment of several tracks in the rail yard is needed to improve the offloading of barge freight and improve the ability of equipment to maneuver. The recommended track realignment is shown in Figure 3.

Security. A detailed analysis is needed to create a comprehensive program that can address security needs at the Whittier facilities of the ARRC.

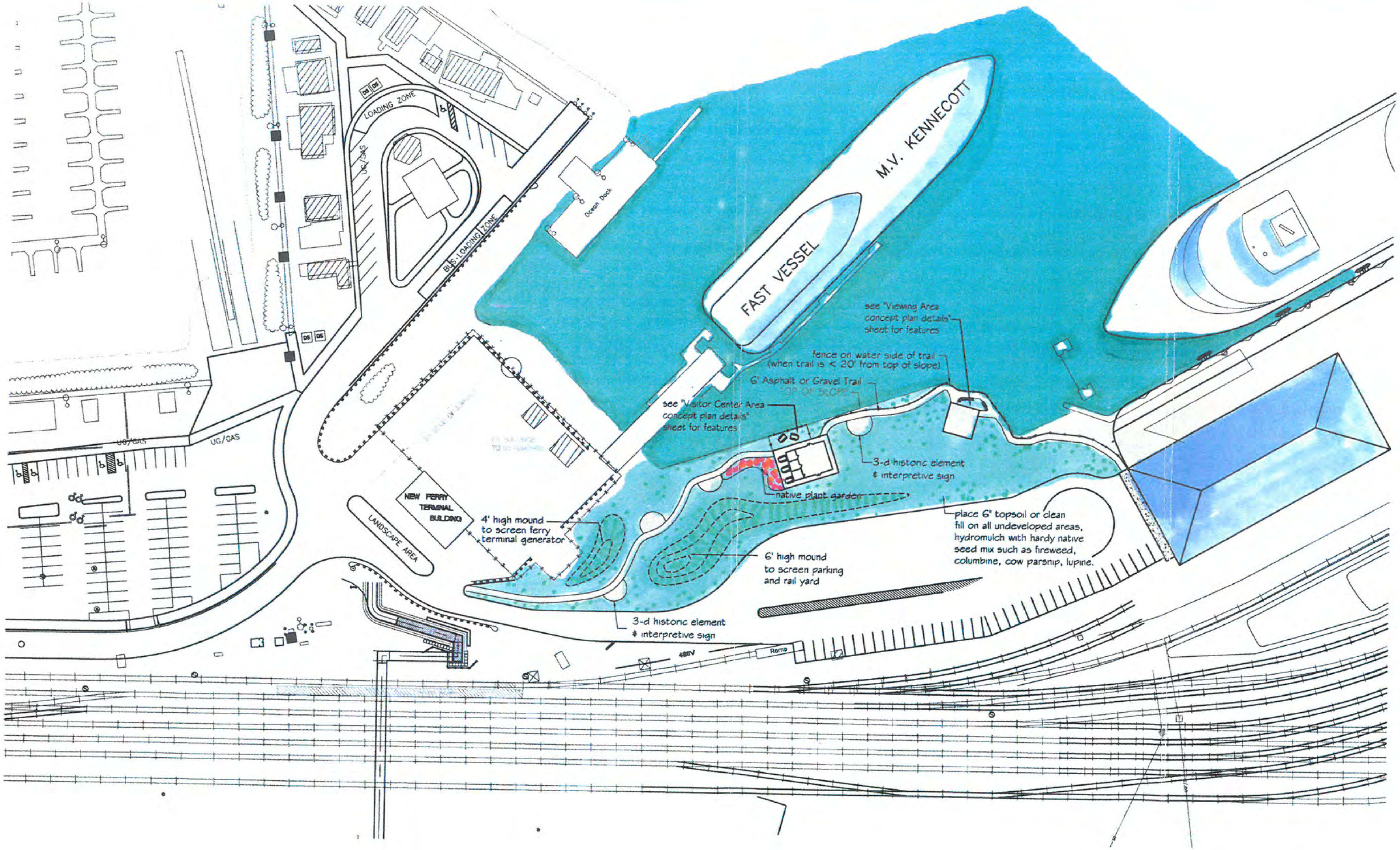
7.4 POTENTIAL IMPROVEMENTS

The following major enhancements are recommended to position the ARRC to meet the needs that resulting from future growth in cruise ship traffic, associated rail passenger volumes, and freight. Associated costs are provided in Table 2.

Passenger Terminal. A passenger terminal and train loading shelter, as shown in Figure 3, would support anticipated growth in cruise ship traffic and supplement the proposed dock development. The passenger terminal would be constructed to handle loading and offloading of large cruise ships and would include space for passenger staging, baggage handling, office and counter space for cruise lines and airlines, and accommodations for vehicle parking and bus staging. The proposed development would also include a 500-foot long passenger train loading facility adjacent to the terminal. This covered loading area would provide two tracks to accommodate immediate loading of two passenger trains.

Pedestrian Enhancements. The U.S. Forest Service has approached the ARRC about the potential of enhancing the waterfront area, adjacent to the proposed passenger terminal, with a small visitor center. The visitor center would accommodate small groups and would include informational kiosks, outdoor viewing platforms, and restroom facilities. The proposed layout of the visitor center is shown in Figure 3. Figures 4 and 5 present examples of potential developments.

The ARRC should work with the Forest Service to explore participation in these pedestrian amenities.



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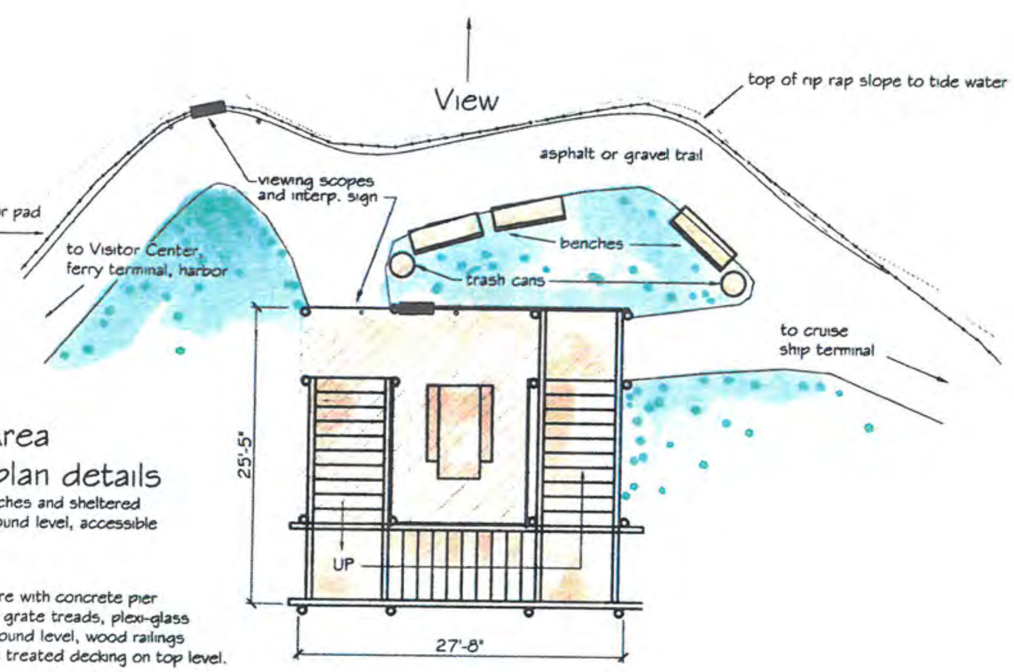
PROJECT:
WHITTIER INTERMODAL DEVELOPMENT

TITLE:
FIGURE 4
POTENTIAL US FOREST SERVICE ENHANCEMENT



Viewing Area concept plan details

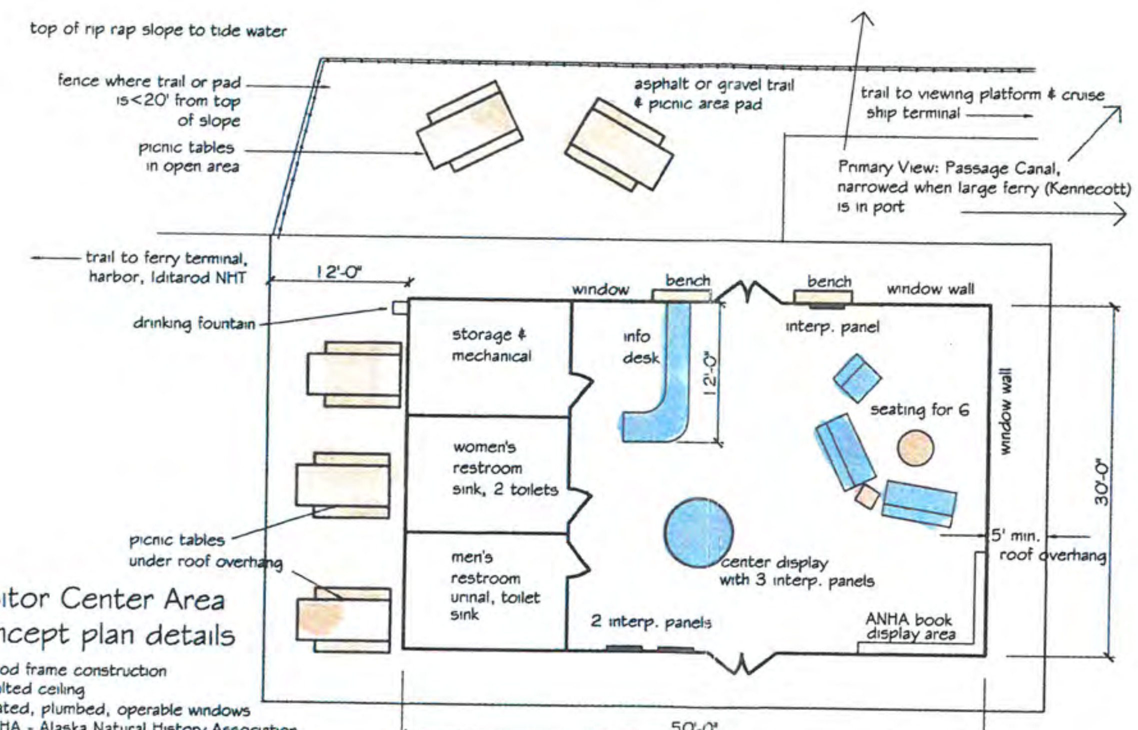
View scopes, benches and sheltered picnic table on ground level, accessible along trail.

Viewing Platform:
wood pole structure with concrete pier foundations, metal grate treads, plexi-glass wind screen for ground level, wood railings all levels, pressure treated decking on top level.

Ground Level:
shelter central area from wind & rains while allowing as much light/views as possible.

Stairs:
3 sets of risers, 6' wide
with 4' - 5' height between landings

Top Deck:
hatched area on plan
12' - 15' above grade
view scopes, interpretive sign
benches



Visitor Center Area concept plan details

wood frame construction
vaulted ceiling
heated, plumbed, operable windows
ANHA - Alaska Natural History Association, (sells books and related items)
seating area for people to browse books and enjoy view
Interpretive Topics: natural history, area info/orientation, Iditarod National Historic Trail, local history.
Site could be Whittier terminus of Iditarod National Historic Trail (INHT)

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PROJECT:
WHITTIER INTERMODAL DEVELOPMENT

TITLE:
FIGURE 5
POTENTIAL US FOREST SERVICE VISITOR CENTER

APPENDIX A

MARKET FORCES AND REVENUE ESTIMATES FOR WHITTIER INTERMODAL DEVELOPMENT

Prepared by
Northern Economics Inc.

Whittier Intermodal Development: Market Forces and Revenue Estimates

Draft

Prepared for

Alaska Railroad Corporation

and

~~Peratrovich Nottingham and Drage~~

December 2003

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Contents

Figure **Page**

1 Introduction

In this report, we update an earlier evaluation by Northern Economics, Inc. of the market forces shaping overall demand for the passenger and freight services provided by the Alaska Railroad Corporation (ARRC) in Whittier, Alaska. Our goal is to describe the various market forces at work in Whittier as well as the complementary nature or points of conflict between the market forces. The report includes sections on the freight industry, cruise ship industry, and tour industry (including day cruise operators and small charter operators).

Our earlier analysis was conducted in 1999 before the Anton Anderson Tunnel opened to vehicle traffic on June 7, 2000. Since 1999, other changes have occurred, including ongoing construction of a new cruise ship dock and a 20,000 square foot Cruise Ship Embarkation Building by private developers. In this report, we describe some of the changes in market forces operating in Whittier since our 1999 report and identify potential market opportunities for the future.

This report also provides forecasts of revenues that may be earned in the freight, cruise, and day tour service markets in Whittier for the period of 2004 to 2025. Forecasts related to rail ridership, land leasing, dock usage, and other ARRC revenue sources are based on illustrative scenarios. For example, forecasts for rail ridership are based on assumptions about growth in the cruise ship industry and the tour and charter industry, acceptance of rail for transport to and from cruise ships, and other factors. The scenarios take into account the considerable uncertainty associated with looking 25 years into the future. They are designed to show potential impacts of various markets on ARRC revenues. Due to uncertainties surrounding the type of equipment that might be used and other factors, no attempt is made to estimate costs or net revenues ARRC might earn in the different markets.

A summary of our findings is presented in Table 1. Passenger rail revenue is attributable to both cruise ship and day tour customers who may choose to use the train for transportation into or out of Whittier. Dockage and boat fee revenues are revenues from day passenger boats that land and sail from Delong Dock. Currently the Delong Dock is the only dock owned and operated by the ARRC (the city also owns a portion of Delong Dock). Parking lot revenues are revenues from the new parking lot that is being developed on ARRC owned land by Alaska Recreation Incorporated.

Table 1. Summary of Annual Revenues for Major Revenue Items –

	Freight Transport Revenue	Passenger Rail Revenue	Dockage and Boat Fee Revenues	Parking Lot Revenues	Land Lease Revenues	Total Annual Revenues
2004	4,807,000	1,473,000	17,000	6,000	218,000	6,521,000
2005	4,860,000	2,602,000	17,000	14,000	1,249,000	8,742,000
2006	4,914,000	2,777,000	58,000	17,000	1,311,000	9,077,000
2008	5,022,000	3,046,000	69,000	25,000	1,446,000	9,608,000
2010	5,134,000	3,530,000	69,000	56,000	1,594,000	10,383,000
2015	5,590,000	4,443,000	117,000	91,000	2,034,000	12,275,000
2020	6,088,000	5,637,000	151,000	195,000	2,596,000	14,667,000
2025	6,630,000	7,247,000	164,000	261,000	3,314,000	17,616,000

Total ARRC annual revenues from various activities in the Whittier area are substantial and have the potential to increase substantially in future years. The following sections describe the freight, cruise ship, and day tour markets of Whittier. Forecasts of potential revenues for ARRC are provided, along with explanations of the scenarios and assumptions that shape the forecasts.

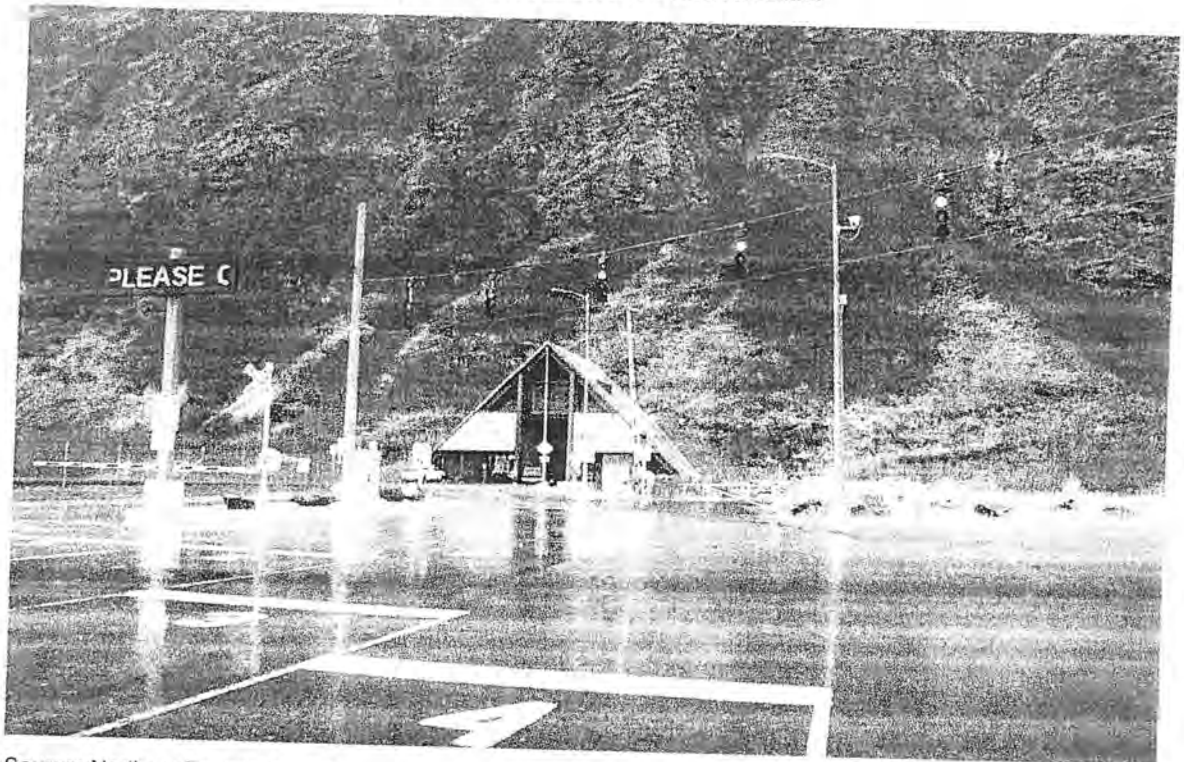
1.1 New Infrastructure and Other Development Activities in Whittier

1.1.1 Anton Anderson Memorial Tunnel

The biggest change in Whittier since 1999 is related to access. The Anton Anderson Memorial Tunnel and road connection opened to vehicle traffic in June 2000. The tunnel was reconstructed to accommodate both rail and highway vehicles. For the first time, residents and visitors were able to drive in and out of Whittier without having to load their vehicles on and off railroad cars. The Whittier tunnel is the longest rail and highway tunnel in North America and the first dual-use tunnel in the United States. The tunnel, including associated vehicle staging areas, and the section of the road commonly known as the Portage Glacier Highway between milepost 5.1, near Portage Creek, Alaska, and the Whittier Ferry Terminal, is designated as a toll facility (Title 17 Alaska Administrative Code 38.005). According to 17 AAC 38.020, the Department of Transportation does not collect tolls for passengers, motor vehicles, or freight traveling on ARRC. Toll collection began April 1, 2001.

The tunnel offers one-way travel for highway vehicles. Due to safety precautions, vehicles do not travel through the tunnel on a first come, first serve basis. Instead, vehicles travel according to their class. Passenger autos go first. Buses and commercial trucks travel through the tunnel at greater intervals in between because of their greater potential for fire load than cars. The number of buses in the tunnel at any one time is limited so there is always ample room for bus passengers in the safe houses along the tunnel. Commercial trucks go last, so that the fewest possible number of vehicles and people are behind slower moving trucks, and the maximum number of vehicles can move through the tunnel each cycle opening. A total of 800 cars can travel through the tunnel during each opening, 400 in each direction.

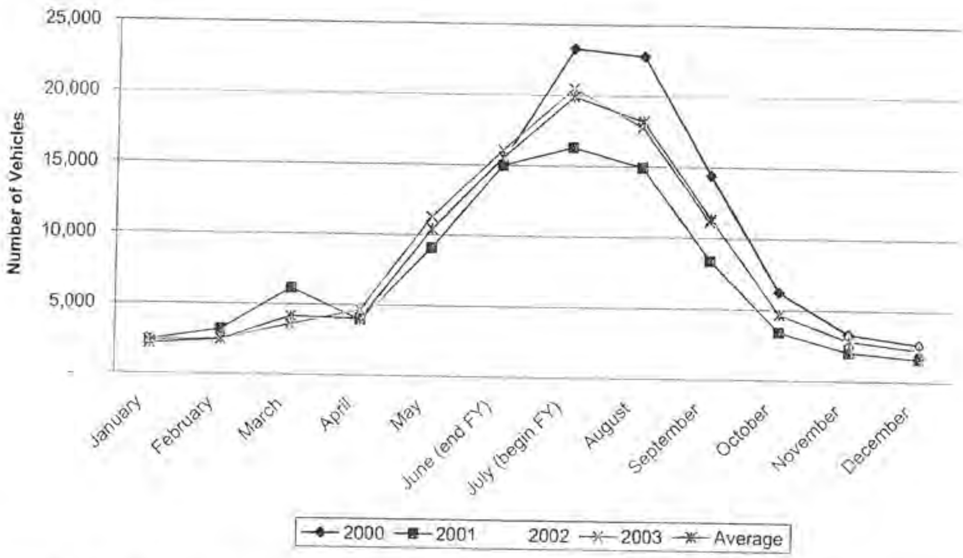
Figure 1. Anton Anderson Memorial Tunnel



Source: Northern Economics, Inc.

Figure 2 shows the total volume of traffic for all vehicle classes traveling through the tunnel. Of note when examining the following traffic counts, is that the Alaska Department of Community and Economic Development certified population count for Whittier in 2002 is 170 individuals. The high traffic counts in summer months attest to the importance and magnitude of the tours, charters, sport fishing, and other recreational activities to Whittier. Tolls were not charged for the first 10 months of operation, which accounts for the high vehicle counts during the summer of 2000.

Figure 2. Volume of Traffic through the Anton Anderson Tunnel, FY 2000 to FY 2003



Source: Facility Manager Gordon S. Burton, Alaska Department of Transportation and Public Facilities.

As of October 2003, the toll for private vehicles is $12, recreational vehicles tolls are either $20 or $35 depending on size and other factors, $125 for buses that carry 30 or more people, $125 for most tractor and trailer trucks, and $300 for oversize vehicles (see Table 2). Coupon books can be purchased that bring the cost for personal vehicles down to $10, buses that carry more than 30 people to $100, and tractor trailer trucks to $115.

Table 2. Tolls for Anton Anderson Memorial Tunnel

Vehicle Class	Toll	Book Of Ten Tickets	Book Of Thirty Tickets	Seasonal Pass
Class A – Passenger vehicles not pulling trailers; motorcycles, and motorcycles pulling trailers; trucks with a gross vehicle weight of less than 12,000 pounds and not pulling trailers; and recreational vehicles less than 28 feet and not pulling trailers.	$12	$100 ($10 per ticket)	$225 ($7.50 per ticket)	$550
Class B_1 – Recreational vehicles 28 feet or greater not pulling trailers; and recreational vehicles less than 28 feet pulling trailers; and passenger vehicles pulling trailers. Trailers in this class cannot be more than 8.5 feet wide or 14 feet high.	$20	$175 ($17.50/ ticket)	$450 ($15 per ticket)	—
Class B_2 – Recreational vehicles 28 feet or greater pulling trailers; vans and buses designed to carry more than nine but fewer than 30 people including the driver; trucks with fewer than four axles pulling trailers; and trucks with a gross vehicle weight of 12,000 pounds or more and fewer than four axles. Trailers in this class cannot be more than 8.5 feet wide or 14 feet high.	$35	$300 ($30 per ticket)	$750 ($25 per ticket)	—
Class C – Buses designed to carry 30 or more people including the driver.	$125	$1,150 ($115 per ticket)	$3,000 ($100 per ticket)	—
Class D – Trucks, including tractor and trailer combinations, with a gross vehicle weight of 12,000 pounds or more and four or more axles; motor vehicles, including any trailer and any load, if they are more than 8.5 feet wide, excluding mirrors, but not more than 10.0 feet wide and not more than 14.0 feet high and not more than 75 feet long; and any motor vehicle that is not otherwise classified in this section.	$125	$1,150 ($115 per ticket)	—	—
Class E – Motor vehicles, including any trailer and any load, if they are more than 10.0 feet wide, excluding mirrors, but not more than 11.0 feet wide; or 14.0 feet high, but not more than 15.0 feet high and not more than 75 feet long.	$300	—	—	—
Class F – Motor vehicles exempt from tolls, including Alaska Railroad Corporation motor vehicles, ADOT/PF motor vehicles, emergency vehicles, law enforcement vehicles, and other motor vehicles as determined to be appropriate by the commissioner for the best interest of the state.	$0	—	—	—
Class G – Government motor vehicles, other than government motor vehicles that fall within Class F, including a vehicle owned or operated by a government agency or school district and on official business, a school bus under contract with a school district and on official business, and other motor vehicles as determined to be appropriate by the commissioner for the best interest of the state.	$10	—	—	

Source: Anton Anderson Memorial Tunnel http://www.dot.state.ak.us/creg/whittiertunnel/schedule.htm. October 2003.

1.1.2 Private Development Projects

A new 600-foot floating dock for cruise ships and a 20,000 square foot Cruise Ship Embarkation Building (see Figure 3) are being built in Whittier, by Whittier Dock Enterprises LLC, an affiliate of Passage Canal LLC. Princess Cruise Lines is one of the partners in Whittier Dock Enterprises LLC, and, according to an informed source, has invested approximately $13 million in the new passenger terminal and dock facilities. The Cruise Embarkation Building is built on land leased from the City of Whittier. The dock can accommodate a single cruise ship visit per day for ships up to 950 feet in length and 75,000 tons. Cruise passengers will arrive and/or leave Whittier by motor coach or rail. The development of a new dock large enough to accommodate large vessels was cited as a necessity for attracting cruise vessels to Whittier. A five-acre parking lot for buses and employees is planned.

A private condo-type marina with 150 slips is also under development by Passage Canal LLC. According to the web page for the Whittier Marina[1], Passage Canal Development LLC is the leaseholder from the City of Whittier and holds permits from state and federal agencies authorizing project construction. Peratrovich, Nottingham, and Drage, Inc. are assisting in all design and engineering matters as well as with permit compliance issues. The marina will be operated by Alaska Recreational Management, Inc., which has been operating parking and camping operations in Whittier since 2000.

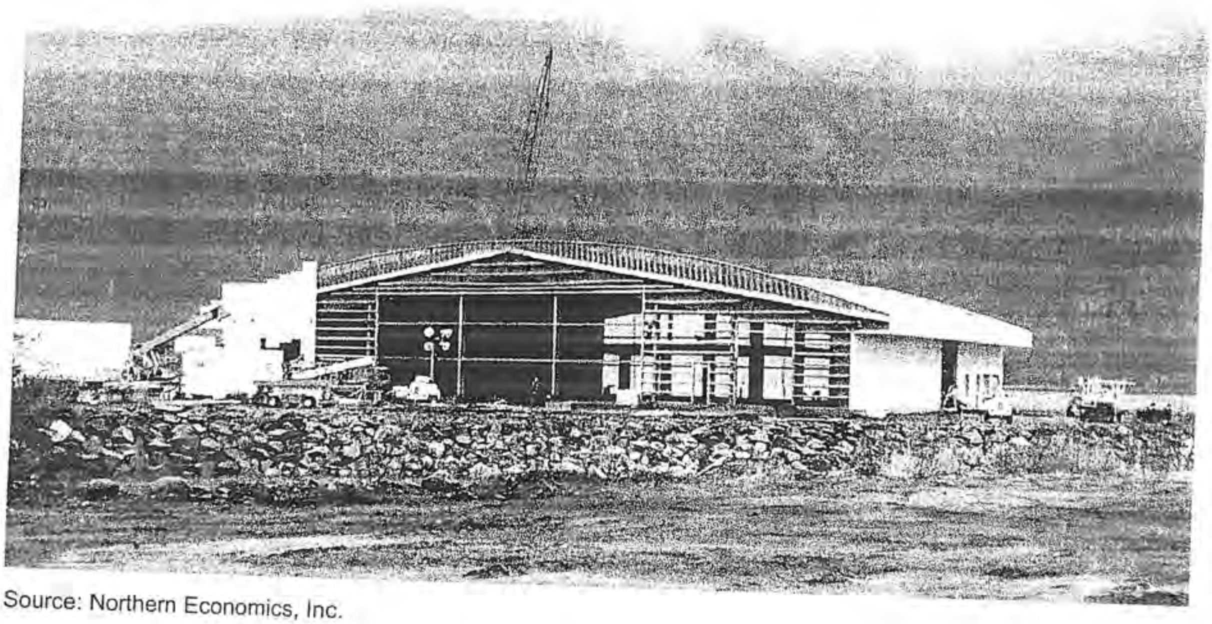
Passage Canal LLC also constructed a parking lot on Whittier Street at a reported cost of approximately one half million dollars. Reported plans for this lot include paving and installation of an oil/grease separator. Alaska Recreational Management, Inc. will manage the parking lot. RV camping has been moved from the Whittier waterfront to an upland site along Whittier Creek. Passage Canal LLC has plans for two other uplands projects. The firm plans to build commercial facilities to support day tour glacier operators using the new Whittier Marina. Construction of dry stack moorage facility is also contemplated on land it leases.

As of October 23, 2003, construction of a four-story, 25-room hotel in Whittier is scheduled to open in Winter 2003, but construction appears to have come to a halt (Figure 4). The Inn at Whittier was first scheduled to open in spring 2003.

Basic amenities such as water, sewer, and telephone are being extended to accommodate the businesses on the waterfront.

[1] http://www.whittiermarina.com/index-main.htm

Figure 3. New Cruise Embarkation Building under Construction, October 23, 2003



Source: Northern Economics, Inc.

Figure 4. The Inn at Whittier, October 23, 2003

Source: Northern Economics, Inc.

1.1.3 ARRC Projects

ARRC has completed several projects in Whittier since our earlier report. In summer 2003, ARRC completed construction of a $2.225 million facility in Whittier for year-round storage and maintenance of its heavy equipment such as graders and bulldozers. The Federal Transit Administration (FTA) provided 80 percent of the funding and ARRC provided 20 percent of the funding for construction of the 4,793 square foot maintenance building and for demolition and removal of the outdated Transit Shed.

ARRC has also constructed a 300-foot long pedestrian underpass traversing the rail yard connecting the town of Whittier to the waterfront with a $2.285 million budget for design, construction, and construction management. ARRC is also constructing a spur track that will increase the space available for arriving and departing trains. This new construction is in part due to the expectation that rail service will expand due to the arriving and departing passengers to the Whittier cruise terminal.

Improvements have also been made to the freight barge slip including the addition of two 34-foot dock structures alongside the slip, facilitating "pass-pass" unloading where the forklift on the barge passes containers to a forklift on the dock. Structural reinforcement and cathodic projections were carried out. These projects with an estimated budget of $42.26 million were funded by ARRC.

The Marginal Wharf was closed July 1, 2002. Using internal funds, ARRC is making improvements including fender piling, water, and electrical service to the DeLong Dock to accommodate tenants displaced by the closure of the Marginal Wharf. The DeLong Dock is owned by ARRC and the City of Whittier, but is operated by ARRC.

2 Freight

Barge traffic in and out of Whittier consists of a weekly ARRC/Alaska Railroad Marine Services rail barge and a Canadian National barge that calls in Whittier once every 11 or 12 days. The contract to pull three 420-foot rail barges between Whittier and Seattle for ARRC is currently held by Lynden Transport. The 425-foot single-deck barge that runs between Whittier and Prince Rupert, B.C., is pulled by Foss.

ARRC anticipates that planned freight activities can be accommodated with the acreage and facilities currently dedicated to freight operations. ARRC previously stated that no analysis needs to be conducted to compare the net benefits of using additional lands for freight activities versus other opportunities, such as supporting day tour activities or building a new berth for cruise ships.

2.1 Existing Freight Activity

ARRC/Alaska Railroad Marine Services (ARMS).

On February 28, 2001, ARRC signed a 10-year contract with Alaska Railbelt Marine LLC (ARM), a subsidiary of Lynden, Inc. chartering space for weekly, year-round service between Seattle and Whittier. Three 420-foot rail barges designed to carry about 50 rail cars each and other freight were constructed. The barges are equipped with rails so that the rail cars can be rolled on and off the barges. These rail barges provide a marine extension of the Alaska Railroad that links ARRC with freight-carrying railroads in the Lower 48 and Canada. In Whittier, the Alaska Railroad unloads the barges and the rail cars are then routed to their destination along the Alaska rail belt.

In spring 2002, the ARM barges were outfitted with steel-built rack systems to increase the vessel's cargo capacity. Cargo is stored in the airspace about the rail cars. ARM subleases space to Alaska Cargo Transport, which ships bulk cargo north and south through Whittier. The increased capacity provides benefits to the Alaska Railroad because increased capacity of the ARM vessels means more freight can move through Whittier.

A barge leaves Seattle every Wednesday and each barge takes approximately two weeks to complete the round trip, depending for the most part on weather. The ARM barges are towed by Western Towboat of Seattle. Table 3 presents data on arm freight activity for the first 10 months of 2003.

Canadian National Railway.

CN Aquatrain, a small division of the Canadian National Railway, has been shipping goods to Alaska between Prince Rupert Canada and Whittier, Alaska for over 40 years. CN Aquatrain makes about 32 rounds trips a year moving between 47 to 48 rail cars per barge trip. According to the CN AquaTrain web page, their clients in Alaska include ConocoPhillips Alaska, BP, Continental Nitrogen & Resources, Spenard Builders and Fort Knox Gold Mine. For example, tank cars of ammonium bisulfite are shipped from Beaumont, Texas to Fairbanks, Alaska, where it is used in the leaching process at the Fort Knox Gold Mine. The 830-mile trip from Prince Rupert to Whittier takes about four days and round-trip transit time is 10 days, including a stop in Anchorage. With the construction that could result from building a natural gas pipeline, CN Aquatrain believes they are "likely to play an even larger role in the Alaskan economy."[2]

Barges for CN Aquatrain are leased from Foss Maritime in Seattle. CN personnel load the railcars onto the barges in Prince Rupert and ARRC workers unload the barges in Whittier and route them to their final destination. AquaTrain utilizes one of the largest railcar barges in the world, with eight 400-foot long tracks.

Table 3. Barge Related ARM Railcar and Tonnage Report January—October 2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Year To Date
North											
Railcars	180	139	119	177	150	173	157	139	119	152	1,505
Tons	15,402	12,289	9,875	14,690	9,814	11,107	12,808	12,106	10,221	13,475	121,787
South											
Railcars	46	35	41	52	30	26	20	37	65	49	401
Tons	2,319	1,798	2,779	3,565	1,674	1,873	1,227	2,155	4,109	2,972	24,471

Source: ARRC.

Table 4 shows the same information for the Canadian National AquaTrain. The cars that travel north generally go south the same month, but very rarely do they carry cargo south.

Table 4. Barge Related CN AquaTrain Railcar and Tonnage Report January—October 2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Year To Date
North											
Railcars	101	97	106	76	165	139	139	131	136	92	1,182
Tons	9,211	9,062	9,607	6,986	15,152	12,891	12,480	11,484	12,492	8,476	107,841

Source: ARRC.

Table 5 shows the number and tons of barge-related containers for January through October 2003. ACT, AML, and Dupont are the three largest container shippers of freight in Whittier.

[2] CN Aquatrain web page. Accessed at http://www.cn.ca/productsservices/aquatrain/en_KFAqautrain.shtml on October 28, 2003.

Table 5. Barge Related Containers, Number and Tons, January-October 2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Year To Date
ACT											
Containers	475	536	510	539	623	434	344	602	392	320	4,775
Tons	8,125	9,303	8,040	8,788	10,257	7,350	5,319	9,496	5,739	4,143	76,560
AML											
Containers	81	117	327	455	278	272	441	303	211	122	2,607
Tons	1,816	3,077	7,245	8,207	6,913	6,512	9,262	7,339	5,248	2,655	58,273
Dupont											
Containers	6	3	3	6	3	6	6	6	3	0	42
Tons	138	66	66	132	66	138	132	132	70		940
Other											
Containers	-	-	-	-	-	-	1	-	-	9	
Tons	-	-	-	-	-	-	25			225	
Total											
Containers	562	656	840	1,000	904	713	791	911	606	451	7,434
Tons	10,078	12,446	15,351	17,127	17,236	14,024	14,714	16,968	11,057	7,023	136,024

2.2 Related Transportation Activity and Revenues

2.2.1 Related Train Activity

ARRC/Alaska Railroad Marine Services (ARMS)

The weekly ARRC barge is currently supported by two to four trains, depending on the tonnage of freight. Some barges require only one train for unloading and one train for loading (for a total of two trains), while other barges require two trains for unloading and two trains for loading. The barges have a turnaround time of approximately 20 hours. Previous turnaround time was approximately 30 hours. This decrease means barges move faster and are very seldom late. The barges are not operating at full capacity

Canadian National

The Canadian barge is supported by two trains, one for unloading and one for loading. No changes are expected in the near future in terms of the number or size of trains.

2.2.2 Related Truck Activity

ARRC currently has a commitment from Lynden that 85 percent of Lynden's freight will be transported to and from Whittier on the railroad. Most of the freight that leaves Whittier on trucks is headed south down to the Kenai Peninsula where there are no rail lines.

Table 6 shows the vehicle counts for Class D Motor vehicles going through the Anton Anderson Tunnel for 2000 through October 2003. Class D includes tractor-trailer trucks. In our earlier report, it was assumed that truck traffic through the tunnel would increase, but no clear trends are shown in the table. Traffic counts for the first six months of operation are higher than the comparable months in the following years, but this is true for all types of vehicles because the tunnel was free for the first 20 months of operation.

Table 6. Vehicle Counts for Class D Motor Vehicles

	Number of Vehicles			
Year	2000	2001	2002	2003
January	-	103	20	49
February	-	148	52	74
March	-	167	71	75
April	-	113	96	142
May	-	227	264	282
June	563	316	333	305
July	357	227	374	365
August	331	167	238	313
September	465	127	301	150
October	211	79	177	N/a
November	147	43	172	N/a
December	95	42	136	N/a
Total	2,169	1,759	2,234	1,755

Class D includes trucks, including tractor and trailer combinations, with a gross vehicle weight of 12,000 pounds or more and four or more axles, motor vehicles, including any trailer and any load, if they are more than 14 feet high, and not more than 75 feet long; and any motor vehicles that is not otherwise classified in this section.
Source: Facility Manager Gordon S. Burton, Alaska Department of Transportation and Public Facilities.
N/a: Not Available

2.2.3 Freight Revenues

A simple forecast of freight revenue from 2004 to 2025 is provided in Table 7. This forecast is based on ARRC operating revenues, and expected population growth[3]. The high, base and low projections are based on high, base and low population growth projects. Figure 5 shows freight revenue growth in a graph format.

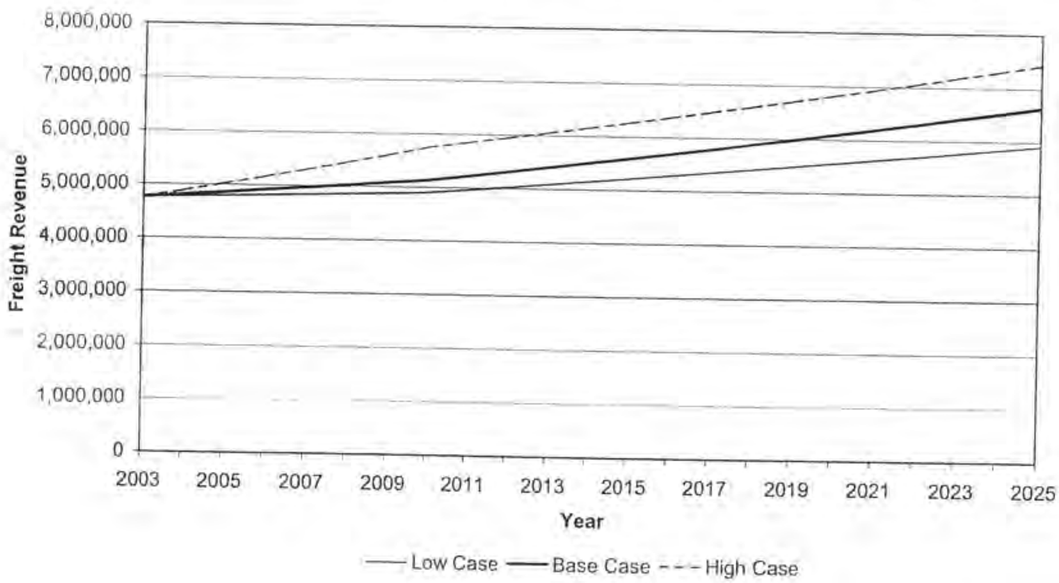
[3] Operating revenue obtained from Alaska Railroad Annual Report 2002 http://www.akrr.com/corporate/annual_reports.html.

Table 7. Possible ARRC Freight Revenue, 2003 to 2025

	Population Change (%)			Revenue ($)		
	Low	Base	High	Low	Base	High
2003				4,755,000	4,755,000	4,755,000
2004	0.43	1.1	2.75	4,776,000	4,807,000	4,886,000
2005	0.43	1.1	2.75	4,796,000	4,860,000	5,020,000
2006	0.43	1.1	2.75	4,817,000	4,914,000	5,158,000
2008	0.43	1.1	2.75	4,858,000	5,022,000	5,446,000
2010	0.43	1.1	2.75	4,900,000	5,134,000	5,750,000
2015	1.26	1.72	1.72	5,217,000	5,590,000	6,261,000
2020	1.26	1.72	1.72	5,554,000	6,088,000	6,819,000
2025	1.26	1.72	1.72	5,913,000	6,630,000	7,426,000

Notes: Dollar values are shown in 2003 dollars. No adjustment has been made for inflation. Population change is based on ISER's projection for statewide population.

Figure 5. Freight Revenue Forecast Using Statewide Population Projection, 2003 to 2025



3 Cruise Industry

3.1 Cruise Ship Passenger Volumes and Landings

According to the Northwest Cruise Ship Association (NWCA) Alaska cruise sales are rebounding. NWCA attributes this rebound to aggressive marketing and some of the lowest pricing ever. In 1992, approximately 265,000 passengers took Alaska cruises. By 2003, that number of passengers per season increased to 777,000 (Table 8).

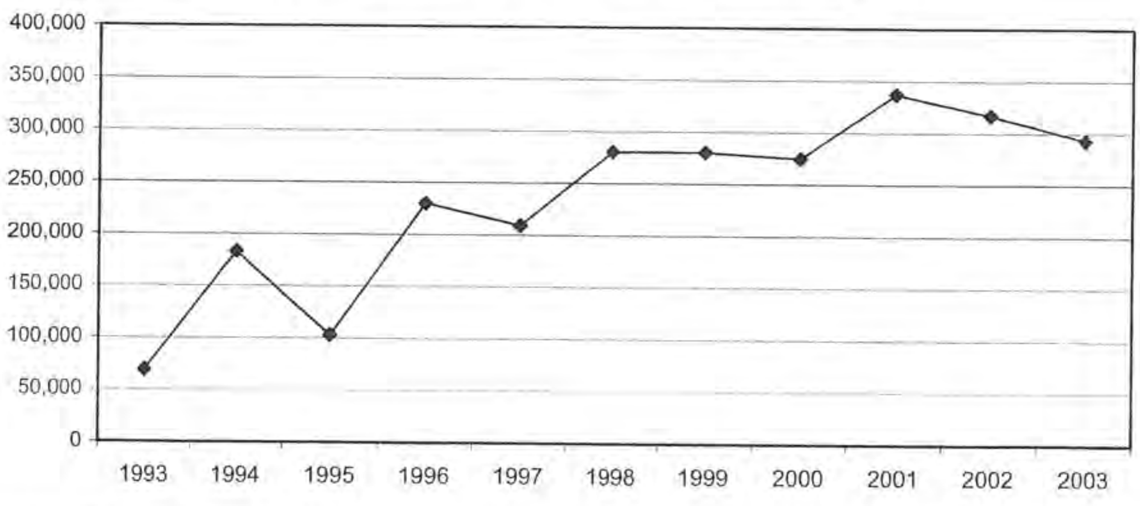
Table 8. Cruise Ship Passengers to Alaska, 1992 through 2003 (thousands)

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Number of Passengers	265	306	379	383	465	525	570	596	641	691	740	777

Source: Cruise Ship Agencies, October 2003.

A growing segment of the cruise market is composed of passengers who cruise in one direction, either north or south, across the Gulf of Alaska. Seward, Alaska has been the turn around point for these cruises. The typical Gulf of Alaska cruise (Vancouver B.C. to Seward, and return) has an average sailing schedule of 7 to 8 days one-way. Since 1993, the volume of passengers crossing the gulf has more than tripled, from approximately 70,000 in 1993, to over 337,000 in 2001, to roughly 290,000 in 2003 (Figure 6).

Figure 6. Passenger Counts for Seward, Alaska, 1993 through 2003



Source: Cruise Ship Agencies, October 2003.

In April 2003, the City of Whittier repealed a cruise-ship head tax and exempted ships above a certain length from any other fees including the seasonal sales tax and the $2.50 per passenger transport fee paid by day-cruise operators and charter vessels.

Princess Cruises is rerouting four ships from Seward to Whittier beginning summer 2004. These four ships will make 36 turn-arounds in Whittier, every Saturday and Sunday. Carnival Cruises is also planning to use Whittier as a turn-around point in summer 2004 for one ship and plans to land in Whittier eight times during the summer season (on alternate Wednesdays). Table 9 shows the date, day of the week, name of the ship, the ship's capacity, and arrival and departure times during summer 2004.

The first Princess ship will arrive on Saturday, May 15, and the last Princess ship, will leave from Whittier on Monday, September 13. Passengers on northbound trips from Vancouver, B.C. are expected to disembark around 9:00 a.m. Passengers boarding in Whittier for a south bound cruise will depart Whittier at 9:00 p.m. the same day. The Carnival ship's first arrival will be on May 26, 2004. If the Princess and Carnival ships operate at capacity arriving and departing from Whittier, approximately 177,300 passengers will be passing through Whittier in summer 2004.

Table 9. Cruise Arrivals and Departures for Whittier, Summer 2004

Date	Day of Week	Ship	Capacity	Arrive in Whittier	Depart from Whittier
May 15, 2004	Saturday	Coral Princess	1,974	9:00 a.m.	9:00 p.m.
May 17, 2004	Monday	Dawn Princess	1,998	9:00 a.m.	9:00 p.m.
May 22, 2004	Saturday	Island Princess	1,970	9:00 a.m.	9:00 p.m.
May 24, 2004	Monday	Sun Princess	2,022	9:00 a.m.	9:00 p.m.
May 26, 2004	Wednesday	Carnival Spirit	2,124	7:00 a.m.	9:00 p.m.
May 29, 2004	Saturday	Coral Princess	1,974	9:00 a.m.	9:00 p.m.
May 31, 2004	Monday	Dawn Princess	1,998	9:00 a.m.	9:00 p.m.
June 5, 2004	Saturday	Island Princess	1,970	9:00 a.m.	9:00 p.m.
June 7, 2004	Monday	Sun Princess	2,022	9:00 a.m.	9:00 p.m.
June 9, 2004	Wednesday	Carnival Spirit	2,124	7:00 a.m.	9:00 p.m.
June 12, 2004	Saturday	Coral Princess	1,974	9:00 a.m.	9:00 p.m.
June 14, 2004	Monday	Dawn Princess	1,998	9:00 a.m.	9:00 p.m.
June 19, 2004	Saturday	Island Princess	1,970	9:00 a.m.	9:00 p.m.
June 21, 2004	Monday	Sun Princess	2,022	9:00 a.m.	9:00 p.m.
June 23, 2004	Wednesday	Carnival Spirit	2,124	7:00 a.m.	9:00 p.m.
June 26, 2004	Saturday	Coral Princess	1,974	9:00 a.m.	9:00 p.m.
June 28, 2004	Monday	Dawn Princess	1,998	9:00 a.m.	9:00 p.m.
July 3, 2004	Saturday	Island Princess	1,970	9:00 a.m.	9:00 p.m.
July 5, 2004	Monday	Sun Princess	2,022	9:00 a.m.	9:00 p.m.
July 7, 2004	Wednesday	Carnival Spirit	2,124	7:00 a.m.	9:00 p.m.
July 10, 2004	Saturday	Coral Princess	1,974	9:00 a.m.	9:00 p.m.
July 12, 2004	Monday	Dawn Princess	1,998	9:00 a.m.	9:00 p.m.
July 17, 2004	Saturday	Island Princess	1,970	9:00 a.m.	9:00 p.m.
July 19, 2004	Monday	Sun Princess	2,022	9:00 a.m.	9:00 p.m.
July 21, 2004	Wednesday	Carnival Spirit	2,124	7:00 a.m.	9:00 p.m.
July 24, 2004	Saturday	Coral Princess	1,974	9:00 a.m.	9:00 p.m.
July 26, 2004	Monday	Dawn Princess	1,998	9:00 a.m.	9:00 p.m.
July 31, 2004	Saturday	Island Princess	1,970	9:00 a.m.	9:00 p.m.
August 2, 2004	Monday	Sun Princess	2,022	9:00 a.m.	9:00 p.m.

Date	Day of Week	Ship	Capacity	Arrive in Whittier	Depart from Whittier
August 4, 2005	Wednesday	Carnival Spirit	2,124	7:00 a.m.	9:00 p.m.
August 7, 2004	Saturday	Coral Princess	1,974	9:00 a.m.	9:00 p.m.
August 9, 2004	Monday	Dawn Princess	1,998	9:00 a.m.	9:00 p.m.
August 14, 2004	Saturday	Island Princess	1,970	9:00 a.m.	9:00 p.m.
August 16, 2004	Monday	Sun Princess	2,022	9:00 a.m.	9:00 p.m.
August 18, 2005	Wednesday	Carnival Spirit	2,124	7:00 a.m.	9:00 p.m.
August 21, 2004	Saturday	Coral Princess	1,974	9:00 a.m.	9:00 p.m.
August 23, 2004	Monday	Dawn Princess	1,998	9:00 a.m.	9:00 p.m.
August 28, 2004	Saturday	Island Princess	1,970	9:00 a.m.	9:00 p.m.
August 30, 2004	Monday	Sun Princess	2,022	9:00 a.m.	9:00 p.m.
September 1, 2004	Wednesday	Carnival Spirit	2,124	7:00 a.m.	9:00 p.m.
September 4, 2004	Saturday	Coral Princess	1,974	9:00 a.m.	9:00 p.m.
September 6, 2004	Monday	Dawn Princess	1,998	9:00 a.m.	9:00 p.m.
September 11, 2004	Saturday	Island Princess	1,970	9:00 a.m.	9:00 p.m.
September 13, 2004	Monday	Sun Princess	2,022	9:00 a.m.	9:00 p.m.
Total Passengers			88,668		

Source: Personal communications with Princess Cruises staff (October 2003), and Carnival Cruises staff (October 2003).

Comments about these new opportunities from cruise companies and others contacted for this report can be summarized as follows:

- Carnival Cruises will reroute their one cruise vessel that had previously docked in Seward to Whittier for the 2004 and 2005 summer seasons. Carnival Cruise lines has no plans to add an additional vessel to this cross-Gulf route within the next two years (their schedules have been set).
- Princess Cruises has two to three ships in construction at this time. Dependent upon customer demand, one or two of these ships may be added, or replace other ships, in the Alaska cross-Gulf fleet.
- Princess anticipates it will be necessary to have 54 landings of cruise ships at the Whittier Dock within the next two years, in order to receive an adequate return on the $13 million they are investing in the Whittier Cruise terminal development project (note: it was not established that these 54 landings would be by Princess ships only).
- Some crew members are expected to receive a day off while their ship is in port at Whittier. It is possible that these crew members will need transport into Anchorage, if they choose not to remain in Whittier for a full day. At this time, it is unknown how many cruise members will have the day off while in Whittier, and of that number how many may need transportation to or from Whittier.
- Cruise passengers are expected to spend very little time in Whittier, as it will merely be a transportation hub for arriving or departing cruise ships.

3.2 ARRC Potential Growth and Revenue Impact Attributable to Cruise Industry

The "wait-and-see" attitude that many cruise lines have with regards to future customer demand, means that no firm estimates of the number of cruise ships that might be expected to call in Whittier beyond 2004 are available. However, considering the large capital investment in the new cruise dock and terminal, and the continued growth in the Alaska cruise industry, considerable growth is expected to occur in the near term for cruise ship dockings in Whittier.

3.2.1 Passenger Growth

According to data provided by the Cruise Ship Agencies (October 2003) over the past ten years, the annual average growth has been 15.5 percent. However, over the past six years, annual average growth has been approximately one percent.

Table 10 presents potential cruise passenger growth at a 1 percent level, a 15.5 percent, and a mid-range 8 percent growth rate. Each growth rate starts at the expected 2004 passenger total of 177,300.

Table 10. Potential Cruise Passenger Growth

	1 Percent Growth	15.5 Percent Growth	8 Percent Mid-Range Growth
2004	177,000	177,000	177,000
2005	179,000	205,000	192,000
2006	181,000	237,000	207,000
2008	185,000	316,000	241,000
2010	188,000	421,000	281,000
2015	198,000	865,000	414,000
2020	208,000	1,779,000	608,000
2025	219,000	3,656,000	893,000
2030	230,000	7,515,000	1,312,000

Princess Cruises is hoping to have 54 landings within the next two to three years. Since they are one of the main investors in the cruise ship terminal, we expect that they will reach their goal of 54 landings by 2006. Due to the nature of the cruise industry and its dependency on generating customer demand, it is difficult to predict growth after 2006. Therefore, a mid-level growth rate is used rather than the low or high rates of growth, for growth occurring after 2006.

Table 11 presents the expected growth for cruise passengers and calls per year for Whittier, using the rationale described above.

Table 11. Expected Growth of Cruise Passengers and Calls/Year

	Number of Passengers	Calls per Year
2004	177,000	42
2005	200,000	48
2006	226,000	54
2008	264,000	61
2010	308,000	70
2015	453,000	98
2020	665,000	139
2025	977,000	195
2030	1,436,000	276

Calls per year, per week, and the estimated capacity for cruise ships landing at Whittier, are provided in Table 12. The capacity of ships is expected to increase, however, because more ships are currently being constructed in the 2,600 range. The number of these ships that will be added to the fleet docking at Whittier is unknown.

Table 12. Potential Cruise Vessel Call Schedule

	Calls per Year	Calls per Week	Capacity
2004	42	2.3	2,100
2005	48	2.7	2,100
2006	54	3.0	2,100
2008	61	3.4	2,160
2010	70	3.9	2,200
2015	98	5.5	2,300
2020	139	7.7	2,400
2025	195	10.9	2,500
2030	276	15.3	2,600

The widening of the tunnel for vehicle transportation has assisted Whittier in becoming a viable option for cruise ship calls. Future options for transporting passengers to and from cruise vessels include motor coaches and rail service. At this time, it is anticipated that besides the regular train that arrives and departs Whittier once per day (197 capacity), an additional 300 passenger capacity train will be added for days that the Princess and Carnival cruise ships are in Whittier. According to the ARRC, Princess Cruises has agreed to have at least 200 cruise passengers at each landing and sailing transported to and from Whittier via rail.

If one 300-passenger train is filled to capacity, approximately 36 motor coaches will still be needed to carry the remaining passengers to or from Whittier. Cruise industry representatives have expressed concern about delays associated with moving that many motor coaches through the tunnel. For example, the time it takes to move 36 motor coaches through the tunnel could negatively affect the ability of small business operators to transport their customers into or out of Whittier.

3.2.2 Gross Revenues Related to the Cruise Ship Industry

There are several potential sources for revenues related to the re-emergence of cruise ships to the Whittier area. Potential sources include dock related revenues, passenger transport revenues, retail sales, and land leases. Each source is described, and revenue potential is determined and quantified when possible.

3.2.2.1 Dock Related Revenues

A dock with space for a single cruise vessel could support seven vessel calls per week, translating to one vessel call per day. However, the preference of most cruise ship customers, as reported by industry sources, is to sail and land on the weekends. Thus, it is unlikely that vessel calls will occur everyday of the week. Further, as described earlier, 15 calls per week are expected. By 2025, cruise ship docking space will need to be expanded to accommodate this number of calls.

However, considering the circumstances surrounding Princess Cruises' decision to return to Whittier and to invest in a privately owned cruise ship dock and terminal facility, it is unclear what demand there may be for a future ARRC cruise ship dock in Whittier until 2015 or later. The fact that the new cruise ship dock and terminal are privately owned and that there will be no head fees and taxes related to the usage of the dock and facilities for the cruise line, was an appealing factor for relocation and investment of Princess Cruises in the Whittier facilities.

The new dock developed by Whittier Dock Enterprises is not owned by ARRC like the previous cruise ship dock at Whittier. The City of Whittier owns the property; therefore, no dock-related revenues are expected from the new dock for the ARRC. It is unclear what future opportunities may exist for the ARRC with regards to the restoration of the Marginal Wharf or other location that could suit the docking of a large cruise ship. However, according to ARRC, there are no plans to construct or restore a dock suitable for cruise ships.

3.2.2.2 Passenger Transport Revenues

The forecasts for rail ridership presented in this report are based on assumptions about growth in the cruise industry and the tour and charter industry as presented in the previous section. The forecasts of rail ridership for the cruise market are based on illustrative scenarios that take into account a wide range of factors, including the considerable uncertainty associated with looking 25 years into the future. While scenarios describe a potential future state, they are not precise predictions of the future. Instead, scenarios help to envision alternative futures, provoke strategic thought, identify underlying assumptions, illuminate uncertainties, and establish a framework for a shared vision of the future.

Passenger volumes on trains between Whittier and the Anchorage International Airport could be between 200 and 300 passengers per train. The maximum capacity of the train is 300, and Princess Cruises has agreed to minimum ridership of 200 per train. At this time, it expected that the ARRC will have one additional train (the Glacier Discovery) on each day that a cruise ship port call is scheduled in Whittier. It is assumed that if demand for rail transport grew, additional trains could be added.

No firm estimate of revenue per train passenger is available. For the purposes of this report, a rough estimate of $20 revenue per person each way is used. This is based on the knowledge that in 1999, cruise lines estimated that transporting passengers between Anchorage and Seward by motor coach costs, on average, $12.50 each way for each passenger. Although there are no cost estimates for transporting passengers between Whittier and Anchorage by motor coach, it is assumed that costs for transporting passengers between Anchorage and Whittier would be less, but not significantly less than transporting between Seward and Anchorage, with the addition of tolls and waiting times. Therefore, the cost of $12.50 each way for each passenger is assumed to be a similar cost for transporting customers to and from Whittier and Anchorage.

Transportation by rail versus motor coach is considered an upgrade for cruise passengers; therefore, it is rationalized that customers will be charged a higher fair for riding the train, and it may be expected that the revenue per passenger on the train will be higher than that for passengers of a motor coach. Table 13 shows possible passenger volumes for rail with revenues at $20.00 per passenger per one-way trip. The $20.00 per passenger per trip charge is kept constant through 2025, assuming that it will maintain its value by increasing at the rate of inflation.

Table 13. Annual Revenue from Transporting Cruise Passengers by Rail

	Number of Calls	Number of Trains	Passengers per Train	Annual Revenues ($)
2004	48	96	260	499,000
2005	54	108	260	562,000
2006	61	122	260	634,000
2008	70	140	260	728,000
2010	98	196	260	1,019,000
2015	139	278	260	1,446,000
2020	195	390	260	2,028,000
2025	276	552	260	2,870,000

No attempt has been made to consider revenue-maximizing strategies in terms of ticket prices and passenger levels. For example, it is possible that train sets used to transport cruise ship passengers to and from the Anchorage International Airport or downtown Anchorage could also be used to transport day tour passengers the opposite direction. However, there is not enough information at this time on scheduling requirements or equipment to know if such dual use is feasible. Separate estimates for revenues related to transporting day tour passengers are provided in a subsequent section.

As the number of cruise ship calls increases, the number of trains required to transport customers to and from Whittier will also increase. This could provide ARRC an opportunity to increase train ridership, as well as expand services provided to cruise ship customers, such as add-on tours to other rail destinations in Alaska. Growth in calls, and the number of cruise passengers in general, could affect the infrastructure needs of the Whittier area. It could eventually become necessary to build a second tunnel to accommodate the increased demand for travel into and out of Whittier via trains, buses, and vehicles associated with growth in both cruse ship dockings, day tour customers, and other visitors to Whittier.

3.2.2.3 Retail Sales

Retail sales have not been established for the ARRC or forecasted at this time. It is likely that ARRC revenues from retail activities are diminutive at this time, however it is possible that this area of revenue could increase in the future. For example, if economic activity increases in Whittier due to the renewed cruise ship activity, the ARRC could benefit by leasing land or building space for retail shops adjacent or close to the cruise ship docks.

3.2.2.4 Land Leases-

The ARRC has 25 acres that are managed by the city and leased to private entities. The ARRC also leases five acres directly to the city, which is the land on which the main residence of the city is housed. The majority of residents in Whittier live in a large condominium complex that sits on this acreage.

Existing ARRC land leases call for 8 percent to 10 percent of appraised value. In Whittier, leases are currently $1.00 per square foot per month. In 2005, leases will be increased to 10 percent of fair market value. The current fair market value is $2.73 per square foot per month, and in 2005, the fair market value may be approximately $3.01 per square foot per month[4]. Whittier manages all lands owned by the ARRC, and the ARRC and city share the revenues from the leases. Private entities pay the city to lease lands from the railroad, and the railroad is then paid a percentage of city revenues earned through the leases. Currently the ARRC is paid 20 percent of city revenues from land leases. In 2005, this will increase to 40 percent.

The projected lease revenue is provided in Table 14, assuming a three percent rate of inflation and a two percent lease rate increase. The percentage paid to the ARRC and the potential ARRC gross revenues are also presented. The ARRC gross revenues are based on receiving a percentage of the city's revenues as explained above. The land available for lease remains constant at 25 acres per year. The five acres leased to the city by the ARRC is not considered in this analysis due to the expectation that this lease is negotiated under unique circumstances.

Table 14. ARRC Land Lease Revenues

	Lease Rate (per square ft.)	Lease Revenue Paid to ARRC (%)	ARRC Gross Revenue ($)
2004	1.00	20	218,000
2005	2.87	40	1,249,000
2006	3.01	40	1,311,000
2008	3.32	40	1,446,000
2010	3.66	40	1,594,000
2015	4.67	40	2,034,000
2020	5.96	40	2,596,000
2025	7.61	40	3,314,000

3.2.2.5 Summary of Revenues Related to Cruise Industry

Table 15 provides an estimate of total annual revenues related to cruise industry activities. Both ARRC passenger revenues and land revenues have the potential to increase beyond the levels forecasted here, dependent upon the growth of the cruise ship industry, as well as other related activities in the Whittier area.

[4] Assumes an annual three percent increase due to inflation, plus an annual two percent increase for a lease rate increase.

Table 15. Summary of ARRC Revenues

	ARRC Passenger Revenues	Land Lease Revenues	Total Revenues
2004	499,000	218,000	717,000
2005	562,000	1,249,000	1,811,000
2006	634,000	1,311,000	1,945,000
2008	728,000	1,446,000	2,174,000
2010	1,019,000	1,594,000	2,613,000
2015	1,446,000	2,034,000	3,480,000
2020	2,028,000	2,596,000	4,624,000
2025	2,870,000	3,314,000	6,184,000

4 Day Tour Activities

Several day tour activities take place in Prince William Sound and Whittier. Prince William Sound is a very popular destination for glacier viewing, as well as sea kayaking, fishing, and sightseeing in general.

4.1 Day Tour Operators

Large day tour operators are those that have large capacity boats and take multiple trips each week. Small day tour operators are considered to be those boats with a typical capacity of six passengers. Whittier has a variety of large and small day tour operators.

4.1.1 Large Day Tour Operators

At present, there are six major tour operators in Whittier—Phillips Cruises and Tours, Major Marine Tours, Cruise West, Prince William Sound Tours, CIRI, and Honey Charters. These operators see a mixture of opportunity and obstacles in Whittier, but expect growth to exceed five percent annual growth in the near term.

Descriptions of these six major operators are provided below.

Phillips Cruises and Tours. Phillips Cruises and Tours has one vessel with a capacity of 350 passengers. The speed of the vessel would allow Phillips to offer three trips per day, with a total capacity of 1,050 people per day. Phillips currently offers one trip per day, which is coordinated with ARRC shuttle schedules. They have an average passenger ridership of 250 to 275 per day. Phillips Cruises and Tours will be docking their boat next to the cruise ship dock next season.

Major Marine Tours. Major Marine has one vessel operating in Whittier with a capacity of 175 people and currently offers one tour per day. Their average customer load is 150 per trip. Major Marine is not planning additional sailings or a new, larger vessel in the near future. Major Marine Tours will also be docking their boat next to the cruise ship dock next season.

CIRI/Alaska Heritage Tours. This tour operator has a capacity of 150 per day, for either a 4-hour or 6-hour tour of the sound.

Prince William Sound Tours. Prince William Sound Tours has one vessel operating in Whittier. This vessel has a capacity of 100 people, but averages 75 people on their daily trip.

Cruise West. Cruise West has two vessels, with a combined capacity of 125, and average daily passengers of 100. These vessels are used for overnight trips of three to four days in length, and depart from Whittier twice per week during the summer season.

Honey Charters. Honey Charters has three boats with an overall capacity of 75 people. Honey Charters attributes over 90 percent of their business to providing shuttle service for sea kayakers. Therefore, they take an average of three trips per day during the summer season.

Growth in the day tour market could include new operators, but could also include growth of existing operators. In 1999, it was reported that the Whittier harbormaster had received calls from operators interested in providing new tour services in Whittier, some for vessels in the 80-passenger range. Currently, Passage Canal LLC is constructing a private marina that will provide 150 additional slips to house small to mid-size boats in Whittier. The availability of additional dock space is expected to provide opportunity for more tour boat companies to operate out of the Whittier area, as well as opportunity for existing operators to expand their fleets.

4.1.2 Smaller Day Charter Operators

Numerous small charter operators take small groups on fishing trips and tours, provide water taxi service for kayakers, and offer other services. There were 30 such tour operators in 1999, and as of summer 2003 there were 33 small charter operators. With an average capacity of six passengers, approximately 200 people per day could come to Whittier for small day charter activities given the number of operators in 2003.

4.2 Related ARRC Revenues

Existing tour and charter volumes are approximately 750 people per day for larger day tour operators, and approximately 200 for smaller operators, for a total day tour capacity of approximately 950 passengers These passengers currently arrive by train, automobile, or motor coach, typically from Anchorage.

When contacted for comment, several tour operators mentioned that the current rail schedule with the mid-day arrival (12:20 p.m.), conflicts with their scheduled tour times. This translates into fewer customers using rail transport as a means to and from Whittier. Further, some of the tour operators offer motor coach transport to and from Whittier as part of their ticket price. Some tour operators have also voiced concern over conflicts between different modes of visitor transportation, and the coordination of vehicles, buses, trucks and trains through the tunnel. There is particular concern over how the transport of cruise ship passengers in and out of Whittier will affect their ability to move their own customers in and out of Whittier.

Many passengers on day tours will travel to and from Whittier by private automobile or motor coach. Still, the opportunity exists for the ARRC to transport a significant portion of the passengers by rail. Most of the operators interviewed for this report expressed interest in transporting their customers via train, especially if it is possible to coordinate train schedules with their tour schedules.

4.2.1 Rail Passenger Revenue Related to Day Tour Operators

Although day tour operators serve approximately 950 customers per day, this could increase rapidly, dependent upon customer demand and the ability of current operators to increase their capacity through additional trips each day, as well as additions to the fleet. Currently it is estimated that annual growth in day tour ridership will be five percent[5]. Table 16 shows possible passenger volumes, ARRC ridership, and potential net revenues. Revenues per person are estimated at $20 per passenger one-way ($40 round trip).

[5]Based upon conversations with Whittier day tour operators.

Table 16. Potential Annual ARRC Revenues

	Day Tour Passengers	ARRC Ridership (per day)	Round Trip Ticket Revenue ($)	Annual Revenue ($)
2004	998	150	40	756,000
2005	1,047	157	40	791,000
2006	1,100	165	40	832,000
2008	1,155	173	40	872,000
2010	1,212	182	40	917,000
2015	1,273	191	40	963,000
2020	1,337	201	40	1,013,000
2025	1,404	211	40	1,063,000

Notes: Assumes an average annual growth rate of 5 percent in passenger volumes, 15 percent of day tour passengers ride trains, and based upon 18-week seasons (126 days).

In order for these forecasted revenue levels to be reached, additional train capacity would be necessary. This would likely mean larger trains, with additional trains transporting customers to and from Whittier on a daily basis.

Gross Revenues Related to Day Tour Industry

As described in the ARRC Projects section, the Marginal Wharf has been condemned so no dockings are allowed. Instead, some boats that were docking at the Marginal Wharf are now using the Delong Dock. The Delong Dock is owned by both the City of Whittier (50 percent) and ARRC (50 percent). The ARRC recently spent $500,000 upgrading the Delong Dock, and currently receives all revenues associated with the dock. After the ARRC recoups its expenditures on the dock, the city will begin to receive revenues from their part ownership of the dock.

Displaced fishermen that no longer had a place to dock after the Marginal Wharf closed use the Delong Dock. The only day tour operator that used the Marginal Wharf, and that is now using Delong Dock, is Cruise West/Alaska Heritage. Other day tour operators use the Whittier Small Boat Harbor, which is owned and operated by the city. Cruise West has 2 vessels with a capacity of 125 passengers. Each averages 100 passengers and sails twice a week.

The ARRC charges day cruise vessels in Whittier the same passenger service charge and dockage fees as outlined in the ARRC / Seward dock tariff. Day tour operators using Whittier docks pay a $1 per passenger fee for each time a passenger crosses the dock ($1 per person for passengers departing Whittier, and $1 per person for passengers arriving Whittier). In addition, operators pay a 3 percent sales tax to the City of Whittier. The dockage fee for vessels up to 300 feet in length is $1.00 per foot per 24-hour period, with a $50.00 minimum charge.

The following tables are provided for discussion purposes. Table 17 shows potential passenger volumes at the Delong Dock, and Table 18 shows the associated revenues for the period 2001 to 2020. The first table starts with the existing number of vessels that use the Delong Dock and allows for reasonable growth in the average capacity of vessels. Currently, only Cruise West uses the Delong Dock as a launching dock for their multi-day trips. It is assumed that more tour boats will move to the Delong Dock as demand for tour boat trips increases. This scenario also assumes that two of these boats will provide trips on a daily basis, while four additional boats will provide multi-day trips similar to those offered by Cruise West. The forecasts also presuppose that the capacity and length of vessels will increase with time, and thus the average capacity of vessels will increase too.

Table 17. Day Tour Passenger Volumes at ARRC Dock

	Number of Boats	Average Capacity	Number of Sailings/Week	Average Length of Vessel
2004	2	65	4	100
2005	2	65	4	100
2006	3	85	11	125
2008	4	85	13	125
2010	4	85	13	125
2015	6	85	22	125
2020	7	100	24	150
2025	8	100	26	150

Table 18. Day Tour Revenues at ARRC Dock

Year	Annual Dockage Revenues	Annual Boat Passenger Fee Revenues	Total Annual Revenues
2004	7,200	9,360	16,560
2005	7,200	9,360	16,560
2006	24,750	33,660	58,410
2008	29,250	39,780	69,030
2010	29,250	39,780	69,030
2015	49,500	67,320	116,820
2020	64,800	86,400	151,200
2025	70,200	93,600	163,800

Note: Based on an 18 week summer season.

4.2.2 Parking Lot Revenues

Another source of revenue for the ARRC attributable to day tour activities is the parking lot that is being developed on leased ARRC land by Alaska Recreation Incorporated. This land is owned by the ARRC, managed by the City of Whittier, and leased to a private entity, Alaska Recreation Incorporated. The parking lot is expected to have a capacity of 700 to 800 spaces, and is adjacent to a campground that will be managed by Alaska Recreation Incorporated as well.

According to employees of the City of Whittier, the lease for the parking lot and adjacent camping facility will be based on a predetermined formula. The ARRC will earn 20 percent of revenues from the leased land for the first 2 years, and then 40 percent of this revenue after 2005. The city's lease is based on the sliding fee schedule. For the first $10,000 (of gross revenues), the city earns 1.5 percent, for each additional $10,000, the city's share increases by .5 percent.

The development of a parking lot in Whittier is directly related to the opening of the Whittier Tunnel to highway traffic in June 2000. Highway traffic includes passenger and recreational vehicles, as well as truck and bus traffic.

Table 19 presents the vehicle counts by month, since the opening of the tunnel to vehicles in June 2000, to the latest available information, September 2003. This table only includes passenger and recreational vehicles (excludes trucks and buses).

Table 19. Vehicle Counts by Month, 2000 to 2003

Month	2000	2001	2002	2003
January	-	2,311	1,639	2,269
February	-	2,895	1,642	2,390
March	-	5,879	2,648	3,455
April	-	3,799	3,329	4,474
May	-	8,795	10,402	10,927
June	14,495	14,521	15,351	15,645
July	22,528	15,922	18,874	20,008
August	22,118	14,628	16,808	17,304
September	13,866	8,206	11,059	10,893
October	6,028	3,331	4,135	4,549*
November	3,163	1,983	2,930	3,223*
December	2,515	1,554	2,323	2,555*
Total	76,258	75,831	91,140	106,702

Source: Facility Manager Gordon S. Burton, Alaska Department of Transportation and Public Facilities.
Notes: *Data unavailable, based on 10 percent growth over prior year.

The number of passenger and recreational vehicles traveling through the tunnel increased on average by 10 percent annually from 2001 to 2003. Growth is not expected to continue at this 10 percent rate indefinitely, but could until issues of congestion and space become limiting factors, constraining the flow of traffic into and out of Whittier. Based upon these expectations, forecasts for passenger and recreational vehicles are provided by month in Table 20.

Table 20. Forecasted Vehicle Counts for Passenger and Recreational Vehicles by Month, 2004 to 2025

Month	2004	2005	2006	2008	2010	2015	2020	2025
January	2,496	2,745	3,020	3,654	4,422	5,643	6,931	8,034
February	2,629	2,892	3,181	3,849	4,657	5,944	7,300	8,463
March	3,801	4,181	4,599	5,564	6,733	8,593	10,553	12,234
April	4,921	5,414	5,955	7,205	8,719	11,127	13,666	15,842
May	12,020	13,222	14,544	17,598	21,294	27,177	33,376	38,692
June	17,210	18,930	20,823	25,196	30,488	38,911	47,787	55,399
July	22,009	24,210	26,631	32,223	38,990	49,762	61,114	70,848
August	19,034	20,938	23,032	27,868	33,721	43,037	52,855	61,273
September	11,982	13,181	14,499	17,543	21,227	27,092	33,272	38,572
October	5,003	5,504	6,054	7,325	8,864	11,313	13,893	16,106
November	3,545	3,900	4,290	5,191	6,281	8,016	9,845	11,413
December	2,811	3,092	3,401	4,115	4,980	6,355	7,805	9,048
Total	117,372	129,109	142,020	171,844	207,932	265,379	325,919	377,829

Table 21 presents possible revenues from the parking lots for the parking lot operator (Alaska Recreation Incorporated), City of Whittier, and ARRC. Note that ARRC revenue from the parking lot will increase significantly from 2005 to 2006. This is due to the planned increase for percentage of city revenues the railroad is allowed to collect on land that is owned by the railroad but managed by the city. In 2006, it will increase from 20 percent to 40 percent.

Based upon traffic flows prior to the development of the parking lot, it is anticipated that in the short term, approximately 15 percent of vehicles will pay to use the parking facilities. As the number of cars traveling to Whittier increases, it will be necessary for more people to use the parking lot facility; thus, the percentage of vehicles using the parking lot will increase with time (to approximately 30 percent). It is expected that revenues to ARRC from parking will be limited due to the space available for parking, as well as the other factors that are limiting the flow of vehicle traffic into and out of Whittier.

Table 21. Possible Net Parking Lot Revenues for ARRC

	2004	2005	2006	2008	2010	2015	2020	2025
Vehicles parking	23,474	25,822	28,404	34,369	51,983	66,345	97,776	113,349
Revenue for city	29,900	35,921	43,180	62,498	140,309	226,716	487,781	653,732
Revenue for ARRC	5,980	14,368	17,272	24,999	56,124	90,687	195,113	261,493

Notes: It is assumed that demand for parking will increase in the future dependent upon growth of vehicular travel to Whittier. Parking lot revenues are based on sliding fee scale for city and subsequent percentage paid to ARRC (20 percent 2004, 40 percent 2005 and after.

Retail Sales and Other Activities

Day tour operators interviewed for this report said they had minimal need for on-shore office or ticket facilities. The larger operators said a 16-foot by 24-foot facility would be nice. The smaller operators said a kiosk or cubicle for one part-time person would be nice, but not necessary.

Day tour activities would also support retail shops, food and beverage establishments, and likely result in the demand for office space. The ARRC could benefit from the corresponding land lease arrangements.

4.2.3 Possible Total Revenues from Day Tour Activities

The following table presents a summary of the annual revenues from major revenue sources that are related to day tour activities. Passenger rail revenues are by far the largest potential source of revenues for the ARRC.

Table 22. Revenues from Day Tour Activities

Year	Rail Passenger Revenues	Parking Lot Revenues	Dockage and Passenger Fee Revenues	Total Annual Revenues
2004	756,000	5,980	16,560	778,540
2005	791,000	14,368	16,560	821,928
2006	832,000	17,272	58,410	907,682
2008	872,000	24,999	69,030	966,029
2010	917,000	56,124	69,030	1,042,154
2015	963,000	90,687	116,820	1,170,507
2020	1,013,000	195,113	151,200	1,359,313
2025	1,063,000	261,493	163,800	1,488,293

5 References

Tryck Nyman Hayes "Port of Anchorage Intermodal Marine Facility Design Study Report"

Northern Economics Inc., "Market Analysis for ARRC Anchorage International Airport Rail Station. July 1999

Table 23. Companies and individuals contacted for this report

Market Area	Organization	Contact Person	Phone No.	Contacted
Cruise Industry				
	Princess Tours	Bob Stone	(206) 728-4202	x
		Don Rosenberger	(206) 728-4202	x
		Dean Brown	(206) 728-4202	x
	Holland America	Bill Pedlar	(206) 281-3535	x
		Pil Broderick	(206) 281-0573	
	Royal Caribbean / Celebrity	Mike Bonner	(305) 539-6270	x
	Norwegian Cruise Lines	Capt. Langset	(305) 436-4956	msg
	Commodore Cruise Lines	Michael Smith	1-800-832-1122 x2128	msg
	Radisson Cruises	Paul Goodwin	1-800-477-7500 x326	msg
	Cruise Line Agencies	Greg Lebeau (Kenai office)	562-8808 (Anch.) 252-6090 (Kenai)	x
Tour Companies				
	CIRI/Alaska Heritage Tours	Kelly Bender	777-2822	x
	Phillips Tours	Brad Phillips	276-8023	x
	Allen Marine	Grant Johnston	276-5959	x
	Major Marine	Ron Major	274-7300	x
	Alaska Sightseeing / Cruise West		276-1305	x
	Premier Alaska Tours	Peter Grinwald	279-0001	msg
	Lazy Otter Charters	Mike Bender	345-3775	msg
	Auklet Charter Services	David Janka	(907) 424-3428 or 253-3428	x
	Honey Charters		(907) 472-2493	msg
Freight				
	Crowley Marine	Jim Dwight	(206) 443-8100	x
		Craig Toranga	257-2822	x
	Samson Tug & Barge	Mike Halco	(206) 767-7820	x
		Jerry Morgan	(206) 767-7820	x
	Northland Services	Ed Spawnhurst	1-800-426-3113	x
	Lynden Transport	Dave Haugen	245-1544	x
	Lynden Logistics	Mark Anderson	245-1544	x
	Dojer Inc.	Jerry Protzman	472-2499	x
	Great Pacific Seafoods		248-7966	x
Other				
	DOTPF	Tom Moses	269-0401	x
	Whittier	Rick Hohnbaum	(907) 472-2327	x
		Boat Harbor	(907) 472-2330	x
	Passage Canal LLC	Jim Barnett	346-2755	x

APPENDIX B

PHASE I ENVIRONMENTAL SITE ASSESSMENT FOR WHITTIER INTERMODAL DEVELOPMENT

Prepared by
Larsen Consulting Group

Doug
Kenley-
Larson

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APPENDICES

1.0 INTRODUCTION

1.1. PURPOSE

The purpose of this report is to present the findings of the Phase 1 Environmental Site Assessment (ESA) for the Alaska Railroad Terminal area in Whittier, Alaska. The ESA was performed as specified by American Society for Testing and Materials (ASTM) Standard E1527 – 97: Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process. This report was prepared in accordance with the proposal presented by Larsen Consulting Group (LCG) to Peratrovich, Nottingham & Drage, Inc. (PN&D) on October 20,1999 and the Peratrovich, Nottingham & Drage, Inc., Work Order No. 1 dated October 27, 1999.

The scope of the ESA, as outlined in the ASTM standard, included conducting appropriate inquiry into previous ownership and uses of the property and surrounding area to identify the potential for contamination at the site. The purpose of the ESA is to satisfy one of the requirements to qualify for an "innocent landowner defense" to Comprehensive Environmental Response, Compensation, and Liability (CERCLA) act liability. The primary goal of the ESA was to identify recognized environmental conditions, including the presence or likely presence of hazardous substances or petroleum products that are either stored on site, or that may be potentially contaminating the soil or groundwater at the site or in the immediately surrounding area.

1.2. LIMITATIONS AND EXCEPTIONS OF ASSESSMENT

LCG's services were performed, within the limits imposed by our client, using the degree of care and skill ordinarily exercised under similar circumstances by reputable environmental professionals in the State of Alaska. The work conducted did not include any invasive investigations, such as drilling or excavation, and did not include soil or water sampling. The investigation was based solely on a review of existing available information, and information gathered during the site visit and interviews. No other warranty or representation, either expressed or implied, is made as to the findings and professional advice presented in this report.

1.3. LIMITING CONDITIONS

Reported spills of approximately 10 million gallons of hazardous materials or petroleum products occurred in the Harbor Expansion Area during the Good Friday earthquake of 1964. Appendix A provides the location of the tank farm site and Harbor Expansion Area. The nature and extent of this spill is of such magnitude that the contamination generated by the event overshadows any contamination that may have occurred after 1964. Thus, it is difficult to determine the level of contamination, if any, resulting from a post-1964 spill event due to the extreme levels of existing contamination throughout the area.

1.4. METHODOLOGY USED

This ESA was performed in accordance with the ASTM Standard referenced above and was accomplished in three phases including: 1) completing a records and historical sources review, 2) conducting interviews with Alaska Railroad and City officials, and 3) completing a site reconnaissance to observe existing conditions and document potential sources of contamination. This report was prepared utilizing the comprehensive knowledge obtained when performing the three phases of the project, and our experience completing similar projects.

A systematic approach was used for the site reconnaissance. The railroad terminal area was divided into four sections consistent with available drawings for the project area including the far west area, the central west area, the central east area, and the far east area. Drawings depicting each area were obtained from PN&D and are attached in Appendix B. These drawings included the most recent information available for the project site. During the site visit, 11" X 17" drawings of each section and of the overall project site were available for reference and were used to document existing features.

Ms. Deborah Allen, PE and Ms. Samantha Spindler, EIT of LCG conducted the site visit on October 22, 1999. During the site visit, a reconnaissance of each section was conducted. Land use, locations of fuel storage tanks, evidence of contamination, etc. were noted on the drawings or in the field notes, as appropriate. Locations of facilities such as buildings, and visible utilities such as manholes and fire hydrants were observed to verify the accuracy of the site map. Differences noted between the drawings and the observed site conditions were recorded.

2.0 SITE DESCRIPTION

Observations during the site reconnaissance, information gathered during the records/historical sources review, and facts gathered during the course of interviews with the Alaska Railroad and City of Whittier Officials were used to compose the information presented in this section.

2.1. Location and Legal Description

The City of Whittier is located on the northeast side of the Kenai Peninsula, at the head of the Passage Canal. The community is located on the western shores of Prince William Sound and is 75 miles southeast of Anchorage. The City encompasses an area of approximately one square mile at the base of mountains that rise steeply to elevations of over 3,500 ft. The local tide range occasionally exceeds 16 ft. The geographical coordinates for Whittier are 60° 46' N Latitude, 148° 41' W Longitude. Whittier lies in Section 24, Township 008 North, Range 004 E, of the Seward Meridian. The City is located within the Anchorage Recording District.

2.2. Site and Vicinity Description

The project site consists of the Alaska Railroad Terminal in Whittier, which is located on a relatively flat, fan-shaped delta adjacent to the coastline. The train tracks run parallel to the coastline. The terminal covers a total approximate area of 51 acres. Refer to Appendix B for drawings depicting the project area.

2.3. Descriptions of Structures, Roads, and Other Improvements on Site

The terminal area is bordered by Whittier Street on the west side and by Depot Road on the southeast side. The coastline of Prince William Sound is immediately adjacent to the northern boundary of the terminal area.

2.3.1. *Marine Docks*

Delong Dock is located on the east end of the project site. Historically, the dock was used to transfer jet fuel from barges to land and through the pipeline between Whittier and Anchorage. According to Alaska Railroad personnel, the dock is no longer in use. As noted during the site visit, the fueling facility consisted of four 12-inch diameter jet fuel pipelines, two that were marked as out of service. The facility is reported to be owned by the U.S. Army. The ownership of the dock facility is in the process of being transferred to the City of Whittier and to the Alaska Railroad Corporation.

The barge slip, which is located on the northeast portion of the project site, is a docking facility for incoming and outgoing freight barges.

The Whittier small boat harbor is located near the western end of the terminal area. Shoreside Petroleum is located along the shore at the western end of the small boat harbor adjacent to the Alaska Railroad terminal property, and operates a commercial fuel dock to supply marine traffic.

2.3.2. *Large Structures*

The Transit Shed is located on the north side of the project area. The shed is divided into 4 bays that are accessed from the marginal wharf on the north side of the building. The two eastern-most bays are leased out for storage. Both of these areas were observed to contain some drums with unknown contents. The adjacent area is leased to Crowley Marine as their Whittier headquarters. During the site visit, the Crowley area appeared to resemble a mechanical shop. There were several drums of unknown contents stored in the area, various tools and parts, and disassembled equipment. No floor drains or water or sewer services were observed for this area during the site visit, although access was limited to the leased properties and an exhaustive search was not performed. The remaining area at the western end of the building is utilized by the railroad as their on-site headquarters. Persons in the office confirmed the presence of sewer and water service to the office area during the site visit.

The Transit Shed may have had an on-site sewer system that consisted of a leachfield that discharged into the harbor at one time. Although rumored, evidence of the existence of this system has never been found to the knowledge of the Alaska Railroad Officials.

A large building leased to Great Pacific Seafoods is located on the south side of the project site. During the site visit, the facility was locked, and the windows were boarded-up. Therefore, the interior of the building was not inspected. Great Pacific oversees the following operations:

1. Off-loading fish from the railroad dock adjoining the Transit Shed called the marginal wharf.

2. Processing and packaging fish at the facility for shipping.

3. Shipping the fish to the Anchorage company headquarters.

2.4. Information Reported by Users Regarding Environmental Liens or Specialized Knowledge or Experience

Alaska Railroad and City of Whittier Officials indicated that there are no environmental liens on the property to the best of their knowledge.

2.5. Current Uses of the Property

The property is currently used as a railroad yard/terminal area for the Alaska Railroad Corporation and is owned by the State of Alaska. Passengers and freight are on/off loaded and freight is stored on the project site. The Transit Shed on the property is used as an office for the railroad with the majority of the building leased to other entities for storage as discussed in Section 2.3.2. The Alaska Railroad Real Estate Official was requested to obtain a list of the lessees for the project site. Refer to Appendix C for the list of lessees.

Delong Dock is located on the west end of the project site. It is currently not in use and is owned by the U.S. Army. The ownership of this property is in the process of being transferred to the City of Whittier and to the Alaska Railroad Corporation. The City of Whittier is to obtain ownership of the tide land surrounding the dock, and the Alaska

Railroad is to obtain ownership of the dock itself. Appendix D contains the legal document transferring the ownership of Delong Dock.

2.6. Past Uses of the Property

The project site was developed in the 1940s by the Federal Government, Department of the Army as a year-round terminal for the Alaska Railroad.

In 1985, the Alaska Railroad changed ownership from the federal government to the State government as per the regulations sited in 45 CFR 501 and AS 42.40. Appendix E includes the Interim Conveyance documenting the change of ownership. The project site has been used as a railroad terminal area/yard continuously since its initial development.

2.7. Current and Past Uses of the Adjoining Properties

Observations during the site reconnaissance, along with information and references gathered during interviews with Alaska Railroad and City of Whittier officials were used to establish the current and past uses of the properties adjoining the project site. Appendix A provides a drawing labeling the structures on and adjoining the project site, as well as other pertinent features observed during the site visit. The following sections provide more detailed descriptions of the properties adjoining the railroad yard.

2.7.1. *Northern Adjoining Properties*

The project site is adjoined on the northwest by property owned by the Alaska Railroad Corporation. This property is classified by the Alaska Railroad as non-operational lands and is leased to the City of Whittier under Alaska Railroad Corporation Contract No. 7531. Refer to Appendix F for a map illustrating the Alaska Railroad non-operational lands currently leased to the City of Whittier.

The leased land adjoining the project site to the northwest is referred to as the Harbor Expansion Area. The area primarily consists of the small boat harbor and contains structures for commercial and municipal purposes. The harbormaster's office, a used oil disposal facility, the Alaska Marine Highway terminal area and docks, a freight outfit, and various commercial venders are located in this area. There is also automobile and boat storage within this area.

Prior to 1964, the harbor expansion area was occupied by four major facilities. including the U.S. Army petroleum, oil, and lubricant tank farm; Union Oil petroleum, oil, and lubricant tank farm; a small cluster of U.S. Army camp buildings; and the Columbia Lumber Company Mill. The site is discussed and illustrated in the document *Environmental Investigations, Harbor Expansion Area, Whittier, Alaska for the Alaska Railroad Corporation* prepared by Golder Associates in 1996. A United States Geological Survey (USGS) map prepared based on an aerial photo taken in 1950 was reviewed. The tank fuel farm is illustrated on the map. Refer to Appendix G for a figure illustrating the Whittier portion of the USGS map and Appendix H for a copy of the Golder report.

The 1964 earthquake destroyed the existing waterfront facilities at the small boat harbor. The Alaska Department of Environmental Conservation (ADEC) sited the resulting spill to be approximately 10 million gallons of petroleum products. Following the earthquake, the army demolished the tank farm and other facilities in the harbor expansion area. Union Oil relocated all salvageable materials, removed all debris from the site, and terminated its lease in the spring of 1966.

The small boat harbor was re-built in the early 1970s, and was expanded in 1980 to its current capacity of 332 berths. The northern portion of the expansion area was filled and graded for parking and storage of boats and vehicles. Appendix I provides copies of 1973 and 1982 aerial photographs that document area development during those periods. Whittier serves as a gateway to Prince William Sound from the Cook Inlet area for sport fishermen and hunters, and for other recreational users because of the relatively short travel distance between Anchorage and Whittier.

The Alaska Railroad cleaned up a site adjacent to the railroad loading ramp and the transit shed containing PCB-contamination shortly after acquiring the property from the federal government in the mid-1980s, according to David Nyman, Alaska Railroad Environmental Engineer for 1985 - 1988. Several hundred barrels of PCB-contaminated soils and a building containing PCB-filled transformers were removed. The contamination was related to federal government activities at the site. Appendix J contains documentation of possible PCB contamination and a location map of the PCB contaminated sites. The documentation states that there was contamination in the Old Union Oil Building. Note that Alaska Railroad Officials do not know the location of this building, although it is suspected that it is the Transit Shed.

Shoreline Petroleum, located on the east side of the Harbor Expansion Area, stores and distributes fuel for automobiles and for marine traffic in the small boat harbor. There are two gas pumps and four approximately 10,000-gallon fuel storage tanks. The tanks were aboveground and double-walled. Two of the tanks were labeled diesel fuel, one was labeled unleaded gasoline, and the fourth tank was labeled #1 fuel oil. Surface staining of the soil was noted in front of both diesel tanks during the site visit. Several drums were observed in the area in front of the tanks, and one of the tanks was dented. The tank farm was partially surrounded by chain-link fencing. The fill stand was located approximately 50 feet northeast of the tank farm and consisted of two pumps. A slight fuel odor was noted in the area surrounding the fill stand. The fuel dock that serves marine traffic is located on the shore of the small boat harbor.

Effluent from the City sewage treatment system is discharged to the harbor through an ocean outfall located in the east side of the Harbor Expansion Area.

2.7.2. *Southwest Adjoining Properties*

The project site is adjoined on the southwest by property owned by the Alaska Railroad Corporation. This property is classified as non-operational lands and is leased to the City of Whittier under Alaska Railroad Corporation Contract No. 7531. Refer to Appendix F for a drawing illustrating the Alaska Railroad non-operational lands leased to the City of Whittier.

The leased land adjoining the project site to the southwest is currently abandoned and is partially used for boat and vehicle storage. Previously, this was the site of the Koppers Creosote Plant, which treated timber railroad ties. Soils contaminated with creosote and other chemicals associated with wood treatment were found and documented in a 1969 report; however, this report but was not available for LCG's review. The extent of the contamination is unknown, but there was a threat to the potable groundwater resources as reported by Ecology and Environment, Inc. in their 1986 site inspection report. U.S. Environmental Protection Agency (EPA) and ADEC investigations indicated there was no contamination of the potable water sources for the City of Whittier as noted in a memo dated December 8, 1986. Refer to Appendix K for a copy of the memo. No evidence of any remediation efforts at the site was uncovered during research.

During the site visit, the land in this area appeared relatively undisturbed except for some areas near the road that appeared to have been filled with gravel. The remaining area was vegetated with grasses, willows, and alders. Standing water was noted in low areas.

2.7.3. *South and Southeast Adjoining Properties*

The properties adjoining the project site to the south and southeast consist of the city pump houses and maintenance buildings, the Anchor Inn Hotel and Restaurant, Alaska Railroad property leased to the City (Whittier Manor), Long's Marine, and boat/vehicle storage. Refer to Appendix D for the property ownership records from the City of Whittier. Appendix F provides a map illustrating the Alaska Railroad non-operational lands leased to the City of Whittier.

Two fuel storage tanks, one aboveground and one underground, were observed adjacent to the City maintenance building. Various heavy equipment and vehicles were parked outside the building.

Long's Marine is an automotive and marine repair service shop. There is a large horizontal used oil storage tank located adjacent to the shop. It is unknown whether the tank is in use.

The City septic tanks are located on land adjoining the project site to the southeast. The septic tanks are west of the Whittier Manor as shown on the figure in Appendix A. The septic tank effluent is discharged through an ocean outfall located in the east side of the Harbor Expansion Area.

2.7.4. *Northeast Adjoining Properties*

The coastline of Prince William Sound adjoins the project site to the northeast.

3.0 RECORDS REVIEW

3.1. STANDARD ENVIRONMENTAL RECORD SOURCES

3.1.1. *Federal Records*

The United States EPA maintains the databases for the National Priority List, the Resource Conservation and Recovery Act (RCRA) Corrective Action and RCRA Treatment, Storage, and Disposal Facilities List, the RCRA Generators List, and the Emergency Response Notification System List. Investigations into these databases related to the City of Whittier resulted in the following:

The National Priority List has no listings for the City of Whittier.

The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) contained no listings within the project search area.

The RCRA Corrective Action and RCRA Treatment, Storage, and Disposal Facilities List has no listings for the City of Whittier.

The RCRA Generators List is a list of reported Large Quantity Generators with their EPA Identification Number, location, and quantity of RCRA hazardous waste generated. Appendix L provides the RCRA Generator listings on reported hazardous waste generators in the State of Alaska. The only listing for the City of Whittier includes the ADEC-City of Whittier Impound Yard, which reported 1.32 RCRA tons of hazardous Waste generated. No acute hazardous waste was reported to be generated in Whittier.

The Emergency Response Notification System (ERNS) List is a list that records calls and reports to the National Response Center. The database for ERNS holds records from 1990 to the present. Appendix L provides the ERNS listings on reported incidents located in Whittier. There are two reported incidents on the project site in which the National Response Center was notified:

1. On July 19, 1999 a tank truck was overfilled from a rail tank car. Approximately 40 gallons of diesel fuel was spilled on the soils of the railroad yard. The suspected responsible party was Shoreside Petroleum.

2. On April 12, 1998 a fuel pipe developed a leak. Approximately 7 gallons of diesel fuel was spilled on the soils of the railroad yard. The suspected responsible party was Shoreside Petroleum.

3.1.2. *State Records*

ADEC maintains databases for contaminated sites, reported spills, active and permanently closed underground storage tanks (USTs), and active and permanently closed leaking underground storage tanks (LUSTs). Investigations into these databases indicated the following for the City of Whittier:

The Contaminated Sites Database is the State of Alaska's equivalent to the National Priority List. The database contains records for reported contaminated sites from March

24, 1964 to July 14, 1998. Currently, it contains the most recent accumulated information on contaminated sites available from the State of Alaska. There were eleven records on contaminated sites for the City of Whittier. A summary of these sites is included in Appendix M. Listings specific to the project site include the following.

- Approximately 40 gallons of Diesel fuel was spilled on the soils of the railroad rail yard. The suspected responsible party was Shoreside Petroleum.
- A contaminated area of 8' X 16' was reported on the project site in 1992.
- Twenty-five gallons of diesel fuel were spilled on the railyard soils as a result of overfilling a tank truck from a rail car.

There are three reported sites in the Whittier area in which the contamination was substantial:

1. Approximately 10 million gallons of diesel fuel was spilled on the soils of the Small Boat Harbor Expansion area as a result of the 1964 earthquake.
2. Creosote and chemical contamination associated with wood treatment at the Koppers Creosote Plant were documented in a 1969 report. The extent of the contamination is unknown, but there was a reported threat to the potable groundwater resources.
3. In 1995, 113,000 gallons of fuel spilled in the Military Fuel Tank Farm within the secondary containment area (Appendix G). Some of the fuel escaped the containment area and was detected in nearby monitoring wells. Approximately 95-99 % of the fuel was recovered during cleanup and remediation efforts. Potential impact to the groundwater resources in the area of the spill is of concern.

The Alaska Spills Database is a database for all spills reported between July 1995 and the present. Spill records prior to July of 1995 are available through ADEC, but it is difficult to find specific records and isolated spills in particular locations because records were not consolidated prior to establishment of the database.

The database reported spills ranging from 1 gallon to 400 gallons of a petroleum product. In 1995, there was a 100-gallon spill of an "other" substance reported. Appendix M provides a listing of the spills reported in Whittier.

The List of Active and Permanently Closed LUST Sites is a series of lists that records active and closed leaking underground storage tanks in the State of Alaska. The *active LUST list* contains one record for the City of Whittier. The location of this record is given as Whittier – BLDG 17-302. No other information was provided in the record, and the location of the tank is unknown. Additional information on this LUST has been requested from ADEC. Tim Stevens of ADEC responded that little information was available on this listing.

The *permanently closed LUST list* contains no records for the City of Whittier.

The List of Active and Permanently Closed Registered UST Sites is a series of lists that includes a record of active and closed underground storage tanks that are registered with the State of Alaska. Presently, the lists available are identical to the LUST lists for Whittier. ADEC was contacted and is attempting to remedy the problem.

3.2. Physical Setting

The physical setting of Whittier was inferred from a 7.5 minute United States Geological Survey Map and from the 1996 Golder Associates *Environmental Investigations of the Harbor Expansion Area in Whittier, Alaska* (Appendix H).

The City of Whittier is located on the northeast side of the Kenai Peninsula, at the head of the Passage Canal. Whittier is on the western shore of Prince William Sound and encompasses an area of approximately one square mile at the base of mountains that rise steeply to elevations over 3,500 ft. The local tide range occasionally exceeds 16 ft.

Whittier glacier is located approximately one-half mile south of the community and terminates at an elevation of 1,000 ft. Whittier Creek flows from the glacier terminal moraine down the mountainside, to the delta and into the harbor.

The Alaska Railroad Terminal in Whittier is located on a fan-shaped delta adjacent to the coastline. There is considerable groundwater flow on the project site because the run-off from the adjacent mountains passes through the deltaic deposits on its way to the harbor.

3.3. Historical Use Information

Based on information gathered from the interviews with Alaska Railroad Officials and from the *Environmental Investigations of the Harbor Expansion Area in Whittier, Alaska* performed by Golder Associates, it was inferred that the project site was developed in the 1940s by the Federal Government, Department of the Army as a year-round terminal for the Alaska Railroad.

In 1985 the Alaska Railroad changed ownership from the federal government to the State of Alaska as per the regulations sited in 45 CFR 501 and AS 42.40. Refer to Appendix E for the Interim Conveyance documenting the change of ownership. The project site has been used as a railroad terminal area and railyard continuously since development.

Aerial photos from 1973 and 1982 verify that the project site has been utilized as a railroad terminal area throughout the period and to the present. Appendix I provides copies of the aerial photos.

USGS maps were obtained based on aerial photos taken in 1950 and 1976. The tank fuel farm that resulted in the 10 million gallon spill in the 1964 earthquake is shown on the map based on the 1950 aerial photo, and the Harbor Expansion Area is noted on the map based on the 1976 aerial photo. Appendix G provides figures prepared using scanned images of these USGS maps.

3.4. Additional Historical and Current Land Use Sources

The Whittier Alaska Walking Map, the Alaska Railroad Land Lease Map, and the R&M Land Status Map provided additional information regarding the current land use in the

City of Whittier. Appendix M includes copies of the walking map and the R&M Land Status Map. Refer to Appendix F for the Alaska Railroad Non-Operational Lands Lease Map.

The report titled *Environmental Investigations of the Harbor Expansion Area in Whittier, Alaska* (Appendix H) dated January 1996 and prepared by Golder Associates provided information about the historical land use of the project site and the surrounding area.

4.0 INFORMATION FROM SITE RECONNAISSANCE AND INTERVIEWS

4.1. OFFICIALS INTERVIEWED

4.1.1. *David Haywood, Public Safety Officer for the City of Whittier*

David Haywood has been the public safety officer in Whittier for 2 years. Mr. Haywood provided general knowledge about the current conditions in the area. His historical knowledge was somewhat limited because he has only lived in the community for 2 years.

4.1.2. *Charlene Arneson, Harbormaster for the City of Whittier*

Charlene Arneson has lived in Whittier since 1964. She moved to Whittier just after the Good Friday earthquake. Ms. Arneson provided general current and historical knowledge of the City of Whittier, including the project site. She noted that she seldom crosses the project site but does work in the areas adjoining the project site. She also noted that, in general, there is a frequent occurrence of sheen on the harbor waters during the summer months; however, Ms. Arneson suspects that this contamination is related to groundwater flow through contaminated soils resulting from the 10-million gallon spill that occurred during the 1964 earthquake.

4.1.3. *David Nyman, Environmental Engineer for the Alaska Railroad, 1985 – 1988*

David Nyman worked for the Alaska Railroad for the period between 1985- 1988. This period was just after the railroad transferred from federal to state ownership. Mr. Nyman was knowledgeable about the occurrence of PCB-containing transformers on the project site. He noted that the clean-up operations for the PCB contamination during the late 1980s were completed in accordance to ADEC and the US EPA regulations, and that reports documenting the operations were created.

4.1.4. *Susan Schrader, Alaska Railroad Environmental Engineer, Current*

Susan Schrader is currently working for the Alaska Railroad as an environmental engineer. She has worked for the railroad since 1994. The interview with Ms. Schrader was performed jointly with Mike Fretwell, Alaska Railroad Real Estate and Dave Hamre, Alaska Railroad Project Manager for the Whittier Intermodal Transportation Project. Ms. Schrader was knowledgeable about most of the events of environmental concern that occurred on the project site since the Alaska Railroad has been state owned. She also was knowledgeable about some of the current and past locations of fuel tanks on and around the project site. She noted that due to the physical setting of the Whittier terminal area, the groundwater flows relatively quickly. Thus, she noted that contamination could migrate onto the project site that did not necessarily originate on the project site.

4.1.5. *Mike Fretwell, Alaska Railroad Real Estate*

Mike Fretwell is currently working for the Alaska Railroad in the Real Estate Department. Mr. Fretwell was knowledgeable about the transfer of the railroad from federal to state ownership. He noted that the land ownership was transferred as per an Interim Conveyance in accordance with 45 CFR 501 and AS 42.40. He also provided general information about the project site.

4.1.6. *Dave Hamre, Project Manager for the Alaska Railroad Intermodal Project*

Dave Hamre is currently working for the Alaska Railroad as a Project Manager for the Whittier Intermodal Project. He provided a document that summarizes the testing results for asbestos and lead in the Whittier Transit Shed performed in 1999. A copy of the report is included in Appendix O.

4.1.7. *Carry Williams, City Manager for the City of Whittier*

Carry Williams is currently the City Manager for Whittier. Numerous attempts have been made to arrange an appointment for an interview. At the present time, an interview appointment has not been established.

4.1.8. *Scott Pexton, Alaska Department of Environmental Conservation*

Scott Pexton of ADEC provided information about the Creosote Plant Contamination and the status of the 1964 spill event. He referred LCG to Jeff Brownlee, the project manager for remediation projects in Whittier with the Army Corps of Engineers.

4.1.9. *Jeff Brownlee, Alaska Department of Environmental Conservation*

Jeff Brownlee is currently working with the Army Corps of Engineers on the Power Plant Tank Demolition and the proposed Whittier Pipeline Testing. He noted that the harbor expansion contamination area is on hold for remediation until 2002. At that time, the extent of the contamination will be investigated and necessary remediation efforts will be identified.

4.2. HAZARDOUS SUBSTANCES

4.2.1. *Contamination*

Building materials in the Transit Shed tested positive for lead and asbestos in 1999 according to Alaska Railroad officials. Removal operations are proposed but are not yet definite. Refer to Appendix O for testing results and the removal proposal.

The former Koppers Creosote Plant for the treatment of timber railroad ties was located adjacent to the property to the southwest. Soils contaminated with creosote and chemicals associated with wood treatment were found and documented in a 1969 report. The extent of the contamination is unknown, but there was a reported threat to the potable groundwater resources in the area. U.S. Environmental Protection Agency investigations performed in 1981 and 1986 indicated there was no evidence of contamination of the potable water source.

Small areas of stained soil at various locations on the project site have been observed by several persons interviewed, and were observed during the site reconnaissance. Typical areas noted for stained soils are as follows:

1. Near underground fuel storage tanks where vents or fill pipes have broken, water has infiltrated, and the product has floated out of the tank.
2. On/in between the railroad tracks as a result of equipment failure.
3. Vehicle/boat storage areas as a result of small leaks or fueling operations from fuel jugs.
4. Near the tanks at the aboveground diesel fuel storage tanks at Shoreside Petroleum. A petroleum odor was also noted at the vehicle fill stand.

Soils stained with oil, PCBs, or occasional debris have been observed during previous excavations as noted throughout this report. Some of this contamination and related debris may have resulted from the 1964 earthquake.

4.2.2. *Hazardous Substances in Connection with Unidentified Uses*

Various hazardous substances such as methanol and solvents were found in the Transit Shed after the State of Alaska took over ownership of the railroad. At the time, the railroad had a policy of consolidating these substances for disposal in Anchorage. Railroad officials reported that the railyard and terminal area were cleaned up as much as possible when the state took over. However, many hazardous substances were left by the federal government and undocumented contamination likely occurred prior to state ownership. Alaska Railroad Officials state that, they are aware and in control of all hazardous substances present at the project site. During the site visit, areas of the Transit Shed leased to other parties were observed to contain drums; however, the contents of the drums were not known.

4.2.3. *Fuel Distribution*

Shoreside Petroleum presently stores and distributes fuel for automotive and marine vehicles on the west side of the Harbor Expansion Area. Refer to the project site plan in Appendix A for the exact location of the facility. The facility consists of a fuel dock for marine traffic, two gas pumps located on the shore, and four aboveground storage tanks. Bulk fuel is stored in tank cars on the Alaska Railroad siding. The location of the tank cars is indicated on the Site Plan in Appendix A.

Dave Nyman noted that there was an old fueling site for the Alaska Railroad located on the south side of the Transit Shed. Alaska Railroad Officials indicated that there currently are no fueling areas for the railroad on the project site. The locomotives fuel in Anchorage.

4.3. Hazardous Substance Containers and Unidentified Substance Containers

4.4. Storage Tanks

4.4.1. *Fuel Storage Tanks*

Dave Nyman noted that there was an aboveground fuel storage tank near the south side of the transit shed when the state took over the railyard. The tank was likely a heating fuel tank that was removed when natural gas service was installed in Whittier.

Susan Schrader stated that in 1991 the railroad removed an underground storage tank and replaced it with a 500 gallon above ground storage tank. This tank was not observed during the site visit.

An above ground fuel storage tank was located in front of the City maintenance building and appeared to be in use. The tank is likely used to fuel City vehicles. An underground fuel storage tank was located adjacent to the rear of the City maintenance building. Vent pipes and an access port were observed during the site visit. The area was heavily overgrown and no soil staining was observed. The tank is likely a heating oil tank that was abandoned when natural gas was installed.

A small fuel storage tank was noted adjacent to the Anchor Inn. Another small fuel storage tank was noted near the Great Pacific Seafood's Building. The approximate locations of each of these fuel storage tanks are shown on the figure in Appendix A.

In the 1940's, the U.S. army built a permanent power plant. A tank supplied fuel for the power plant. The 1.5 million-gallon field constructed tank was set into an excavated rock bluff lined with a few inches of fuel saturated sand. The power plant tank site is located about 480 feet east of the Anchor Inn restaurant. Refer to Appendix A for the tank site location.

The power plant was demolished in the 1970's when power was routed to Whittier from Portage. The tank was recently demolished and disposed of properly. The underlying sandbed, consisting of approximately 118 cy of contaminated soils, was removed and thermally treated. Further contamination is not expected due to the impermeable nature of the rock bluff.

The pipelines that were used to fill the tank from Delong Dock and supply the power plant are scheduled to be tested during the spring of 2000. The scope of work includes: (1) drilling boreholes and collecting soil samples to determine the level of soil contamination in the pipeline corridors, and (2) tapping the pipeline and collecting samples to determine the pipeline contents.

4.4.2. *Bulk Fuel Rail Cars*

Shoreside Petroleum stores fuel in bulk fuel rail cars stored on a siding on the southwest portion of the project site as shown in Appendix A. At the time of the site visit, seven cars were observed.

4.4.3. *Septic Tanks*

The City septic tanks are located on land adjoining the project site to the southeast. The septic tanks are west of Whittier Manor as shown on the figure in Appendix A. The effluent is discharged through an ocean outfall located on the east side of the Harbor Expansion Area.

4.4.4. *Used Oil Storage Tanks*

Several of the persons interviewed mentioned that there was, at one time, a waste oil disposal tank located in the Harbor Expansion Area. This disposal tank was removed when the used oil disposal facility was constructed.

A used oil tank is located adjacent to Long's Marine on the property adjoining the project site on the southeast.

4.4.5. *Heating Oil Tanks*

Dave Nyman noted that there was, at one time, a heating oil tank located on the west side of the Transit Shed. There were likely other heating oil storage tanks located throughout the site and adjacent areas in the past such as those discussed in Section 4.1.1. The tanks were probably removed when natural gas service was installed in the community.

4.5. INDICATIONS OF PCBs

The Alaska Railroad, in cooperation with the U.S. Environmental Protection Agency, performed remediation operations on several sites contaminated with PCBs. Several hundred barrels of PCB-contaminated soils and a building containing PCB-filled transformers were removed during the late 1980s after the State of Alaska took over ownership of the railroad. The contaminated substances were shipped to the lower 48 for proper disposal. All concrete remaining in place was cleaned and epoxy sealed.

David Nyman reported that documentation of the remediation operations was prepared. Appendix I contains documentation of possible PCB contamination and a location map of the PCB contaminated sites. The documentation states that there was contamination in the Old Union Oil Building. Note that Alaska Railroad Officials do not know the location of this building, although it is suspected to be the Transit Shed.

Interviews with Alaska Railroad Officials and Dave Nyman revealed that there were PCB contaminated transformers in the transit shed and approximately five transformer vaults containing PCB-filled transformers. The transformers were completely removed from the Transit Shed. The vaults were fully remediated, but it is unknown whether all of the vaults were removed. The general location of the vaults can be found in Appendix J.

During the site visit, existing electrical transformers were observed. All transformers noted were labeled "No PCBs".

4.6. Indications of Waste Disposal

During the site visit, there was little indication of solid waste disposal on the project site or surrounding area. Railroad officials noted that occasionally there is solid waste abandoned on or near the project site. The waste is cleaned up in a timely manner. During the site visit, small quantities of miscellaneous materials such as scrap metal, trash, etc. were noted on the terminal site. In general, the area was clean and relatively free of debris and solid waste. The railyard adjacent to the north side of the railroad tracks appeared to have been recently regraded.

The City of Whittier has all of the solid waste, contaminated substances, and recyclable products hauled out of the City by Southwest Peninsula Sanitation. There are several garbage dumpsters available throughout the city for deposition of solid waste. All solid wastes are disposed of outside of the community as there is currently no landfill in Whittier. A concrete vault in front of Whittier Manor, where an old heating oil tank car was recently removed, is filled with garbage such as paper plates and pop cans.

Alaska Railroad officials mentioned that there was some incident where Great Pacific Seafoods might have been releasing fish by-products into the storm water system. Very little details were available.

The old city dumpsite was briefly mentioned during interviews with railroad and City officials. The location was reported to be in the vicinity of the Whittier Airport, which is located to the west of the project site. The dump was not reported to be near the project site.

4.7. Physical Setting Analysis

The Alaska Railroad Terminal in Whittier is located on a fan-shaped delta adjacent to the coastline. There is considerable groundwater flow on the project site because the run-off from the adjacent mountains passes through the fan-shaped delta on its way to the harbor. Because of this physical setting and the likely swift groundwater movement from the mountains to Prince William Sound, contamination could easily migrate to other, previously uncontaminated, areas.

For example, one city official recalled that an oil sheen was observed in the harbor early last summer. The source of the contamination was not found, but it was suspected that the contamination was leached from an unknown source into the harbor. The contamination was contained with booms and cleaned-up under direction of the city. Due to proximity to the 1964 spill, the sheen may have been the result of groundwater washing product into the harbor, or may be related to more recent spill events.

4.8. Any Other Conditions

Stockpiles at several locations and recently backfilled areas were noted during the site visit. Investigations revealed that excavations were recently performed to improve the wastewater collection system, and that the stockpiled soils resulted from these sewer improvements.

Boat and vehicle storage areas were noted at various locations adjacent to the project area during the site reconnaissance. These areas were observed to be relatively clean and free of solid waste and signs of contamination except as otherwise noted throughout this report.

5.0 CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

This investigation was performed in three components in accordance with the procedures outlined in ASTM Standard E1527-97:

1) Review of Records and Historical Sources

2) Conducting Interviews with Railroad and City Officials, and

3) Site Reconnaissance.

This report was prepared based on the comprehensive knowledge obtained during completion of these three components of the Environmental Site Assessment. The findings of the investigation are summarized in the following paragraphs.

- The site was developed in the 1940s by the Corps of Engineers for the U.S. Army to be a year-round terminal for the Alaska Railroad. The area has been used as a railroad terminal area/yard continuously since development. The Terminal area changed from federal to state ownership in accordance with 45 CFR 501 and AS 42.40 under the Interim Conveyance dated January 5, 1985.

- Following the ownership transfer, the Alaska Railroad Corporation instigated a policy to clean-up hazardous and solid wastes and to remediate contaminated areas at the railyard. Extensive clean-up operations were performed in an attempt to remove existing hazardous wastes and contamination. A summary of these removal operations is as follows.

  - PCB containing transformers were found on the project site and removed in the late 1980s. Contaminated soils were removed and shipped to the lower 48 states for proper disposal. Concrete surfaces were scrubbed and sealed with epoxy.

  - Various hazardous substances, such as methanol and other solvents, were found in the Transit Shed. These chemicals were removed for proper disposal off site.

  - Hazardous substances that are currently used on site are controlled by the railroad.

- During previous excavation activities at the railyard and in the surrounding area, soils contaminated with fuel, PCBs, or debris have been found.

- During the site visit, the project site area was observed to be relatively clean and free of solid waste, and minimal signs of contamination were observed. Sources of contamination were not observed on the project site during the site reconnaissance. Interviews with the Alaska Railroad Officials confirmed that established hazardous and solid waste prevention and clean-up policies exist for the railroad terminal area.

- Reported spills of approximately 10 million gallons occurred as a result of the 1964 earthquake in the Harbor Expansion Area. Investigations related to this spill are documented in the 1996 Golder Associates report titled *Environmental Investigations of the Harbor Expansion Area in Whittier, Alaska* (Appendix A). Because of the magnitude of this spill, it is difficult to differentiate the levels of contamination that may have resulted from any subsequent spills.

- Due to the considerable groundwater flow that is reported to occur throughout the project site, contamination could migrate onto the site from upgradient properties.

- The City of Whittier manages the handling, storage, and disposal of solid and hazardous waste. There is a used oil disposal facility available free of charge to the public. Commercial users must pay for the service. There are dumpsters at several locations in the City for disposition of solid waste. All solid and hazardous wastes are shipped out of Whittier for appropriate disposal.

Based on the findings presented in this report, it can be concluded that the Alaska Railroad has undergone extensive effort to minimize the contamination present on the project site related to previous activities, primarily by the federal government. Additionally, the Alaska Railroad had procedures in place to manage and control the storage and use of hazardous substances in the terminal area. Contaminated soils underlying the surface may be present throughout the site due to the historical events and land uses documented in this report.

DISCUSSION

Because of the history of the site, including the 10 million-gallon fuel spill, previous PCB contamination, and use of the area as a railyard for over 50 years, hydrocarbon or other contamination could be found at nearly any location. The Alaska Railroad has maintained a policy of remediating contamination as it is found, however, no extensive investigations to delineate the type and extent of contamination have been performed at the project site. The 1996 Golder investigation (Appendix H) only covered adjacent areas.

A detailed investigation covering the entire site would be required to verify the type and level of contamination that may be present at any particular location. Depending upon the scope of the Phase II investigation, costs could be substantial.

RECOMMENDATIONS

It is recommended that Phase II investigations be conducted as needed at the site of proposed construction projects. For example, a limited drilling program could be conducted at each development location in the Master Plan currently being prepared by PN&D. Verifying the presence or absence of contamination for each individual project would indicate to the Alaska Railroad whether handling contaminated soil and/or groundwater would be required during construction. This would allow the railroad to avoid construction claims associated with encountering unanticipated conditions during construction.

As noted in the October 21, 1999 report (Appendix O), both asbestos and lead based paint were confirmed to be present in the transit shed. Costs for asbestos removal were estimated to be approximately $129,000. Costs for removal of lead based paint were not included; however, these costs should be fairly minimal assuming that the paint is remediated during building demolition, in which case the paint could be disposed of as part of the demolition debris. Removal of both the asbestos and lead based paint should be completed as soon as practicable.

6.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS PARTICIPATING IN PHASE I ENVIRONMENTAL SITE ASSESSMENT

This work for this project was performed and this report was prepared in accordance with generally accepted environmental practices in the State of Alaska at the time of this writing. The report was prepared by Larsen Consulting Group, Inc. under the direction of the undersigned in accordance with the procedures outlined in the *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E 1527-97).

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7.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS PARTICIPATING IN PHASE I ENVIRONMENTAL SITE ASSESSMENT

Ms. Deborah S. Allen. PE has over 15 years of engineering related experience in Alaska, including 10 years as a civil and environmental engineer. Her responsibilities have included project management, sanitary engineering, design, specification writing, geotechnical investigations, hazardous substance investigations, computer programming, water resource assessment, and report preparation. Throughout her career, Ms. Allen has participated on the following projects.

- PL-81 Pipeline Demolition, U.S. Air Force, Elmendorf Air Force Base, Alaska – Project Manager for preparation of design drawings and specifications for the demolition of the PL-81 pipeline. The project included demolishing nearly two miles of abandoned jet fuel and aviation gas pipelines and associated valve pit structures. The project was completed both on Elmendorf Air Force Base and within the Port of Anchorage. Prepared drawings and specifications to remove the pipeline, construct a parking area and bike trail, and restore the asphalt pavement. The entire project was completed in three months.

- UST Removal, Municipality of Anchorage, Department of Property and Facility Management – Senior Reviewer for a variety of underground storage tank (UST) removal and release investigations projects that were conducted at various municipal facilities throughout the City.

- Environmental Investigation, Kiska Island, U.S. Army Corps of Engineers, Alaska – Project Engineer for an environmental field investigation at Kiska Island in the Aleutian Chain. Project responsibilities included documenting and evaluating potential transportation routes and methods for future investigation and remediation activities at sites where potential contamination was encountered. More than 30 operable units were investigated for hazardous materials related to Japanese and American activities during World War II. Unexploded ordnance experts cleared each area prior to Dames & Moore's work. This remote site project was staged from a boat anchored in Kiska Harbor.

- ST-32 Pipeline Demolition, U.S. Air Force, Elmendorf Air Force Base, Alaska – Project Manager for the environmental investigation and design for the removal of the ST-32 fuel pipeline. The project included the demolition of nearly 3 miles of fuel pipeline along with more than 40 associated valve pit structures. The environmental investigation included drilling at each of the valve pits and conducting a soil vapor survey at 100-foot intervals along the pipeline alignment. An environmental report was prepared to document suspected contamination to assist prospective contractors in bid preparation. A complete design package was prepared including drawings, technical specifications, and an engineer's estimate of construction costs. The entire project was completed in just over two months to allow for bidding prior to the end of the federal fiscal year.

- Unexploded Ordnance Evaluation and Risk Analysis, Attu Island, U.S. Army Engineer Division, Huntsville – Project Manager for an Engineering Evaluation/Cost

Analysis (EE/CA) for unexploded ordnance (UXO) at Attu Island. The project included formulating and evaluating alternatives, including the project alternative, based on site history; previous site visits; estimated quantities of UXO; estimated risk to human life, property, and the environment; and a risk analysis performed for the higher priority sites. Results of the EE/CA were presented in a summary report that included a description of, and cost estimate for, implementing each alternative. After completion of the EE/CA, an Action Memorandum was prepared to identify the selected alternative and to serve as a decision document for the COE. Both the EE/CA report and the Action Memorandum were prepared in accordance with EPA guidelines and regulations.

- Soil Stockpile Characterization, U.S. Air Force, Elmendorf Air Force Base, Alaska – Project Manager for a bioremediation project to treat petroleum, oil, and lubricant (POL) contaminated soils. The project included the daily operation, monitoring, and maintenance of a lined bioremediation facility, including soil moisture and temperature monitoring, operation of air injection equipment, and collection and laboratory analysis of soil samples to monitor the progress of the remediation program. Interim reports were prepared periodically to apprise the USAF of the progress of the project. The project also included the characterization and mapping of 18 POL contaminated soil stockpiles to obtain estimates of the quantity of soil present, as well as the type and level of contamination in each stockpile. The goal of the mapping and sampling program was to provide adequate data to allow the Air Force to prepare a plan for the ultimate treatment and disposal of the soil.

- Site Assessment and Remediation Work Plans, National Park Service, Denali National Park, Alaska – Staff Engineer responsible for preparing remediation work plans and cleanup cost estimates for 17 properties within the historic Kantishna Mining District in Denali National Park. A comprehensive work plan was provided that included design drawings and construction/bid specifications for remediation using bioremediation (landfarming) and thermal treatment (incineration) for petroleum contaminated soils. Additional background samples and leachability analyses will be performed in areas suspected of being impacted by metals, arsenic, and/or cyanide.

- Environmental Assessment, National Park Service, Denali National Park – Field Engineer for a large Level I and Level II environmental assessment for hazardous materials on approximately 200 patented and unpatented lode and placer mining claims covering more than 4,700 acres in the old Kantishna mining district. Responsibilities included site reconnaissance and evaluation, soil and ground water sampling, and report preparation.

- Environmental Assessment, Federal Deposit Insurance Corporation, Tudor Centre, Anchorage – Project Engineer responsible for a Phase II environmental assessment of a shopping center. Responsibilities included installing and sampling three ground water monitoring wells and two soil borings, as well as preparing a report presenting the investigation findings.

- Remediation Work Plan, Arctic Coiled Tubing, Prudhoe Bay, Alaska – Project Manager for the preparation of a comprehensive work plan to remediate hydrocarbon contaminated soils at an oil field support facility on the North Slope of Alaska. Key aspects of the work plan included consideration of soil temperature and moisture content because of the low mean annual temperature in the area (10°F), and the resulting effect of reduced biological activity. The work plan included provisions for interim soil sampling and analysis to monitor the progress of the remediation program. A detailed cost estimate to implement the work plan was prepared, and the entire plan was submitted to the Alaska Department of Environmental Conservation for approval.

- UST Removal, Brown & Root, Anchorage, Alaska – Project Engineer for the removal of three USTs and associated piping including two 10,000-gallon gasoline and one 500-gallon waste oil tanks. Specific project duties included monitoring tank removal and closure operations, collecting soil and groundwater samples for laboratory analysis, monitoring backfill operations, and preparing a summary report presenting the results of the field work. Subsequent work included characterizing the soil, which was removed from the excavation, and arranging for treatment and ultimate disposal of the impacted soils.

- Environmental Assessment, Tesoro Alaska Petroleum Company, Anchorage – Project Engineer responsible for a Phase I environmental assessment of a warehouse in Anchorage, including historical data review, site visit and interviews, and preparation of a report presenting the findings of the investigation.

- Environmental Assessment, Tesoro Alaska Petroleum Company, Anchorage – Project Engineer responsible for a Phase II environmental assessment of a warehouse in Anchorage, including supervising the installation of four monitoring wells, soil and ground water sampling for field screening and laboratory analysis, and preparing a report presenting the subsurface investigation findings.

ACADEMIC BACKGROUND

B.S. (1990) Civil Engineering, University of Alaska Anchorage

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers

CERTIFICATIONS/TRAINING

Nuclear Testing Equipment (Densometer) Certificate
First Aid and Adult CPR
HAZWOPER 40 Hour OSHA Training
HAZWOPER 8-hour OSHA Supervisor Training

REGISTRATIONS

Professional Engineer, Alaska (1994), CE #8747

8.0 REFERENCES

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G.5. 2020 Structural Condition Assessment of Whittier Marine Terminal – Report of Findings and Recommendations

December 10th, 2020

2020 STRUCTURAL CONDITION ASSESSMENT OF WHITTIER MARINE TERMINAL

Report of Findings and Recommendations

Whittier, AK


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EXECUTIVE SUMMARY

The inspected structures of the Whittier Marine Terminal were generally in poor condition, with condition assessment ratings ranging from critical to good. Structures/areas in poor, severe, or critical condition are listed below. A summary and general recommendations is in Section 1.3 and a detailed list of observations and recommendations are provided in Section 5 of this report.

- Winch Cells #1, #2 & #3 (1-Critical)
- Timber Finger Dock/Trestle and Mooring Bollard (West End) (1-Critical)
- Marginal Wharf (2-Serious)
- Barge Railcar Transfer Ramp Closed Cells, Timber Trestle & Catwalk (3-Poor)

Structures/areas in poor, serious, or critical condition should be inspected at a minimum of every 2 years due to their condition and frequency of use. Structures/areas in good, satisfactory, or fair condition should be inspected a minimum of every 4 years due to their condition. Inspection frequency recommendations are based on the structure material, coating/protection, condition severity, and environment.

1. GENERAL OVERVIEW AND SUMMARY

1.1 Introduction

This overview highlights the condition of the Whittier Marine Terminal structures in Whittier, AK. In addition, any high priority repair items are summarized within.

PND Engineers, Inc. (PND) provided a visual, above water condition assessment of the Alaska Railroad Corporation's (ARRC) Whittier Marine Terminal on October 6th (above deck) and October 10th, 2020 (below deck via boat). The above water condition assessment was conducted in accordance with *ASCE Manuals and Reports of Engineering Practice No. 130 (MOP 130),* **Waterfront Facilities Inspection and Assessment**, 2015. Global Diving and Salvage (GDS) provided a routine underwater dive inspection on October 6th and 7th, 2020.

See Figure 1 below for satellite view of inspected structures/areas:

- Marginal Wharf
- Turning Dolphin #4 (East end of Marginal Wharf)
- Barge Railcar Transfer Ramp Closed Cells, Trestle and Catwalk
- Barge Pass-Pass Concrete Docks #1 (East) and #2 (West)
- Timber Finger Dock/Trestle and Mooring Bollard (West end of Trestle)
- Winch Cells #1 (West), #2 (Middle) and #3 (East)
- Transfer Bridge
- Turning Dolphin #1 (East of Transfer Bridge)

Figure 1 Satellite View of Inspected Components, Courtesy Google Earth

1.2 Qualifications of Inspectors

An above water investigation of all the ARRC dock structures in Whittier was completed by PND and an underwater inspection was completed by GDS. The investigation was conducted by highly qualified crews from both PND and GDS. The crews were composed of professional and technical personnel experienced in both inspection and assessment of the structural members. The following summarizes the site crew's credentials:

Table 1-1 Qualifications of Inspectors

Personnel	Credentials
Michael Beglin, P.E.	• PND Engineers, Inc. • Senior Engineer • 10 years experience in structural design and inspection
Mark Kobylinski, P.E.	• PND Engineers, Inc. • Senior Engineer • 11 years experience in structural design and inspection
Taylor Mortensen, E.I.T.	• PND Engineers, Inc. • Staff Engineer
Wade St. Clair	• Global Diving & Salvage • Supervisor • 11 year of experience in marine structures dive inspection
Weston Durocher	• Global Diving & Salvage • Diver • 10 years experience in marine structures dive inspection
Casey Lilijedahl	• Global Diving & Salvage • Diver • 9 years experience in marine structures dive inspection
Anthony Smith	• Global Diving & Salvage • Tender • 3 years experience in marine structures dive inspection

1.3 Summary and Recommendations

After a thorough on-site inspection and condition assessment, an overall rating has been assigned to each structure/area on the property. All ratings are based on the rating guidance established in the MOP 130 manual. A brief summary of recommended high priority actions is provided in this section. A more detailed list of all ratings, deficiencies, and repair recommendations on each major component of each structure (per area) is included in Section 5. Condition assessment ratings are for the overall structure (as opposed to each element/component) and are based on scale from 1 to 6. The condition assessment rating assigned to each structure/area is as follows:

Table 1-2 Evaluation and Assessment Summary

Area	Condition Assessment Rating of Entire Structure
Marginal Wharf	2-Serious
Turning Dolphin #4 (East end of Marginal Wharf, Excluding Wharf)	4-Fair
Barge Railcar Transfer Ramp Closed Cells, Timber Trestle & Catwalk	3-Poor
Barge Pass-Pass Concrete Docks #1 & #2	4-Fair
Timber Finger Dock/Trestle and Mooring Bollard (West End)	1-Critical
Winch Cells #1, #2 & #3	1-Critical
Transfer Bridge	4-Fair
Turning Dolphin #1 (East of Transfer Bridge)	5-Satisfactory

Marginal Wharf:

A **serious** condition rating was assigned to the Marginal Wharf. Assignment of this rating was due to advanced deterioration of sheet piling, a failing concrete cap at the catwalk support, loose tie back rods, and repetitive uplands sinkholes near the sheet face. In general, short-term repairs should be made to maintain structural integrity and safe operation until replacement of the entire retaining wall can be completed.

- PND recommends the following action items:Immediately restrict heavy loads from the NE corner, where the wall is leaning.
- Within the next 1-3 years, install a new catwalk support (turning dolphin #4). Restrict use of the catwalk until a competent support is installed.
- At an appropriate low tide, inspect the face of the wall for localized failures in the sheep pile and patch as necessary. Fill sinkholes due to scour and patch holes as they form, until full replacement can be accomplished.
- Repair damaged appurtenances as soon as practical.
- Due to the widespread section loss and deficiencies observed, a full replacement of the Marginal Wharf sheet pile wall should take place within the next 3-6 years. In order to do this, the design and permit process should begin within the next 1-3 years.
- Continue routine inspection of the structure, at a minimum of every 2 years.

Turning Dolphin #4:

A **fair** condition rating was assigned to the Turning Dolphin #4. In general, the dolphin is in good condition; however, the need for minor repairs reduces the rating to fair.

PND recommends the following action items:

- Tighten loose fender bracket bolts by the turn-of-nut method within 1-3 years.
- See Marginal Wharf regarding the catwalk support deficiencies and recommended restrictions.
- Continue routine inspection of this structure, at a minimum of every 4 years.

Barge Railcar Transfer Ramp Closed Cells, Trestle and Catwalk:

A **poor** condition rating was assigned to the Barge Railcar Transfer Ramp Closed Cells, Trestle and Catwalk. Rating assignment was due to advanced deterioration of the closed cells with widespread sheet pile corrosion, sheet pile perforations, full-depth cracks and exposed rebar in the concrete pad, and complete (100%) section loss of H-pile supports for the cantilevered concrete pad. Additionally, there is widespread deterioration of the timber trestle components including damaged and/or split piling, pile caps, diagonal bracing and transverse deck members.

PND recommends the following action items:

- Repair all Closed Cell #1 and #2 sheet pile holes with cover plates, core through concrete pad and fill void with concrete or grout within 1-3 years.
- Patch/repair spalled concrete on concrete pad extensions where rebar is exposed to slow deterioration within 1-3 years.
- Concrete pad extensions no longer carry heavy loads as they were initially designed; however, if temporary or permanent loads should increase beyond foot traffic, further analyses and repairs should be performed.
- Replace all damaged or missing timber trestle members within 1-3 years.
- Continue routine inspection of this structure, at a minimum of every 2 years.

Barge Pass-Pass Concrete Docks #1 and #2:

A **fair** condition rating was assigned to the Barge Pass-Pass Concrete Docks #1 and #2. Rating assignment was based upon minor deficiencies observed including the damaged fender connections, steel pile surface corrosion, concrete deterioration, and a sink hole in the Platform #1 approach.

PND recommends the following action items:

- Repair the damaged fender connections (cracked welds and broken threaded rods) and patch the spalled concrete (where rebar is exposed) within 1-3 years.
- Repair the sink hole with placement of riprap around the bottom of the undermined backwall, followed by placement of geotextile and fill within the approach. Repair as soon as practical.
- Repair the steel tube rail if functionality is affected.
- Continue routine inspection of this structure, at a minimum of every 4 years.

Timber Finger Dock/Trestle and Mooring Bollard:

A **critical** condition rating was assigned to the Timber Finger Dock/Trestle and Mooring Bollard, Closed Cells, Trestle and Catwalk. The rating was based on severe deterioration and compromised structural integrity of the mooring bollard platform and timber finger trestle dock resulting from broken/missing diagonal bracing, nonbearing or damaged pile, limited bearing lengths, lateral displacement, and damaged superstructure members.

PND recommends the following action items:

- Immediately restrict access to the mooring bollard platform and use of the bollard until it is fully replaced or significant repairs are conducted restore structural integrity.
- Immediately restrict dock to as needed foot traffic only until it is fully replaced or significant repairs are conducted to restore structural integrity.
- Replace all diagonal timber bracing in-kind within 1-3 years.
- Shim piles that do not bear on the timber pile cap with steel within 1-3 years.
- Piles that exceed 20% section loss or have splits that extend into or beyond the middle of the pile should be replaced or repaired within 1-3 years.
- Analyze or verify the modified cantilevered stringers near Pass-Pass Platform #2 to ensure the section is sufficient to support the ramp and anticipated loads within 1-3 years.
- Retrofit all pile caps so that the stringer support length meets current code requirements within 1-3 years.
- Replace in-kind the damaged stringer (longitudinal girder) and all damaged ties (transverse deck members) within 1-3 years.
- Continue routine inspection of this structure annually due to the severity of deterioration and frequency of use.

Winch Cells #1, #2 and #3:

A **critical** condition rating was assigned to the Winch Cells #1, #2 and #3. Rating was based on severe widespread corrosion of the sheet pile with localized holes, splits/cracks and fill loss. Moderate to severe deterioration of the concrete caps was also found including spalling, cracking and exposed rebar.

PND recommends the following action items:

- Repair all Winch Cell #1, #2, and #3 sheet pile holes with cover plates. At the face of the cells, where the most significant damage occurred, an engineered repair is recommended to repair the sheets and fenders within 1-3 years.
- Core through the concrete deck and fill cell voids with concrete or grout within 1-3 years.
- Patch/repair spalled concrete on concrete caps where rebar is exposed within 1-3 years.
- Continue routine inspection of this structure annually due to the severity of deterioration and frequency of use.

Transfer Bridge:

A **fair** condition rating was assigned to the Transfer Bridge. In general, the transfer bridge components are in satisfactory condition; however, the need for repair reduces the rating to fair.

PND recommends the following action items:

- Tighten loose bolts by the turn-of-nut method within 1-3 years.
- Continue routine inspection of this structure, at a minimum of every 4 years.

Turning Dolphin #1:

A **satisfactory** condition rating was assigned to the Turning Dolphin #1. In general, the dolphin is in good condition; however, localized deterioration reduces the rating to satisfactory. Reduction of this rating was due to heavy corrosion near two (2) circumferential welds and a bulbous deformation on a vertical pile (both noted underwater).

PND recommends the following action items:

- Inspect/monitor the heavy corrosion near the circumferential welds during next routine inspection.
- Monitor the bulbous deformation on the vertical pile during next routine inspection.
- Continue routine inspection of this structure, at a minimum of every 4 years.

2. BACKGROUND

Alaska Railroad Corporation hired PND Engineers, Inc. to provide the condition assessment services on the Whittier Marine Terminal. PND's Michael Beglin provided an initial site visit on September 29th, 2020 to review the project site and meet with ARRC's Elizabeth Greer.

Following the initial site visit, a two-day above deck and below deck condition assessment was scheduled. PND hired GDS as a subconsultant to provide underwater dive inspection of the structural components at the project site.

3. EVALUATION AND ASSESSMENT METHODOLOGY

3.1 Inspection

The inspection was conducted as a Routine Inspection as outlined in the *ASCE Manuals and Reports on Engineering Practice No. 130 (MOP 130),* **Waterfront Facilities Inspection and Assessment.** The purpose of the inspection was to assess the general condition of the structures, assign a condition assessment rating to each structure, assign element-level damage ratings to each structural component, provide maintenance recommendations, and advise client on maintenance priorities.

3.2 Scope and Methodology

The following summarizes the scope and methodology followed during the condition assessment:

<u>Above and Below Deck Condition Assessment (by PND):</u>

PND provided a visual condition assessment at the project site on October 6th (above deck) and October 10th, 2020 (below deck via boat). A photo log with commentary of the inspection is included in Attachments A1 through A8. Additional photos recorded during the condition assessment are available upon request.

The condition assessment occurred in all accessible locations of each structure/area by foot (above deck) and by boat (below deck), at a Level I effort; which is limited to a visual examination that is detailed enough to detect obvious, major damage or deterioration due to overstress or other severe deteriorations.

<u>Underwater Dive Inspection (by GDS):</u>

GDS provided a routine underwater dive inspection between October 6th and 7th, 2020. Global Diving's full report is included in Attachment C1.

The dive investigation included inspection of the following components. The Marginal Wharf was excluded due to shallow water, a rocky substrate, and rough weather.

- Turning Dolphin #4: steel vertical and batter piles
- Barge Railcar Ramp: steel sheet pile (closed cells) and timber trestle piles
- Barge Pass-Pass Concrete Docks: steel pipe piles and fender piles
- Timber Finger Dock/Trestle: timber piles and diagonal braces
- Winch Cells #1, #2, & #3: steel sheet pile (closed cells), steel fender pile at cell #3
- Turning Dolphin #1: steel vertical and lateral brace (strut) piles

The dive inspection was conducted using Level I, II, and III inspection techniques. The Level I inspection was conducted on 100% of members and included visual assessment of all accessible members. The Level II/III inspection occurred at random locations for each component. Level II inspection included the necessary cleaning over a representative area to sufficiently facilitate a detailed investigation of the member. Level III inspection provided ultrasonic thickness measurements in a representative area.

3.3 Rating Systems

Each structure/area is assigned an overall condition assessment rating based on the observed condition during the time of inspection. For each structure/area, the structural components are then assigned a general element-level damage rating. The condition assessment rating system and element-level damage rating is based on the rating system outlined in MOP 130. The MOP 130 reference tables are provided in Attachment B1.

4. PROJECT SITE OVERVIEW

The following provides a brief overview of the characteristics of the site components. Past reports by ARRC and as-built drawings were referenced.

4.1 Marginal Wharf

The original wharf was likely constructed in the 1940's, during WWII. Since then, many renovations have been conducted and the pile supported wharf was ultimately demolished in 2007. The remaining structure consists of a concrete edge beam atop a steel sheet pile wall extending approximately 1,150 feet along the shoreline. Originally, the concrete edge beams also served as footings for a, now demolished, in-transit shed and are secured by below grade steel tie rods.

4.2 Turning Dolphin #4

Date of construction for Turning Dolphin #4 is unknown, but it appears to be 12-15 years old based on its condition, previous PND project imagery, and Google Earth imagery. The dolphin consists of three (3) piles; two (2) 24-inch-diameter steel batter piles and one (1) 24-inch-diameter steel plumb pile. The fender consists of one (1) 30-inch-diameter steel pile wrapped with large tires for mooring. A 42-foot single-span steel-framed catwalk bridge connects the dolphin to the Marginal Wharf's sheet pile wall concrete cap.

4.3 Railcar Barge Transfer Ramp, Closed Cells, Trestle and Catwalk

The original "Car Barge Slip No.2" was designed in 1964 and consisted of a transfer bridge which would raise and lower with the tide as well as move laterally under an overhead tower-supported gantry and on shore rails. Dolphins supported the side of the barge along the shore.

In 1970, replacement renovations consisted of a 31.5' x 120' steel ramp, closed sheet-pile cells (Closed Cell #1, inboard and Closed Cell #2, outboard) with concrete caps, timber approach trestle and counter-weight machinery houses. The ramp was pin-connected at the shore end and cable-connected to the counter-weight machinery at the sea end. The timber approach trestle consists of 12-inch-diameter timber piles, 12x12 timber caps, 9x17 timber stringers, and 8x10 timber ties which support 3-inch-thick timber deck planks.

In 2010 the counter-weight machinery houses were demolished, the lifting mechanism was retrofitted with a caisson hydraulic lifting mechanism, and the ramp was retrofitted to support the new design. The steel catwalk connecting the shore to Closed Cell #1 was added at some point after the 2010 conversion. PND does not have design information on the catwalk.

4.4 Concrete Pass-Pass Docks (#1 and #2)

The Whittier barge concrete pass-pass docks were constructed in 2002 to facilitate barge unloading, in support of the Railcar Barge Slip. Existing sections of the timber finger dock/trestle were removed to make room for the docks prior to construction. The remaining sections of the timber finger dock/trestle provide connection between the concrete pass-pass docks and access to shore. The concrete pass-pass docks consist of 30-inch-dimeter steel pipe piles (plumb and batter), CIP concrete pier caps, precast concrete deck panels and removeable steel bull rails.

4.5 Timber Finger Dock/Trestle and Mooring Bollard

The timber finger dock/trestle was constructed in 1970 to connect the three (3) mooring dolphins (now Winch Cells #1-3) and the shore. The timber dock consists of 12-inch-diameter timber piles (plumb and batter), 12x12 timber caps, 9x17 timber stringers, and 8x10 timber ties which support 3-inch-thick timber deck planks. Trestle bents are spaced 15 feet apart. Portions of the timber dock were removed when the concrete pass-pass docks were installed in 2002.

4.6 Winch Cells (#1, #2, and #3)

Originally the winch cells were constructed as mooring dolphins in 1970. In 1984 the mooring dolphins were then retrofitted with 75-ton winches and new fairleads. The winch cells are 26 feet in diameter and consist of closed cell sheet pile design. A timber trestle dock provides access from Winch Cell #1 and Winch Cell #2 to the shore and to Concrete (Pass) Dock #1 and #2. Winch Cell #3 is adjacent to the Transfer Bridge and also provides a foundation for its lifting frame's eastern leg.

4.7 Transfer Bridge

The transfer bridge consists of a roll-on roll-off (RO/RO) style ramp pin-supported at the shore abutment and cable-supported with a steel lifting frame at the sea end. The lifting frame's western leg is supported by Concrete (Pass) Dock #1 and its eastern leg is supported by Winch Cell #3.

4.8 Turning Dolphin #1

Date of construction for Turning Dolphin #1 is unknown, but it appears to 10-15 years old based on its condition, previous PND project imagery, and Google Earth imagery. The dolphin consists of one (1) 48-inch-diameter fender pile wrapped with large tires for turning and berthing. The fender pile is supported by four (4) 30-inch-diameter pipe braces to the shore; two (2) at the top and two (2) lower on the fender pile. 6-inch-diameter pins connect the support braces to the shore abutments.

5. SUMMARY OF OBSERVATIONS AND RECOMMENDATIONS FOR REPAIRS AND UPGRADING

For each structure/area, a table provides an element-level damage rating for each structural component and also summarizes the observations made during the condition assessment. The table also includes the condition assessment ratings at each structure/area and provides a list of action items with a recommended priority status.

The element-level damage rating and condition assessment rating is provided based on guidelines established in MOP 130. A table of damage rating and condition rating guidelines is referenced in Attachment B1. Element-level damage ratings include: not inspected, no defects, minor, moderate, major, severe. Condition assessment ratings include: 6-Good, 5-Satisfactory, 4-Fair, 3-Poor, 2-Serious, 1-Critical. PND's priority rating is as follows: "High" priority items - recommend addressing within the next 1-3 years, "Medium" priority items - recommend addressing within the next 3-6 years, and "Low" priority items - recommend addressing within the next 6-10+ years.

5.1 Marginal Wharf

Table 5-1. Marginal Wharf Element-Level Damage Rating, Commentary, Reference Photos, Condition Assessment Rating, Action Items, and Priority

Component	Element Damage Rating	Comment / Explanation of Damage Rating	REF.	Condition Assessment Rating	Action Item	Priority

Steel Sheet Pile	Major to Severe at East End	- Sheet pile wall is leaning seaward along the eastern end, approx. 50-feet in length. A split sheet pile knuckle was observed at the NE corner. The split knuckle occurs at a tailwall and/or terminal end wall.
		- Observed holes in the sheet piles at (2) locations near tie back rods, at the eastern end of the dock.
		- Sheet piles observed were highly corroded with rust scale noted throughout.
		- Shallow water, a rocky substrate, and rough weather, the divers were unable to conduct the dive inspection. Ultrasonic thickness readings as follows:
		  - East end: 0.405”
		  - 200-feet: 0.310”
		  - 400-feet: 0.360”
		  - 600-feet: 0.415”
		  - West end: 0.390”
		- Original design sheet piles are presumed to be PZ-32 with a flange thickness of 0.500”. Calculated average total loss of sheet pile thickness based on UT readings is 24.8%.
		- See GDS Report, Attachment C1.
			A1: MW-1, MW-2	Serious (Rating 2)	- Recommend heavy loads be restricted from the NE corner of the wall.
					- Inspect sheets at low tide to identify and repair local wall failures.
					- Consider replacing the wall in the near future. Begin design and permit process within 1-3 years. Permitting process may take 2+ years to complete.
						High,
						Medium (replace)

Steel Rod Tie Backs	Severe	- Steel tie back rods throughout the sheet pile wall were found loose, i.e. significant gaps between the rod nut/bearing plate and the sheet pile. Due to the separation and ineffectiveness of the tie backs they provide no support with the lateral forces along the entire sheet pile wall length.	A1: MW-2		- Also see action items for “Steel Sheet Pile”.	NA
Concrete Cap & Catwalk Support for Dolphin #4	Severe	- Concrete spalling and cracking was observed in places along the concrete sheet pile cap. Rebar is exposed in several locations and cracks exceed ¼” near the east end, as well as, along the sheet pile to cap interface. - The damaged concrete cap and sheet pile at the east end of the wharf, compromises the support provided to the catwalk for dolphin #4 access.	A1: MW-1, MW-3, MW-4		- Recommend a new support be provided to support the catwalk. - Also see action items for “Steel Sheet Pile”.	High
Cathodic Protection (Anodes)	Not Inspected	- The presence or lack of anodes was not confirmed, since the dive inspection was not conducted due to shallow water, rocky substrate, and rough weather.	A1: NA		- NA	NA
Backfill	Major	- Localized failures in backfill observed from erosion and has been reported in the past. - Observed sinkholes adjacent to a tower and near the east end of the wharf. Currently temporarily repaired with geotextile and gravel fill.	A1: MW-6		- Recommend installing geotextile (filter fabric) and backfilling new erosion holes. - Monitor annually to ensure the failure has not expanded and the remediation remains effective.	High
Armor Rock & Riprap Slope Protection	Minor	- Armor rock and riprap used for slope stability appears stable and/or well maintained. The original slope and elevation of slope protection rock is unknown.	A1: MW-7		- NA	NA
Appurtenances	Severe	- Damaged manhole cover observed. - Damaged fire hydrant observed.	A1: MW-8, MW-9		- Recommend manhole cover and hydrant replacement.	High

5.2 Turning Dolphin #4 and Catwalk (East end of Marginal Wharf, Excluding Wharf)

Table 5-2. Turning Dolphin #4 and Catwalk (East end of Marginal Wharf, Excluding Wharf) Element-Level Damage Rating, Commentary, Reference Photos, Condition Assessment Rating, Action Items, and Priority

Component	Element Damage Rating	Comment / Explanation of Damage Rating	REF.	Condition Assessment Rating	Action Item	Priority

Piles	Minor	- Minor coating damage and corrosion observed, both above water and below water during the dive inspection. Ultrasonic thickness readings as follows:
		  - West batter pile: 0.500”, 0.510”, 0.505”
		  - East batter pile: 0.500”, 0.495”, 0.500”
		  - Vertical fender pile: 0.520”, 0.565”, 0.535”
		- Original design/pile thickness information was not obtained.
		- See GDS Report, Attachment C1.
		- (4) anodes were observed with 95% - 100% remaining.
			A2: D4-1,	Fair (Rating 4)	- NA	NA

Pile Cap	Minor	- Minor coating damage and corrosion observed.	A2: D4-1, D4-2		- NA	NA
Turning Fender	Minor	- Minor deterioration to tire fenders, such as, cuts, gouges, tears, etc. - (4) Four loose bolts observed on the fender bracket.	A2: D4-3, D4-4		- Recommend tightening the loose bolts by the turn-of-nut method. - Also see action items for “Marginal Wharf”.	High
Catwalk (excluding Marginal Wharf Support)	Minor	- Minor coating damage and corrosion observed. - See Concrete Cap, under Section 5.1 Marginal Wharf, for rating of the Marginal Wharf that supports the south end of the catwalk.	A2: D4-5, D4-6, D4-7		- NA	NA

5.3 Barge Railcar Transfer Ramp: Closed Cell #1 (Inboard) & #2 (Outboard), Timber Trestle, & Catwalk (excluding Transfer Ramp)

Table 5-3. Barge Railcar Transfer Ramp: Closed Cell #1 (Inboard) & #2 (Outboard), Timber Trestle, & Catwalk Element-Level Damage Rating, Commentary, Reference Photos, Condition Assessment Rating, Action Items, and Priority

Component	Element Damage Rating	Comment / Explanation of Damage Rating	Appendix Reference	Condition Assessment Rating	Action Item	Priority

Closed Cell #2 (Outboard, north)	Severe	- Above water inspection observed that all sheet piles are affected by corrosion with visible reduction of wall thickness at pitting locations. During dive inspection, heavy corrosion and pitting was observed.
		- Above water inspection observed three (3) perforations on the cell perimeter, one (1) on the north side and two (2) on the south side. During dive inspection, three (3) holes were observed. A 12" x 36" tall, a 4" x 11" tall, and a 8" x 60" tall hole, all located on the south side of the cell. Two (2) hole observed during above water inspection are two (2) of the three (3) holes the divers observed, so four (4) holes total observed. Ultrasonic thickness readings as follows:
		  - South East: 0.385", 0.365", 0.455"
		  - North: 0.410", 0.410", 0.455"
		  - South West: 0.325", 0.250"
		- Original design sheet piles are presumed to be PS-32 with a sheet thickness of 0.500". Calculated average total loss of sheet pile thickness based on UT readings is 23.6%.
		- See GDS Report, Attachment C1.
		- Two (2) concrete pad extensions, "fingers", extend from the closed cell and are supported by H-piles and round piles. The SE finger has two (2) full depth cracks, one of which is ~1/2" wide. The SW finger has complete loss of concrete cover over rebar at one (1) bottom corner.
		- The concrete pad extensions are "supported" by H-pile, which are corroded in half, and therefore do not provide any support. The one (1) round pile that supports the concrete "fingers" has one (1) anode with 40% remaining.
		- Six (6) anodes were in place on the sheet pile with 95% remaining.
			A3: TR-1, TR-2, TR-3, TR-4	Poor (Rating 3)	- Recommended to repair every hole with a 3/8" thick cover plate. Extend the cover plate 2" beyond the edge of the hole or until the sheet pile is a 1/4" thick, whichever is a greater distance. A 2" extension is not required at sheet pile knuckles.
					- Recommend coring through the concrete deck and probing to determine the full extent of fill loss.
					- Following repair of sheet pile holes and probing, fill cell voids with concrete or grout.
					- Recommend further evaluation of the concrete cantilever sections, if areas are loaded or need to be loaded in the future. It is PND's understanding these areas are restricted from use and the H-pile supports no longer need to support the original loading they were designed for.
						High

Closed Cell #1 (Inboard, south)	Major	- Above water inspection observed all sheet piles are affected by corrosion with visible reduction of wall thickness at pitting locations. During dive inspection, medium corrosion was observed.
		- During dive inspection, one (1) 3" hole was observed on the west side of the cell. Ultrasonic thickness readings as follows:
		  - South East: 0.440", 0.350", 0.366"
		  - North: 0.385", 0.360", 0.365"
		  - South West: 0.335", 0.350", 0.470"
		- Original design sheet piles are presumed to be PS-32 with a sheet thickness of 0.500". Calculated average total loss of sheet pile thickness based on UT readings is 24.0%.
		- See GDS Report, Attachment C1.
			A2: TR-5		- See Closed Cell #2 for action items.	High

		- The concrete pad extensions are "supported" by H-piles and round piles. The H-piles are corroded in half, and therefore do not provide any support. The two (2) round pile that support the concrete pad extensions each have one (1) anode with 30% remaining. - Six (6) anodes were in place with 95% remaining.				
Timber Trestle (north)	Severe	- All diagonal timber braces on the pile bents (for lateral support) are severely damaged. Confirmed with dive inspection. - Dive inspection found the timber trestle piles to only have minor damage. - Several structural timbers have major to severe damage, including several transverse deck timber (near the abutment) and the abutment pile cap timber. Also, a transverse deck timber appears to be missing near the abutment.	A3: TR-6, TR-7, TR-8, TR-9, TR-10		- Recommend replacing damaged and missing members.	High
Catwalk (south)	Minor	- Less than 50% of the surface is affected by corrosion. No visual evidence of section loss observed.	A3: TR-11		- NA	NA
Abutment Sheet Pile Wall	Severe	- All sheet piles are affected by corrosion with visible reduction of wall thickness at pitting locations. - Several perforations were observed along the abutment sheet pile wall. Connections, bracing, and general load paths are not clear due to modifications of the existing structure throughout its life. - A portion of the sheet pile abutment wall has a concrete cap that is severely damaged, exposing reinforcement due to spalled concrete. - No ultrasonic thickness readings taken and no coatings or anodes observed.	A3: TR-12, TR-13		- Consider replacing the wall in the near future - Recommend biannual inspection of the abutment.	High
Armor Rock & Riprap Slope Protection	Minor	- Armor rock and riprap used for slope stability appears stable and/or well maintained. The original slope and elevation of slope protection rock is unknown.	A3: TR-14		- NA	NA

5.4 Barge Pass-Pass Concrete Docks #1 & #2

Table 5-4. Barge Pass-Pass Concrete Docks #1 & #2 Element-Level Damage Rating, Commentary, Reference Photos, Condition Assessment Rating, Action Items, and Priority

Component	Element Damage Rating	Comment / Explanation of Damage Rating	Appendix Reference	Condition Assessment Rating	Action Item	Priority

Steel Piles, Platform #2 (West)	Minor	- Less than 50% of the surface is affected by corrosion. No visual evidence of section loss observed.
		- Ultrasonic thickness readings as follows:
		  - East Vertical Pile: 0.615", 0.605", 0.605"
		  - East Batter Pile: 0.610", 0.605", 0.605"
		  - West Batter Pile: 0.615", 0.605", 0.610"
		  - West Vertical Pile: 0.610", 0.610", 0.610"
		- Original design pile thickness is presumed to be 0.625". Calculated average total loss of pile thickness based on UT readings is 2.6%.
		- See GDS Report, Attachment C1
		- An anode is attached to each pile and all are estimated to have 80% remaining material.
			A4: PP-1	Fair (Rating 4)	- NA	NA

Concrete Pile Caps, Platform #2 (West)	Moderate	- Spalling at bottom corners and edges near the face & fender, have eliminated concrete cover, exposing rebar. - On the east end of the most seaward pile cap, a crack extends below the deck panel.	A4: PP-2, PP-3		- Recommend patching/repairing concrete where rebar is exposed. - Monitor existing cracks on routine inspections.	Medium
Concrete Deck, Abutment, & Appurtenances, Platform #2 (West)	Minor	- Minor abrasions, corrosion & efflorescent stains, and cracks less than 1/16" wide observed. - A steels square tube rail along the end of the dock is bent from impact with damaged connection to the dock.	A4: PP-4, PP-5		- Re-tighten connections, capacity does not appear compromised, replace if damage effects operational use.	Medium
Fenders, Platform #2 (West)	Minor to Moderate	- Cracks observed in welds. - Broken threaded rod tie-backs observed. - Several steel fender panel elements bent or gouged, but primary members maintain structurally stability. - Rubber energy absorbers have minor to moderate wear, tears, and gouges.	A4: PP-7		- Recommend repairing damaged connections (welds and threaded rods).	High

Steel Piles, Platform #1 (East)	Minor	- Less than 50% of the surface is affected by corrosion. No visual evidence of section loss observed.
		- Ultrasonic thickness readings as follows:
		  - East Vertical Pile: 0.610", 0.610", 0.610"
		  - East Batter Pile: 0.610", 0.610", 0.610"
		  - West Batter Pile: 0.610", 0.610", 0.610"
		- Original design pile thickness is presumed to be 0.625". Calculated average total loss of pile thickness based on UT readings is 2.4%.
		- See GDS Report, Attachment C1
		- An anode is attached to each pile and all are estimated to have 80% remaining material.
			A4: PP-1		- NA	NA

Concrete Pile Cap, Platform #1 (East)	Minor	- Spalling at bottom corners and edges near the face & fender.	A4: PP-2		- NA	NA
Concrete Deck, Abutment, & Appurtenances Platform #1 (East)	Minor to Severe	- Minor abrasions, corrosion & efflorescent stains, and cracks less than 1/16" wide observed. - A sinkhole was observed at the east end of the abutment. - A steels square tube rail along the end of the dock is bent from impact with damaged connection to the dock.	A4: PP-4, PP-5, PP-6		- Recommend installing geotextile (filter fabric) and backfilling the sinkhole. Place Class I riprap around exterior face of the undermined backwall. - Repair connections and repair/replace in-kind the steel tube rail.	High, Medium
Fenders, Platform #1 (East)	Minor to Moderate	- Cracks observed in welds. - Broken thread rod tie-backs observed. - Several steel fender panel elements bent or gouged, but primary members maintain structurally stability. - Rubber energy absorbers have minor to moderate wear, tears, and gouges.	A4: PP-7		- See Fenders, Platform #2 for action items.	High

5.5 Timber Finger Dock/Trestle and Mooring Bollard (West End)

Table 5-5. Timber Finger Dock/Trestle and Mooring Bollard (West End) Element-Level Damage Rating, Commentary, Reference Photos, Condition Assessment Rating, Action Items, and Priority

Component	Element Damage Rating	Comment / Explanation of Damage Rating	REF.	Condition Assessment Rating	Action Item	Priority
Mooring bollard & Platform (West End of Trestle)	Severe	- Multiple cracks are propagating from torch cut holes. - The sheet pile are leaning out of plum and corroded. - The access platform supports are damaged and, in some cases, no longer connected. The structural integrity of the platform is compromised.	A5: TT-1, TT-2, TT-3	Critical (Rating 1)	- Recommend the access platform and bollard use be restricted until it is fully replaced/repaired.	High
Timber Trestle Piles & Pile Caps	Moderate to Severe	- Piles, and entire trestle, is leaning seaward between the winch cells. - Many diagonal timbers, i.e. lateral bracing, are split, broken, missing or otherwise damaged. The dive inspection reported 90% of the bracing on the piles or were deteriorated to the point of falling off. - One (1) pile at two (2) different bents are not bearing on the pile cap. One is located on the east side of the most westerly trestle section, the other is just west of Pass-Pass platform #1. - Several piles are split, cracked, and in some cases section loss exceeds 50%. - The dive inspection reported the piles, in general, were in good condition below waterline.	A5: TT-4, TT-5, TT-6, TT-7, TT-8		- Recommend replacing, in-kind, all diagonal timber members. - Recommend shimming piles with steel that do not bear on the timber pile cap. - Recommend replacing/repairing piles that exceed 20% section loss. - Recommend replacing/repairing piles with splits that extend beyond the middle of the pile (greater than 50% of the diameter).	High
Timber Stringers, Ties, and Deck Members	Moderate to Severe	- Many, if not all, timber stingers to have inadequate support length and do not meet current codes. i.e. the length of stringer on the pile caps is too short. - Interior stringer adjacent to the Pass-Pass platform #2 are cantilevered. This is a deviation from the original design. - A split and damaged timber stringer was observed east of winch cell #1, on the trestles north exterior stringer. - Several split and damaged timber tie were observed east of winch cell #1, primarily the members northern end.	A5: TT-9, TT-10, TT-11, TT-12		- Recommend modifying all pile caps so that the stringer support length meets current code requirements. - Recommend verifying the modified interior stringers below the Pass-Pass platform #1 transition ramp were altered from the typically simply supported end conditions to cantilevered by intension and carrying capacity is sufficient for the design loads. - Recommend replacing the damaged girder and all damaged transverse deck members. - Analyze or verify the modified cantilevered stringers, near Pass-Pass Platform #2, to ensure the section is sufficient to support the ramp and anticipated loads.	High
Decking, Bullrail, etc	Minor	- Minor abrasions, cracks, and general wear and tear.			- NA	NA

5.6 Winch Cells #1, #2, and #3

Table 5-6. Winch Cells #1, #2, and #3 Element-Level Damage Rating, Commentary, Reference Photos, Condition Assessment Rating, Action Items, and Priority

Component	Element Damage Rating	Comment / Explanation of Damage Rating	Appendix Reference	Condition Assessment Rating	Action Item	Priority
Steel Sheet Pile	Severe	- Holes were observed in all (3) winch cells. Sheet piles observed were corroded with rust scale and pitting noted throughout. Additionally, the dive inspection observed heavy corrosion and pitting. - Winch Cell #1: Numerous holes were observed. Above water inspection observed several "large" holes, splits and cracks along the north side of winch cell #1. Ultrasonic thickness readings as follows: - South East: 0.235" - North: 0.210", 0.231", 0.270" - South West: 0.250" - Original design sheet piles are presumed to be PS-32 with a sheet thickness of 0.500". Calculated average total loss of sheet pile thickness based on UT readings is 40.4%. - Winch Cell #2: Numerous holes were observed. Above water inspection observed several "large" holes, splits and cracks along the north side of winch cell #2. Dive inspection observed a 12" x 3-½" tall hole on the north side. Ultrasonic thickness readings as follows: - South East: 0.205", 0.200" - North: 0.230", 0.250", 0.260" - South West: 0.245", 0.250" - Original design sheet piles are presumed to be PS-32 with a sheet thickness of 0.500". Calculated average total loss of sheet pile thickness based on UT readings is 51.9%. - Winch Cell #3: (5) Five holes total were observed. Above water inspection observed (3) holes on the north side of winch cell #3; however, the north face was obstructed with a tire fender. During dive inspection, (2) holes were observed. A 4" x 18" tall hole on the north side and a 10" x 5" hole on the west side. Ultrasonic thickness readings as follows: - South East: 0.320", 0.310", 0.310" - North: 0.265", 0.290", 0.235" - South West: 0.295", 0.365", 0.290" - Fender Pile: 0.445", 0.595" - Original design sheet piles are presumed to be PS-32 with a sheet thickness of 0.500". Calculated average total loss of sheet pile thickness based on UT readings is 52.2%. - See GDS Report, Attachment C1.	A6: WC-1, WC-2	Critical (Rating 1)	- Recommended to repair every hole with a 3/8" thick cover plate. Extend the cover plate 2" beyond the edge of the hole or until the sheet pile is a ¼" thick, whichever is a greater distance. A 2" extension is not required at sheet pile knuckles. - At the face of the cells (including fenders), where the most significant damage occurred, an engineered repair is recommended. - Recommend coring through the concrete deck at all (3) three winch cells and probing to determine the full extent of fill loss. - Following repair of sheet pile holes and probing, fill cell voids with concrete or grout. - Considering the extent of damage, full replacement should be considered.	High
In-fill	Severe	- Fill loss from inside the winch cells was observed at cell #1 and #2. A hole at winch cell #3 is large enough for fill loss to occur; however, the extent, if any, could not be confirmed.	A6: WC-3,		- See "Steel Sheet Pile" section for related observations and recommendations.	NA

Concrete Cap	Moderate to Severe	- Concrete spalling and cracking was observed at the bottom corners at each cell face. Rebar is exposed in several locations. - At the back side of winch cell #2 (underneath the timber trestle), significant concrete degradation has exposed a "significant" amount of the rebar. - The top surface of the concrete caps has moderate cracking, staining and spalling.	A6: WC-4, WC-5, WC-6		- Recommend patching/repairing concrete where rebar is exposed.	High
Fenders	Minor to Severe	The "new" tire fenders, where added, are in good condition with minor deteriorations. The "original" fenders/rub strips are severely damaged, which includes the sheet piles that support them.			- Replace original fenders/rub strips or add tire fenders where they currently do not exist. See "Steel Sheet Pile" section for related observations and recommendations.	High
Catwalk	Minor to Moderate	- Surface corrosion and coating loss exceeds 50% of the surface area.	A6: WC-7		- NA	NA
Cathodic Protection (Anodes)	No Defect	- (6) Seven anodes found with 95% remaining on winch cell #1 (winch cell #3 in GDS Report, App. C1). - (6) Six anodes found with 95% remaining on winch cell #2. - (7) Seven anodes found with 95% remaining on winch cell #3 (winch cell #1 in GDS Report, App. C1).	A6: NA		- NA	NA

5.7 Transfer Bridge (Excluding the Bridge)

Table 5-7. Transfer Bridge Element-Level Damage Rating, Commentary, Reference Photos, Condition Assessment Rating, Action Items, and Priority

Component	Element Damage Rating	Comment / Explanation of Damage Rating	REF.	Condition Assessment Rating	Action Item	Priority
Seaward supports (on Pass-Pass Platform #1 & Winch Cell #3)	Minor	- (2) loose bolts were found at the support on the NW corner. - Minor corrosion and coating loss.	A7: TB-1	Satisfactory (Rating 5)	- Recommend tightening loose nuts by RCSC turn-of-nut method.	High
Abutment, Armor Rock, & Riprap Slope Protection	Minor	- Armor rock and riprap used for slope stability appears stable and/or well maintained. The original slope and elevation of slope protection rock is unknown. - Minor corrosion and wear and tear observed at the abutment.	A7: TB-2		- NA	NA

5.8 Turning Dolphin #1 (East of Winch Cell #3)

Table 5-8. Turning Dolphin #1 (East of Winch Cell #3) Element-Level Damage Rating, Commentary, Reference Photos, Condition Assessment Rating, Action Items, and Priority

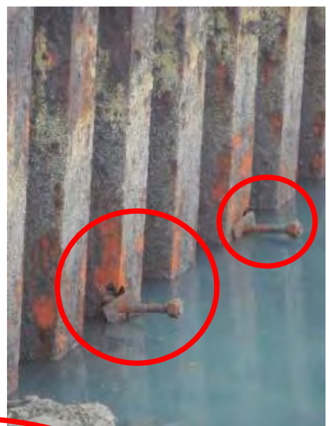
Component	Element Damage Rating	Comment / Explanation of Damage Rating	Appendix Reference	Condition Assessment Rating	Action Item	Priority
Piles	Minor	- Minor coating damage and corrosion observed above the HTL. Dive inspection observed coating damage and medium to heavy corrosion near two (2) circumferential welds. A bulbous deformation (bulge) was also observed in the vertical pile. - Ultrasonic thickness readings as follows: - Fender Pile: 0.750", 0.760", 0.775" - West Lower Strut: 0.650", 0.650" - East Lower Strut: 0.500", 0.515" - Original design/pile thickness information was not obtained. - See GDS Report, Attachment C1.	C1: Sec. 2.1	Satisfactory (Rating 5)	- Continue to monitor the heavy corrosion near the circumferential welds and the bulbous deformation.	Medium
Pile connections and lateral braces	Minor	- Minor coating damage and corrosion observed. - Bent plates observed on king pile brackets. No impact to functionality and structural stability.	A8: D1-1,		- NA	NA
Turning Fender	Minor	- Minor deterioration to tire fenders, such as, cuts, gouges, tears, etc.	A8: D1-2		- NA	NA
Cathodic Protection (Anodes)	Minor	- Three (3) anodes intact and 95% remaining.			- NA	NA

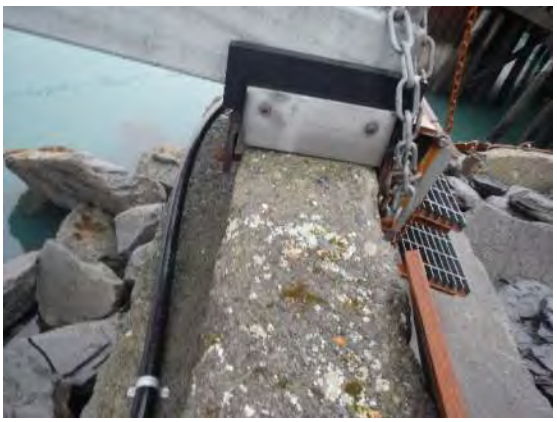
6. CONCLUSION

Overall, the inspected waterfront facilities at Whittier Marine Terminal are in varying degrees of deterioration. The newer structures are in fair or satisfactory condition but much of the older areas are in critical or serious condition. Many of these areas have exceeded their designed service life and deterioration has begun to affect primary load carrying components. An increasing level of maintenance, inspection, and repairs will be required to sustain its current service level. It can be concluded these components have reached the point where long-term replacement should be considered as it may be more economically and operationally advantageous than keeping it in service. It is recommended an alternative analysis be conducted to compare repair and replacement costs against long-term goals. Until repairs are made, routine inspections should continue at regular intervals and immediate load/personnel restrictions should be implemental in the areas noted as they involve life/safety issues.

ATTACHMENT A1

MARGINAL WHARF – PHOTO LOG

	**Photograph No. MW-1** **Description:** **Sheet pile wall is leaning seaward along the eastern end, approx. 50-feet in length. A split sheet pile knuckle was observed at the NE corner. The split knuckle occurs at a tailwall and/or terminal end wall. Photo looking west. Additionally, the concrete is spalled and cracked along the sheet pile to cap interface.**
	**Photograph No. MW-2** **Description:** **Observed holes in the sheet piles at (2) locations near tie back rods, at the eastern end of the dock.**
	**Photograph No. MW-3** **Description:** **Concrete spalling and cracking was observed in places along the concrete sheet pile cap. Rebar is exposed in several locations and cracks exceed ¼" near the east end, as well as, along the sheet pile to cap interface.**

	**Photograph No. MW-4** **<u>Description:</u>** **Concrete spalling and cracking was observed in places along the concrete sheet pile cap. Rebar is exposed in several locations and cracks exceed ¼" near the east end, as well as, along the sheet pile to cap interface.**
	**Photograph No. MW-5** **<u>Description:</u>** **The damaged concrete cap and sheet pile at the east end of the wharf, compromises the support provided to the catwalk for dolphin #4 access.**
	**Photograph No. MW-6** **<u>Description:</u>** **Observed sinkholes adjacent to a tower and near the east end of the wharf. Currently temporarily repaired with geotextile and gravel fill.**

Photograph No. MW-7

Description:

Armor rock and riprap used for slope stability appears stable and/or well maintained. The original slope and elevation of slope protection rock is unknown.

Photograph No. MW-8

Description:

Damaged manhole cover observed.

Photograph No. MW-9

Description:

Damaged fire hydrant observed.

ATTACHMENT A2

TURNING DOLPHIN #4 – PHOTO LOG

	**Photograph No. D4-1** **<u>Description:</u>** **Minor coating damage and corrosion observed.**
	**Photograph No. D4-2** **<u>Description:</u>** **Minor coating damage and corrosion observed.**
	**Photograph No. D4-3** **<u>Description:</u>** **Minor deterioration to tire fenders, such as, cuts, gouges, tears, etc. (4) loose bolts observed on the fender bracket.**

	**Photograph No. D4-4** **Description:** **Minor deterioration to tire fenders, such as, cuts, gouges, tears, etc.**
	**Photograph No. D4-5** **Description:** **Minor coating damage and corrosion observed.**
	**Photograph No. D4-6** **Description:** **Catwalk to dolphin cap connection.**

	**Photograph No. D4-7** **<u>Description:</u>** **Catwalk to Marginal Wharf cap connection. Note cracking of concrete cap.**

ATTACHMENT A3

BARGE RAILCAR TRANSFER RAMP, CLOSED CELLS, TRESTLE AND CATWALK – PHOTO LOG

Photograph No. TR-1

Description:

(2) perforations observed on the cell's south side.

Photograph No. TR-2

Description:

Perforation observed on the cell's north side.

Photograph No. TR-3

Description:

(2) concrete "fingers" extend from the closed cell and are supported by H-piles. The SE finger has (2) full depth cracks, one of which is ~1/2" wide.

Photograph No. TR-4

Description:

(2) concrete "fingers" extend from the closed cell and are supported by H-piles. The SW finger has complete loss of concrete cover over rebar at (1) bottom corner.

Photograph No. TR-5

Description:

All sheet piles are affected by corrosion with visible reduction of wall thickness at pitting locations.

Photograph No. TR-6

Description:

All diagonal timber braces on the pile bents (for lateral support) are severely damaged

Photograph No. TR-7

Description:

Crushing transverse deck timber near the abutment.

Photograph No. TR-8

Description:

Split transverse deck timber near the abutment.

	**Photograph No. TR-9** **Description:** Split and damaged abutment pile cap timber. Looking up.
	**Photograph No. TR-10** **Description:** Missing transverse deck timber and crushed/split cap beam near the abutment.
	**Photograph No. TR-11** **Description:** Less than 50% of the surface is affected by corrosion.
	**Photograph No. TR-12** **Description:** Several perforations were observed along the abutment sheet pile wall. Connections, bracing, and general load paths are not clear due to modifications of the existing structure throughout it's life

	**Photograph No. TR-13** **Description:** **A portion of the sheet pile abutment wall has a concrete cap that is severely damaged, exposing reinforcement due to spalled concrete.**
	**Photograph No. TR-14** **Description:** Armor rock and riprap used for slope stability appears stable and/or well maintained. The original slope and elevation of slope protection rock is unknown.

ATTACHMENT A4

BARGE PASS-PASS CONCRETE DOCKS #1 & #2 – PHOTO LOG

	**Photograph No. PP-1** **<u>Description:</u>** **Less than 50% of the surface is affected by corrosion. No visual evidence of section loss observed. Platform #1 and #2.**
	**Photograph No. PP-2** **<u>Description:</u>** **Spalling at bottom corners and edges near the face & fender, have eliminated concrete cover, exposing rebar. Platform #1 and #2.**
	**Photograph No. PP-3** **<u>Description:</u>** **On the east end of the most seaward pile cap, a crack extends below the deck panel. Platform #2.**
	**Photograph No. PP-4** **<u>Description:</u>** **A steels square tube rail along the end of the dock is bent from impact with damaged connections to the dock. Platform #1 and #2.**

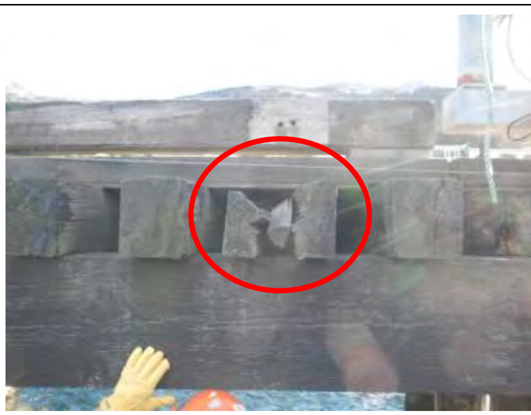
	Photograph No. PP-5 **Description:** Typical deck of Platform #1 and #2.
	Photograph No. PP-6 Description: A sink hole was observed at the east end of the abutment.
	Photograph No. PP-7 **Description:** Cracks observed in fender assembly welds. Platform #1 and #2.

ATTACHMENT A5

TIMBER FINGER DOCK-TRESTLE AND MOORING BOLLARD – PHOTO LOG

	**Photograph No. TT-1** **<u>Description:</u>** **Multiple cracks are propagating from torch cut holes.**
	**Photograph No. TT-2** **<u>Description:</u>** **The sheet pile are leaning out of plum and corroded.**
	**Photograph No. TT-3** **<u>Description:</u>** **The access platform supports are damaged and in some cases no longer connected. The structural integrity of the platform is compromised.**
	**Photograph No. TT-4** **<u>Description:</u>** **Piles, and entire trestle, is leaning seaward between the winch cells.**

	**Photograph No. TT-5** **<u>Description:</u>** **Many diagonal timbers, i.e. lateral bracing, are split, broken, missing or otherwise damaged.**
	**Photograph No. TT-6** **<u>Description:</u>** **Pile not bearing on the pile cap on a bent located just west of Pass-Pass platform #1.**
	**Photograph No. TT-6** **<u>Description:</u>** **Pile not bearing on the pile cap at the east side of the most westerly trestle section.**
	**Photograph No. TT-7** **<u>Description:</u>** **Several piles are split, cracked, and in some cases section loss exceeds 50%.**

	**Photograph No. TT-8** **<u>Description:</u>** **Timber pile with severe section loss.**
	**Photograph No. TT-9** **<u>Description:</u>** **Many, if not all, timber stringers have inadequate support length and do not meet current codes. i.e. the length of girders contacting the pile caps is too short.**
	**Photograph No. TT-10** **<u>Description:</u>** **Modified interior stringers for pass pass platform supports. Note, exterior stingers remain simply supported per original design.**
	**Photograph No. TT-11** **<u>Description:</u>** **Several split and damaged timber transverse deck members were observed east of winch cell #1, primarily the northern end of the members.**

ATTACHMENT A6

WINCH CELLS #1, #2 AND #3 – PHOTO LOG

Photograph No. WC-1

Description:

Holes were observed all (3) winch cells. Numerous "large" holes, splits and cracks were observed in winch cells #1 and #2. (3) holes were observed on the north side of winch cell #3; however, the north face was obstructed with a tire fender.

Photograph No. WC-2

Description:

Typical hole observed in winch cell.

Photograph No. WC-3

Description:

Fill loss from inside the winch cells was observed at cell #1 and #2. Fill loss may have also occurred at winch cell #3; however, this could not be confirmed.

Photograph No. WC-4

Description:

Concrete spalling and cracking was observed at the bottom corners at each cell face. Rebar is exposed in several locations.

Photograph No. WC-5

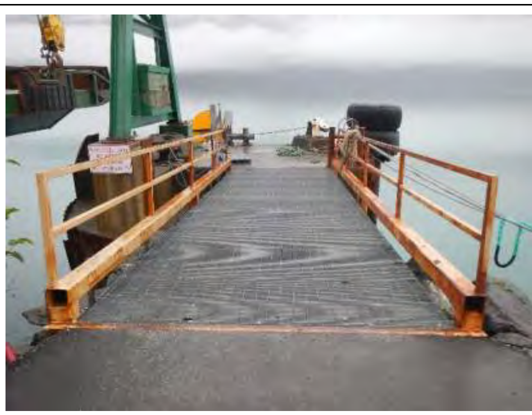
Description:

At the back side of winch cell #2 (underneath the timber trestle), significant concrete degradation has exposed a "significant" amount of the rebar.

Photograph No. WC-6

Description:

The top surface of the concrete caps has moderate cracking, staining and spalling.



Photograph No. WC-7

Description:

Surface corrosion and coating loss exceeds 50% of the surface area.

ATTACHMENT A7

TRANSFER BRIDGE – PHOTO LOG

	**Photograph No. TB-1** **<u>Description:</u>** **(2) loose bolts were found at the support on the NW corner.**
	**Photograph No. TB-2** **<u>Description:</u>** **Armor rock and riprap used for slope stability appears stable and/or well maintained. The original slope and elevation of slope protection rock is unknown.**

ATTACHMENT A8

TURNING DOLPHIN #1 – PHOTO LOG

	**Photograph No. D1-1** **<u>Description:</u>** **Bents plates observed on king pile brackets. No impact to functionality and structural stability.**
	**Photograph No. D1-1** **<u>Description:</u>** **Minor wear and gouges on the rubber tires.**

ATTACHMENT B1

RELEVANT MOP-130 TABLES

Damage Ratings for Timber Elements (per MOP-130 Table 2-4)		
Damage Rating	**Existing Damage**	**Exclusion [Defects Requiring Elevation to the Next Higher Damage Rating(s)]**
NI - Not Inspected	Not inspected, inaccessible, or passed by	
ND - No Defects	• Sound surface material	
MN - Minor	• Checks, splits, and gouges less than 0.5 in. wide • Evidence of marine borers or fungal decay	Minor damage not appropriate if: • Loss of cross section • Marine borer infestation • Displacements, loss of bearing, or connections
MD - Moderate	• Remaining diameter loss up to 15% • Checks and splits wider than 0.5 in. • Cross-section area loss up to 25% • Corroded hardware • Evidence of marine borers or fungal decay, with loss of section	Moderate damage not appropriate if: • Displacements, loss of bearing or connections
MJ - Major	• Remaining diameter loss 15 to 30% • Checks and splits through full depth of cross section • Cross-section area loss 25 to 50%; heavily corroded hardware • Displacement and misalignments at connections	Major damage not appropriate if: • Partial or complete breakage
SV - Severe	• Remaining diameter loss more than 30% • Cross-section area loss more than 50% • Loss of connections and/or fully nonbearing condition • Partial or complete breakage	

Damage Ratings for Steel Elements (per MOP-130 Table 2-5)		
Damage Rating	Existing Damage	Exclusion [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI - Not Inspected	Not inspected, inaccessible, or passed by	
ND - No Defects	• Protective coating or wrap intact Light surface rust • No apparent loss of material	
MN - Minor	• Protective coating or wrap damaged and loss of thickness up to 15% of nominal at any location • Less than 50% of perimeter or circumference affected by corrosion at any elevation or cross section • Loss of thickness up to 15% of nominal at any location	Minor damage not appropriate if: • Changes in straight line configuration or local buckling • Corrosion loss exceeding fabrication tolerances (at any location)
MD - Moderate	• Protective coating or wrap damaged and loss of thickness 15 to 30% of nominal at any location • More than 50% of perimeter or circumference affected by corrosion at any elevation or cross section • Loss of thickness 15 to 30% of nominal at any location	Moderate damage not appropriate if: • Changes in straight line configuration or local buckling • Loss of thickness exceeding 30% of nominal at any location
MJ - Major	• Protective coating or wrap damaged and loss of nominal thickness 30 to 50% at any location • Partial loss of flange edges or visible reduction of wall thickness on pipe piles • Loss of nominal thickness 30 to 50% at any location	Major damage not appropriate if: • Changes in straight line configuration or local buckling • Perforations or loss of wall thickness exceeding 50% of nominal
SV - Severe	• Protective coating or wrap damaged and loss of wall thickness exceeding 50% of nominal at any location • Structural bends or buckling, breakage and displacement at supports, loose or lost connections • Loss of wall thickness exceeding 50% of nominal at any location	

Damage Ratings for Reinforced Concrete Elements (per MOP-130 Table 2-6)		
Damage Rating	**Existing Damage**	**Exclusion [Defects Requiring Elevation to the Next Higher Damage Rating(s)]**
NI - Not Inspected	Not inspected, inaccessible, or passed by	
ND - No Defects	• Good original hard surface, hard material, sound	
MN - Minor	• Protective coating or wrap damaged and loss of thickness up to 15% of nominal at any location • Mechanical abrasion or impact spalls up to 1 in. in depth • Occasional corrosion stains or small pop-out corrosion spalls • General cracks up to 1/16 in: in width	Minor damage not appropriate if: • Structural damage • Corrosion cracks • Chemical deterioration
MD - Moderate	• Structural cracks up to 1/16 in: in width • Corrosion cracks up to 1/4 in: in width • Chemical deterioration: Random cracks up to 1/16 in: in width; "Soft" concrete and/or rounding of corners up to 1 in. deep • Mechanical abrasion or impact spalls greater than 1 in. in depth	Moderate damage not appropriate if: • Structural breakage and/or spalls • Exposed reinforcement • Loss of cross section due to chemical deterioration beyond rounding of corner edges
MJ - Major	• Structural cracks 1/16 in: to 1/4 in: in width and partial breakage (through section cracking with structural spalls) • Corrosion cracks wider than 1/4 in: and open or closed corrosion spalls (excluding pop-outs) • Multiple cracks and disintegration of surface layer due to chemical deterioration • Mechanical abrasion or impact spalls exposing the reinforcing	Major damage not appropriate if: • Loss of cross section exceeding 30% due to any cause
SV - Severe	• Structural cracks wider than 1/4 in: or complete breakage • Complete loss of concrete cover due to corrosion of reinforcing steel with more than 30% of diameter loss for any main reinforcing bar • Loss of bearing and displacement at connections • Loss of concrete cover (exposed steel) due to chemical deterioration	

	• Loss of more 30% of cross section due to any cause	

Condition Assessment Ratings (per MOP-130 Table 2-14)	
Rating	**Description**
6. Good	No visible damage or only minor damage noted. Structural elements may show very minor deterioration, but no overstressing observed. No repairs are required.
5. Satisfactory	Limited minor to moderate defects or deterioration observed but no overstressing observed. No repairs are required.
4. Fair	All primary structural elements are sound but minor to moderate defects or deterioration observed. Localized areas of moderate to advanced deterioration may be present but do not significantly reduce the loadbearing capacity of the structure. Repairs are recommended, but the priority of the recommended repairs is low.
3. Poor	Advanced deterioration or overstressing observed on widespread portions of the structure but does not significantly reduce the load-bearing capacity of the structure. Repairs may need to be carried out with moderate urgency.
2. Serious	Advanced deterioration, overstressing, or breakage may have significantly affected the load-bearing capacity of primary structural components. Local failures are possible, and loading restrictions may be necessary. Repairs may need to be carried out on a high-priority basis with urgency.
1. Critical	Very advanced deterioration, overstressing, or breakage has resulted in localized failure(s) of primary structural components. More widespread failures are possible or likely to occur, and load restrictions should be implemented as necessary. Repairs may need to be carried out on a very high-priority basis with strong urgency.

Recommended Inspection Interval (Excerpt from MOP-130 Table 2-2)

Abbreviated Table 2-2. Recommended Maximum Interval between Routine Inspections (Years)[a]

Condition Rating from Previous Inspection		CONSTRUCTION MATERIAL: Unwrapped Timber or Unprotected Steel (No Coating or Cathodic Protection)[c] — Aggressive[b] Environment	CONSTRUCTION MATERIAL: Concrete, Masonry, Wrapped Wood, Protected Steel, or Composite Materials[c] — Aggressive[b] Environment
6	Good	4	5
5	Satisfactory	4	5
4	Fair	3	4
3	Poor	3	4
2	Serious	1	2
1	Critical	0.5	0.5

[a]The maximum interval between routine inspections may be reduced based on extent of deterioration, anticipated deterioration, and importance of the structure. Intervals may be increased for atypical cases where special construction materials are used. Regulations may dictate a maximum inspection interval.
[b]Aggressive environments include brackish water, seawater, polluted water, or waters with currents >0.75 knots. Facilities that handle chemicals containing elements detrimental to the structure's durability, such as chlorides, sulfates, or alkalis, are aggressive environments.
[c]The intervals indicate requirements for sounding timbers.

STANDARDS OF PRACTICE 15

ATTACHMENT C1

GDS's DIVE INSPECTION REPORT

Inspection Report

ARRC Whittier Marginal Wharf Inspection

Whittier, Alaska
PND Engineers, Inc.

WO# 20AKDC0028

Submitted to:
PND Engineers, Inc.
1506 West 36th Avenue
Anchorage, AK 99503
Office: (907) 561-1011

Submitted by:
Global Diving & Salvage, Inc.
5304 Eielson Street
Anchorage, AK 99518
Office: (907) 563-9060
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1. Introduction

On October 6th, 2020 Global Diving & Salvage Inc. was contracted to conduct an underwater inspection on the Whittier Marginal Wharf in Whittier, Alaska. Global utilized a four man dive team, shallow surface supplied dive spread, underwater video with 4 wire communications, ultrasonic thickness meter and an underwater camera to complete the inspection. All diving operations were conducted off a 31ft landing craft.

All diving activities are accordance with the following regulations and industry guidance publications. Global personnel and their subcontractors follow the strictest requirement on the work site.

- Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926
- Occupational Safety and Health Administration (OSHA) General Industry Standards, 29 CFR 1910
- Occupational Safety and Health Administration (OSHA) Commercial Diving Standards 29 CFR Part 1910, and Subpart T
- Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response, 29 CFR 1926.65 or 29 CFR 1910.120
- United States Coast Guard (USCG), 46 CFR 197, Subpart B
- ADCI (Association of Diving Contractors International), Industry Standards, 6th Edition

2. Summary of Inspection

The intent of the inspection was to work closely with PND Engineers to develop a scope to provide baseline condition information of the underwater structure to the owner, Alaska Railroad Corporation. With Global providing the underwater details found in this summary report and PND Engineers providing a more comprehensive topside report, incorporating the data found here. To accomplish this the following scope of work was developed.

- Swim-by Visual Inspection of 100% of the underwater structure.
- Representative Ultrasonic Thickness Readings as follows, on structural steel components, pile and sheet pile.
- Estimate anode material remaining on any anodes found
- For Timber Piles, take representative core samples.

Details for the inspection of the dock components can be found in the following sections of this report.

2.1 Turning/Breasting Dolphin No.1

During the inspection the diver found medium to heavy coating loss and corrosion on circumferential weld below the fender tire clamp, as well as bulbous deformation on the 48" vertical fender pile. Medium pitting and corrosion was also present on the bottom circumferential weld on the 48" fender pile. All three anodes welded on earlier this year were intact and at 95% remaining. UT's were taken on each strut and 48" fender pile below water line, mid water and near the sea floor.

Ultrasonic Readings for Turning/Breasting Dolphin #1			
	West Lower Strut	East Lower Strut	Fender Pile
Surface	n/a	n/a	.750
Middle	.650	.500	.760
Bottom	.650	.515	.775
All readings in decimal inches			

Image 1: Heavy Corrosion

Image 2: Bulbous Deformation

2.2 Winch Cell No. 1 with Fender Pile

During the inspection the diver found heavy corrosion, pitting and metal loss throughout Wench Cell #1 as well as a 4" x 18" Tall hole on the North side of the cell as well as a 10" x 5 " hole on the west side . Note: The north side was found to be more deteriorated. Inspection also found knife edge corrosion on a circumferential weld on Fender #1. Seven brand new anodes where found to be in place and at 95% remaining. UT's were taken on the South East Side, North and South West side of the cell and on 3 locations on Fender #1.

Ultrasonic Readings for Winch Cell No. 1 w/ Fender Pile				
Winch Cell No. 1				Fender Pile
	Southeast side	North Side	Southwest Side	
Surface	.320	.265	.295	.445
Middle	.310	.290	.365	n/a – fender tires
Bottom	.310	.235	.290	.595
All readings in decimal inches				

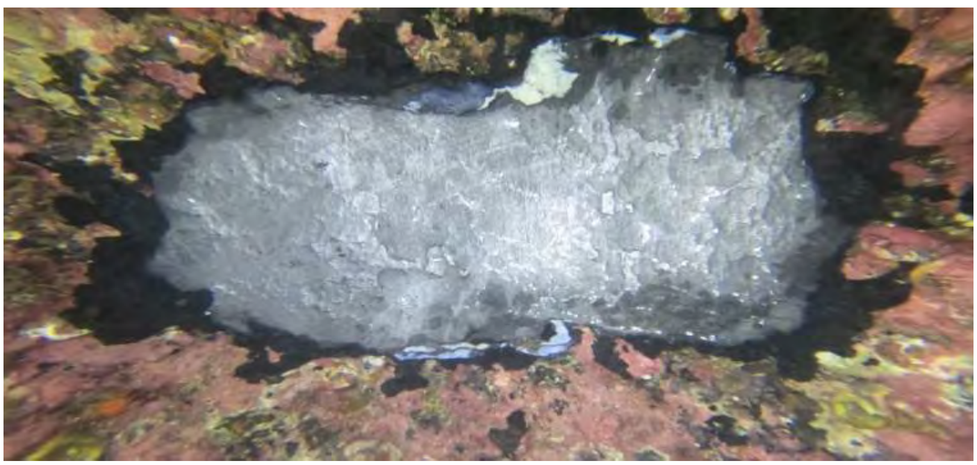


Image 1 Heavy Corrosion on Cell #1

Image 2 close up of corrosion

Image 3 - 4" x 18" Hole North Side of Cell

Image 6 - 10”x5” Hole, West Side Cell

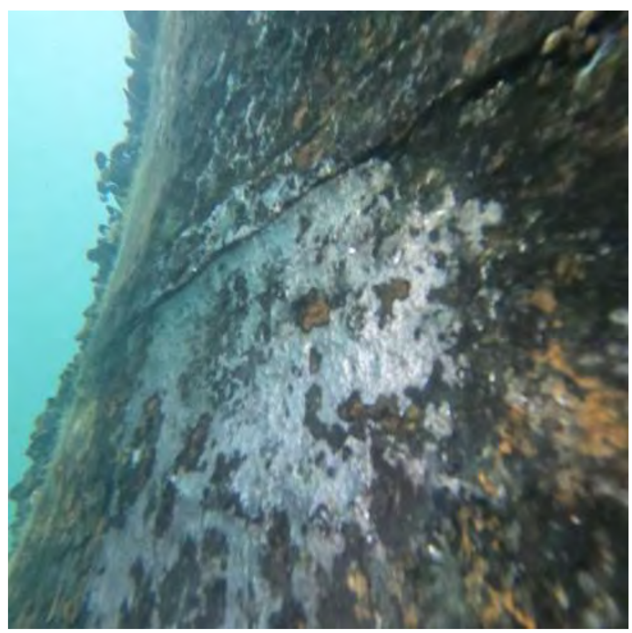


Image 7 – Knife Edge Corrosion Pile Weld

2.3 Winch Cell No. 2

Survey found that Cell #2 had heavy corrosion, pitting and coating loss, and a 12" x 3 ½' tall hole on the North side. All 6 new anodes were in place and at 95% remaining. UT's were also taken on the South East, North and South West side with 3 UT's per location.

Ultrasonic Readings for Winch Cell No. 2			
	South East	North	South West
Surface	.250	.230	.245
Middle	n/a – 'shallow water'	.250	n/a – 'shallow water'
Bottom	.200	.260	.250
All readings in decimal inches			

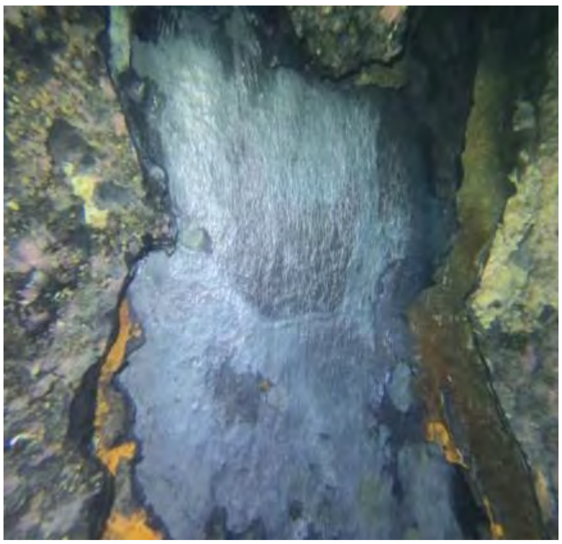


Image 8 – Heavy Corrosion

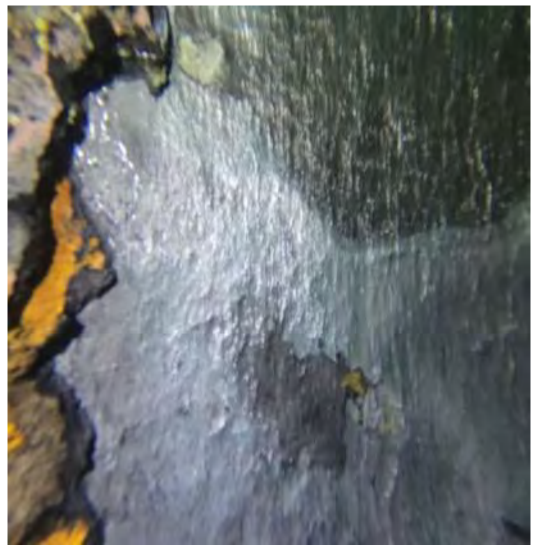


Image 9 – Close up of corrosion

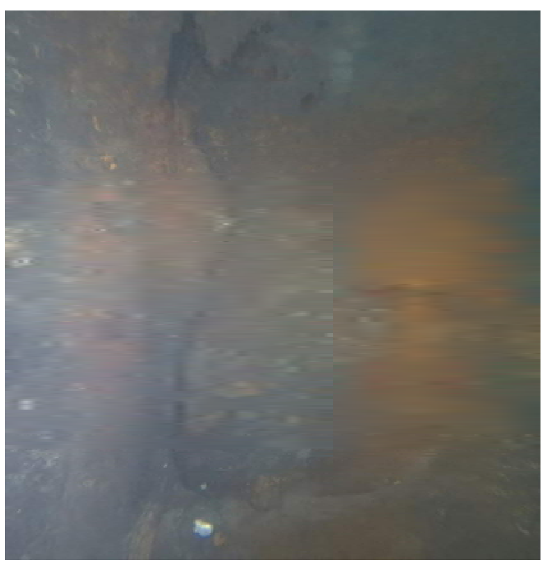


Image 10 – 12"x 3 ½" Hole Cell north side

2.4 Winch Cell No. 3

The inspection swim through found that Wench Cell #3 was in a little better condition than the other two Wench Cells. No damage was found outside of the typical heavy corrosion, pitting and metal loss that we saw in the other two cells. All 6 new anodes were in place and at 95% remaining. UT's were also taken in the South East, North and South West quadrants of the cell.

Ultrasonic Readings for Winch Cell No. 3			
	South East	North	South West
Surface	n/a – 'shallow water'	.210	n/a – 'shallow water'
Middle	.235	.231	.250
Bottom	n/a – 'shallow water'	.270	n/a – 'shallow water'
All readings in decimal inches			


Image 11 – Typical corrosion found


Image 12 – Close up of corrosion

2.5 Inboard Slip Cell

Survey swim through found the inner slip cell to have medium corrosion throughout the cell, the only damage found was a small 3" hole on the West side of the cell most likely the remnants of a tie back bolt hole. All 6 anodes were in place and at 95% remaining on the cell. Two anodes were in place 3' off bottom, with 30% remaining on the vertical round piles supporting the North East portion of the concrete dock next to the cell.

Ultrasonic Readings for Inboard Slip Cell			
	South East	North	South West
Surface	.440	.385	.335
Middle	.350	.360	.350
Bottom	.366	.365	.470
All readings in decimal inches			

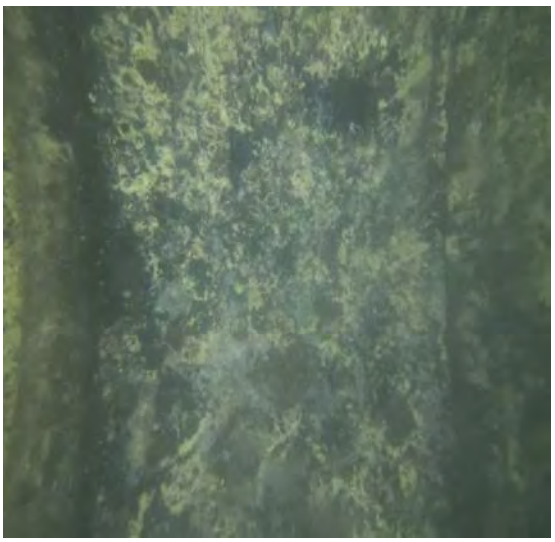


Image 13 – Typical Medium Corrosion

Image 14 – 3" Hole found (Corroded Tieback?)

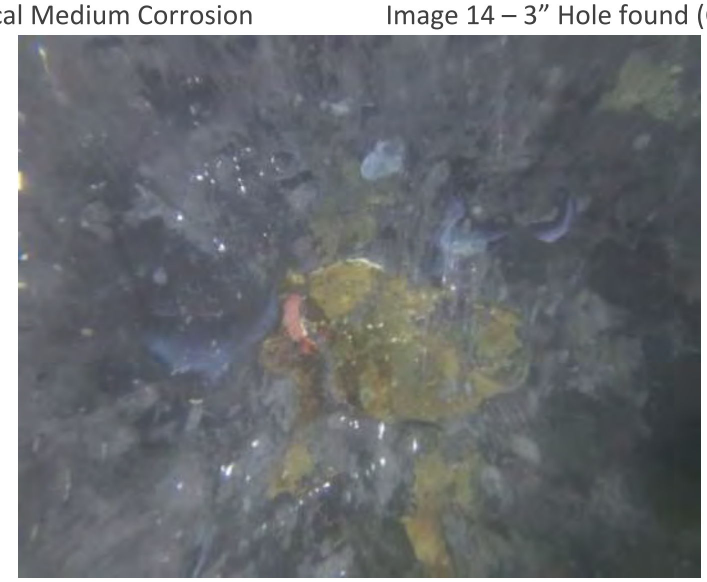


Image 15 - Close up of pitting and corrosion

2.6 Outboard Slip Cell

Survey swim through found heavy corrosion and pitting prevalent throughout the structure. Three holes in the cell were also found: one measuring 12” x 3’ tall, second 4” x 11” tall and the third measuring 8” x 5’ tall, all located on the South side of the cell. All 6 new anodes were in place and at 95% remaining on the cell, as well as an anode at 40% remaining on the vertical round pile supporting the South corner of the concrete portion of the Slip Cell.

Note: this section of the slip cell is supported by 24” round pile and from the surface it appears it’s also supported by numerous H-Pile. During the survey the diver found that these H-piles on the outboard slip cell and the inboard slip cell were corroded in half. It also appears that the round pile might have been driven in the past to correct the H- pile deterioration issue. UT’s were taken on the South East, North and South West sections of the cell.

Ultrasonic Readings for Outboard Slip Cell			
	South East	North	South West
Surface	.385	.410	.325
Middle	.365	.410	n/a – ‘shallow water’
Bottom	.455	.455	.250
All readings in decimal inches			


Image 16- Heavy corrosion, pitting and material loss


Image 17 – 12”x3’ Hole South Side Cell

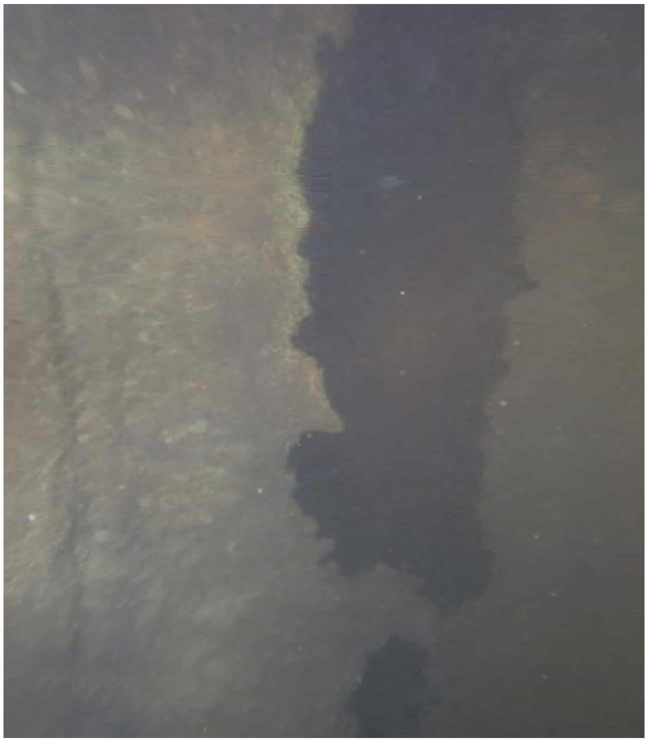


Image 18 – 8” x 5 ‘ Hole, South side cell


Image 19 – 4” x 11” Hole, South side cell


Image 20 – Typical H-Pile Condition at Slip Cells

2.7 Turning/Berthing Dolphin No. 4

Dolphin #4 was found to be in good shape. All four piles had typical heavy marine growth around the tidal zone area but other than that the coating was still intact and no abnormalities where found. All 4 anodes were in place, three at 95% and one at 100% "welded on during inspection". UT's were taken on the West batter pile, East batter pile and fender pile.

Ultrasonic Readings for Turning/Breasting Dolphin No. 4			
	West Batter Pile	East Batter Pile	Fender Pile
Surface	.500	.500	.520
Middle	.510	.495	.565
Bottom	.505	.500	.535
All readings in decimal inches			

Image 21 – Typical Surface Condition

Image 22 – 2020 installed anode typical

Image 23 – Close up of anode end

2.8 Trestle Piers

Trestles between structures on the dock are supported by both steel and wood piles. All piles were inspected with the following details noted

2.8.1 Steel Trestle Pier in Between Winch Cell No. 1 and Winch Cell No. 2

The steel piles appear to be in good condition, with coatings intact and with anodes located on each pile, mounted 6” to 4’ off the seafloor. All anodes are estimated to have 80% remaining material. Representative ultrasonic thickness readings were taken as follows.

Ultrasonic Readings for Trestle Piles between Winch Cell 1 and 2 – Middle Row				
	East Vertical Pile	East Batter Pile	West Batter Pile	West Vertical Pile
Surface	.615	.610	.615	.610
Middle	.605	.605	.605	.610
Bottom	.605	.605	.610	.610
All readings in decimal inches				

2.8.2 Steel Trestle Pier in Between Winch Cell No. 2 and Winch Cell No. 3

The steel piles appear to be in good condition, with coatings intact and with anodes located on each pile, mounted 6” to 4’ off the seafloor. All anodes are estimated to have 80% remaining material. Representative ultrasonic thickness readings were taken as follows.

Ultrasonic Readings for Trestle Piles between Winch Cell 2 and 3 – Offshore Row			
	East Vertical Pile	East Batter Pile	West Batter Pile
Surface	.610	.610	.610
Middle	.610	.610	.610
Bottom	.610	.610	.610
All readings in decimal inches			

Image 24 – Trestle Steel Pile, typical condition

Image 25 – Trestle Steel Pile, Typical Condition

2.8.3 Timber Pile Trestles

On trestle structures supported by timber pile, the survey found that the piles on the trestles appeared to be in good condition, soundings were found to be solid not punky or hollow. However up to 90% of the X–Beams cross members were not supporting all the vertical piles, the majority of them where deteriorated to the point of falling off the piles. Representative core samples were taken on each structure with timber piles. All sample locations received galvanized lag bolt plugs with rubber washer seals.

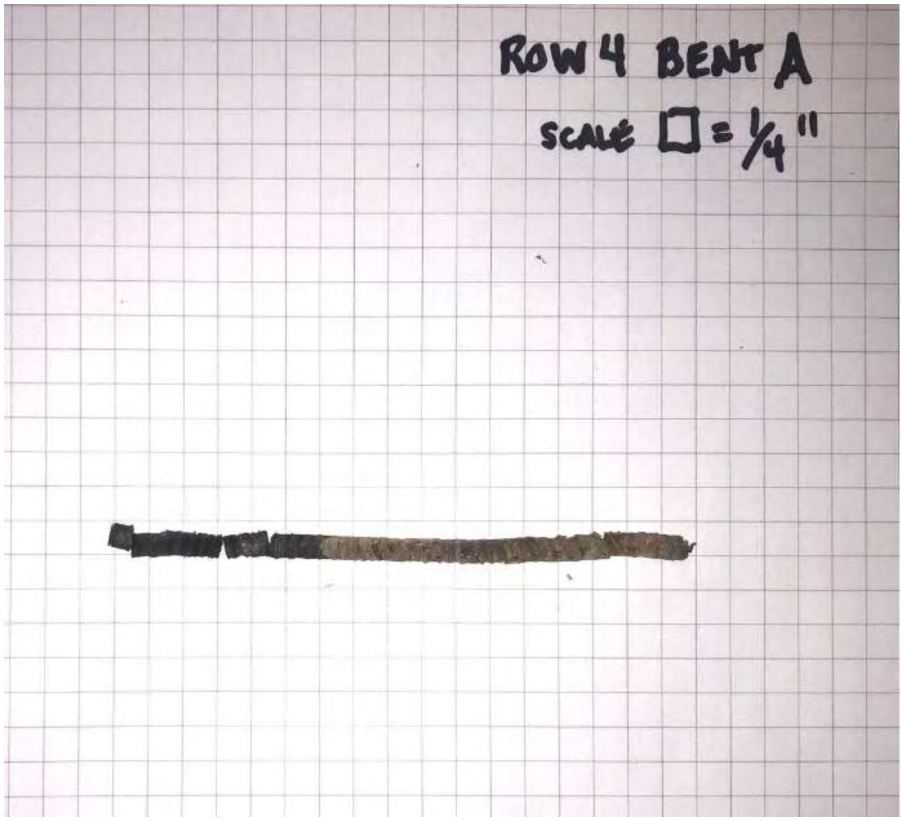
Image 26 – X-Member Beam Typical

Image 27 – Typical Pile Light Growth

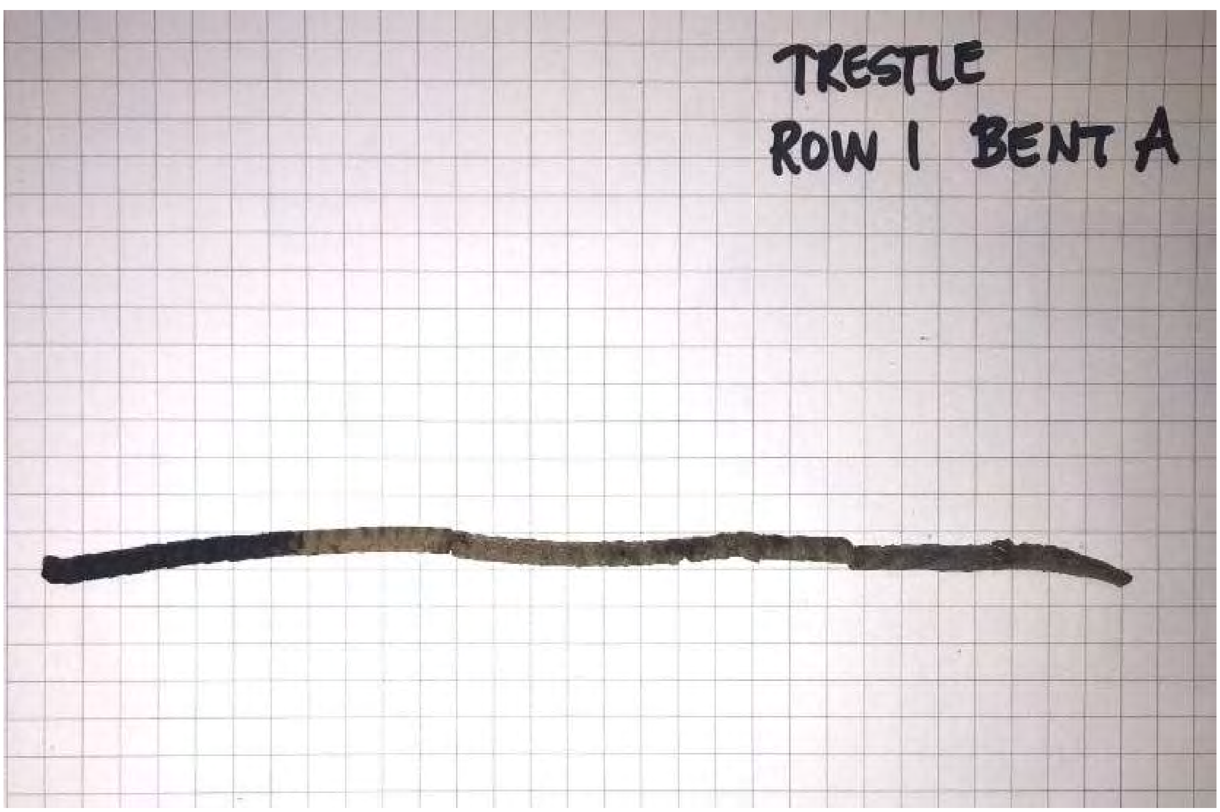
Image 28 – Typical Pile Growth near surface

Image 29 – Galvanized Lag and rubber seal

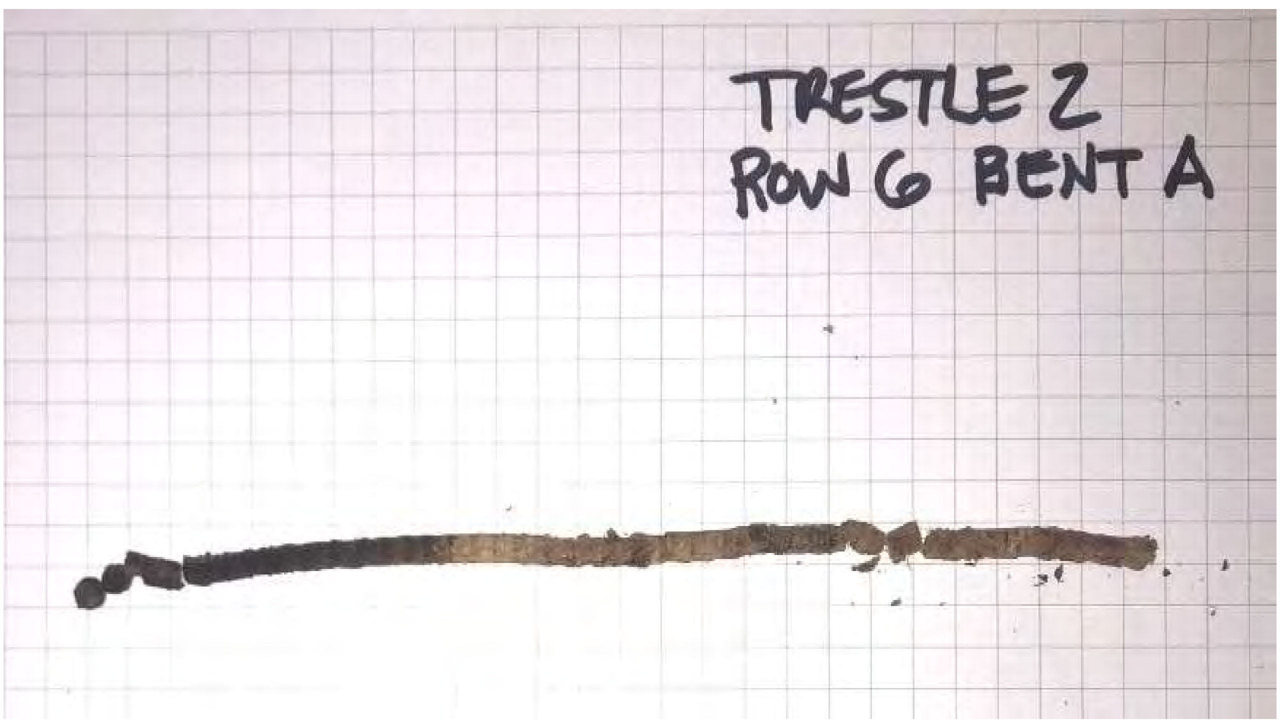
2.8.4 Timber Pile Core Samples




ROW 3 TRESTLE 1
BENT B


TRESTLE
ROW 1 BENT A


TRESTLE 2
ROW 8 BENT A


TRESTLE 2
ROW 6 BENT A

2.9 Marginal Wharf Sheet Wall

Due to shallow water, rocks and rough weather, we were unable to conduct diving operations on the sheet wall. A representative ultrasonic thickness readings were taken on the sheet wall every 200 feet, starting from the East end and working west. The representative readings are as follows:

Ultrasonic Readings for Marginal Way Sheetwall					
	East End	200 ft	400 ft	600 ft	West End
Splash zone	.405	.310	.360	.415	.390
All readings in decimal inches					

G.6. Survey Report – R&M Project No. 2852.01, Task 2 – Whittier Planning Survey, Phase 1 – Whittier, Alaska

R&M CONSULTANTS, INC.
9101 Vanguard Drive • Anchorage, AK 99507 • 907.522.1707
212 Front Street #150 • Fairbanks, AK 99701 • 907.452.5270

SURVEY REPORT

R&M Project No: 2852.01, Task 2

Whittier Planning Survey, Phase 1
Whittier, Alaska

Scope

The purpose of this project was to create a basemap of existing conditions that can be used for planning purposes. The final basemap is a compilation of historic and field surveyed information. The field survey was performed between December 29, 2020 and January 25, 2021, with large amounts of snow and ice covering the site. Imagery and upland surface was collected using a drone, and bottom of sea surface was collected by eTrac using hydrographic surveying methods.

Survey Control

The basis of coordinates for this project is Alaska State Plane (ASP), Zone 4, NAD83 (2011), in U.S. feet, based on the shared solution for Point No. 502, which is Station "4949 E 2007" (PID BBFH95), a brass cap set in the north abutment of the bridge crossing Whittier Creek. Final coordinates for other survey control was established by GPS network holding the shared solution for Station "4949 E 2007" as N2,478,201.534 and E1,873,727.935.

The Basis of Bearings is a grid bearing based on GPS observations.

Project elevations are Mean Lower Low Water (MLLW) based on Tide Station 9454949 Whittier, Alaska, published 09/09/2008, holding station "949 B 2007", a brass cap set in concrete at the Alaska Marine Highway Ferry Terminal, having an elevation of 22.76 feet above MLLW.

Field Survey

Most of the data shown on the final basemap was input from historic data provided by ARRC. Items that were field surveyed for this basemap included the centerline of the tracks, with switches and frogs, the Marginal Wharf edge, and the drill hole locations.

Methods and Equipment

Primary survey control was established using Trimble R10 Receivers, and a static network with redundant antenna height measurements. Field measurement of other information was performed utilizing Trimble R10 Real-Time Kinematic (RTK) methods. Horizontal and vertical check shots were performed at the beginning and end of each setup, and a Quality Assurance Report is included in the deliverables under the Quality Assurance tab.

Elevations were transferred by differential level loops starting and ending on known benchmarks using a Leica DNA 10 digital level.

Property Boundaries

Because of the snow and ice, many property corners could not be recovered, however, five primary subdivision corners were found and used to recreate the record boundaries within the project area. Two benchmarks were also found, and the elevations verified by differential level loop between the monuments. Overall, the boundary fit well with the existing corners found, and the property lines appear to be within +/- 0.5' of the record dimensions. A thorough search in the summer would likely reveal more property corners which can be recovered in a future phase of the project.

Aerial Imagery and TIN Surface

The R&M aerial imagery and TIN surface was obtained using a DJI M600 drone on October 10, 2020. The information was tied to the project survey control and check shots were taken to control and check the final location and accuracy of the mapping. A UAS Processing Report is included under the UAS tab in the deliverables, and shows that the average horizontal error is less than 0.1', and the average vertical error is less than 0.4'. A check shot report of the final surface compared RTK positions taken between the tracks, in rock, to the drone surface, and showed an average of less than 0.50' difference. This can be attributed to the fact that developing a surface from imagery is less accurate than using ground survey or LiDAR methods, however, creating surfaces from imagery is more economical and works well with planning phases of projects.

Bathymetric Survey

A bathymetric survey was performed by eTrac, Inc. on January 25, 2021, and imported into the final, compiled basemap. The final bathymetric TIN is a stand-alone surface with five-foot contours, with a slight gap between it and the uplands survey. The boat was not able to collect information at the very edge of the Marginal Wharf, and R&M was unable to get bottom of sea shots from the top of the Marginal Wharf. See the eTrac Executive Summary for more detailed hydrographic information. Also included in the deliverables is a PDF showing some of the larger objects that were captured on the sea floor, and a PDF of the final mapping. There is also a folder containing the CAD elements of the survey.

Utility Survey

Utility information shown on the final basemap was provided by ARRC from historic drawings. The position of Underground lines was adjusted based on current aerial imagery showing actual locations of above ground utilities such as manholes and light poles. No utility locates were requested or surveyed for this effort, and underground lines shown may or may not exist within the project area.

It appears that the storm drains have been reconfigured over the years. Historic data was used as a guide for positioning below ground pipes, but current aerial imagery was used to position catch basins and manholes.

Lease Boundaries

Lease boundaries shown were computed using historic data supplied by the ARRC, and research performed for this project. The ARRC may have more complete information that shows the existence of additional lease holdings, or that some leases have expired.

G.7. Port of Whittier Freight Study

Port of Whittier

FREIGHT STUDY

MAY 2020

TABLE OF CONTENTS

Figures

Tables

Appendices

ACRONYMS

ACE .... Affordable Clean Energy
ADEC........ Alaska Department of Environmental Conservation
AGDC .... Alaska Gasline Development Corporation
AIDEA .... Alaska Industrial Development and Export Authority
AML .... Alaska Marine Lines
ARRC........ Alaska Railroad Corporation
bbl/hr .... Barrels per hour
CBS .... Cost Breakdown Structure
City .... City of Whittier
CN........ Canadian National
DEX .... Denali Express
DOT&PF........ Department of Transportation and Public Facilities
EIS........ Environmental Impact Statement
FERC .... United States Federal Energy Regulatory Commission
FTA .... Federal Transit Administration
ID .... Identification Card
JBER .... Joint Base Elmendorf Richardson
LNG........ Liquefied Natural Gas
LO/LO .... Lift-On/Lift-Off
Mat-Su........ Matanuska-Susitna Borough
Master Plan .... Whittier Intermodal Master Plan
MEX .... McKinley Express
MLLW .... Mean Lower Low Water Level
PAMP........ Port of Alaska Modernization Program
PCT .... Petroleum and Cement Terminal
POA .... Port of Alaska (Anchorage)
RFQ........ Request for Qualifications
RO/RO .... Roll-On/Roll-Off
ROW .... Right of Way
SLF .... Seward Loading Facility
USACE........ United States Army Corps of Engineers

EXECUTIVE SUMMARY

Introduction

The Alaska Railroad serves three major port facilities in Southcentral Alaska consisting of Whittier, Anchorage, and Seward. The location of these port facilities, more than 100 miles apart, affect Alaska Railroad's operations and profitability given their linkage to Alaska's rail belt. The Alaska Railroad Corporation operates the freight barge slip in Whittier, which serves Alaska Marine Trucking (a Lynden company), and several smaller freight customers. The Corporation also owns and operates the freight dock in Seward.

In 2015, the Alaska Railroad Corporation embarked on the Seward Marine Terminal Expansion Planning effort, which included several studies that culminated in the development of a Master Plan. The Master Plan will guide future development at the terminal over the next 20 or more years. The Freight Traffic Study completed as part of the Master Plan identified that although there are freight facilities in both Seward and Whittier, both have relative strengths and limitations (for example, Seward provides better pass/pass freight facilities, and Whittier provides better roll-on/roll-off facilities). Both locations could increase the volume of freight handled, and the Alaska Railroad Corporation is looking to understand which facility offers the strongest ability to entice new freight business, to support investment decisions.

The Whittier Freight Study evaluated:

- Existing facilities and their condition
- Current operations and activities
- Recent and historic business trends
- Future business opportunities
- Potential for existing facilities to support future freight operations and improvements needed to accommodate anticipated freight operations.

Approach

The Whittier Freight Study addresses several objectives:

- **Establishes a freight facility and user baseline:** The ARRC Whittier facilities include a barge slip providing for Roll-On/Roll-Off barge freight, and rail yard and track. The upland area is currently used for by Alaska Marine Trucking on a permit basis for laydown, storage and staging.
- **Identify issues with the existing facilities and services:** The ARRC Whittier marine facilities provide a range of functions and services, and is 50 years or older. The current facilities have been adapted over time, and compromises have been made to adapt to changes in usage and demand.
- **Identify opportunities based on a comparative analysis with other ports on the rail belt:** An analysis has been completed of activities and plans at other south-central ports located on the rail belt (Anchorage and Seward) to identify whether these create opportunities to secure new business at Whittier.

- **Identify options to address issues and opportunities:** A range of options were developed to address identified issues and opportunities.
- **Refine options to generate a preferred approach:** The comprehensive economic analysis completed as part of the Seward Marine Terminal Expansion Planning project was updated to summarize the existing market, current trends, and potential growth trends over the next 20 years and beyond. The analysis explored the relative advantages of the Whittier freight facility to enable the recommendation of a preferred approach, based on two potential improvement options. Options were developed to allow a flexible delivery of improvements, dependent on future demand, with a "cafeteria style" approach laid out to provide freight services and facilities in response to demand and market trends over the next 20 years.

Opportunities

Potential opportunities to increase the level of freight activity in Whittier are created by:

- Port of Alaska (Anchorage) modernization and the associated cost of redeveloping facilities in this location and associated uncertainty around funding.
- Port of Seward passenger terminal redevelopment and the potential impact this may have on freight activities.
- Attracting an existing freight operator from another port.
- Attracting cruise business from the cruise dock near the Whittier Cliff Side Harbor, or from another port.

These opportunities informed the development of recommended projects to improve the use of, and return on investment for the freight facilities at Whittier.

Issues and Limitations

The Whittier facilities require investment to maintain current operations and provide for future opportunities. Funding, without contractual commitments, is challenging.

The existing freight yard has been designed for the support of the barge-float operations, yet the existing facility is now supporting a significant amount of intermodal traffic as well. The yard is subsequently constrained by the poor space arrangement for the loading and unloading of containers as well as short tracks that preclude efficient switching of the facility without blocking the Whittier Street grade crossing. Further, freight trains seasonally conflict with passenger traffic as the current passenger loading facility is located at the throat of the yard. Although train length could be mitigated using double-stack equipment, this train-car configuration cannot be used due to clearance restrictions in the Portage Tunnel, four miles out of town.

Currently, the only operating ARRC waterfront facility is the barge slip. This facility is past its service life and requires significant rehabilitation or replacement in the next few years if the facility is to remain serviceable. There is an additional 1,200-foot sea wall adjacent to the barge slip that used to be the location of a Marginal Wharf. The wharf was demolished in 2005 as it reached the end of its service life; however, the seal wall retaining the yard remains. This wall is failing and requires replacement in the near future.

Options

Options developed were focused on waterfront improvements to allow a flexible delivery and ability to provide for future demand. Improvements to the uplands, including a railyard and regional track constraints, are anticipated to accommodate traffic which might include yard and City track reconfiguration, a grade separation at Whittier Street, and/or the removal of the height constraints at the tunnels and bridges to enable double stacking. Double stacking would shorten the required train lengths and relieve pressure on the Whittier Street grade crossing and the Anton Anderson Memorial Tunnel travel time.

The two waterfront improvement project options considered the most feasible to support additional business opportunities were:

- Marginal Wharf Redevelopment – Container Freight
- Marginal Wharf Redevelopment – Combined Break Bulk Freight Dock and Cruise Ship Terminal

The project options were advanced to include conceptual plans, and planning-level cost estimates. Project delivery could occur separately or as a single project, dependent on the needs of a future customer and availability of funding. The existing Barge Slip will require repairs to extend its service life while the Marginal Wharf development progresses.

1. INTRODUCTION

The Alaska Railroad Corporation (ARRC) provides a Class II railroad that extends from Seward to Eielson Air Force Base, and provides freight and passenger services throughout the rail belt. In addition to the railroad track, ARRC has significant land reserves, including a 291-acre reserve at 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 occurs using the Anton Anderson Memorial Tunnel to the 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 also travel through the Portage Tunnel to get to Bear Valley prior to using the Anton Anderson Memorial Tunnel.

Whittier was established as a strategic military facility during World War II, when the U.S. Army constructed a port and railroad terminus for the transportation of fuel and other supplies. The railroad spur and two tunnels were completed in 1943, and the Port became the entrance for troops and dependent of the Alaska Command. Following the withdrawal of the military from Whittier, much of the land reserve at 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. The largest freight port in Alaska, the Port of Alaska in Anchorage (POA), needs significant repairs owing to aging infrastructure. These present opportunities for increasing freight business at Whittier.

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 because of constrained rail facilities and potential conflicts between passenger and freight operations.

In 2017, ARRC completed the Seward Marine Terminal Expansion Planning Master Plan, which identified that freight facilities were being operated by the ARRC in both Seward and Whittier, and the two facilities jointly accounted for an average of 14 percent of inbound freight processed through southcentral Alaska between 2003 and 2013. The Freight Traffic Study completed as part of the Master Plan noted the market for freight in Seward declined primarily as a consequence of the downturn in international demand for coal, and without diversification, there is limited future growth potential in the freight forecast for Seward. During subsequent discussions with ARRC, it was determined that an analysis of freight operations at Whittier would be beneficial to understand where it was most appropriate for ARRC to make investments in freight facilities to support future demand.

1.1 Purpose of the Freight Study

The Whittier Freight Study evaluated:

- Existing facilities and their condition
- Current operations and activities
- Recent and historic business trends
- Future business opportunities

- Potential for existing facilities to support future freight operations and improvements needed to accommodate anticipated freight operations.

As ARRC owns port facilities at the Seward Marine Terminal, the analysis also sought to consider the relationship between the two facilities, whether recommended facility improvements are best located at either Whitter or Seward, and the likely implications of these recommendations.

1.2 Study Objectives

The Whittier Freight Study addresses several objectives:

- **Establishes a freight facility and user baseline:** The ARRC Whittier facilities include a barge slip providing for Roll-On/Roll-Off barge freight, and rail yard and track. The upland area is currently used for by Alaska Marine Trucking on a permit basis for laydown, storage and staging.
- **Identify issues with the existing facilities and services:** The ARRC Whittier facilities provide a range of functions and services and range in age from 60-80 years. The current facilities have been adapted over time, and compromises have been made to adapt to changes in usage and demand.
- **Identify opportunities based on a comparative analysis with other ports on the rail belt:** An analysis has been completed of activities and plans at other south-central ports located on the rail belt (Anchorage and Seward) to identify whether these create opportunities to secure new business at Whittier.
- **Identify options to address issues and opportunities:** A range of options were developed to address identified issues and opportunities.
- **Refine options to generate a preferred approach:** The comprehensive economic analysis completed as part of the Seward Marine Terminal Expansion Planning project was updated to summarize the existing market, current trends, and potential growth trends over the next 20 years and beyond. The analysis explored the relative advantages of the Whittier freight facility to enable the recommendation of a preferred approach, based on two potential improvement options. Options were developed to allow a flexible delivery of improvements, dependent on future demand, with a "cafeteria style" approach laid out provide freight services and facilities in response to demand and market trends over the next 20 years.

2. Existing Conditions

2.1 Alaska Railroad Network

The Alaska Railroad extends a total of 470 miles (760 kilometers) from Seward in Southcentral Alaska to Eielson Air Force Base, near Fairbanks. It includes 15 land reserves (Figure 1), four of which have rail yards, including Whittier. ARRC owns and operates port facilities at Whittier and Seward, and has significant land holdings at the Port of Alaska, in Anchorage. Rail connection is provided to all these ports for freight purposes.

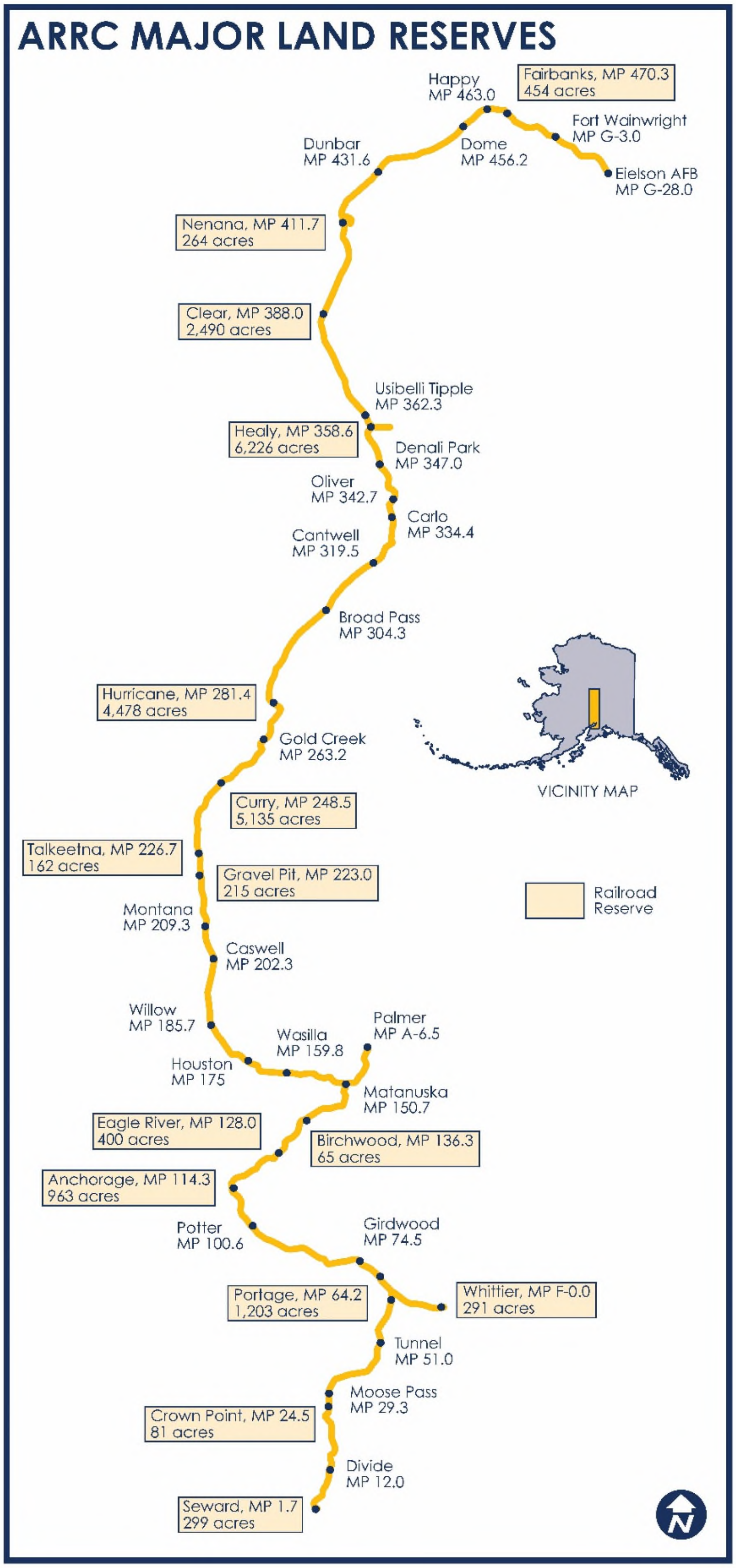


Figure 1: ARRC Network and Land Holdings[1]

1 Alaska Railroad Corporation (2016) Business Facts: Real Estate and Facilities.

2.1.1 Freight Services

The ARRC specializes in moving lumber, heavy machinery, rebar, pipe and hazardous material. Historically, freight generated about two-thirds (65 percent) of operating revenues (excluding capital grants), although this situation has changed with the downturn in the coal market worldwide. In 2018 and 2019, freight accounted for just under half of ARRC's operating revenue.

The railroad operates a comprehensive fleet management program involving rehabilitation and replacement of freight assets, which means that not all the assets are available for use on a continuous basis. The railroad's revenue-service freight fleet of 831 railcars is as set out in Table 1. There can be seasonal shortages of some car types because of customer demand and staging challenges.

Table 1: ARRC Freight Fleet Railcar Types[2]

Railcar Type	Purpose	Fleet
Tank Car	Moves liquid bulk cargo including jet fuel, diesel, gasoline, asphalt, vegetable oils, aircraft deicer, and various other chemicals.	232 cars
Flat Car	Moves trailers and containers, pipe, lumber, and heavy equipment.	205 cars
Air Dump (Articulated cars)	Side-dumping railcars used primarily to transport ballast and other rock materials for track maintenance.	55 cars
Open Top Hopper	Moves bulk solids, primarily coal and gravel, and unloads from the bottom.	326 cars
Covered Hopper	Moves dry bulk including grain, fertilizer and cement.	30 cars
Boxcar	Moves a variety of commodities including lumber, paper, and drilling mud.	14 cars
Gondola	Moves metal products (pipe, sheet pile, rebar) north and scrap south.	25 cars

ARRC experiences seasonal shortages of car types, particularly flat cars. This occurs because of summer demands for flat cars in different locations around the rail belt and is particularly apparent on Wednesdays owing to freight schedules.

Annual freight volumes dropped 44 percent over the eight years between 2008 and 2016, with the total tonnage moved dropping from 6.6 million tons in 2008, to 3.7 million tons in 2016[3]. Freight train operations have reduced due to lower demand, with scheduled freight operating between Fairbanks and Anchorage being lowered from two trains, seven days per week to two trains, five days per week in 2017[4]. Freight trains are constructed on an as-needed basis, dependent on customer requirements and demand. The trains are not operated as a regularly scheduled service.

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[2] Fact Sheet. 2015, updated by ARRC staff on 11/21/19.

[3] Seward Marine Terminal Expansion Planning Freight Traffic Study, May 2017.

[4] Ibid.

2.2 Whittier Freight Facilities and Operations

The ARRC's Whittier Terminal Reserve is approximately 291 acres. The reserve is comprised of the following land classifications (Figures 2 and 3):

- Right of Way (ROW): ~55 acres
- Operation Land: ~35 acres
- Leased Land: ~186 acres, most of which is controlled through a Master Lease with the City of Whittier
- Permitted Land: ~2.6 acres

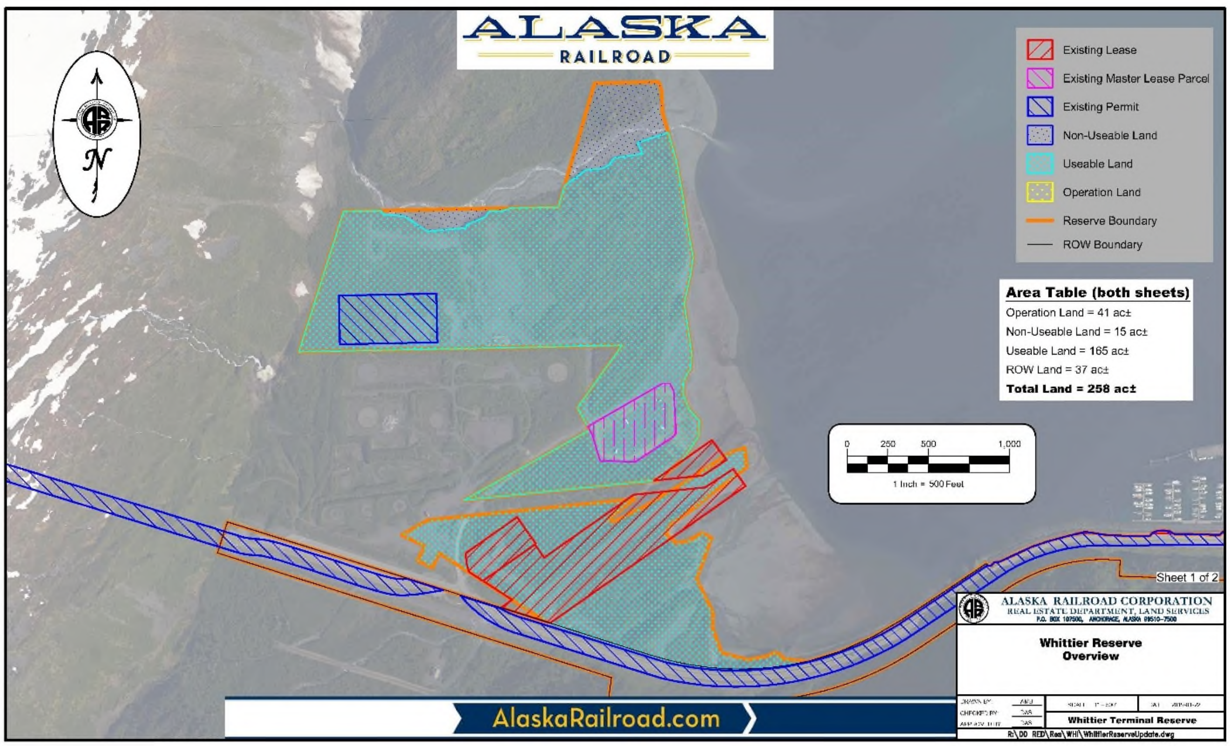

Figure 2: Whittier Terminal Reserve – Western Whittier

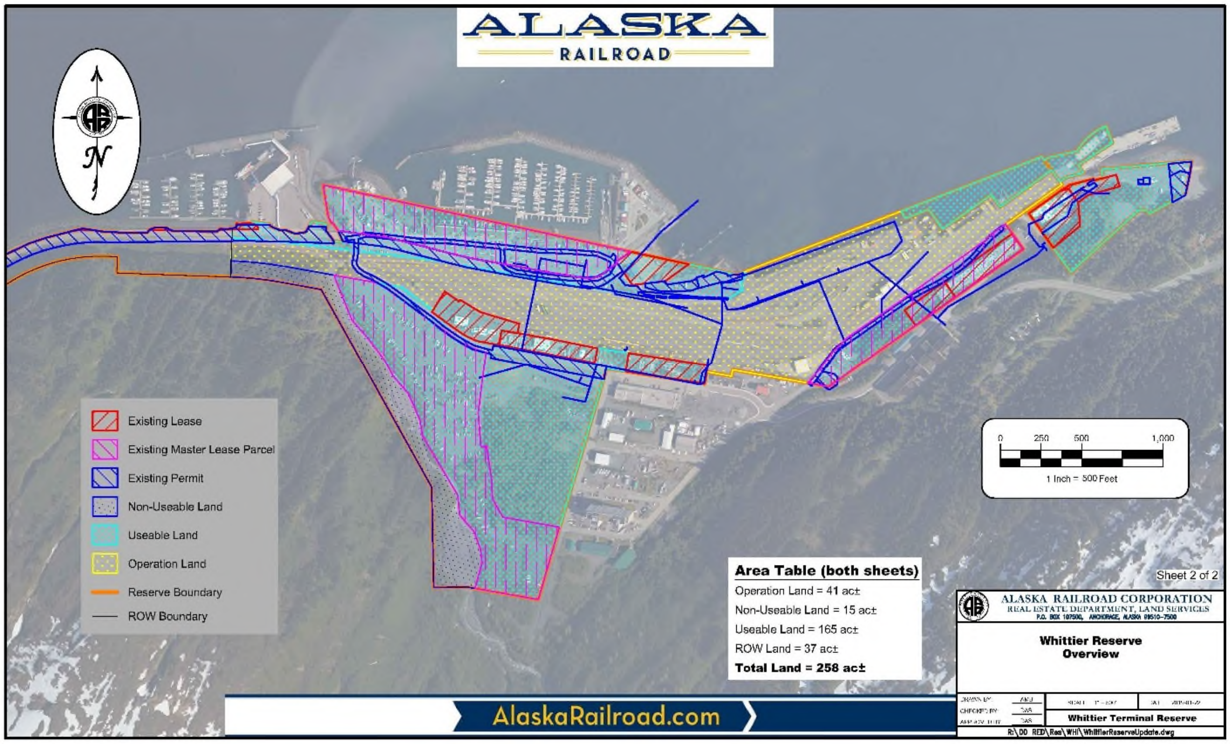

Figure 3: Whittier Terminal Reserve – Eastern Whittier

The ARRC has leased most of its non-operating lands to the City of Whittier (City) under a Master Lease agreement that became effective in 1999. The Whittier Intermodal Master Plan (Master Plan) notes in section 2.4 most of the usable land is leased to the City and the City subleases the land to third parties on a shared revenue basis with the ARRC. The ARRC owns approximately 8,000 feet of waterfront in the core area, which represents about 70 percent of the total waterfront. Further information on land ownership in Whittier is provided in the Master Plan.

ARRC's existing facilities in Whittier include a barge slip, rail yard and tracks, a maintenance building, pedestrian underpass, and associated uplands. A Marginal Wharf, comprising a 1,100 feet long by 60 feet wide dock with steel piles and a concrete deck was available for freight operations until 2002, when the facility was initially closed and then demolished (Photo 1). The ARRC facilities are described below, using information taken from the Master Plan.

Photo 1: Former Marginal Wharf Location

2.2.1 Barge Slip

The barge slip functions as the rail link with the Lower 48 states and Canada, and works as a bridge from land to a barge (Photos 2 and 3). It rests on the barge during loading and unloading operations so that tracks on the slip align with those on the barge dock. The barge slip is anchored on the land end, and is able to move to accommodate tides and the changing freeboard of the barge.

Photo 2: Barge Slip

Photo 3: Barge Slip with Active Barge Loading Operations Occurring

Several repairs and upgrades were conducted to maintain the facility, and improve performance. In 2001 and 2002, a side-loading facility was created to facilitate pass-pass unloading, but this is no longer used. A cathodic protection system and structural reinforcement were also added to the slip in 2001. Additional safety improvements in 2003 included installing a fendering system on the pass-pass platforms, and ramps to allow safer access to the trestles. In 2005 a ramp was installed. This is used to unload containers that are not mounted on rail cars which are transported on racks on the barge. The mechanical and electrical system was upgraded in 2008-2010, when the lifting mechanism was revised to a hydraulic system.

2.2.2 Rail Yard and Track

ARRC trains access Whittier via the Portage Tunnel and the 2.5-mile single track/single lane Anton Anderson Memorial Tunnel. The height limitations at the Portage Tunnel do not currently allow trains to be double stacked, meaning longer trains are needed to transport a full load of freight. The Anton Anderson Memorial Tunnel was originally constructed as a railroad tunnel during World War II and was converted to joint highway-railroad use in 2000. During the day, one-way vehicular traffic is released for travel through the tunnel on a toll basis every 30 minutes (top and bottom of the hour). Train traffic is released for movement on the 20-minute and 50-minute of the hour, except for the first two and last two east/west vehicle releases. One train movement occurs per 'opening' allowing for the locomotive emissions to clear the tunnel before the vehicle traffic passes during their opening window. The tunnel is open for motor vehicle use from 5:30am until 11:15pm between May 1 and September 30[5], and from 7:00am until 10:45pm from October 1 until April 30[6]. The closure of the tunnel at night for vehicular use provides for more flexible use by the ARRC, but the tunnel doors must be operated remotely by the railroad during this time. Traffic is controlled via a control building located at the west end (Bear Valley end) of the tunnel using a series of traffic lights and switch derail links.

[5] http://www.dot.state.ak.us/creg/whittiertunnel/assets/WhittierSummerSchedule.pdf, accessed November 7, 2019.
[6] http://www.dot.state.ak.us/creg/whittiertunnel/assets/WhittierWinterSchedule.pdf

The track map for Whittier is shown in Figure 4, which sets out the track names as described in further detail in the following paragraphs. There is approximately 6,500 feet between the tunnel derail and the turnout and yard tracks. West Camp Road (Whittier Highway) extends parallel to the north of the railroad mainline, within the ARRC ROW from the tunnel entrance to the waterfront. There is one at-grade crossing approximately one-third of a mile from the tunnel entrance for O'Neal Creek Road, accessing privately owned, undeveloped land to the south of the ARRC reserve. There is also a west-facing spur immediately east of the O'Neal Creek Road crossing for a railroad spur serving the old military tank farm area north of West Camp Road at the head of Passage Canal. Since there is no commercial activity presently along this spur, this track is used for occasional storage of rail cars, but has been retained for possible future use by development north of West Camp Road on property owned by ARRC. The City of Whittier previously held a lease for this area, but the terms of the lease and payments were not met. The area used for a campground is the only land still subject to an active lease. This general area has ongoing environmental contamination and clear-up concerns from the historic tank farm adjacent to the property.

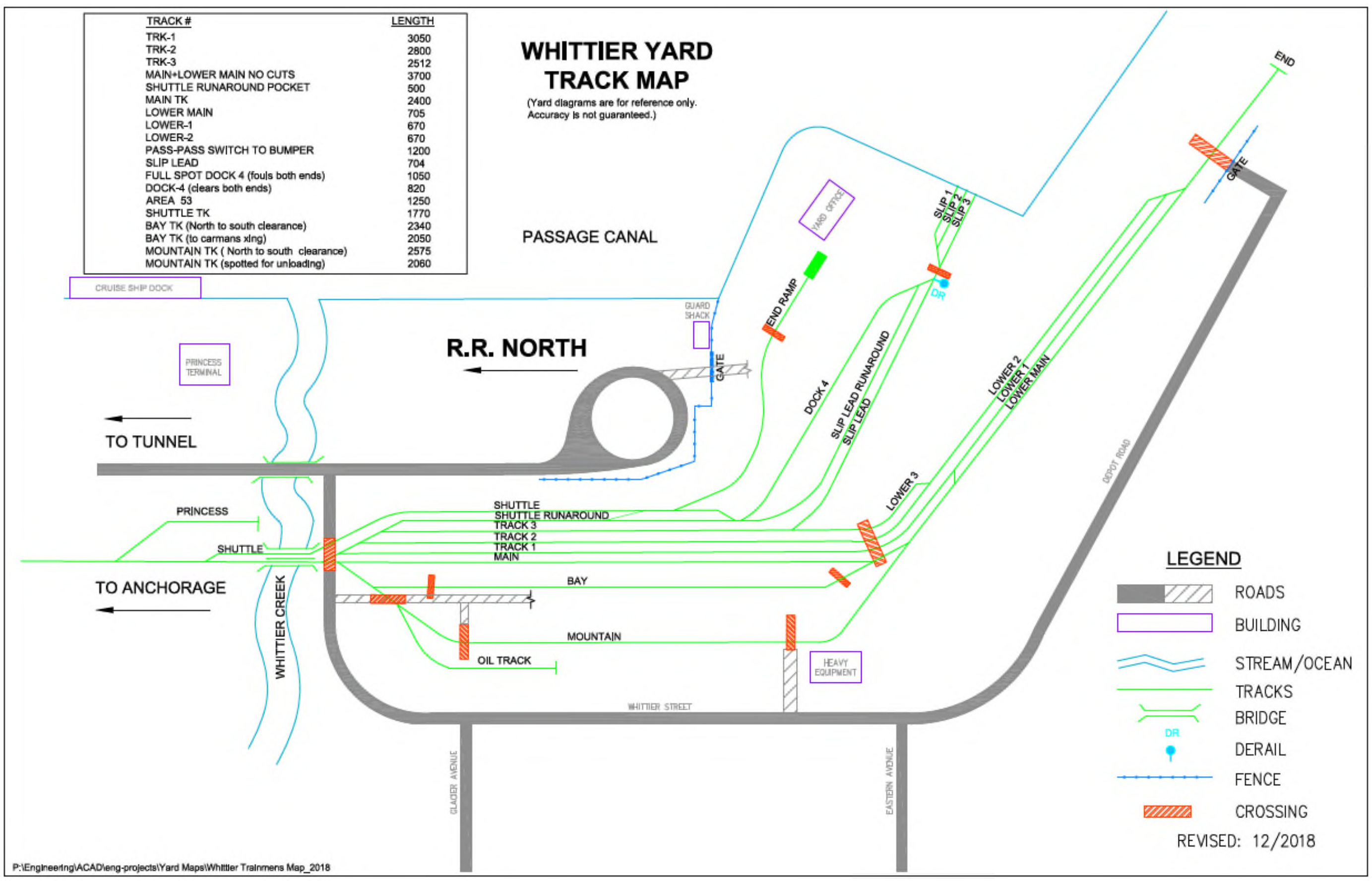

Figure 4: Whittier Track Map

A passenger loading/unloading spur was constructed in 2004 between the mainline and West Camp Road. The track is approximately 1,000-feet long (800 feet clear), single-ended, with an east-facing turnout nearly 1,100 feet from the Whittier Creek bridge. Nearly 350 feet west of Whittier Creek is the east-facing turnout for the Shuttle Track. Both the Main and Shuttle tracks cross Whittier Creek on two separate bridge structures (25-foot centers) immediately west of Whittier Street.

The proximity of the passenger spur track to the yard and Shuttle tracks can cause impacts to freight train movements, especially during the tourist season. Priority is given to passenger trains, which can delay movements of trains and can create challenges for rail car loading and train assembly.

The ARRC is considering relocation of the passenger spur turnout to 1,400-feet west of the existing location and connecting the east end of the track into the Shuttle track immediately west of Whittier Creek. This would effectively make the existing Shuttle Runaround-Main turnout into a left-handed crossover. The relocation would provide additional track length and marginally improve the operational efficiency of train movements at the west end of the yard.

Immediately east of Whittier Creek (and in the middle of the Whittier Road grade crossing), the ladder for the yard diverts from the main track. The yard consists of four tracks measuring 2,900 to 3,600 feet in length, named Yard Track 1,2,3, and Shuttle Runaround. Tracks 1 and 2 continue past the barge slip and connect to the main with a short tail track immediately shy of the DeLong Dock (transferred by the City). Yard Track 3 connects with Yard Track 2 midway to the end of the other yard tracks. There are several crossovers along the length of the yard tracks to accommodate the movement between tracks.

The Shuttle Runaround connects with the shuttle track 1,500-feet east of Whittier Creek. These tracks, in combination of the Slip Lead track branching from Yard track 3, become the Slip Runaround and Dock 4 tracks. All three tracks connect 400 feet shy of the barge loading bridge, then, separates into the three barge slip tracks. There is a short ramp track which splits from the Shuttle track before connection with the Shuttle Runaround to accommodate the end-loading of flat cars.

At the west end of the yard, after the yard tracks diverge from the main, two additional tracks then diverge to the south. The Mountain and Bay tracks are about 2,500 feet long and are at nearly 100-foot track centers. These tracks connect back into the main at the east end of the yard. Additionally, there is a spur track diverting from the Mountain Track at the east end of the yard which serves a fuel terminal.

2.2.3 Maintenance Facility

The maintenance facility was completed in March 2003 with federal financial assistance made available through the Federal Transit Administration (FTA). It provides a building with space for storage and maintenance of equipment. The facility can house as many as four pieces of heavy equipment. This facility replaced the Whittier Transit building, which was demolished in 2000 and 2003. The building allows year-round repair and maintenance of large equipment in Whittier.

2.2.4 Pedestrian Underpass

A pedestrian underpass was completed in June 2002 with federal financial assistance made available through the FTA. The facility is a 300-foot long pedestrian underpass crossing beneath the rail yard, from the waterfront area to the Whittier town site. A 10-foot-diameter corrugated pipe provides the underpass frame, enclosing a concrete pathway. Covered portal ramps at each end provide for ingress and egress, and covered pathways lead to the tunnel openings. The tunnel has significantly improved pedestrian safety in the rail yard area.

2.2.5 Lease Properties

Active leases in the Whittier Terminal Reserve are set out in Table 2:

Table 2: Active Leases in the ARRC Whittier Terminal Reserve

Lease No.	Lessee	Expiration Date
04951	State of Alaska, Department of Transportation and Public Facilities	11/14/98
07365	World Net Communications	11/30/32
07531	City of Whittier	11/12/33
07824	Shoreside Petroleum, Inc.	02/28/35
08459	State of Alaska, Department of Transportation and Public Facilities	08/31/59
09127	Whittier Marina Condominium	08/31/39
07439	Whittier Rail Yard LLC	11/30/44
07440	Whittier Rail Yard LLC	11/30/44
09844	Matthew J. Protzman DBA Dojer Services LLC	09/30/26
20286	Whittier Seafood, LLC	04/30/25

2.2.6 Permitted Activities

Activities that operate on a permit basis on the Whittier Terminal Reserve are set out in Table 3:

Table 3: Active Permits in the ARRC Whittier Terminal Reserve

Lease No.	Lessee	Expiration Date
06980	US Defense Fuels Office, Alaska	05/31/01
07439	City of Whittier	02/28/33
07901	Yukon Telephone Co., Inc.	09/12/99
07902	Yukon Telephone Co., Inc.	07/31/20
08293	Chugach Electric Association	12/31/21
08333	Chugach Electric Association	12/31/21
08898	Rock Reber	10/15/19
09178	Lynden Transport, Inc	-
09330	City of Whittier	06/30/14
09577	Lazy Otter Charters, Inc	09/30/20
09576	Thomas E. Woods	10/15/19
09595	Dojer Services LLC	04/30/21
09559	City of Whittier	03/01/13
09678	Dave Chaput	10/15/19
09690	Alaska Marine Highway System	06/30/22
20043	Un Ho Kim	10/15/19
20060	Robert L Hunt, DBA Donut Depot	05/31/20
20192	Glacier Jetski Adventures	04/30/21
20244	Inlet Fish Producers, Inc	08/31/21
20263	US Army Corps of Engineers	01/31/22
20288	Whittier Seafood, LLC	03/31/22

2.2.7 Security

Several security procedures have been implemented at Whittier's freight yard to deter unauthorized access:

- A security office was constructed at the entrance to the Whittier yard, and by rule, everyone entering the yard is required to enter through the main gate.
- Unauthorized access is controlled during vessel operations through the vigilance of employees and contracted security officers.
- Railroad employees entering ARRC ports must have their ARRC identification card (ID) or a Transportation Worker Identification (TWIC) card. All other individuals must have a government issued photo ID. All individuals entering the restricted areas at the ports during barge or passenger operations must be on official business and on an authorized access list.
- A seasonal fence is erected during the summer season (May – September) on the water side of the track and yard. The fence does not completely enclose the yard and access can occur from the mountain side. During the winter months, fencing is removed to facilitate snow removal.
- Two video cameras are used to monitor barge operations and restricted areas.

2.2.8 Railroad Operations

Freight operations are directly related to rail-barge operations. The ARRC does not own or operate any barges, but serves the Canadian National (CN) barge, and has a contractual relationship for Alaska Rail Marine Service (ARMS) barge operations with Alaska Marine Line (AML), a Lynden Transportation.

CN operates a railroad car barge (approximately 48 car capacity) between Whittier and Prince Rupert, British Columbia. Sailing time between Whittier and Prince Rupert is four days. Pending barge arrival in Whittier, ARRC sends a train to Whittier with south-sound CN interchange cars. The train is spotted on the Shuttle and the Slip Lead tracks. The 8-tracks on the barge are then pulled in two cuts. The northbound cars are spotted on the Bay and Mountain tracks for inspection before the train returns to Anchorage.

AML operates three regularly scheduled mixed-use barges, and one extra rail barge as needed, between ARRC dock facilities in Seattle and Whittier. The operation is planned for seven-day sail times between ports, with departures/arrivals on Wednesdays.

Generally, there is no the tide restrictions for barge operations, but tides can impact the operation of the barge slip. Vessels need to coordinate loading with the tides. Extreme tides can also impact berthing. Rough seas due to weather in the winter, spring and fall often cause delays making the arrivals of barges in Whittier erratic. The barges are configured with 8-tracks on the lower deck (approximately 48-cars), and container and cargo loading on the upper deck. Containers are also frequently located on the lower deck with freight cars. The ARRC lease space on the barge under agreement with AML. Operations vary depending on the mix of freight car/container traffic, but are generally as detailed in Table 4.

Table 4: Schedule of Freight Operations at Whittier

Approximate Time	Operation
Commencement of operations	Before the barge arrives, a train with a three-person crew, pulled by three to four locomotives, leaves Anchorage with 7,005 feet of interchange cars (cars loaded with containers) and flat cars. Upon arrival in Whittier, these cars are spotted in approximately 7,000-foot lengths on the Mountain, Bay, Lower Main, Dock 4 and Dock 5 tracks. The train takes approximately 3 hours from the call time to arrive in Whittier from Anchorage.
	When the barge arrives, a two-person crew will switch the train within the yard in two cuts. The first 120-container north cut is placed on the Main track for mechanical inspection as the barge is positioned for container unloading. The three-person crew then dead-head back to Anchorage in the summertime, dependent on freight volume. AML discharge the containers and stack them on the east end of the yard (adjacent to Hill Street) and in between the Slip Lead and Lower 2 tracks.
12 hours following commencement	A second southbound train pulled by three locomotives departs Anchorage to Whittier with a two-person turn crew, hauling interchange cars, remaining flat cars, and petroleum cars. Depending on demand, this train will be 1-3,000' feet in length. The train arrives and the container cars are spotted in readiness for loading north-bound freight. For constructing the northbound train, the interchange volume dictates the length of train as cars that are loaded with containers are heavier than empty cars. The train is usually divided into three cuts. Loaded cars are placed on the Main track, the Bay track and the Mountain track. The total weight of the train is approximately 9,000 tonnes, and the total length is approximately 7,500 feet. Once inspected, the train departs Whittier and the journey to Anchorage takes approximately three hours.
Midnight-6:00a.m.	Lynden typically halt the discharge of the barge between midnight and 6:00a.m., by which time the barge is three-quarters emptied. When work commences in the morning, discharge activities continue and work also commences on loading empty racks while the remaining discharge activities occur.
Approximately 20 hours following commencement	A call is made for a third two-person dead head crew to come to Whittier from Anchorage, and depending on the discharge of the southbound loaded volume from the second southbound train, they will start building a second northbound train. In summer, the Whittier Street at-grade crossing needs to be avoided during the late afternoon/early evening due to conflicts with tourism activities in Whittier. The southbound interchange train (train with cars carrying containers) needs to be switched to line up with the barge and hazmat requirements are different for freight on land than on a barge, so that dictates some operations. Once the train is appropriately loaded and the deck is clear, the cars are loaded onto the barge.
Approximately 37 hours following commencement	Following inspection the second northbound train departs for Anchorage. The train arrives approximately 2.5-3 hours after departure from Whittier, and pressure sometimes occurs to ensure alignment with tunnel openings and to minimize conflicts with tourism operations. The freight train normally departs in the 2050 tunnel opening, which means it follows passengers trains in the evenings.

The switching operation can result in disruption of vehicular traffic across the Whittier Street at-grade crossing due to trains being pulled across the at-grade crossing during switching operations. ARRC minimizes the number and duration of the closures of the crossing as much as practicable, and avoids closures between 4:30 and 5:30p.m., as this is a peak time for traffic associated with tourism activities. During tourist season, freight operations can conflict with passenger operations in Whittier and near the tunnel as the two operations are not presently able to be separated.

2.3 Existing Passenger Facilities and Operations

Whittier is a major transfer point for cruise ships, the Alaska Marine Highway System, and day-boat operations. Daily scheduled seasonal passenger trains, charters, and freight train operations are scheduled around the arrival and departure of water-borne transportation. The existing passenger and freight operations are described below.

2.3.1 Passenger Train Operations

The ARRC operates daily scheduled seasonal passenger services between Anchorage, Whittier, and points south of Portage. The service is scheduled to provide connection with day-boat and marine highway schedules, with 30-45 minute stops at approximately midday and 5:45 in the evening. The ARRC operates two additional passenger trains, the Denali Express and the McKinley Express to cater exclusively to cruise ship passengers. Cruise ships generally call at Whittier on Wednesdays and Saturdays during the summer cruise ship season.

All Whittier passenger trains currently use the passenger platform near Whittier Creek. This location is nearly half a mile from tourist destinations including the Alaska Marine Highway System terminal, many of the day-boat operations, and the pedestrian underpass connecting the waterfront with the City of Whittier. It also requires passengers to cross the Whittier Highway to reach the passenger loading area.

When cruise ships are at Whittier, there are multiple trains in operation on each day. Passengers are loaded on both the terminal track and the main line, requiring them to cross through the near train and between the two tracks to load. The passenger schedule in Whittier during these times is as outlined in Table 5.

Table 5: Passenger Schedule on Cruise Ship Days

Time (Approximate)	Activity
5:45am	McKinley Express (MEX) arrives empty from Seward on main passenger spur; loads.
7:05am	Denali Express (DEX) arrives empty from Anchorage on the main track; loads.
7:15am	MEX departs for Talkeetna.
8:15am	DEX departs for Airport/Talkeetna/Denali.
12:00pm	Glacier Discovery arrives on the main passenger spur; loads/unloads.
12:45pm	Glacier Discovery leaves for Hunter
5:30pm	DEX arrives loaded from Denali/Talkeetna/Airport on main track; unloads.
5:40pm	Glacier Discovery moves to yard (Bay or Mountain track); waits.
5:45pm	Glacier Discovery arrives from Hunter on Main; loads/unloads.
6:30pm	MEX arrives loaded from Talkeetna on passenger spur; unloads.
6:45pm	Glacier Discovery leaves for Anchorage.
7:15pm	MEX leaves empty for Seward.
7:45pm	DEX leaves empty for Anchorage.

The passenger operation prevents freight operations when barge traffic arrives, as it completely blocks the main line, yard and ladder tracks, and a substantial area of the yard required for train inspection.

3. Market analysis

3.1 Port of Whittier

The ARRC's freight income at Whittier is comprised of tariffs on port facility usage (wharfage and dockage), services provided during port facility use, and rail rates based on freight train transportation. Rates are set out in the Whittier Terminal Tariff ARR 601-A[7].

Tariffs apply to all cargo, passengers, vessels and vehicles using the wharves and/or facilities owned and operated by ARRC. Dockage is defined as charges assessed against a vessel for berthing at a wharf, pier, bank, or other facility or for mooring to a docked vessel. It is assessed based on a vessel's length, as set out in the Tariff. Wharfage is defined as the charges assessed against cargo for its passage over, under, or through any ARRC wharf, pier or facility or loaded or discharged over-side vessels berthed at an ARRC facility.

Additional charges identified in the Tariff include passenger service charges, annual vehicle access fees, vessel oily waste or garbage disposal, potable water charges, wharf storage charges (after free time has been used), and security fees.

3.1.1 Location and Setting

The Port of Whittier is located on Passage Canal of Prince William Sound, approximately 65 miles south of Anchorage. The port primarily serves as an import port for rail cars, container traffic, and break bulk goods. It is an important transfer hub and experiences approximately 90 vessel calls per year, primarily barge traffic. ARRC owns significant land holdings in Whittier, and large areas of the land are leased by the City for a variety of uses including private businesses, the small boat harbor and cruise ship dock and terminal.

3.1.2 Infrastructure

ARRC-owned freight facilities in Whittier are detailed in Section 2.2 of this report, and comprise a barge slip, rail yard, uplands and maintenance building. In addition, the DeLong dock is owned by the City and is used for commercial fishing vessel operations. A small boat harbor, owned by the City is located west of the ARRC freight facility and is used for recreational vessels, commercial vessels including tourist day-cruises. Additional dock facilities at the small boat harbor include commercial fishing, and a privately-owned cruise ship dock provides turn facilities for Princess Cruises, with an associated terminal building.

7 https://www.alaskarailroad.com/sites/default/files/Real_Estate/FT_ARR_601-A_Eff_12-01-19.pdf. Accessed 3/11/20.

3.1.3 Transportation

Whittier is connected to the Alaska Highway system, the ARRC Rail Belt, and the Alaska Marine Highway System (Alaska State Ferry). Rail and road access to and from Whittier requires passing through the one-lane, single rail track Anton Anderson Memorial Tunnel for 2.5 miles to Bear Valley. Traffic is allowed through the tunnel in each direction approximately once an hour. Other transportation issues in the community include the presence of at-grade rail crossings on main thoroughfares (particularly the crossing of Whittier Street at the intersection with West Camp Road), which creates conflicts with vehicles and the community, and extended traffic delays.

Trains traveling from Whittier to Anchorage encounter slight grades and require only two locomotives for a fully loaded train. AML and CN provide regularly scheduled rail barge service to and from Whittier. The AML barge arrives with 36 to 48 rail cars carrying products such as iron, lime, salt, chemicals, and flat cars carrying products such as lumber, pipe, and heavy machinery. Additional containerized freight is also carried on racks above the tracks on the barge. The CN Aquatrain operates on a 10-day cycle and usually arrives with 48 rail cars of lumber, oilfield and mining supplies. The Aquatrain is a barge with eight tracks on its deck, which allows for rail cars to be rolled on and off the barge using rail switches and engines.

The Whittier Airport is owned by the State of Alaska Department of Transportation and Public Facilities (DOT&PF), and is located at the head of Passage Canal. There is no scheduled air service between the community and other locations, and the airport primarily functions as a landing strip for small aircraft unable to cross the Chugach Mountains due to poor weather or other complications.

3.1.4 Freight Operations

Reported data are drawn from the United States Army Corps of Engineers (USACE) Institute for Water Resources Five-Year Cargo Reports for the years 2013 to 2018[8]. It supplements data previously gathered as part of the economic analysis completed for the Seward Marine Terminal Expansion Planning Effort (Years 2004-2013). There were some revisions to how commodities were grouped, and variations in the data. Where variations were noted, assumptions were made for the purpose of analysis and this is discussed in further detail below. Reported amounts are total imports and exports on a location basis and are not data exclusively from ARRC operations. For the purposes of this analysis and due to changes in reporting over the period captured in this report, some data groups have been aggregated.

Approximately 514,2000 tons of goods were imported through Whittier in 2018 (Table 6). Most of this inbound freight included manufactured equipment, machinery, and products, which amounted to 58.4 percent of the total import tonnage for 2018. The other two primary categories of imports include food and farm products other than fish (13.3 percent) and fish (6.1 percent).

In the last five years (from 2014 to 2018), Whittier has seen a 32.2 percent increase in inbound freight. This was primarily driven by a sharp increase in manufactured equipment, machinery, and products. In contrast, food and farm products have decreased since 2014, and fish has remained at a relatively stable level.

Approximately 48,300 tons of outbound freight exported through Whittier in 2018 (Table 7). The main export category was manufactured equipment, machinery, and products, with 26,300 tons, or 54.5 percent

8 file:///Q:/38/62527-01/40Study/Whittier%20Economic%20Analysis/RAW%20data/IWR%20–%20U.S.%20Army%20Engineer%20Institute%20for%20Water%20Resources.html#/,accessed 7/3/19.

of the total tonnage in 2018. The next largest exports were food and farm products, including fish (11.1 percent), and paper products (7.5 percent).

From 2008 to 2016, the total tonnage of outbound freight has maintained steadily, ranging from 10,400 to 21,900 thousand tons each year. However, from 2016 to 2017, Whittier experienced a 41,800-ton increase, or 329 percent, and the volume of outbound freight was also higher in 2018 (48,300 tons total). This was primarily driven by a sudden increase in the amount 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.

Table 6: Port of Whittier Inbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	**208.1**	**247.7**	**264.3**	**351.4**	**266.1**	**316.4**	**259.5**	**247**	**253.1**	**280.6**	**348.7**	**355.1**	**332.5**	**432.7**	**514.2**
Food and Farm Products Other Than Fish	10.5	14.1	17.5	26	44.5	32	54.4	79.1	83.9	93.3	109.0	103.6	81.3	59.7	68.2
Manufactured Equipment, Machinery, and Products	53.2	56.4	61.8	63.8	73.3	74.1	62.2	77.3	88.1	75.3	121.1	130.5	157.9	282.3	300.3
Fish	11.7	23	18.7	26.3	14.3	10.4	28	17.8	25.6	31.8	31.4	28.9	16.7	28.6	31.4
Other Chemicals and Related Products	41.8	39.2	44.5	25.5	28.8	40.8	31.8	25.5	15.6	24.9	8.3	8.6	8.1	7.4	14.6
Lime, Cement, and Glass	23.3	20.8	37.3	37.2	44.3	51.9	18.4	9.6	7.3	11.6	21.2	27.1	23.2	4.0	8.9
Petroleum Products	5.5	6.2	7.7	7.6	7.4	55.8	11.9	8.5	10.7	8.3	4.8	4.0	5.6	5.1	16.3
Forest Products, Wood and Chips	13.4	18.4	16.8	18.5	10.6	11.1	9.7	6.8	3.7	8.1	8.1	9.4	6.5	6.3	11.3
Primary Non-Ferrous Metal Products	6.3	7.6	8.6	11.9	8.1	10	5.3	5.3	6.4	7.7	20.9	21.1	13.5	9.2	5.2
Fertilizers	9	11.8	9.6	3.8	7.4	5.7	6.6	2.4	2.2	5.1	0.9	0.7	0.5	0.7	8.4
Paper Products	13.1	29.4	26	18	14.6	10.7	8	6	5.2	4.9	6.3	4.8	4.8	9.1	9.3
Other Non-Metal Minerals[1]	3.8	5.9	10.4	4.3	5	8.1	6.8	2.3	2	3.8	5.9	6.1	3.1	6.5	10.2
Primary Iron and Steel Products	6.4	3.7	2.8	3.3	2.7	2.2	2.6	0.6	1.2	3.2	2.3	3.1	2.7	1.0	11.4
Primary Wood Products; Veneer	4.9	5.5	0.8	2.6	2	1.9	0.1	1.3	0	1.6	3.0	3.0	1.8	9.0	13.0
Iron Ore and Scrap; Non-Ferrous Ores and Scrap; Sulfur, Clay, and Salt[2]; Slag	0	0.1	0	0	0.8	0.4	0.4	2.9	0.2	0.7	0.1	0.1	0.1	0.1	0.3
Soil, Sand, Gravel, Rock, and Stone	2.4	2.6	1.1	1.8	2	0.9	13.3	0.2	0.5	0.5	4.9	2.4	4.4	1.8	1.6
Waste and Scrap Not Elsewhere Classified; Unknown or Not Elsewhere Classified	2.1	0.6	0.3	0.7	0.4	0.3	0	1.6	0.5	0.2	0.1	1.8	2.3	2.0	3.9
Coal[3]	0.6	2.4	0.1	0	0	0	0	0.2	0	0					

1. This category includes salt for years 2014-2017. It is unclear on whether salt was included in this category in the 2004-2013 data.

2. Salt is not included in this category for years 2013-2017. The 2013 quantities from the two different data sources do not match unless SALT is removed from the category and grouped into the "Other non-metal minerals category".

3. No coal data provided for 2014-2018.

Table 7: Port of Whittier Outbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total[1]	**47.6**	**25.3**	**34.4**	**18.9**	**10.4**	**12.1**	**11.7**	**10.8**	**9.9**	**11.8**	**14.4**	**21.9**	**12.7**	**54.5**	**48.3**
Sub-Total[2]	47.6	25.3	34.3	18.9	10.4	12.3	11.8	10.9	10.0	11.8	14.2	21.7	12.6	54.5	48.0
Manufactured Equipment, Machinery and Products	44	17.7	28.8	12.4	4.4	6.3	5.9	5.2	4.1	6.1	7.6	9.3	5.3	25.4	26.3
Primary Non-Ferrous Metal Products	1.3	1.9	2	1.7	2.2	2.1	1.4	1.9	1.6	2.3	2.2	1.8	1.6	8.5	1.7
Food and Farm Products[3]	0.4	3.2	1.3	1.1	1.2	1.4	1.2	1.2	1.2	1.3	1.6	8.6	3.1	7.2	5.4
Paper Products	0.4	0.7	0.7	1.1	0.6	0.8	0.6	0.8	0.9	0.6	0.8	0.8	1.0	2.8	3.6
Other Non-Metal Minerals	0.2	0.6	0.6	0.6	1.1	0.8	0.6	0.8	0.4	0.5	0.6	0.2	0.3	2.5	1.7
Chemicals and Related Products	0.1	0.1	0.2	0.9	0.4	0.3	0.3	0.3	0.2	0.3	0.4	0.2	0.5	0.5	0.5
Lime, Cement and Glass	0.1	0.4	0.2	0.3	0.1	0.3	1.3	0.2	0.1	0.3	0.2	0.3	0.1	0.4	0.1
Forest Products, Wood and Chips	0.4	0.2	0.3	0.2	0	0.1	0.3	0.1	0.1	0.2	0.2	0.4	0.5	2.6	2.1
Petroleum Products[4]	0.5	0.4	0.2	0.6	0.4	0.2	0.2	0.4	1.4	0.2	0.2	0.2	0.2	3.4	2.8
Primary Iron and Steel Products; Primary Wood Products, Veneer	0	0.1	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.5	3.1
Soil, Sand, Gravel, Rock and Stone	0	0	0	0	0	0	0	0	0	0	0.5	0.0	0.0	0.8	0.7
Unknown or Not Elsewhere Classified	0.2	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0

1. This total was provided in the USACE report and include ALL categories that are provided in the USACE report. Not all categories were included in the 2004-2013 data, so not all categories are included in this table.

2. This sub-total shows the calculated sum of only the values included in this table.
3. 2014-2017 includes fish. Cannot confirm that 2004-2013 data includes fish, but quantity for 2013 match for two sets of data.
4. The 2017-2018 southbound petroleum products was Flint Hills moving their tank cars out of state (full) when they shuttered the North Pole refinery and sold the assets.

Figure 5 illustrates the trends for inbound freight at Whittier from 2004 to 2018, and Figure 6 illustrates the trends for outbound freight. The total volume of inbound freight has increased over the last 14 years, with a significant increase being observed between 2013 and 2018. The total volume of outbound freight has decreased over the same time period, except for the jump in outbound freight observed in 2017 and 2018.

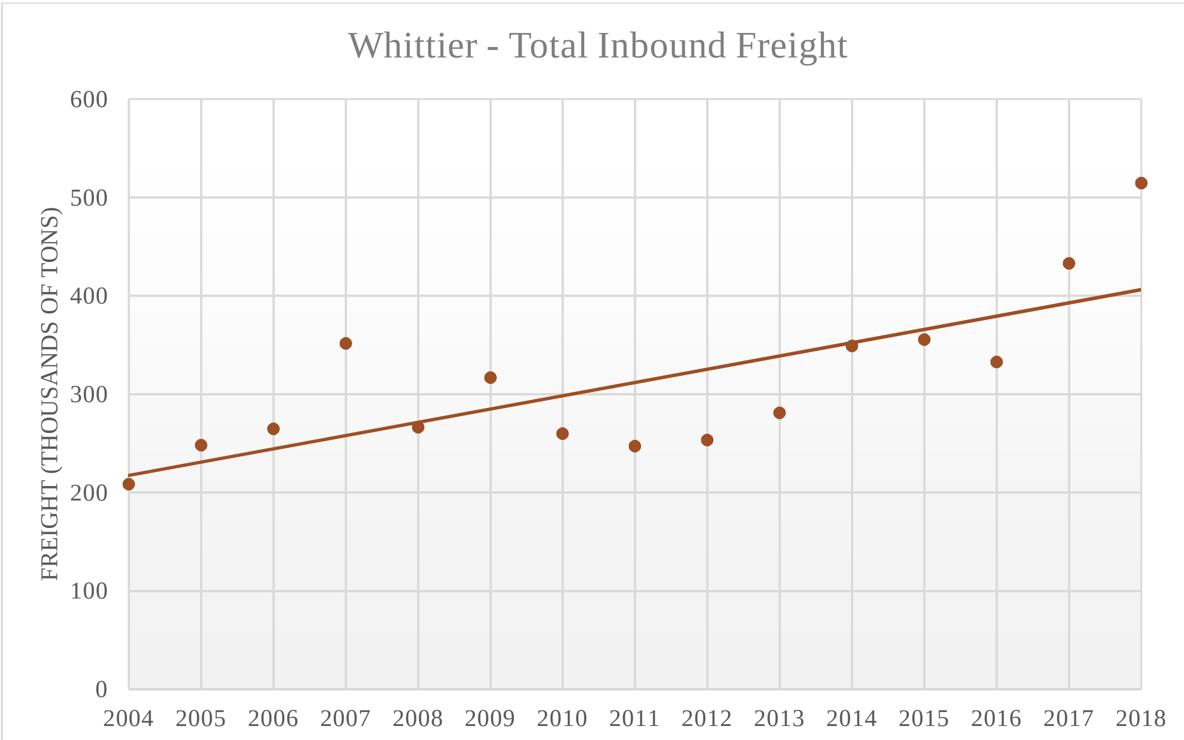

Figure 5: Whittier Inbound Freight Trends 2004 – 2018

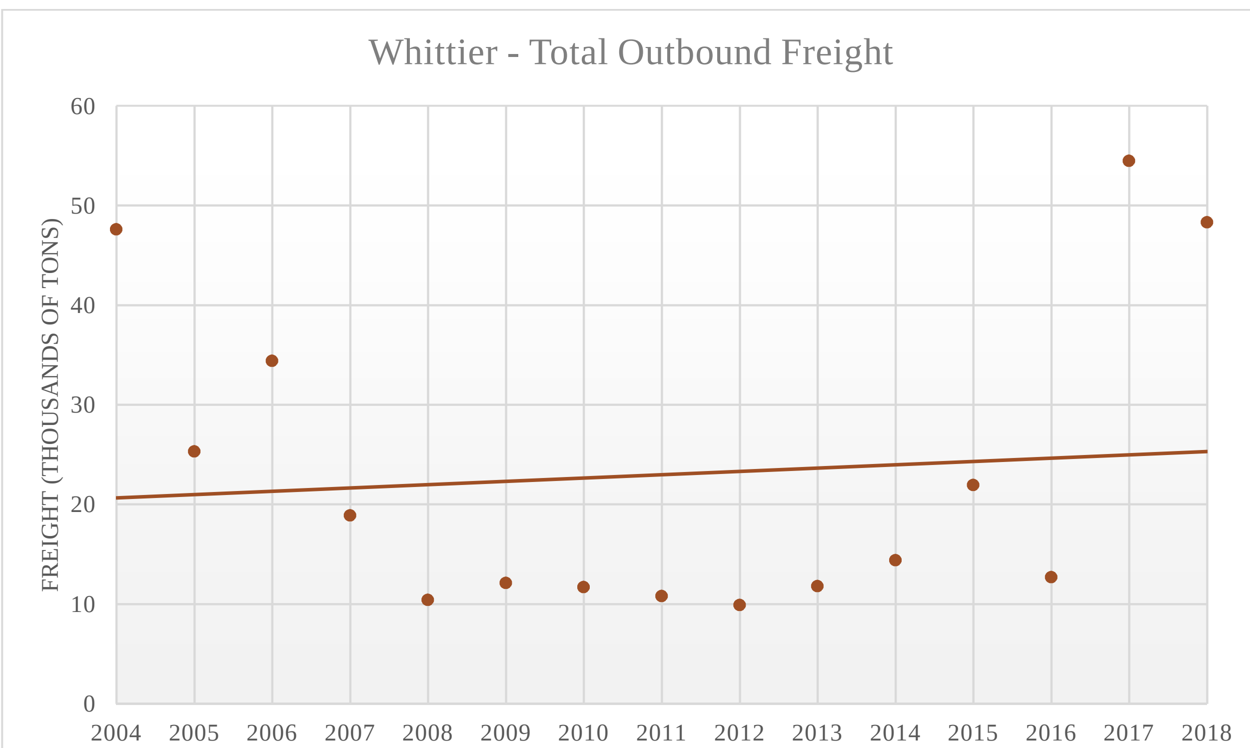

Figure 6: Whittier Outbound Freight Trends 2004 – 2018

3.1.5 Freight Businesses

ARRC's tenant at Whittier is AML/Lynden, a transportation company providing barge service to and from Alaska and Hawaii. AML offers twice weekly barge service to central Alaska, and seasonal barge service to western Alaska[9]. AML operates in a limited area of the terminal uplands. Often cargo loads require additional operational area in ARRC controlled areas. AML is currently working with ARRC Real Estate to modify their permit to secure additional unrestricted operational area.

Additional freight tenants within Whittier include (list is not comprehensive):

- Dojer Services, a landing craft service that provides year-round transportation and fuel services in Prince William Sound and the Gulf of Alaska is based in Whittier.
- Whittier Seafood LLC, which operates a salmon processing plant in Whittier.
- Fee's Custom Seafoods, a seafood processor and general store, provides custom fish processing and gifts from their location on the outer-east side of the Whittier Small Boat Harbor.
- Shoreside Petroleum, a fuel and lubricant distributor within the Whittier Small Boat Harbor, leases land for a fuel distribution terminal (McDowell Group 2015a).
- Custom Marine Services LLC, a boat repair service based in Whittier.

3.2 Comparison with Other South-Central Port Facilities

Ports considered in the comparative analysis were:

- Seward
- Anchorage
- Homer
- Valdez

The analysis uses data drawn from the USACE Institute for Water Resources[10] (Years 2013-2017), and it supplements data previously gathered as part of the economic analysis completed for the Seward Marine Terminal Expansion Planning Effort (Years 2004-2013). There were some revisions to how commodities were grouped, and variations in the data. Where variations were noted, assumptions were made for the purpose of analysis and this is discussed in further detail below. Reported amounts are total imports and exports on a location basis and are not data exclusively from ARRC operations. For the purposes of this analysis and due to changes in reporting over the period captured in this report, some data groups have been aggregated.

Port MacKenzie (Matanuska-Susitna (Mat-Su) Borough) has a partially constructed rail spur in Houston, Alaska, more than 30 miles from the port. However, construction is incomplete and project completion has been halted because of a lack of funding. Also, data for Port MacKenzie is not captured by the USACE Institute of Water Resources. Therefore, Port MacKenzie has been excluded from this analysis.

9 http://www.lynden.com/destinations/shipping-to-alaska.html accessed 11/7/19.

10 file:///Q:/38/62527-01/40Study/Whittier%20Economic%20Analysis/RAW%20data/IWR%20–%20U.S.%20Army%20Engineer%20Institute%20for%20Water%20Resources.html#/,accessed 3/11/20.

3.2.1 Port of Seward

The Port of Seward is an ice-free port located on the east side of the Kenai Peninsula, approximately 125 highway miles and 114.3 rail miles south of Anchorage. The Port is located on the Alaska national highway system, as well as the ARRC rail belt. Its location on the Kenai Peninsula allows for freight movement throughout the State by means of connecting rail and highway networks. The seafood industry is a major economic driver for Seward's economy. Seward is one of the top commercial fishing ports in Southcentral Alaska and one of the largest ports in the United States (as ranked by landed value). In 2014, Seward processors bought 52.4 million pounds of seafood worth $52.7 million, making it the 21st largest port in the United States by value out of 128 commercial fishery landings.

The ARRC facilities at Seward comprise three functional docks, which are described below.

- **Passenger Dock:** The passenger dock was constructed in 1965, and is a pile-supported pier dock with a concrete deck, a length of 736 feet and a width of 200 feet. The surface area of the dock is 147,200 square feet and it has an elevation of 24 feet relative to Mean Lower Low Water Level (MLLW). The dock has reached its 50-year design life, and the foundation has experienced significant corrosion, which has limited the useful life of the dock and has resulted in weight restrictions being imposed. The dock is currently used for cruise ship landings during the summer months, and supports freight activities when needed outside the passenger season.
- **Freight Dock:** The freight dock was constructed in 2001 to relieve the aging passenger dock and separate freight and passenger operations. The dock is used primarily for freight operations, and consists of compacted gravel fill supported on the west face by a sheet pile bulkhead and on the east face with a riprap armored embankment. It is 620 feet in length and has a width varying between 200 feet and 320 feet, and an approximate area of 145,000 square feet.
- **Seward Loading Facility:** The Seward Loading Facility (SLF) was built in 1984 as an economic development project for the State of Alaska, providing a facility to transfer bulk materials from Seward for shipment worldwide. The facility was constructed on property leased from the ARRC to Suneel Alaska Corporation. In 2003, ownership of the SLF was transferred to ARRC and it was operated by Aurora Energy Services, LLC, a subsidiary of Usibelli Coal Mine, Inc on a permit basis until 2016. The SLF transfers bulk materials, such as coal and gravel, from railcars, stockpiles the materials on ARRC land, and loads the material into bulk carriers, tethered to mooring dolphins. The SLF consists of a conveyer, vehicle access, stationery ship loader, and a coal bunker for unloading coal directly from rail cars.

3.2.1.1 Facilities

The Port of Seward is located 114.3 rail miles from Anchorage and 470.3 rail miles from Fairbanks. The community's primary arterial roadway is the Seward Highway, which extends 125 miles north to Anchorage. The Seward Marine Terminal shares its northwestern border with the Seward Airport. The airport is an unmanned, state-operated facility. Some air service, flightseeing, and air charter services are available. The airport's two paved runways are 4,240 feet long by 100 feet wide, and 2,279 feet long by 75 feet wide. The DOT&PF is currently considering airport improvements at Seward. Flight time between Seward and Anchorage is approximately 45 minutes, although no scheduled passenger services currently operate.

Trains traveling from Seward to Anchorage must climb a three percent grade, which requires a significant number of locomotives per car for a fully loaded train. By comparison, trains traveling from Whittier to Anchorage encounter slight grades and only two locomotives are required for a fully loaded train.

3.2.1.2 Freight Operations

As outlined in Table 8, most of the inbound freight tonnage in 2013 consisted of forest products (primarily lumber) followed by lime, cement, and glass. In 2013, these categories of freight were approximately 30 percent of Seward's total inbound freight tonnage. Between 2004 and 2013, the total volume of inbound freight has increased by 84.6 percent, but this has fluctuated seasonally year-on-year and has shown three distinct trends: between 2004 and 2007 volumes remained relatively similar prior to a drop of 50 percent between 2008 and 2010, and then a substantial increase between 2001 and 2013.

Seward's level of inbound freight from 2008 to 2018 shows growth overall with seasonal fluctuations until 2017. In 2018, inbound freight volume decreased by 63 percent, which was largely because of a decrease in imports of petroleum products (44.3 percent), primary wood products (77.8 percent), and unknown or not elsewhere classified goods (100 percent). It is not currently clear whether this is a one-off reduction, or the start of a new trend. Between 2004 and 2017, imports have fluctuated seasonally year-on-year and have shown three distinct trends: between 2004 and 2007 volumes remained relatively similar prior to a drop of 50 percent between 2008 and 2010, and then a substantial increase between 2010 and 2012. Imports then decreased in 2013 and 2014, and then increased to a new high of 90,900 tons in 2015. This tonnage dropped down to 65,500 tons in 2016, but started to climb again in 2017 to 75,700 tons.

Coal accounted for almost 99 percent of the outgoing freight tonnage from Seward during 2004 to 2016 (refer to Table 9). However, coal exports from Alaska has reduced significantly and in 2016 export volumes were 71,700 tons, or approximately 6.7 percent of the 2011 peak coal export volume. In 2016 only one shipment of coal was processed through the SLF, and the facility was placed in cold storage pending a re-evaluation of its future. Between the years 2004 and 2011, the outbound freight exports remained almost the same. In 2013, there was a sudden increase in exports, which was manufactured equipment, machinery and products. Excluding coal exports, Seward's largest export in 2013 by weight was manufactured equipment, machinery, and products. Since 2014, the only notable export has been petroleum products.

Table 8: Port of Seward Inbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	**26.0**	**17.9**	**25.9**	**24.6**	**12.1**	**13.6**	**10.6**	**40.6**	**71.5**	**48.1**	**46.6**	**90.9**	**65.6**	**75.7**	**28.0**
Forest Products	5.7	7	8.9	9.9	5.7	4.5	2.7	7.8	13.3	8.5	5.6	6.3	0.0	9.2	2.1
Lime, Cement, and Glass	6.7	5.2	8.7	7.1	3.9	4.8	4.2	8.3	13.8	7.6	6.4	2.8	0.0	8.8	3.0
Manufactured Equipment	1.7	1.4	2	1.8	0.9	1.5	2.1	8.8	10.8	7.4	0.4	0.7	0.0	1.4	0.0
Petroleum Products	0	0.1	0	0	0	1.4	0	3.7	7.2	5.5	31.1	71.5	65.6	37.0	20.6
Primary Iron and Steel Products	3.5	2.4	3.9	3.2	0	0	0	3	5.1	5.4	0.0	6.5	0.0	4.0	0.1
Primary Non-Ferrous Metal Products	0.1	0	0	0	0	0	0.5	3.3	9.5	4.4	0.0	0.0	0.0	1.0	0.0
Primary Wood Products	1.4	1.9	2.4	2.6	1.6	1.5	0.8	1.3	5.1	3.3	3.1	3.1	0.0	7.2	1.6
Other Chemical and Related Products	1.2	0	0	0	0	0	0.2	0.4	1.5	2.9	0.0	0.0	0.0	0.0	*
Processed Grain and Animal Feed; Other Agricultural Products; Fish[1]	0.1	0	0	0	0	0	0	2.1	4	2.2	0.0	0.0	0.0	0.0	*
Soil, Sand, Gravel, Rock, and Stone[2]	0	0	0	0	0	0	0	1.3	1	0.8	0.0	0.0	0.0	0.0	*
Paper Products	5.5	0	0	0	0	0	0	0.6	0.1	0.1	0.0	0.0	0.0	0.0	*
Subtotal Unknown or Not Elsewhere Classified	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	7.2	0.0

1. 2013 values matches from both the old and new sources, if ALL Food and Farm products are included, including alcoholic beverages.
2. This category only includes some crude materials. Otherwise, the 2013 values does not match across the old and new data source.
* Indicates that data categories were not available in 2018 dataset.

Table 9: Port of Seward Outbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	**572.9**	**505.2**	**403.5**	**226.6**	**579.6**	**889.9**	**948.8**	**1,072.6**	**893.0**	**670.5**	**554.2**	**149.4**	**71.7**	**0.7**	**2.3**
Coal	570.3	505.2	403.2	226.3	578.6	886.4	948.7	1,070.70	890.4	641.3	553.8	149.0	71.7	0.0	0.0
Manufactured Equipment, Machinery, and Products	1.1	0	0.3	0.2	0	3.5	0	1.1	0.9	23.7	0.0	0.4	0.0	0.0	0.0
Fish	0.7	0	0	0.1	0	0	0	0.2	0	4.7	0.0	0.0	0.0	0.0	*
Iron Ore and Scrap	0	0	0	0	0	0	0	0	1	0.5	0.0	0.0	0.0	0.0	0.0
Primary Manufactured Goods	0	0	0	0	0	0	0	0.1	0	0.2	0.0	0.0	0.0	0.2	0.0
Processed Grain and Animal Feed; Other Agricultural Products[1]	0	0	0	0	0	0	0	0	0	0.1	0.0	0.0	0.0	0.0	*
Pulp and Waste Paper	0	0	0	0	0	0	0	0.2	0.2	0.1	0.0	0.0	0.0	0.0	*
Other Chemicals and Related Products	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	*
Forest Products, Wood, and Chips	0.8	0	0	0	0	0	0	0.3	0	0	0.0	0.0	0.0	0.0	0.0
Petroleum Products	0	0	0	0	1	0.1	0.1	0	0.6	0	0.4	0.0	0.0	0.5	2.2
Other Non-Metal Minerals	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	*
Unknown or Not Elsewhere Classified	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0

1. The categories for outbound do not match the inbound table. Fish is its own category in outbound, but is grouped into Processed Grain and Animal Feed, Etc. in the Inbound table.

* Indicates that data categories were not available in 2018 dataset.

Figure 7 illustrates the trends for inbound freight at Seward from 2004 to 2018, and Figure 8 illustrates the trends for outbound freight. The total volume of inbound freight has increased over the last 13 years, but there was a significant drop in the total inbound freight volume in 2018. It is unclear whether this is a single event, or a new trend. The total volume of outbound freight has decreased over the same time period, with a precipitous decline from 2015 onwards associated with the decline and eventual cessation of coal exports.

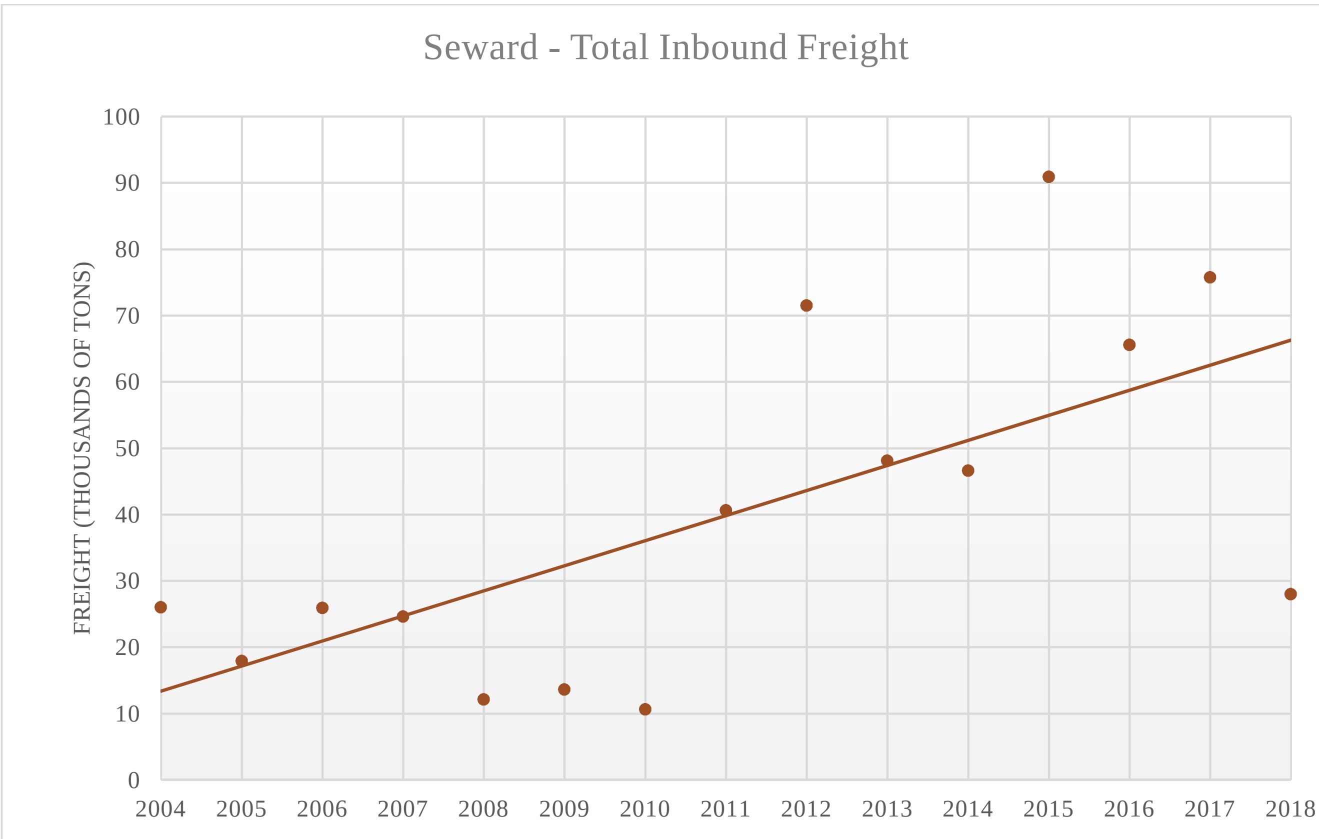

Figure 7: Seward Inbound Freight Trends 2004 – 2018

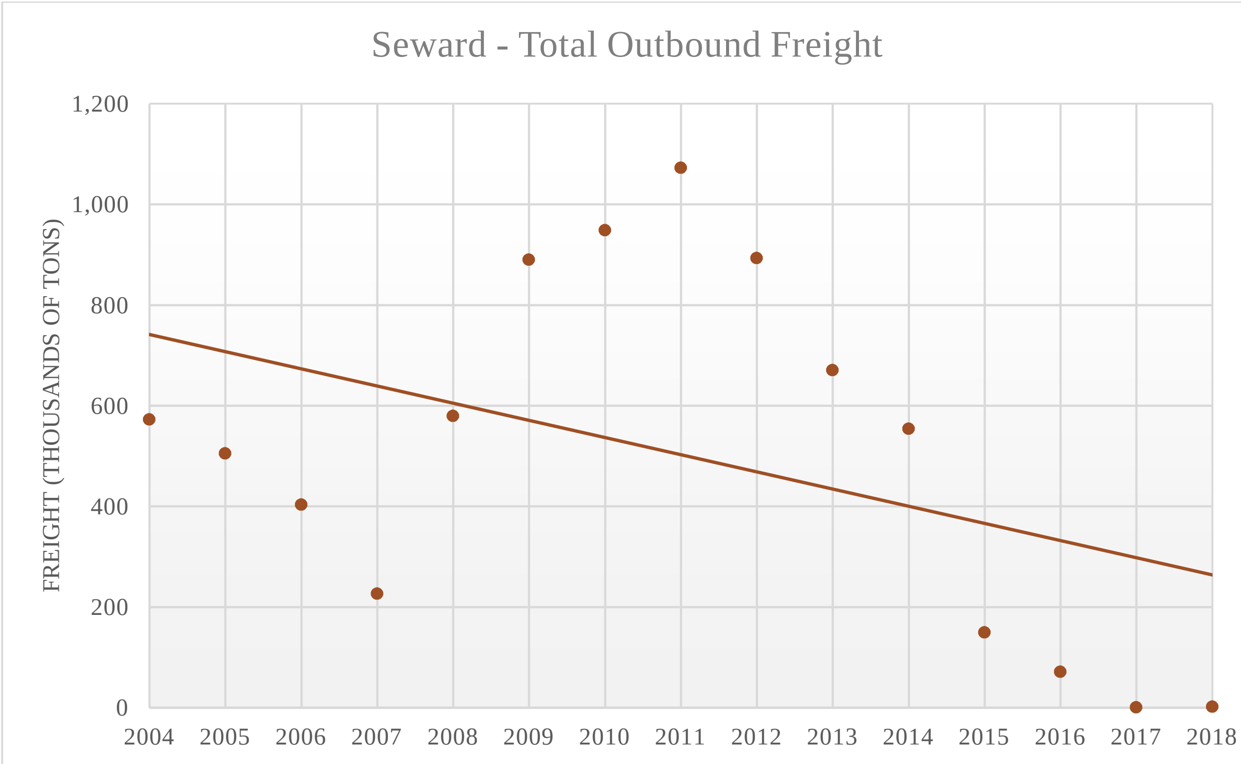

Figure 8: Seward Outbound Freight Trends 2004 – 2017

3.2.1.3 Freight Dock Customers

More than 60 organizations and individuals were ARRC customers at the freight dock between 2013 and 2016. Many of the customers have used the dock every year to load, unload, or store freight at the dock. Others have landed at the freight dock for marine repair and maintenance operations. The top six freight customers at the Seward freight dock (by value) are listed below[11]. These customers account for 70 percent of the total business at the freight dock between 2013 and 2016.

- Samson Tug and Barge, an intermodal freight carrier, makes the most frequent calls at the freight dock and accounts for approximately 32 percent of the total freight dock business.
- Alaska Logistics, LLC, a marine transportation company accounts for approximately 10 percent of the total business.
- Crowley Marine Services, a transportation and logistics company, also accounts for approximately 10 percent of the total business.
- SeaTac Marine Services transports two barges of goods each year to Seward and accounts for approximately 9.5 percent of the total business.
- Northland Services accounts for approximately 4.5 percent of the total business at the freight dock between 2013 and 2016. Northland was acquired by AML in 2013.

11 ARRC 2017, Seward Freight Invoices 2013-2016.

- Shoreside Petroleum Inc. uses fuel pipes on the freight dock to transfer fuel to and from its local facility at Seward from Kirby Offshore Marine Barges. Shoreside Petroleum also accounts for approximately 4.4 percent of the total business.

3.2.1.4 Permit Holders at Seward Marine Terminal

Seward Marine Terminal tenants (permit holders) include the following (the list is not comprehensive):

- Alaska Logistics, a marine transportation company, operates from the Freight Dock and maintains equipment and freight handling capabilities.
- Carlile Transportation provides services at Seward and leases the freight building.
- Colaska/QAP, a manufacturing company that provides various aggregate, emulsion, binders, asphalt, and concrete mixes for road construction projects, uses its permit area for laydown capacity and has historically received freight at the freight dock.
- Orion Marine Contractors, a marine-based construction company, primarily uses its permit area for equipment laydown space and logistical staging areas.
- Pacific Pile and Marine, a civil and marine contractor, leases laydown space.
- Samson Tug and Barge, an intermodal freight carrier, transports via barge, rail and truck; leases land; and has an office in the Dale R. Lindsey Intermodal Terminal.
- Shoreside Petroleum Inc. holds a land permit for their fuel headers at the freight dock.

3.2.2 Port of Alaska (Anchorage)

The 220-acre Port of Alaska (Anchorage) (POA) is adjacent to downtown Anchorage and is owned and operated by the Municipality of Anchorage. About 450 vessels call on the POA each year, making it the largest and busiest port in the state. About 80 percent of goods serving 85 percent of Alaska's populated areas arrive through the POA including: gasoline, heating oil, diesel fuel, cement, business supplies, and groceries. Additionally, the port is one of only 19 commercial ports in the U.S designated as a Department of Defense Strategic Seaport. This designation recognizes POA's role in supporting overseas deployments, fuel for Joint Base Elmendorf Richardson (JBER), vehicle transportation, and goods used in day-to-day business and the commissary.

The POA contains three cargo berths, two petroleum berths, and a dry barge landing. The cargo berths have 2,100 feet of dock space for loading and unloading bulk and break-bulk cargo (break-bulk is general non-bulk or intermodal cargo such as bags, bails, boxes, cartons, drums, pallets and vehicles). The facility is capable of RO/RO transfer of cargo; has multiple rail-mounted, electric container cranes capable of moving up to 40 tons; and can handle bulk cement and break-bulk cargo. The two petroleum terminals each have 600 feet of berthing space and four 2,000 barrels per hour (bbl/hr) product pipelines. The POA operating depth is currently dredged to -35 feet MLLW. The POA is currently in the process of modernization to increase berth depth, improve facilities and increase the life of the facility (refer to Section 4.1).

Goods arriving at the POA have access to the state by ship, rail, highway, airport, and pipeline. The close proximity to Ted Stevens Anchorage International Airport, the fifth busiest air cargo hub in the world, allows goods to be quickly transferred from one mode of transportation to another. A network of pipelines allows for the transportation of fuel from the Tesoro refinery in Nikiski to the POA, and also for redistribution from the POA to the airport and JBER. In the winter months, ice can build up around the docks and harbor area. In addition, vessels take 12 to 16 hours additional sailing time to reach the POA compared with the Port of Whittier, and need to navigate the unusual tide cycles in Cook Inlet.

3.2.2.1 Freight Operations

Approximately three million tons of goods were imported through the POA in 2018 (Table 10). 43 percent of the total imported tonnage consisted of petroleum products. Manufactured equipment, machinery, and products (38.7 percent) and food and farm products other than fish (9.5 percent) accounted for the second and third highest imported tonnage, respectively. The percentage increase in inbound freight at POA was 12.6 percent between 2014 and 2018, although there have been year-on-year fluctuations.

Approximately 300,200 tons of goods were exported through the POA in 2018 (Table 11). Nearly 60 percent of that tonnage consisted of manufactured equipment, machinery, and products. Forest products, wood and chips; Iron ore and scrap; and Food and farm products other than fish were the next largest categories of export tonnage, respectively. Seafood also plays an important part in the economic vitality of Anchorage, and Alaska as a whole. Producers can “backhaul” their frozen fish on shippers return trips. By doing this whenever possible, shippers can charge more competitive rates, lowering the overall transportation costs in both directions.

The total volume of goods exported through the POA decreased 30.7 percent between 2004 and 2013, although there were year-on-year fluctuations. From 2013 to 2014, total tonnage amounts decreased significantly from 662.8 thousand tons, to 284.0 thousand tons, a 57 percent decrease. This was largely due to a reduction in petroleum product exports. Total export levels have ranged from 212.9 to 300.2 thousand tons between 2014 and 2018.

Table 10: Port of Anchorage Inbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	**2,129.8**	**2,535.6**	**2,298.6**	**2,005.6**	**1,989.5**	**1,862.2**	**2,452.4**	**2,465.3**	**2,520.7**	**2,286.6**	**2,580.3**	**3,327.7**	**2,938.3**	**3,052.8**	**2,952.2**
Manufactured Equipment, Machinery, and Products	1,021.5	1,055.2	1,004.4	1,019.9	1,043.4	1,052.5	1,112.6	1,121.0	1,135.4	1,113.9	1,241.6	1,171.4	962.1	968.4	1,143.6
Petroleum Products	418.3	661.7	520.2	306.8	280.9	264.8	774.5	811.4	806.7	593.8	811.7	1,604.8	1,284.1	1,413.4	1,269.4
Food and Farm Products Other than Fish	335.2	342.3	312.2	327.2	313.0	283.1	263.4	220.6	227.0	198.5	86.4	97.0	238.8	251.1	280.9
Lime, Cement, and Glass	149.0	183.4	138.1	142.8	150.8	137.8	149.2	124.7	146.3	149.8	147.0	151.5	146.4	99.9	140.1
Forest Products, Wood, and Chips	84.1	156.2	128.6	120.7	113.3	76.5	81.1	89.9	100.3	96.7	58.9	68.4	72.4	73.5	60.6
Primary Non-Ferrous Metal Products	48.5	56.1	44.1	44.0	35.1	8.8	10.2	30.3	31.3	56.7	158.3	154.3	158.7	161.1	1.1
Primary Iron and Steel Products	2.9	4.1	2.7	2.0	2.8	12.1	9.5	8.7	11.7	22.4	8.3	6.8	1.4	8.7	4.1
Primary Wood Products; Veneer	10.2	14.1	17.1	10.8	16.2	14.6	16.6	23.9	20.2	21.8	13.3	20.1	20.3	20.0	5.7
Unknown or Not Elsewhere Classified: Waste and Scrap Not Elsewhere Classified	10.0	1.4	0.0	0.0	0.2	8.2	15.9	12.3	15.3	18.9	34.3	29.9	22.1	30.8	0.1
Other Non-Metal Minerals[1]	0.0	21.6	19.8	14.8	19.9	1.2	17.1	20.0	20.9	9.6	19.4	15.7	8.3	1.3	10.5
Other Chemicals and Related Products[2]	16.8	5.1	4.0	1.4	2.5	1.8	1.7	1.7	2.3	2.6	0.1	6.8	12.2	14.2	25.2
Other Crude Materials	0.2	9.0	0.1	0.2	0.2	0.1	0.0	0.0	2.3	1.7	0.0	0.0	3.2	2.4	2.9
Paper Products	32.9	25.5	17.4	14.9	11.0	0.4	0.4	0.6	0.6	0.2	0.7	0.7	8.2	8.0	7.9
Fish	0.2	0.1	89.8	0.1	0.0	0.2	0.2	0.2	0.1	0.0	0.3	0.2	0.2	0.1	0.0

1. There is a discrepancy in the data for 2013. The original Economic Analysis report records 9.6 in 2013, but latest USACE data records 9.7.

2. This category Includes fertilizers for 2013-18. It cannot be confirmed whether fertilizer was included in the 2004-2012 data.

Table 11: Port of Anchorage Outbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	**955.9**	**991.7**	**624.7**	**627.2**	**415.7**	**330.3**	**317.8**	**318.7**	**283.6**	**662.8**	**284.0**	**212.9**	**276.8**	**245.0**	**300.2**
Petroleum Products	720.1	576.6	330.5	307.7	124.7	137.9	92.2	115.3	56.1	327.4	23.9	8.3	37.2	10.8	7.5
Manufactured Equipment, Machinery, and Products	122.1	180.9	138.6	141.6	156.7	129.6	148	164.2	152.8	151.0	186.3	155.2	172.7	166.1	178.4
Fish	24.3	42.8	47.9	80.2	26.7	52.4	44.3	26.3	19.6	83.4	0.0	10.5	9.5	5.7	10.6
Iron Ore and Scrap	18.7	16.4	17.5	0	5.5	0	0	1	33.7	45.6	9.8	2.7	17.5	29.7	26.0
Forest Products, Wood, and Chips	40.8	142.5	29.3	58.2	67.7	1.2	1.5	1.1	1.8	32.7	21.9	12.8	7.8	0.5	61.6
Food and Farm Products Other than Fish	13.7	19.2	22.3	12.7	14.2	2.9	2.5	3.1	4.4	7.7	12.0	5.3	17.4	17.8	13.8
Waste and Scrap Not Elsewhere Classified; Unknown or Not Elsewhere Classified	4.6	0.7	0.1	1.2	0.1	2.9	3.7	3.6	3.8	7.1	22.0	11.7	6.4	6.5	0.0
Primary Non-Ferrous Metal Products	7.2	7	5	20.5	4.4	1.4	3.1	2	7.1	3.2	5.7	5.5	5.8	5.9	0.0
Other Chemicals and Related Products[1]	3.2	4.6	2.6	3.4	13.7	0.5	0.2	0.1	2.1	2.7	0.4	0.1	0.3	0.8	0.8
Lime, Cement, and Glass	0.8	0.5	0.8	1.2	1.5	1.3	1.3	1.2	1.4	1.3	1.4	0.5	1.0	0.0	0.0
Soil, Sand, Gravel, Rock, and Stone	0	0	0	0.1	0.1	0	20	0	0.2	0.4	0.4	0.2	0.1	0.0	0.0
Primary Manufactured Goods[2]	0.2	0.3	0.3	0.1	0.3	0.2	0.2	0.2	0.2	0.4	0.2	0.0	0.6	0.8	1.3
Other Crude Materials	0.2	0.1	0.1	0.1	0	0	0.7	0.4	0.4	0	0.1	0.0	0.4	0.3	0.0
Fertilizers	0	0.2	29.6	0.2	0.1	0	0	0	0	0	0.1	0.0	0.1	0.0	0.0

1. This category does not include fertilizers.
2. This category includes Paper Products and Primary Iron and Steel Products.

Figure 9 illustrates the trends for inbound freight at Anchorage from 2004 to 2018, and Figure 10 illustrates the trends for outbound freight. The total volume of inbound freight has increased over the last 13 years. The total volume of outbound freight has decreased over the same time period, with a precipitous decline from 2015 onwards associated with the decline and eventual cessation of coal exports.

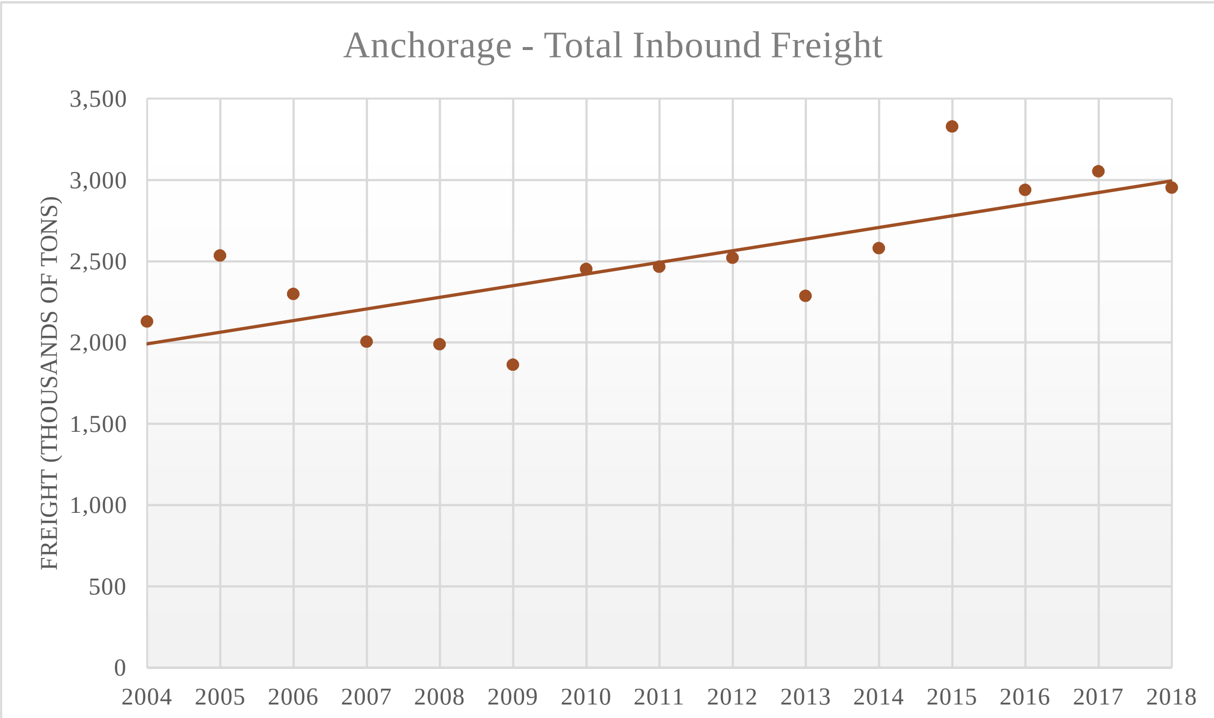

Figure 9: Anchorage Inbound Freight Trends 2004 – 2017

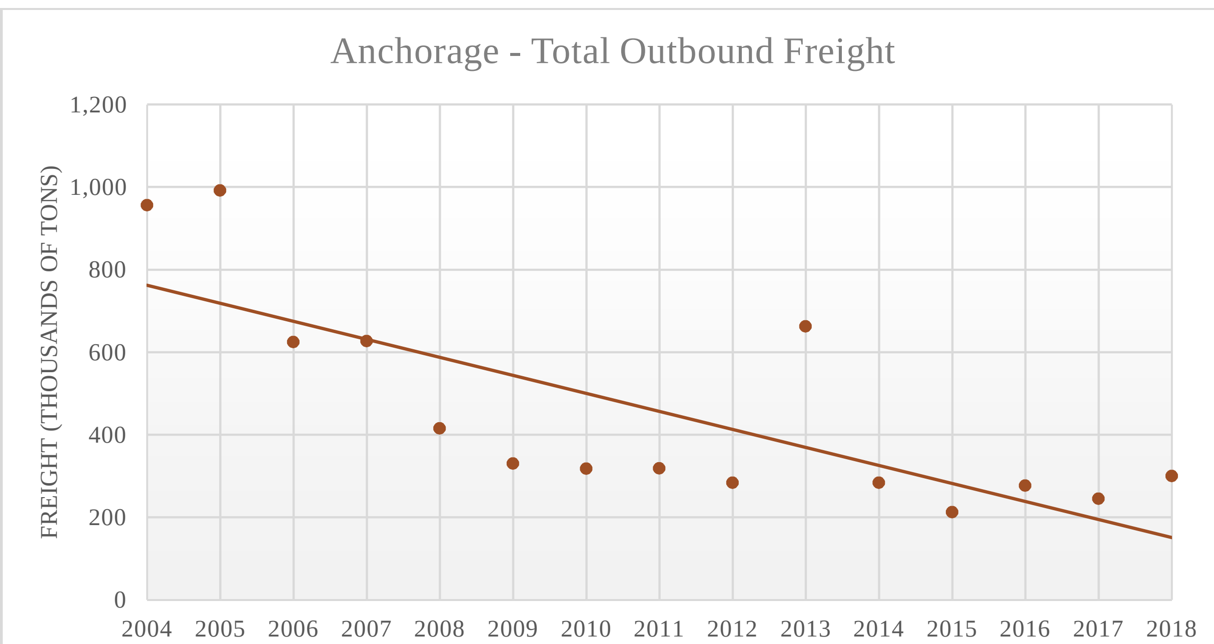

Figure 10: Anchorage Outbound Freight Trends 2004 – 2017

3.2.2.2 *Freight Businesses*

The POA serves as a transportation hub for many goods imported into Alaska and more than 250 Alaskan communities are served by goods arriving at the POA. Lift-on/Lift-off (LO/LO) and RO/RO operations primarily arrive from the Port of Tacoma, Tesoro Kenai Refinery, Petro Star North Pole Refinery, and domestic and international ships and vessels. Cement imports originate from Korea, China, and Thailand. Cement imported into the POA is shipped throughout Alaska. Automobiles, commercial vehicles and United States Postal Service mail arrives from the Port of Tacoma. Bulk shipments and construction materials arrive from the Port of Seattle, Port of Tacoma, and international sources.

Recent changes in freight flow occurred when the Flint Hills Resources Alaska North Pole Refinery closed in 2014. Prior to the refinery's closure, jet fuel produced by this facility was transported south by rail and supplied much of the demand at Ted Stevens Anchorage International Airport. Jet fuel for the airport is now imported by fuel truck or small diameter pipeline from the Tesoro Refinery in Nikiski, the Lower 48 or overseas sources rather than transported by train from North Pole to Anchorage[12]. Companies with large fuel storage capacity at POA, such as Tesoro, Crowley Maritime Corporation, Aircraft Services International Group, and Delta Western ship fuel by truck throughout southcentral Alaska and by barge to western Alaska destinations. Fuel is also distributed to JBER and Ted Stevens Anchorage International Airport though a system of pipelines.

3.2.3 Port of Homer

The Port of Homer is located on the north side of the entrance to Kachemak Bay within Cook Inlet on the Kenai Peninsula. Homer is connected to the Sterling Highway. The Port of Homer is a year-round ice-free port. Facilities at the Port of Homer include three docks, a boat launch, two tidal grids for hull inspections, and a range of dock-side amenities such as security, electricity, potable water, sewage pump, fuel, used oil collection, and fish cleaning tables. The deep-water dock (also called the cargo dock) is 345 feet long and has a depth of -40 feet MLLW. It is equipped with a 5-ton crane. The Pioneer dock is 469 feet in length and has a depth of -40 feet MLLW. It is primarily used for the Alaska Marine Highway, but it is also available to appropriately sized ships when it is unoccupied. The Fish dock is 382 feet long with 50 feet side berths, a depth of -20 feet MLLW, and a dock height of +31 feet above MLLW. It is equipped with eight cranes, six 2.5-ton cranes and two 5-ton cranes. An associated ice plant and cold storage is closed during winter.

Homer is located about 225 miles south of Anchorage on the Sterling Highway. Homer Airport receives regular air carrier service from Anchorage, and regular ferry service from the Alaska Marine Highway. Alaskan Coastal Freight regularly provides barge services to Homer, Kachemak Bay, Cook Inlet, Chignik Bay, Perryville, Dillingham, and Kodiak Island. In addition to Alaska Coastal Freight, Cook Inlet Tug & Barge also provides barge services to Homer.

12 https://www.portofalaska.com/services/fuel-distribution/. Accessed 4/15/20.

3.2.3.1 Freight Operations

Homer's level of inbound freight from 2004 to 2018 shows growth overall with seasonal fluctuations (Table 12). Almost all inbound freight is petroleum and petroleum products.

Except for one-off exports of other products, almost all recorded outbound freight from the Port of Homer is petroleum and petroleum products (refer to Table 13). The total export volume fluctuates annually, but has increased between 2013 and 2018.

Table 12: Port of Homer Inbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	**34.4**	**71.2**	**265.9**	**418.9**	**144.7**	**73.2**	**100.6**	**274.7**	**136.2**	**165.4**	**206.2**	**110.3**	**147.2**	**103.1**	**145.2**
Petroleum and Petroleum Products	34	71.2	265.9	418.9	144.7	73.2	100.6	273.3	128.4	206.1	206.1	110.3	140.3	103.1	145.2
Manufactured Equipment, Machinery, and Products	0.4	0	0	0	0	0	0	1.4	7.8	0	0	0	6.9	0	0
Primary Non-Ferrous Metal Products	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0	0	0
Forest Products, Wood, and Chips	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*
Lime, Cement, and Glass	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*
Fish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* This category does not exist in 2018 data.

Table 13: Port of Homer Outbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	**62.7**	**46.3**	**105.7**	**4.5**	**16.5**	**64.2**	**7.3**	**0.8**	**3.6**	**53.7**	**243.4**	**81.8**	**85.8**	**4.0**	**84.9**
Petroleum and Petroleum Products	0	2.5	4.5	4.5	0	64.2	0.7	0	3.6	53.7	243.4	81.8	85.5	3.7	84.9
Other Chemicals and Chemical Products*	0	26.0	0	0	0	0	0	0	0	0	*	*	*	*	*
Forest Products, Wood, and Chips***	59.6	17.9	0	0	0	0	0	0	0	0	0	0	0	0	***
Sulfur, Clay, and Salt*	0	0	0	0	16.5	0	0	0	0	0	*	*	*	*	*
Primary Non-Ferrous Metal Products	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0	0
Fish	3.1	0	0	0	0	0	6.5	0	0	0	0	0	0	0.3	0
Other Agricultural Products*	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*
Lime, Cement, and Glass**	**	**	**	**	**	**	**	**	**	0	0	0	0	0	**
Primary Iron and Steel Products**	**	**	**	**	**	**	**	**	**	0	0	0	0	0	**

* This category does not exist in the 2014-2018 data.
** This category does not exist in the 2004-2013 or 2018 data.
*** This category does not exist in the 2018 data.

Figure 11 illustrates the trends for inbound freight at Homer from 2004 to 2018, and Figure 12 illustrates the trends for outbound freight. The total volume of been relatively static with a slight downward trend and seasonal fluctuations over the last 14 years. The total volume of outbound freight has increased over the same time period with seasonal fluctuations. A particularly high year for exports was recorded in 2014, but export volumes returned to a level more closely aligned with historic trends after that single year of high export volumes.

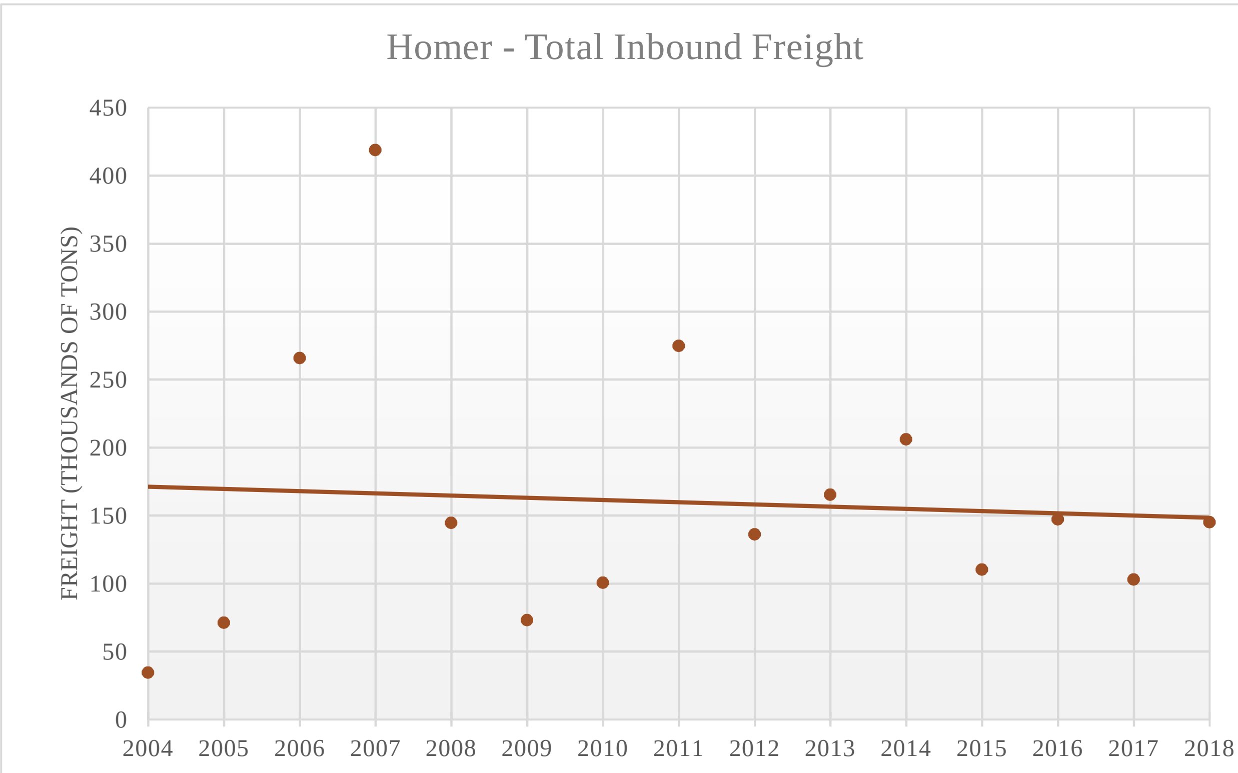

Figure 11: Homer Inbound Freight Trends 2004 – 2018

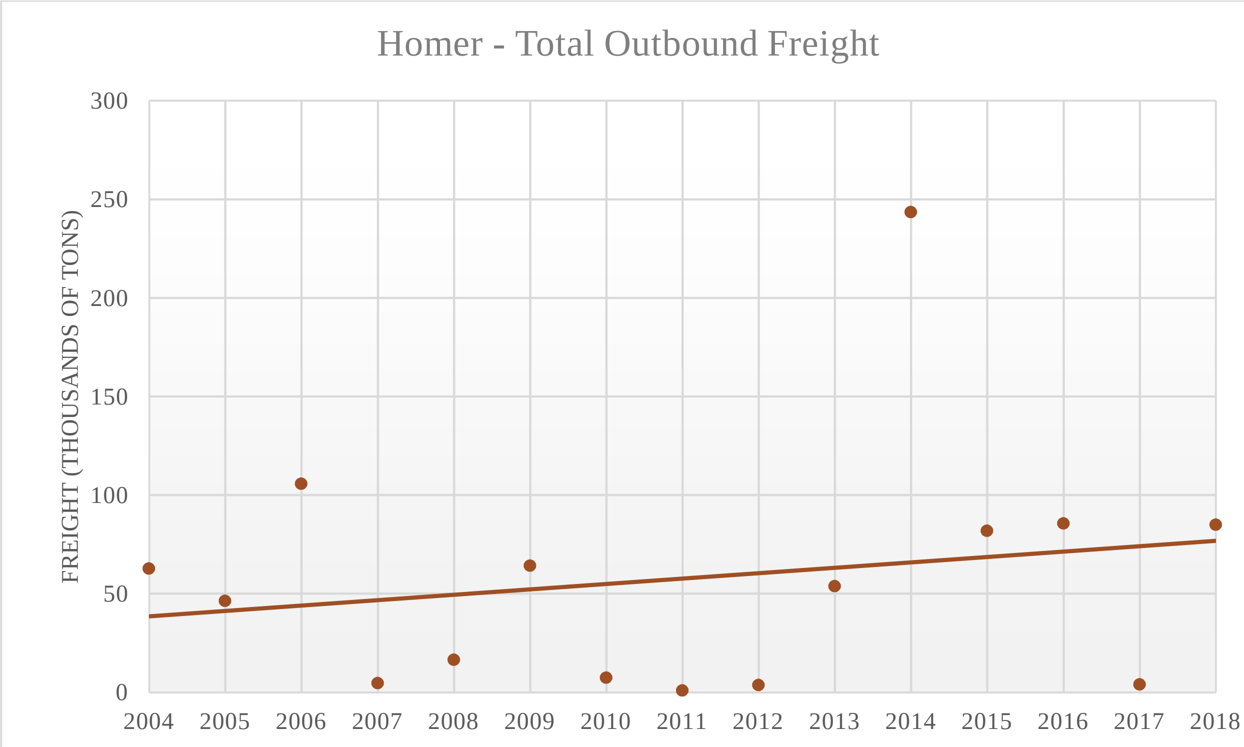

Figure 12: Homer Outbound Freight Trends 2004 – 2018

3.2.3.2 Freight Businesses

Tenants at the Port of Homer include marine transportation companies, fish and seafood processing companies, a scrap recycling company, petroleum marketing and distribution company, the Alaska Marine Highway System, and the United States Coast Guard.

3.2.4 Port of Valdez

Valdez is located in the northeast corner of Prince William Sound. It is the terminus for the Trans-Alaska Pipeline System (TAPS), which originates in Prudhoe Bay, Alaska. Valdez is the most northerly ice-free port in the United States, allowing year-round access to southcentral and interior Alaska. The direct distance between Anchorage and Valdez is about 120 miles, but the highway distance is approximately 300 miles.

The Port of Valdez contains several facilities owned by the City of Valdez – the Valdez Container Terminal, Valdez Grain Terminal, John Thomas Kelsey Municipal Dock, Valdez Small Boat Harbor, and Valdez Pioneer Field Airport Terminal.

The Container Terminal is an offshore floating dock made of concrete that is capable of handling containerized, RO/RO and LO/LO freight. The dock is 700 feet long, with the ability to extend to 1,200 feet, with an operational depth of -50 feet MLLW. The entire dock is attached by two 200-foot ramps that lead to 21 acres of storage area. The Valdez Grain Terminal consists of nine concrete silos that are 112 feet tall and 33 feet in diameter with a total capacity of 522,000 bushels. The John Thomas Kelsey Municipal Dock is a 600-foot wooden wharf that features a recently remodeled fendering system. Water depth at the municipal dock is -35 feet MLLW. The Valdez Small Boat Harbor has water depths of 10 to 12 feet, and is capable of housing 511 boats, ranging from 20 feet to 65 feet, for long-term or transient berthing. Services at the harbor include water, fuel, electricity, telephone, cable television, boat-launch ramps, and a mobile vertical boat lift capable of lifting 60 tons. The Valdez Pioneer Field Airport Terminal is served daily by a well-established commuter airline.

The privately-owned Valdez Marine Terminal stores, loads, and ships crude oil received from the TAPS. The Valdez Marine Terminal is owned and operated by Alyeska Pipeline Service Company. The end of the 800-mile TAPS lies on 1,000 acres of land, which is used for loading and storing crude oil. There are 14 functional storage tanks, a power plant, two loading berths, and equipment to measure the inbound oil.

3.2.4.1 Freight Operations

The Port of Valdez's level of inbound freight from 2004 to 2018 shows no clear trend and seasonal fluctuations (Table 14). 2013 and 2014 were particularly high import years, and almost all the inward freight volume comprised petroleum-related products and crude oil.

The Port of Valdez is the largest exporter of all the Ports evaluated in southcentral Alaska, and almost all the outbound freight is crude oil from the Prudhoe Bay Oilfields transported through the 800-mile-long TAPS. The total volume exported is several times greater than the total volume of any other ports evaluated for this study (Table 15). The volume of petroleum products exported from the Port of Valdez has been declining by an average of four percent a year over the years 2004 to 2018. Fish and other agricultural products are the only other notable export from Valdez, and the total volumes exported fluctuate year on year.

Table 14: Port of Valdez Inbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	**4.4**	**29.7**	**1.0**	**4.3**	**186.2**	**134.0**	**35.6**	**52.7**	**20.5**	**7.8**	**5.2**	**13.5**	**8.0**	**47.4**	**9.0**
Petroleum Products	3.6	1.1	1.0	3.8	15.2	57.2	35.6	52.7	13.9	5.2	4.2	3.9	7.6	1.2	8.3
Primary Iron and Steel Products	0	0	0	0	0	0	0	0	5.1	2.3	0	0.2	0	0	0
Manufactured Equipment, Machinery, and Products	0.2	0	0	0.5	0.6	1.0	0	0	2 6	0	1	6.2	0.4	0.9	0.7
Crude Petroleum	0	28.5	0	0	170.4	75.8	0	0	0	0	0	0	0	45.3	0
Other Chemicals and Related Products	0.1	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0
Lime, Cement, and Glass; Primary Non-Ferrous Metal Products	0.1	0.1	0	0	0	0	0	0	0	0	0	1.3	0	0	0
Fish	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Unknown or Not Elsewhere Classified	0.4	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0
Waste Material, Garbage, Landfill, Sewage Sludge, Waste Water	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0
Forest Products, Lumber, Logs, Woodchips	*	*	*	*	*	*	*	*	*	*	0	0.4	0	0	0
Sand, Gravel, Stone, Rock, Limestone, Soil, Dredged Material	*	*	*	*	*	*	*	*	*	*	0	0.1	0	0	0
Paper and Allied Products	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0
Animal Feed, Grain Mill Products, Flour, Processed Grains	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0

* Data not available for 2004-2013

Table 15: Port of Valdez Outbound Freight (thousands of tons)

Commodities	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total	**46,754**	**44,379**	**36,152**	**37,770**	**35,781**	**34,339**	**31,866**	**29,784**	**27,879**	**28,158**	**26,508**	**26,734**	**27,583**	**27,808**	**25,799**
Petroleum Products	46,752	44,378	36,152	37,770	35,781	34,339	31,857	29,783	27,868	28,147	26,497	26,711	27,574	27,802	25,791
Fish	3.0	0	0	0	0	0	8.0	1.0	9.0	9.3	6.2	10.6	2.2	0.4	0.5
Other Agricultural Products	0	0	0	0	0	0	1.0	0	1.0	1.0	2.7	7.0	1.5	0.2	0.2
Manufactured Equipment, Machinery and Products	0	0	0	0	0	0	0	0	1.0	0.2	1.3	2.2	1.4	1.1	1.1
Lime, Cement, and Glass; Primary Non-Ferrous Metal Products	*	*	*	*	*	*	*	*	*	0.3	0.2	0.1	0.2	0.4	0.0
Waste Material; Garbage, Landfill, Sewage Sludge, Waste Water	*	*	*	*	*	*	*	*	*	0	0	1.8	2.1	1.3	2.8
Other Chemicals and Related Products	*	*	*	*	*	*	*	*	*	0	0	0	0.1	0	0
Forest Products, Lumber, Logs, Woodchips	*	*	*	*	*	*	*	*	*	0	0.2	0.3	0.1	0	0
Sand, Gravel, Stone, Rock, Limestone, Soil, Dredged Material	*	*	*	*	*	*	*	*	*	0	0.1	0	0	0	0
Paper and Allied Products	*	*	*	*	*	*	*	*	*	0	0	0.1	0.2	0.3	0
Animal Feed, Grain Mill Products, Flour, Processed Grains	*	*	*	*	*	*	*	*	*	0	0	0.4	0	2.3	2.9

* Data not available for 2004-2013.

Figure 13 illustrates the trends for inbound freight at Valdez from 2004 to 2018, and Figure 14 illustrates the trends for outbound freight. The total volumes of both inbound and outbound freight has declined over the last 14 years. There have been seasonal fluctuations in inbound freight, but the total volume is several orders of magnitude smaller than the total volume of outbound freight.

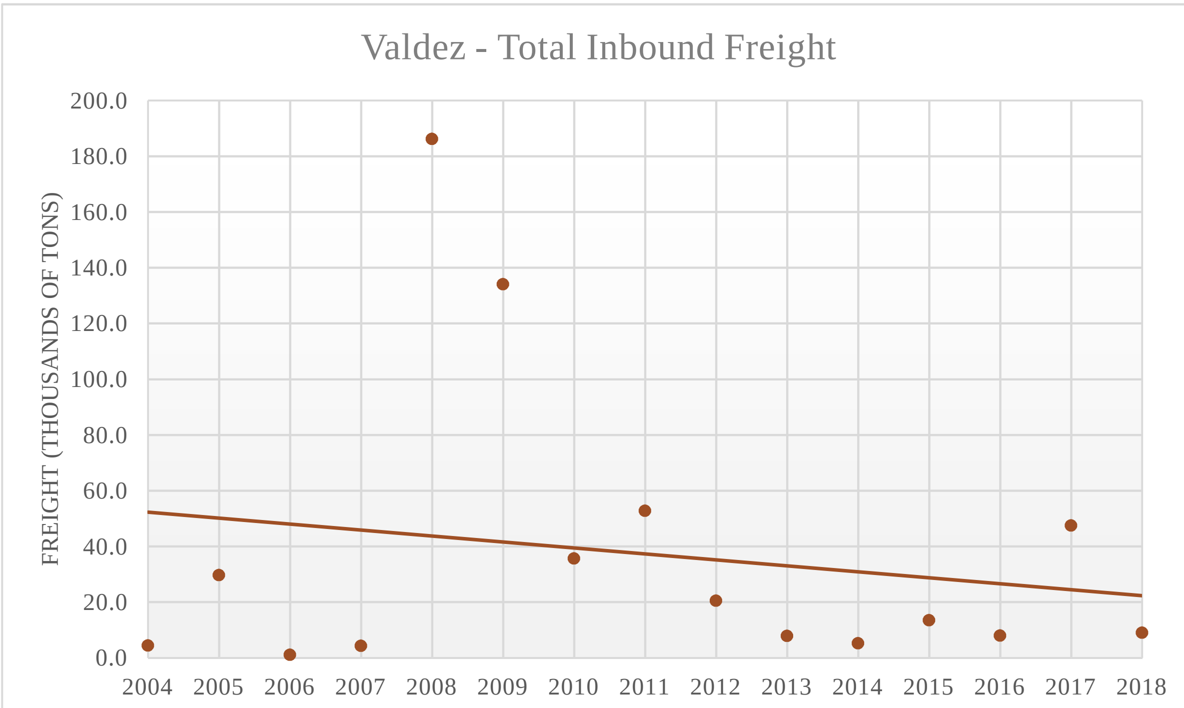

Figure 13: Anchorage Inbound Freight Trends 2004 – 2017

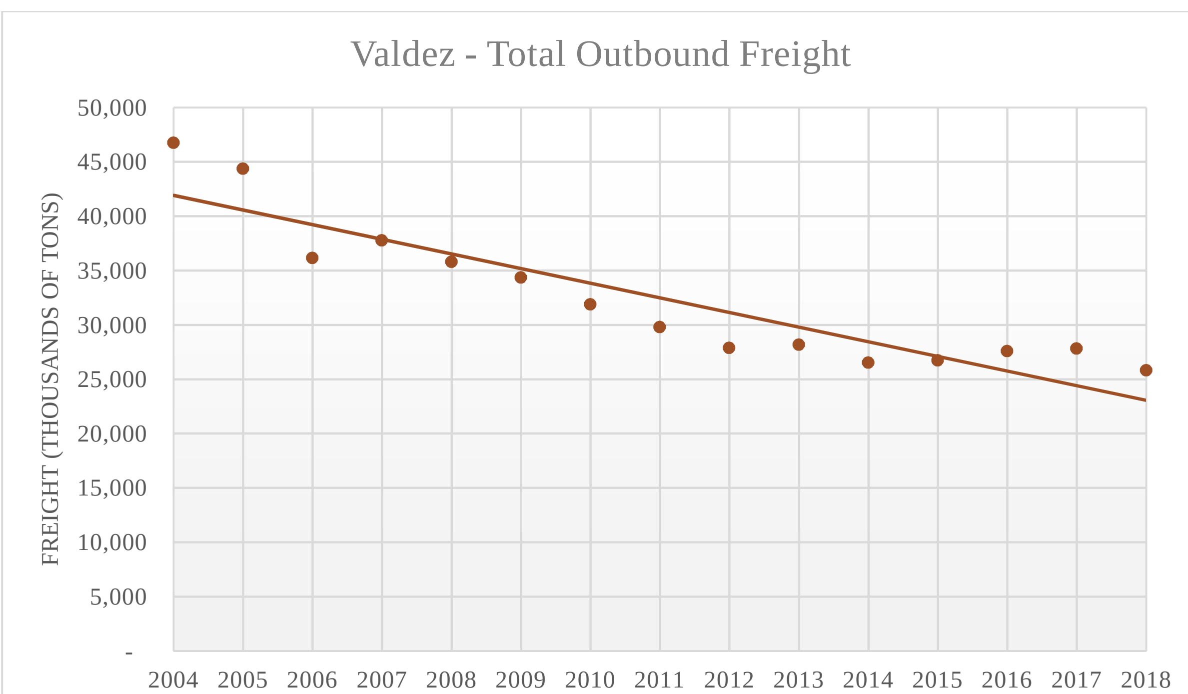

Figure 14: Anchorage Outbound Freight Trends 2004 – 2017

3.2.4.2 *Freight Businesses*

Businesses operating from the Port of Valdez include several fish processing plants, a ready-mixed concrete manufacturer, a stevedoring company, an intermodal freight carrier, tourism operations, and the United States Coast Guard.

3.3 Port Comparisons

Alaska is a net importer of goods, which is was illustrated in a review of total inbound freight as compared with total outbound freight. The state's main export is crude oil, which is primarily exported through the Port of Valdez. The analysis of import and export volumes through the ports connected to the Alaska Railbelt has highlighted that freight imports are increasing over time, and exports are decreasing. The level of decline in export volumes has sped up since 2015, when coal exports significantly reduced and then ceased through the port of Seward. Excluding petroleum product exports through the Port of Valdez, in 2018, the total volume of exports through Anchorage, Whittier, Seward, Homer and Valdez was just 12.2 percent of the total volume of imports into the five ports.

3.3.1 Inbound Freight

When comparing the ports in Whittier, Anchorage, and Seward, Homer and Valdez, Anchorage is the largest importer of goods by a significant amount (Figure 15). In 2018, Anchorage imported 2.95 million tons, nearly six times more than its closest competitor, Whitter, which imported 514,200 tons. Trends for both ports show that imports are steadily increasing over time. Import trends for Seward, Homer, and Valdez are significantly smaller, and volumes have not significantly increased in the last 10 years.

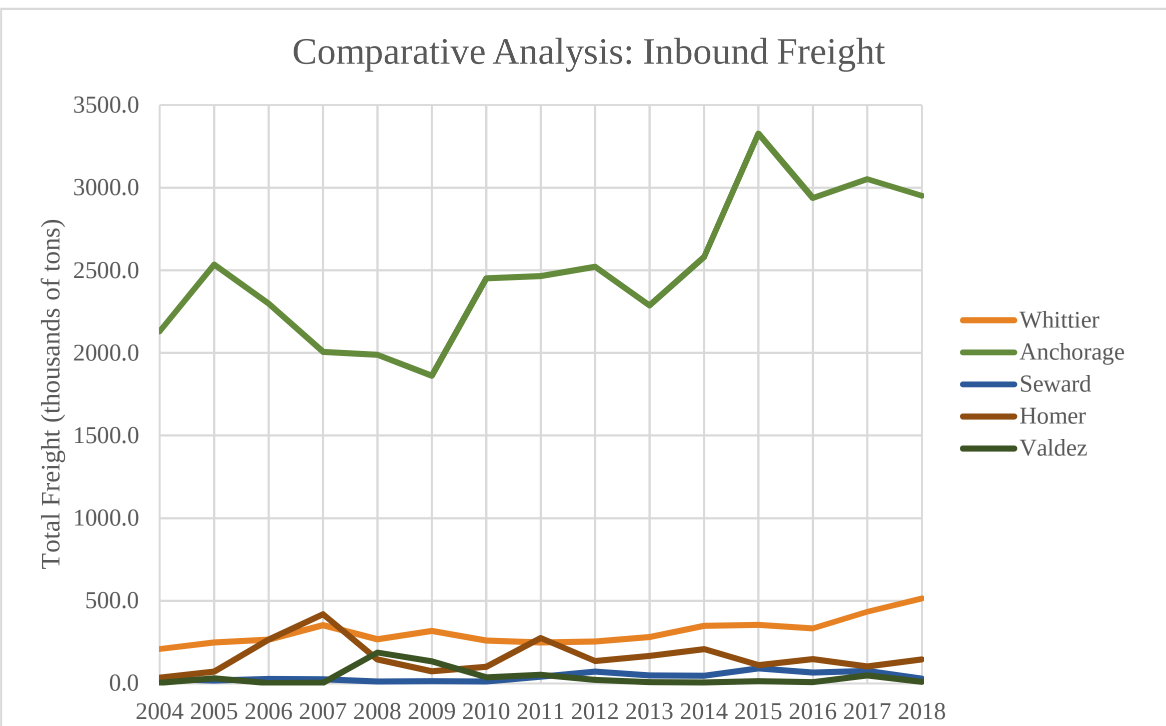

Figure 15: Whittier, Anchorage, Seward, Homer and Valdez Inbound Freight Trends 2004 – 2018

3.3.2 Outbound Freight

Outbound freight volumes are shown in Figures 16 and 17. The volume of petroleum product exported from the Port of Valdez is so significant it is difficult to discern trends using a comparable scale when considering other ports (Figure 17). Therefore, Figure 17 excludes exports from the Port of Valdez, and this provides a greater level of clarity on exports from other ports. Export levels for Seward and Anchorage have decreasing trends in recent years. Whitter has slightly increased the total volume of outbound freight, but the overall tonnage is still relatively low at 48,300 tons. Seward has experienced the most significant decrease in export volumes, dropping significantly from 2015 onwards as a result of the decrease, and subsequent cessation, of coal export. Anchorage has experienced the largest export volumes in the last three years, surpassing Seward in 2015 with 212,900 thousand tons. However, Anchorage shows a decreasing export trend over the extended timeframe from 2004 to 2018.

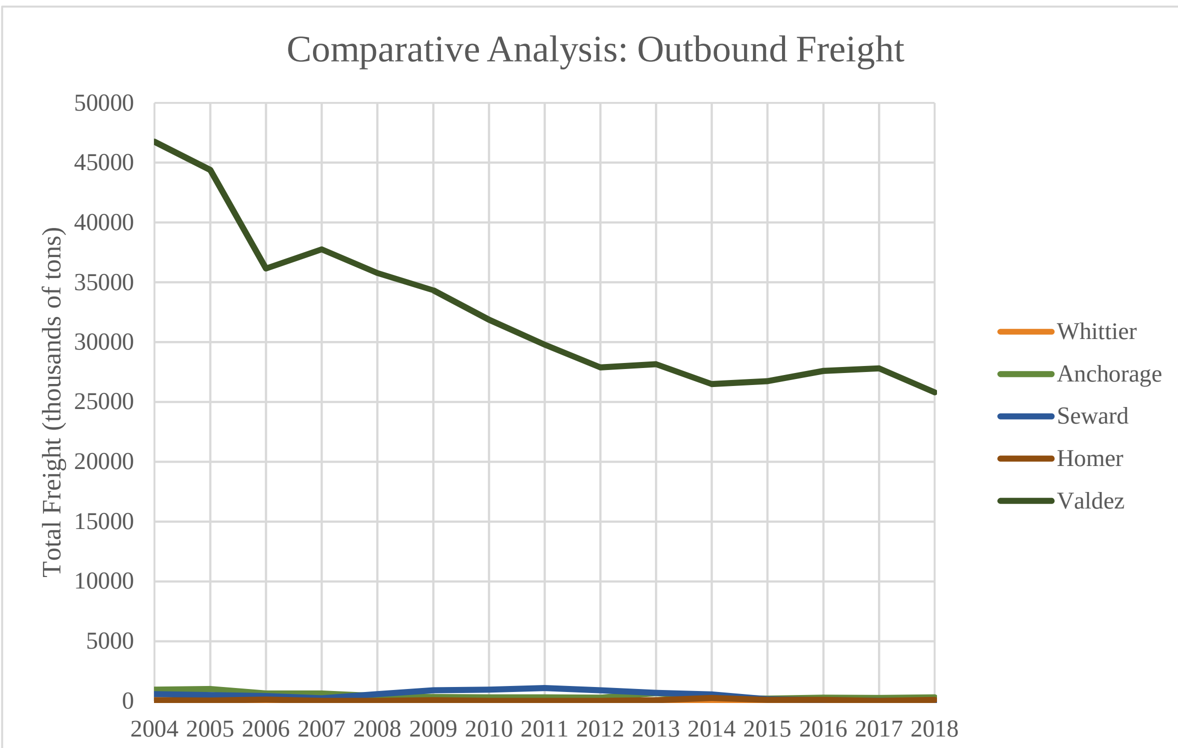

Figure 16: Whittier, Anchorage, Seward, Homer and Valdez Outbound Freight Trends 2004 – 2018

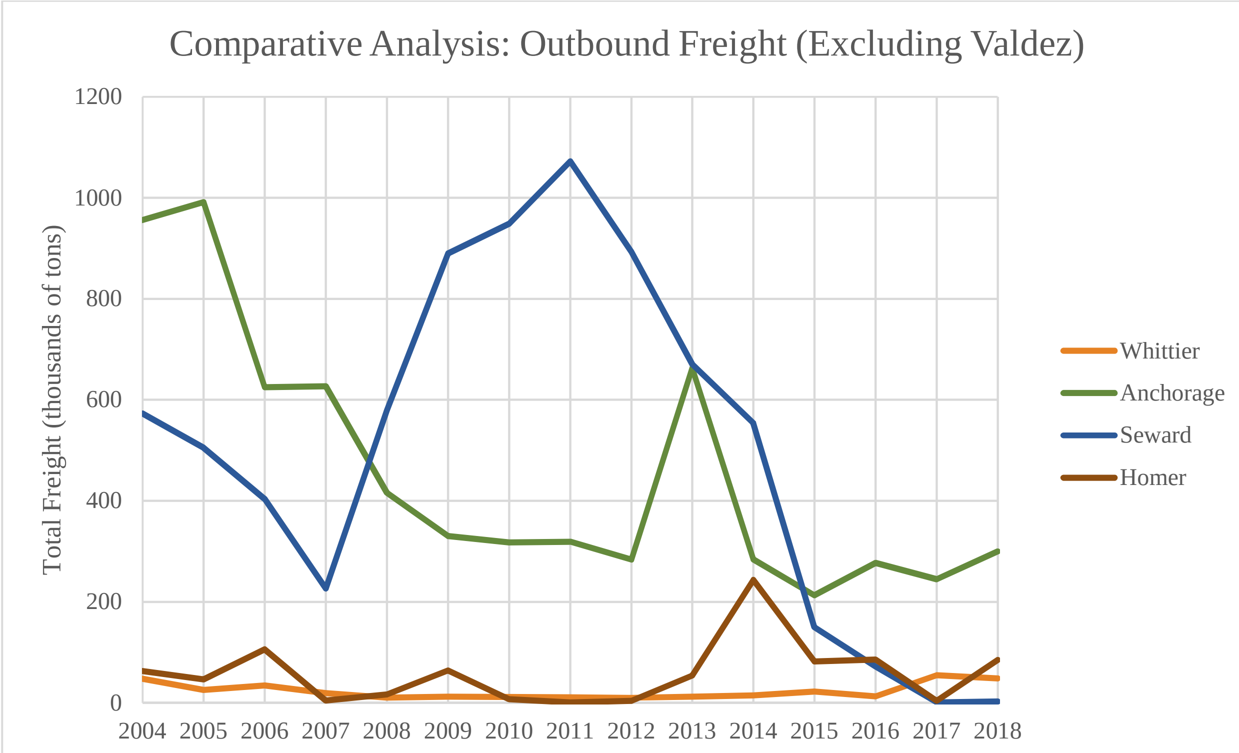

Figure 17: Outbound Freight Trends (Excluding Valdez) 2004 – 2018

3.4 Competitive Analysis

The following competitive analysis has been drawn from the Seward Marine Terminal Expansion Planning Freight Traffic Study, as it considers the differences between the ports evaluated and whether they are able to compete based on rates for various services provided. This information is relevant because it assists to understand the total cost of transporting freight inbound at a specific port location. The information has been updated on a qualitative basis to reflect trends since 2016, when the economic analysis to support the Freight Traffic Study was completed.

3.4.1 Rail Service

The ports of Whittier, Seward, and Anchorage are served by rail. Table 16 provides the estimated costs of shipping a specific cargo type (machinery and other articles) in 2016, to compare the rail shipping cost differences among the ports. The cost of shipping from Seward is higher than both Whittier and Anchorage, and the cost from shipping from Whittier is higher than Anchorage for trips to both Anchorage and Fairbanks, but lower for trips to Seward.

Table 16: Rail Transport Costs for Machinery and Other Articles, 2016

Carload Minimum Weights (lb)	Fairbanks		Anchorage		Whittier		Seward	
	Total	Per lb	Total	Per lb	Total	Per lb	Total	Per lb
Between Anchorage/And								
50,000	$2,140	$0.043	-	-	$1,160	$0.023	$1,350	$0.027
75,000	$3,000	$0.040	-	-	$1,298	$0.017	$1,673	$0.022
100,000	$3,710	$0.037	-	-	$1,450	$0.015	$1,920	$0.019
Between Whittier/And								
50,000	$2,545	$0.051	$1,160	$0.023	-	-	$1,230	$0.025
75,000	$3,615	$0.048	$1,298	$0.017	-	-	$1,425	$0.019
100,000	$4,470	$0.045	$1,450	$0.015	-	-	$1,560	$0.016
Between Seward/And								
50,000	$2,735	$0.055	$1,350	$0.027	$1,230	$0.025	-	-
75,000	$3,945	$0.053	$1,673	$0.022	$1,425	$0.019	-	-
100,000	$4,950	$0.050	$1,920	$0.019	$1,560	$0.016	-	-

As set out in the above table, the costs of transporting freight by rail from Whittier to Anchorage (the main population center) would need to be added to the overall cost of receiving freight at Whittier as opposed to receiving it directly at Anchorage. In addition, it costs approximately 17 percent more to transport freight from Whittier to Fairbanks than from Anchorage to Fairbanks by rail. It costs approximately 10 percent less to transport freight from Whittier to Seward than from Anchorage to Seward.

3.4.2 Truck Service

On average, long distance freight movement is cheaper and quicker by rail in the United States[13]. This is also the case in Alaska. Based on 2016 quotes from two Alaska-based trucking companies, the estimated average cost of shipping a 40,000 pound container by truck from Southcentral ports along the Alaska Highway system to Fairbanks is higher (on a cost per pound basis) than shipping by rail from those ports with rail service. AML/Lynden is based at Whittier, which reduces the cost of moving freight by truck from this location using their trucks. Carlile Transportation does not have any facilities in Whittier and therefore has quoted exponentially higher costs for moving freight from Whittier, which has skewed the information. (Table 17).

13 https://www.freightera.com/blog/shipping-road-vs-rail/. Accessed 3/15/20.

Table 17: Truck Rates

Between/And	Fairbanks					
	Lynden Alaska West Express		Carlile Transportation		Average	
	Total	Per lb	Total	Per lb	Total	Per lb
Anchorage	$2,037	$0.051	$1,527	$0.038	$1,782	$0.045
Whittier	$2,444	$0.061	$3,027	$0.076	$2,736	$0.069
Seward	$2,772	$0.069	$1,950	$0.049	$2,361	$0.059

3.4.3 Port Rates

Port rates were considered as part of the Economic Analysis Report completed for the Seward Marine Terminal Expansion Planning effort. The data in that report highlighted the following trends:

- A dockage fee is the charge assessed to a vessel for tying up to a dock. Dockage rates for Whittier, Anchorage and Seward are comparable to each other.
- Wharfage is a charge assessed by a shipping terminal or port on specific goods moved through the port. Wharfage fees differ depending on the type of good moving through the port. Whittier and Seward have higher fuel wharfage fees than Anchorage. Wharfage rates for freight – not otherwise specified are lower, however.

3.4.4 Stevedoring Services

Stevedoring services at ports include the loading and unloading of freight from vessels and land transportation, line handling, and other manual labor[14]. Two models exist for the provision of stevedoring services: an open arrangement or an exclusive arrangement. An open arrangement allows a company to provide stevedoring services at a port, provided that port rules are complied with. This means that companies active in maritime activity can become approved stevedores, and staff present at a dock can perform needed work. The ports of Anchorage, Whittier and Seward all use an open stevedoring arrangement[15]. An open arrangement generally makes greater economic sense owing to the flexibility to use staff present at the port to assist with stevedoring activities, rather than being reliant on a specific service provider to undertake stevedoring activities.

3.5 Market Trends for Freight

The Economic Analysis prepared as part of the Seward Marine Terminal Expansion Planning effort considered market trends for a range of industries that could impact freight demand. These industries were coal, oil and gas, mining, and seafood. The analysis is set out in detail in the Seward Freight Traffic Study, and summarized below. The analysis was completed in 2016, and the below summary provides a commentary on whether trends have changed in the last three years (2016-2019).

14 Competitive Market Analysis and Long Range Planning for the Port of Valdez (September 2015) prepared for the City of Valdez by McDowell Group.

15 Ibid.

3.5.1 Oil and Gas

The oil and gas industry dominate Alaska's economy, and it is estimated at 50 percent of jobs in Alaska are related to the oil industry. The oil and gas industry have historically accounted for a significant proportion of impacts (and exports in the form of crude oil). Oil and gas activity also generate increased imports of goods, which has positive implications on southcentral Alaska ports. The declining price of oil has had a significant impact on oil and gas development in Alaska, with several projects being discontinued and production slowing from existing sites.

As at March 2020, the price of oil is approximately $32 per barrel[16]. This is associated with recent poor stock market performance and a ramp-up in production in Saudi Arabia[17], and is a reduction from the $58 per barrel price observed in November 2019. The November price is in line with World Bank projections for oil, which was in the $36 to $70 per barrel range over the 2016 to 2025 period. Worldwide demand for Liquefied Natural Gas (LNG) is expected to grow by 3.6 percent a year to 2035, and there is an expectation that LNG demand will exceed overall gas demand as United States producers seek overseas markets for their gas (both pipe and LNG)[18].

The Alaska LNG project has continued to progress, with the United States Federal Energy Regulatory Commission (FERC) preparing its draft environmental impact statement (EIS) for the project proposed by the Alaska Gasline Development Corporation (AGDC) to produce 20 million tons of LNG per year for export[19]. The date for the project is unknown.

The low price of oil will continue to have implications for oil company investment in Alaska, but there has been significant new investment in Alaska in recent years and several new projects are planned[20][21][22]. Whittier's existing business is not as reliant on the oil and gas sectors as other southcentral Alaska Ports, such as Anchorage and Valdez. If the Alaska LNG project were constructed, the oil and gas industry is likely to have a significant impact on Whittier due to the planned construction needs of the project. The likelihood of development of the project remains dependent on project sponsors.

3.5.2 Mining

There are currently six major mines operating in Alaska. There are also 120 active rock, sand, and gravel mining operations and more than 600 placer mining operations throughout the states. In addition, several mining exploration projects are underway in the state. The Ambler Mining District access road is a key project currently being progressed by the Alaska Industrial Development and Export Authority (AIDEA) to provide access to the Ambler Mining District, which is a mineral-rich area in northwest Alaska. The environmental documentation for the project is nearing completion, and a record of decision for the environmental impact statement is expected in Spring 2020. Construction will likely follow design and

16 https://www.macrotrends.net/2566/crude-oil-prices-today-live-chart. Accessed 11/27/19 and 3/15/20.

17 https://www.cnn.com/2020/03/09/business/oil-price-crash-explainer/index.html. Accessed 3/15/20.

18 https://www.mckinsey.com/industries/oil-and-gas/our-insights/global-gas-and-lng-outlook-to-2035. Accessed 11/27/19.

19 https://www.lngworldnews.com/ferc-issues-draft-eis-for-alaska-lng/ Posted 7/1/19, Accessed 11/27/19.

20 https://www.akrdc.org/oil-and-gas. Accessed 3/15/20.

21 http://www.nanushukeis.com/projectdescription.html. Accessed 3/15/20.

22 https://www.blm.gov/programs/planning-and-nepa/plans-development/alaska/willow-eis. Accessed 3/15/20.

right-of-way acquisition[23]. If this project progresses, significant additional freight capacity would be required, and additional development would be needed in Whittier to support the construction.

As a generally low per-unit commodity, it is not anticipated that existing or proposed metal or mineral mines will have a significant effect on imports or exports from Whittier. There is a potential market for aggregate materials such as rock, sand and gravel but there are a range of alternative sources within the state that are likely to be more cost effective than transporting aggregate materials from Whittier.

3.5.3 Seafood

The seafood industry is a major economic driver in Alaska, and is a significant activity in Whittier. The largest operator in Whittier is Whittier Seafood, LLC, which processes salmon. Three major processors currently land seafood in Whittier, Whittier Seafood, Copper River Seafood, and North Pacific Seafood. These operators use the DeLong Dock, which is operated by the City of Whittier. In July 2019, a fishing vessel exploded whilst tied up at the dock, which caused significant damage to the dock and relocation of fishing offload activities[24][25].

The Alaska Seafood Marketing Institute and McDowell Group prepared an analysis titled "The Economic Value of Alaska's Seafood Industry" in September 2017[26]. This document groups Whittier as part of the Southcentral Alaska regional ports with Cordova, Kenai, Seward, Anchorage, Valdez, Homer, Whittier, Kasilof, Nikiski and Anchor Point. Whittier is one of the smaller ports by landed value of this group, which is consistent with the small resident population in Whittier.

Seafood consumption is expected to increase internationally, which means the seafood industry is anticipated to continue to offer future growth opportunities for Whittier. This trend has been observed in the volume of seafood in the outbound freight from Whittier. Whittier competes with other ports in Southcentral Alaska, and additional opportunities will most likely be created by consolidation of existing business activities rather than a new operator entering the market.

23 http://www.ambleraccess.com/index.html. Accessed 3/15/20.

24 https://www.ktuu.com/content/news/Fishing-operations-in-Whittier-back-in-action-after-explosion--512499431.html. Accessed 11/29/19.

25 https://www.adn.com/alaska-news/2019/07/11/boat-explosion-and-fire-leaves-part-of-whittier-dock-unsafe-and-hundreds-of-pounds-of-fish-in-limbo/. Accessed 11/29/19.

26 https://www.alaskaseafood.org/wp-content/uploads/2015/10/AK-Seafood-Impacts-Sep2017-Final-Digital-Copy.pdf. Accessed 11/29/19.

4. OPPORTUNITIES FOR WHITTIER

Several opportunities exist to increase freight business at Whittier. These opportunities are outlined in further detail in the following sections.

4.1 Port of Alaska (Anchorage) Modernization Costs/Funding Challenges

The POA's infrastructure is 50 years old and has exceeded its economic and design life. Repairs initially began in 2003 with the POA Intermodal Expansion Project, but the project was terminated in 2010 when extensive damage to the newly-installed sheet pile was discovered.

On November 30 2018, a 7.1 earthquake struck near Joint Base Elmendorf-Richardson, just ten miles north of Anchorage. Damage from this earthquake was extensive across Anchorage and the Mat-Su Borough, including the POA. As of the summer of 2019, damages at the port were still being discovered and assessed. These inspections have determined the port's two current fuel docks are the most at-risk of failing if another major earthquake occurs. In July of 2019, the Terminal 1 load capacity was de-rated due to earthquake damage. If the docks are not replaced, more will have to be de-rated or even closed within ten years, and potentially sooner if another significant earthquake occurs.

There are plans in progress for addressing these issues. The Port of Alaska Modernization Program (PAMP) is a reconstruction project that aims to:

- Enable safe and reliable port operations
- Improve resiliency against seismic activity and Cook Inlet's harsh marine environment
- Accommodate modern shipping operations, including supporting larger, deeper draft vessels.

The cost of the PAMP was initially presented to the Anchorage Assembly in November 2014 as $485 million, at an 80 percent confidence level. In July 2019, the cost estimate increased to $1.932 billion. Given the cost escalation and lack of identified funding, the program's full scope and cost is not clear (Ascent, p. 11).

It was recognized that $1.9 billion program cost would not be feasible, so the MOA hired a third party, Ascent PGM and subconsultant Northern Compass Group LLC, to re-evaluate the costs of the PAMP. Results of that analysis were presented in a draft in September 2019, which suggest that $600-800 million could be saved if a series of changes are made to the plan, including combining the RO/RO and LO/LO cargo operations into one joint use terminal and lower the capital costs of constructing the berth[27]. Current users of the RO/RO and LO/LO facility, Matson and TOTE Maritime, have raised concerns with this suggestion and have noted shipping schedules are set out of necessity[28]. Compelling the shippers to adjust their schedules may present an opportunity to entice one of the users to an alternative port.

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27 Ascent PGM & Northern Compass, LLC., Report to the Anchorage Assembly (draft)., September 19, 2019.

28 https://www.adn.com/alaska-news/anchorage/2019/10/10/consultants-19-billion-anchorage-port-renovation-cost-could-be-cut-in-half/., Accessed 11/20/19.

The first phase to implement the PAMP is the construction of a new petroleum and cement terminal (PCT), which has an estimated cost more than $200 million[29]. In July of 2019, the Anchorage Assembly approved a $42.156 million contract to commence building[30]. On November 6, 2019, the MOA received an additional $25 million grant from the Federal Department of Transportation that will also be allocated toward the PCT[31]. This work will be constructed in 2020. Another phase could begin as soon as 2021, however there is still a more than $125 million gap in funding that must be overcome to enable the project to be completed.

Port users have expressed concerns the funding gaps may at least in part be addressed by tariffs levied on the goods and commodities offloaded at the port. Increased tariffs could adversely impacts cargo operations at the Ted Stevens Anchorage International Airport, which is sensitive to changes in fuel prices[32]. The pass-through effect of higher tariffs also has the potential to increase grocery and goods prices throughout Alaska[33].

Port users collectively anticipate scheduled changes in the tariff structure and have worked it into corporate financial planning. However, the September 2019 draft report to the Anchorage Assembly notes that it would be economically unwise to assume a large tariff hike will pay for the needed changes and that the cost will be passed on through consumer goods in a market where things are already generally more expensive than the rest of the country[34].

The Anchorage Assembly Report emphasized that tariffs should be considered a revenue stream that is *one piece* of the entire picture of financing the POA going forward. A scheduled five-year tariff review period is approaching, and this was identified as an opportunity to consider when the tariff increase will be needed to fund the project, and how much. The report explains that it may not be the right time to increase above the normal rate that is scheduled, but a discussion must happen to recognize the timing and that it will be within the new five-year agreement. One suggested idea is to bank income from the tariff increase, use it to raise other funds as a match and save enough to do some of the needed large-scale projects[35].

While a definitive funding plan has not been generated, the port users and Administration have both been supportive of a plan where most of the required PAMP funding would come from sources other than tariffs, including State and Federal funding. It is anticipated that a coalition of stakeholders would be developed to advocate for funding at the State and Federal levels[36].

The uncertainty surrounding redevelopment plans at POA, including proposals to replace the existing RO/RO and LO/LO facilities with a single cargo terminal, tariff increases, and funding uncertainty

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29 https://www.alaskajournal.com/2019-07-31/anchorage-assembly-approves-42m-contract-first-new-port-dock. Accessed 11/20/19; https://www.adn.com/alaska-news/anchorage/2019/10/10/consultants-19-billion-anchorage-port-renovation-cost-could-be-cut-in-half/; Accessed 11/20/19

30 Ibid

31 Alaska Journal of Commerce, 11/13/19.

32 Ibid.

33 https://www.adn.com/alaska-news/anchorage/2019/01/25/cost-doubles-to-2-billion-to-fix-anchorage-port-setting-stage-for-higher-gas-and-grocery-prices/. Accessed 11/20/19.

34 Ascent PGM & Northern Compass, LLC., Report to the Anchorage Assembly (draft)., September 19, 2019.

35 Ibid.

36 Ibid.

presents a significant opportunity to entice one of the existing users to consider relocating its operations to Whittier.

4.2 Port of Seward Passenger Terminal Replacement

ARRC is currently seeking a private sector operator or consortium to develop a cruise facility at Seward. The partner will design, construct, and seasonally operate the new facility, which will replace the existing passenger dock and terminal building, and potentially expand cruise passenger activities to include additional uplands development. The project Fact Sheet notes that ARRC is open to exploring opportunities that use the available lease areas for viable commercial development[37]. The area potentially available for terminal development occupies much of the Seward Marine Terminal Reserve, but excludes the freight dock, fenced permit area north and north-west of the freight dock, and the unfenced permit area north of the freight dock.

As noted on the project fact sheet, the project purpose is to replace the existing passenger dock, which was constructed in 1966 and is nearing the end of its useful life. Project goals include:

- Replace the existing passenger terminal, including the dock, building and upland facilities to support continued growth of cruise/visitor activity in Southcentral Alaska
- Provide opportunities for new entrants to the cruise tourism market
- Increase passenger rail business and ARRC profitability
- Develop unleased areas of the Seward Terminal Reserve adjacent to the existing passenger terminal.

A Request for Qualifications (RFQ) solicitation was recently issued by ARRC to seek statements of qualifications from interested parties to provide a cruise passenger terminal in Seward, replace or refurbish the dock and terminal building, and potentially provide for upland commercial development within the Seward Terminal Reserve west of the existing railyard. The preliminary solicitation concluded on October 30, 2019, and ARRC has selected two respondents to participate further in the solicitation[38]. The notice to proceed with the project is expected to be issued to the preferred supplier in late summer 2020[39].

This opportunity excludes parts of the Seward Marine Terminal currently used for freight operations, and improvements are proposed to freight facilities separate to the passenger redevelopment described in the above paragraph. However, the redevelopment work at Seward provides an opportunity to transfer some business operations to Whittier, and potentially to increase the freight business.

37 http://www.railportseward.com/sites/default/files/2019_Seward_Cruise_Terminal_Replacement_FactSheet.pdf, accessed 11/11/19.

38 http://www.railportseward.com/sites/default/files/updates/20191230-QualifiedTeamsShortlist.pdf. Accessed 3/15/20.

39 http://www.railportseward.com/. Accessed 3/15/20.

4.3 New Business Opportunities

4.3.1 Freight Customers

As set out in Section 3, total inbound freight volumes have been slowly increasing over the last several years, proportionate to population and relative demand for goods in Alaska. Total volumes of outbound freight have declined, and only form a small percentage of total freight traffic at the ports evaluated in this study. There was a one-year increase between 2014 and 2015 observed at POA, representing an approximately 20 percent increase, but the following year there was a reduction in inbound freight. This increase most likely related to changes in the way the USACE reported freight data between the years 2013 and 2015. Other than this single data point, been no significant one-off increases in total freight volumes in any one location, which indicates there has been no significant new business opportunities added to any one port between the years 2004 and 2017.

The most likely path to secure new business at Whittier therefore, is to leverage challenges and operational changes at POA and Seward to entice business to relocate to Whittier. As discussed in Section 4, the following opportunities should be considered:

- The uncertainty surrounding redevelopment plans at POA, including proposals to replace the existing RO/RO and LO/LO facilities with a single cargo terminal, tariff increases, and funding uncertainty presents a significant opportunity to entice one of the existing users to consider relocating its operations to Whittier. Matson and TOTE Maritime have stated that shipping schedules are significantly influenced by external factors and they may not be able to change operations to share a future single facility at POA.
- The redevelopment of the passenger terminal at Seward will potentially impact the freight business during construction and, dependent on the scale and nature of tourism activities, into the future. This could include displacing freight businesses, who may seek to relocate to a port such as Whittier, that is more accommodating of freight. It is noted that freight customers at Seward are already ARRC customers, so this opportunity may not increase freight revenue for ARRC.

4.3.2 Cruise Customers

Alaska is a premier cruise destination market in the United States. Cruise ship tourism grew considerably between 1997 and 2008, and following increasing costs of operating in Alaska legislative assistance increased the attractiveness of the market. The industry exceeded one million passengers a year in 2016, and the years since have set records for passenger numbers. The Cruise Line Industry Association noted that cruise passengers comprise 57 percent of Alaska's summer visitors[40].

Cruises occur in Alaska between late April and early October each year and have an average length of seven days. Itineraries consist primarily of two routes: round trip through Southeast Alaska's Inside

40 http://www.cliaalaska.org/cruising-in-alaska/overview/ accessed 11/18/19.

Passage, which primarily depart from Seattle, Washington and Vancouver, British Columbia; and trips that cross the Gulf of Alaska, which arrive or depart at Anchorage, Seward, or Whittier[41].

Seward and Whittier are the primary arrival/departure ports for cruises crossing the Gulf of Alaska, accounting for an average of 93 percent of the total passenger capacity between 2017 and scheduled sailings in 2020. Seward accounts for 54 percent of the total passenger capacity, and Whittier accounts for 40 percent. Anchorage accounts for the remaining six percent of passenger capacity.

Table 18 presents cruise ship capacities for Anchorage, Seward and Whittier, which are calculated based on the maximum passenger capacity of each cruise ship calling at the Port and the number of calls made each year. This is not reflective of actual passenger numbers, but enables an analysis of changes in capacity over time.

Table 18: Total Passenger Capacity Crossing the Gulf of Alaska

Port	Passenger Capacity (total Passenger Capacity Per Ship Multiplied by Number of Calls)				Percentage Change		
	2017	2018	2019	2020	2017-2018	2018-2019	2019-2020
Anchorage	12,620	14,320	14,723	17,904	11.9%	2.7%	17.8%
Seward	94,784	105,698	118,676	122,551	10.3%	10.9%	3.2%
Whittier	69,636	90,632	95,466	85,464	23.1%	5.1%	-10.5%
Total Passenger Capacity crossing Gulf of Alaska	177,040	210,650	228,865	225,919	16.0%	8.0%	-1.3%

Whittier is the terminal point for Princess Cruises (Carnival Cruise Line) ships crossing the Gulf of Alaska. Over the four years evaluated as part of this study, only three landings (approximately 2,500 passenger capacity) originated from another operator and all other landings were Princess cruise ships. Whittier experienced a significant increase in passenger capacity in 2018 when Princess introduced a weekly landing on Wednesdays (until 2018 Wednesday landings were bi-weekly), and the capacity of ships landing at Whittier has increased. Fewer landings are scheduled for 2020 (a reduction of 10.5 percent passenger capacity). This change may be a one-time occurrence, or it could be a potential trend.

Currently, cruise ships land at the cruise ship dock in the Whittier small boat harbor. As this dock is essentially dedicated to operations carried out by Princess Cruises, there is an opportunity to target additional cruise business from another location in Whittier. Other opportunities currently being explored by the City of Whittier include the construction of a cruise ship dock and terminal at the head of Passage Canal, near the western edge of Whittier and accessed from W Camp Road. Preliminary sketch plans have been developed, but this opportunity has not progressed recently.

41 Ibid. accessed 11/18/19.

Seward has experienced significant increases in cruise capacity since 2017, and has been successful in securing a greater range of cruise operators regularly landing in Seward. ARRC is currently proposing to redevelop the passenger terminal in Seward, which is a significant business opportunity and could increase the level of interest and number of landings at Seward. Whittier will need to compete with the new facility in Seward, but could provide back-up service, or increased service during the construction of the new passenger terminal in Seward.

4.4 Comparison with Competitors

Whittier, Anchorage and Seward are the only Alaska ports that are located on the ARRC railbelt. Therefore, these ports are the primary competition, and the Port of Alaska (Anchorage) has the competitive advantage of being located at the center of the largest population center and distribution hub. Consequently, Anchorage is by far the largest port in Alaska by trade volume, with an estimated 84 percent of non-petroleum, non-coal freight volume passing through the port up to 2015[42]. Additionally, Anchorage is one of only 19 commercial ports in the United States designated as a Department of Defense Strategic Seaport. Whittier is the second largest port in Alaska by trade volume, with an estimated 11 percent of non-petroleum, non-coal freight passing through the port[43].

Anchorage is also Alaska's population center. 41 percent of the state's population resides within the Municipality of Anchorage, and 54 percent of the population is located close to the port in both Anchorage and the Mat-Su Borough[44]. The center of demand for goods and services is primarily within Anchorage or nearby communities. Additionally, the Ted Stevens Anchorage International Airport is also located in Anchorage, which is the fifth busiest airport by cargo traffic in metric tonnes in the world[45]. All of these factors mean the Port of Alaska (Anchorage) is positioned most favorably in relation to the center of demand for freight in Alaska.

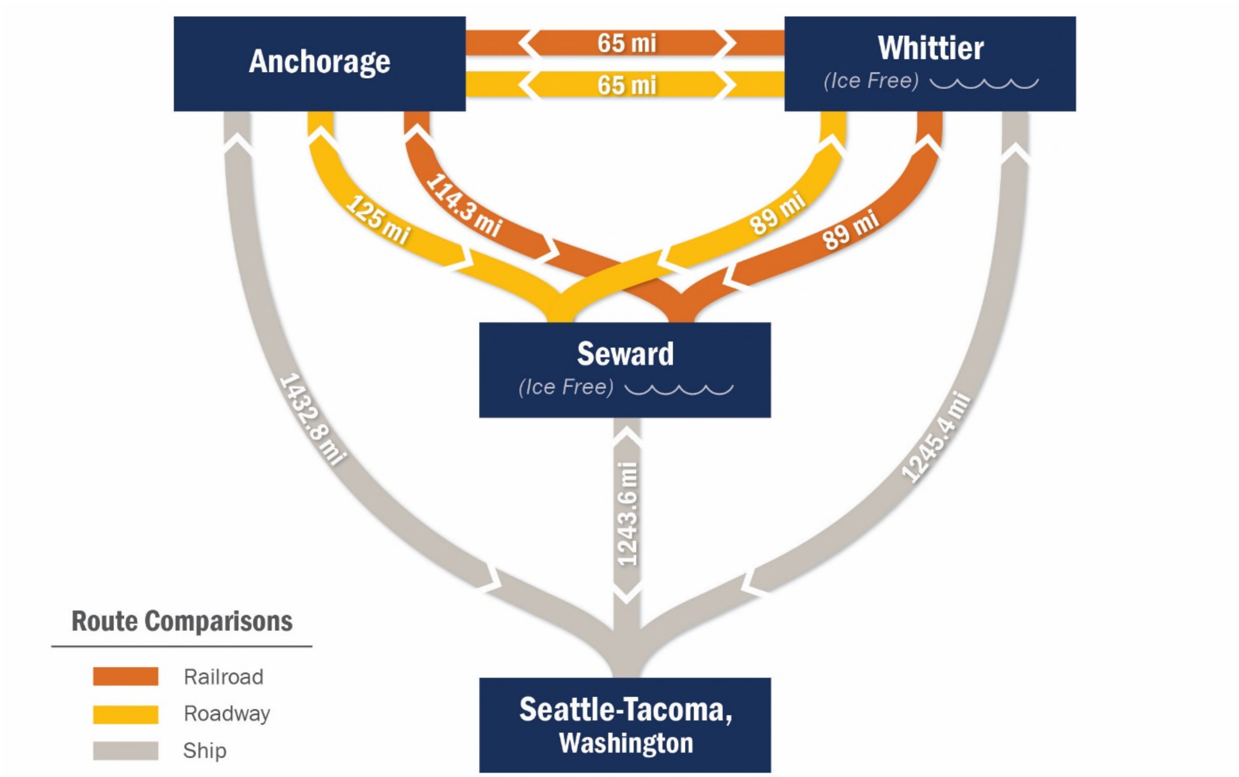
Figure 18 is drawn and updated from the Seward Marine Terminal Expansion Planning Freight Traffic Study, and provides a useful comparison of the transportation distances by water, road and rail and the associated population centers. This figure compares transportation distances by water from Seattle-Tacoma, Washington, which is where a large proportion of Alaska's freight traffic originates from.

42 Competitive Market Analysis and Long Range Planning for the Port of Valdez (September 2015) prepared for the City of Valdez by McDowell Group.

43 Ibid.

44 United States Census Bureau. https://www.census.gov/quickfacts/. Accessed 11/18/19.

45 https://aci.aero/news/2019/03/13/preliminary-world-airport-traffic-rankings-released/. Accessed 11/18/19.



Port of Anchorage — Population | 291,538 *(2018)*

From Seward		From Whittier		From SeaTac	
Rail	114.3 mi 3% grade	Rail	65 mi slight grade	Ship	89 hrs @ 14 knots
Road	125 mi	Road	65 mi		
Ship	12-16 hrs	Tunnel	with wait time		

Port of Anchorage is near Ted Stevens International Airport
(5th busiest air cargo hub in the world)

Port of Whittier — Population | 205 *(2018)*

From Seward		From Anchorage		From SeaTac	
Rail	89 mi	Rail	65 mi slight grade	Ship	77 hrs @ 14 knots
Road	89 mi	Road	65 mi		
Tunnel	with wait time	Tunnel	with wait time		

Port of Seward — Population | 2,729 *(2018)*

From Seward		From Whittier		From SeaTac	
Rail	114.3 mi 3% grade	Rail	65 mi slight grade	Ship	77 hrs @ 14 knots
Road	125 mi	Road	65 mi		
Ship	12-16 hrs	Tunnel	with wait time		

Port of Seattle-Tacoma

To Seward		To Whittier		To Anchorage	
Ship	77 hrs @ 14 knots	Ship	77 hrs @ 14 knots	Ship	89 hrs @ 14 knots

Figure 18: Freight Distance Travel Comparisons – Anchorage, Seward and Whittier

The amount of inbound freight to Whittier is increasing but the total volume is still small when compared to Anchorage. In 2017, Anchorage imported 3.05 million tons, seven times more than Whittier, which imported 433,000 tonnes. Seward's import trends are significantly smaller (Table 19). The volume of outbound freight at all three ports is comparatively very small (Table 20).

Table 19: Total Inbound Freight to Ports on Alaska Railbelt (thousands of tons)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Anchorage	2,005.6	1989.5	1862.2	2452.4	2465.3	2520.7	2286.6	2580.3	3327.7	2938.3	3052.8	2952.2
Whittier	351.4	266.1	316.4	259.5	247.0	253.1	280.6	348.7	355.1	332.5	432.7	514.2
Seward	24.6	12.1	13.6	10.6	40.6	71.5	48.1	46.6	90.9	65.6	75.7	28.0
Total	2381.6	2267.7	2192.2	2722.5	2752.9	2845.3	2615.3	2975.6	3725.8	3336.4	3561.2	3494.4

Table 20: Total Outbound Freight to Ports on Alaska Railbelt (thousands of tons)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Anchorage	627.2	415.7	330.3	317.8	318.7	283.6	662.8	284.0	212.9	276.8	245.0	300.2
Whittier	18.9	10.4	12.1	11.7	10.8	9.9	11.8	14.4	21.9	12.7	54.5	48.3
Seward	226.6	279.6	889.9	948.8	1072.6	893.0	670.5	554.2	149.4	71.7	0.7	2.3
Total	875.7	705.7	1232.3	1279.2	1402.1	1186.5	1345.1	852.6	384.2	361.2	300.2	350.8

4.5 What Are Whittier's Economic Advantages and Challenges?

4.5.1 Whittier's Economic Advantages

- A natural, ice-free, year-round deep-water port.
- Efficient access directly to rail at the freight dock and out of Whittier to the Alaska Railbelt.
- Efficient access by rail directly to barges at the freight rail dock.
- Relatively close proximity to Anchorage (89 miles by road or rail), which is a major center of demand and transportation hub.
- Marine freight destined for Whittier and north can save 12-16 hours on the water by landing at Whittier as compared to Anchorage, and can avoid the challenging tides and silt in Cook Inlet.
- Port facilities are in generally good condition.
- Opportunity to reconstruct the Marginal Wharf, which will enhance the offering of freight facilities at Whittier.
- Whittier has an open stevedoring arrangement, which can generate cost efficiencies for freight operators using the port.
- The Alaska Railroad is a common carrier, which means it may have to ship anything at any time. All railcars containing hazardous materials can be found on any track within the Whittier yard. All hazardous materials are packaged and shipping according to the regulations found in 49 CFR 172.

4.5.2 Whittier's Economic Challenges?

- Shippers are time and cost sensitive. It is generally cheaper to transport goods directly to the main center of demand at Anchorage, notwithstanding the additional time it takes. This is owing to the costs of transportation by water being lower.
- Whittier is 89 miles by both road and rail from Anchorage, the main center of population and distribution. It is also only accessible through the Anton Anderson Memorial Tunnel, which creates additional logistical challenges with limited opening times. This is likely to be more of a

challenge for road-based transportation, as trains can haul a significantly larger volume of freight in a single trip.

- The Seward Highway between Whittier and Anchorage can have high traffic volumes and experiences an elevated crash rate, particularly during the summer months. This can generate delays for freight traffic by truck.
- Improvements are needed to the port facility to enhance its attractiveness. These include the reconstruction of the marginal wharf and, dependent on the needs of a future customer, support facilities and improved security.
- Dockage and wharfage rates for Whittier are currently about the same as Anchorage, and therefore, no cost advantage can be gained by landing goods at Whittier.
- The size of the military operation at JBER, coupled with the special designation of the POA as having strategic importance to the Department of Defense, results in Anchorage serving as the primary port for military shipments.
- The Whittier Yard has historically had operations which released contaminants on the site. Currently there are no Alaska Department of Environmental Conservation (ADEC) open sites at the yard but several release sites have been closed with known contamination remaining in the soils above established clean-up levels. Institutional controls assigned to these known sites would require ADEC approval if soils were to be removed from the site or remediated. If unknown sites are encountered during construction, these would need to be reported and coordinated with ARRC and ADEC.

5. WHAT ARE THE ISSUES AND OPPORTUNITIES?

Following the review of existing conditions and facilities and the market analysis, several issues and opportunities were identified at Whittier. Addressing the issues also has the potential to create opportunities for ARRC’s operations at Whittier.

5.1 Issues

5.1.1 Train Services

- There are currently no scheduled freight train services. Trains are built on an as-booked, as-needed basis to customer requirements.
- There are seasonal shortages of freight cars to meet the needs of loads arriving at Whittier. Shortages exist with flat cars in particular, and occur because cars are needed in different locations over the course of a week. This can result in inbound freight being delayed at the dock.

- The cost of transporting freight from Whittier to the center of demand and distribution in Anchorage must be added to the total cost of inbound freight. Overland transportation costs are avoided for local freight which arrives at the POA.

5.1.2 Dock Facilities

- The limited dock facilities in Whittier create challenges for unloading vessels that are not configured to use the dock.
- Space for staging freight operations is very limited.
- The gravel surface of the uplands areas freezes and can block track access. Blocked flangeways need to be cleaned with track maintenance equipment each time the tracks are used. Additional maintenance of way crews are needed to undertake this work.

5.1.3 Laydown Area

- Laydown area is very limited, which creates challenges for loading/unloading and staging freight.
- The laydown area is currently operated on a "floating permit" basis by a single operator, which may make it difficult to entice a new operator to the facility.
- The freight dock area is not fully secured, and uncontrolled access could occur from the landside of the laydown area.

5.1.4 Railyard

- Whittier has upgraded rail and a tie replacement program has been ongoing. The railyard has drainage and snow removal issues that create challenges for rail operation and result in mitigation and maintenance activities, including hand-removal of ice and fine soil material to ensure smooth rail operations.

5.1.5 Freight/City Interface

- The at-grade crossing of Whittier Street can be blocked for extended period when stringing cars together to build a freight train. This results in inefficiencies for freight handling, requires frequent repositioning and switching, and ARRC must carefully stage operations to reduce frustration for Whittier residents and visitors.
- The seasonal train platform for passenger operations creates conflicts with freight operations, which reduces the area for stringing trains together and storing built trains. This conflict has increased with the increasing cruise ship arrivals.
- There is only one track extending to the Anton Anderson Memorial Tunnel, which cannot be blocked during the summer as it conflicts with passenger train operations.

5.2 Opportunities

The potential opportunities to increase the level of freight activity in Whittier are created by:

- Port of Alaska (Anchorage) modernization, and the associated cost of redeveloping facilities in this location and associated uncertainty around funding.
- Port of Seward passenger terminal redevelopment, and the potential impact this may have on freight activities.
- Attracting an existing freight operator from another port.
- Attracting cruise business from the cruise dock at the Whittier Cliff Side Marina, or from another port.

These issues and opportunities have informed projects recommended to improve the use of, and return on investment for the freight facilities at Whittier.

6. PROJECT OPTIONS

Several options were evaluated to encourage new business at Whittier. These options included:

- Redevelop the Marginal Wharf to support container freight operations
- Redevelop the Marginal Wharf to support break bulk freight operations
- Redevelop the Marginal Wharf to support cruise ship operations
- Develop a new cruise ship dock facilities and associated support services at the head of Passage Canal.

These options were developed on a preliminary basis. The two project options that were considered the most promising to support additional business opportunities identified in Section 5.2 were:

- Marginal Wharf Redevelopment – Container Freight
- Marginal Wharf Redevelopment – Combined Break Bulk Freight Dock and Cruise Ship Terminal

These options are outlined in further detail below. Note that track configuration shown on plans is conceptual, and would need detailed design to ensure it works effectively to serve wharf redevelopment opportunities identified.

In addition to these projects, additional rail track development is recommended for consideration including:

- Constructing a second main track between the Anton Anderson Memorial Tunnel and the Whittier freight yard ladder track
- Constructing a second rail siding in the vicinity of the cruise ship passenger terminal, to provide staging for trains from cruise ships
- Grade separating the existing at-grade Whittier Street crossing to eliminate conflicts with vehicular and pedestrian movements.
- Removal of height restrictions on tracks to allow double stacking. This would include replacement of a bridge, raising the height of the Portage Tunnel, and other improvements within the area.

6.1 Marginal Wharf Redevelopment – Container Freight

The new Marginal Wharf concept will be in the same location in the previous Marginal Wharf. This concept can be implemented in three phases, which are described in further detail below. A cost estimate has been provided for each phase. The purpose of the redevelopment is to provide a dock that will primarily be used for container freight handling. Facilities will also be provided to replace the existing RO/RO barge dock in a different location on the site (part of Phase 2 development).

The Marginal Wharf redevelopment for container freight can also be constructed as a single phase, and a cost estimate for implementation in a single phase is provided in section 6.1.5.

6.1.1 Phase 1

Overview

Phase 1 provides for the construction of a full-size sheet pile bulkhead dock creating approximately 1,125 feet of usable dock space, and approximately 1,050 feet of crane to rail loading area. The concept provides the ability to provide 5,580 feet of direct to rail loading capacity. It also provides approximately 1.6 acres of new uplands area for staging and laydown, and provides a 40-foot draft MLLW. A crane rail will be provided, to enable direct loading by crane from a barge to train.

This development phase retains the existing RO/RO barge dock. The Phase 1 concept plan is shown in Figure 19. It is also reproduced in large scale in Appendix A.

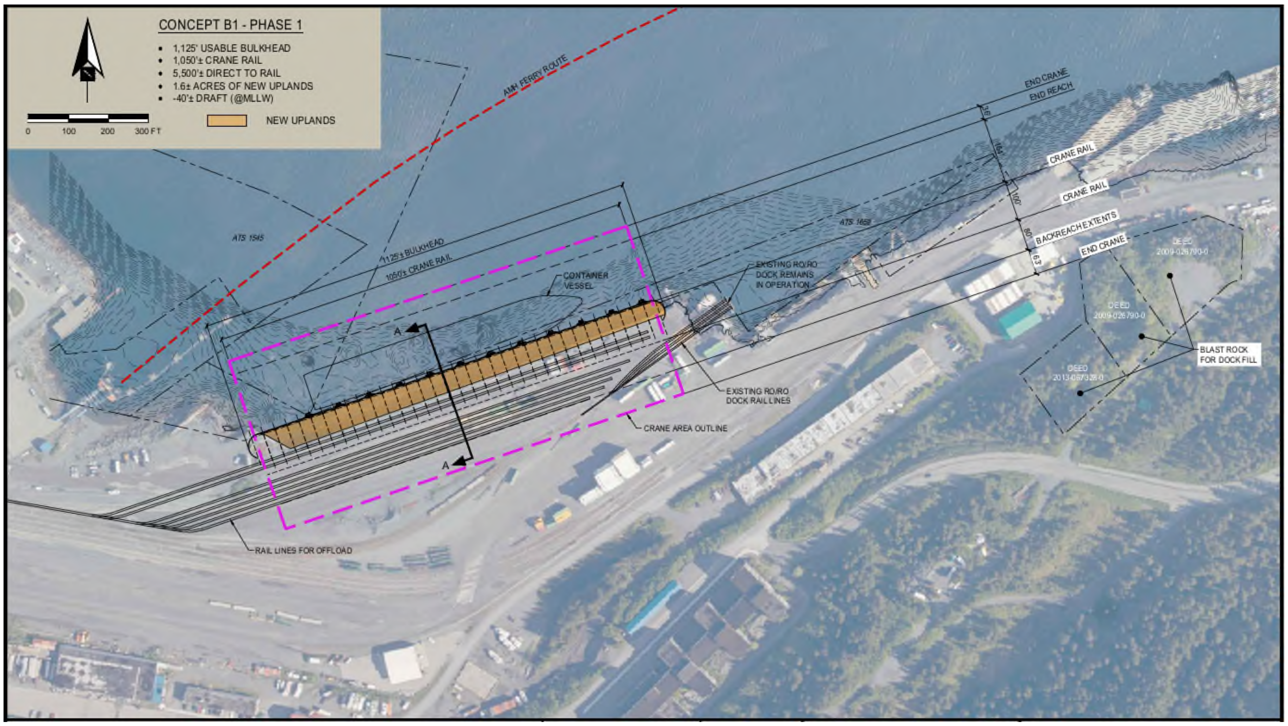


Figure 19: Phase 1 Concept Plan

Cost Estimate

A cost estimate has been developed for Phase 1. The high-level cost items, rounded to the nearest $100,000 are in Table 21, and a detailed Cost Breakdown Structure (CBS) Register is included in Appendix B.

Table 21: Marginal Wharf for Container Freight Cost Estimate – Phase 1

Description	Cost ($ Million)
Mobilization and demobilization	$3.4M
Demolition of existing structures	$2.7M
Sheet Pile Dock (includes sheet pile installation, deep compaction, layer compacted fill)	$16.5M
Uplands Drainage	$1.0M
Fender System	$2.6M
Dock utilities (water, electrical and lighting)	$1.4M
Container Crane Foundation	$7.7M
Crane Power Infrastructure	$1.1M
ARRC Railroad Tracks	$2.3M
Dredging	$0.1M
Contractor Indirect Costs (Marine mammal monitoring, other costs)	$1.4M
Engineering, Permitting, Construction Support	$5.6M
Contingency (Assumes 20%)	$8.7M
Subtotal	**$54.5M**
Container Crane	$75.0M
Tunnel Renovations	$4.0M
Intersection Upgrade	$20.0M
Subtotal	**$99.0M**
Phase 1 Total	**$153.5M**

6.1.2 Phase 2

Phase 2 of the Marginal Wharf redevelopment provides for the relocation of the existing RO/RO dock to the south-eastern end of the freight dock area. The new RO/RO dock will have a draft of approximately -34 feet MLLW. The existing RO/RO barge dock and associated side berthing will be demolished as part of Phase 2. The Phase 2 concept plan is shown in Figure 20. It is also reproduced in large scale in Appendix A.

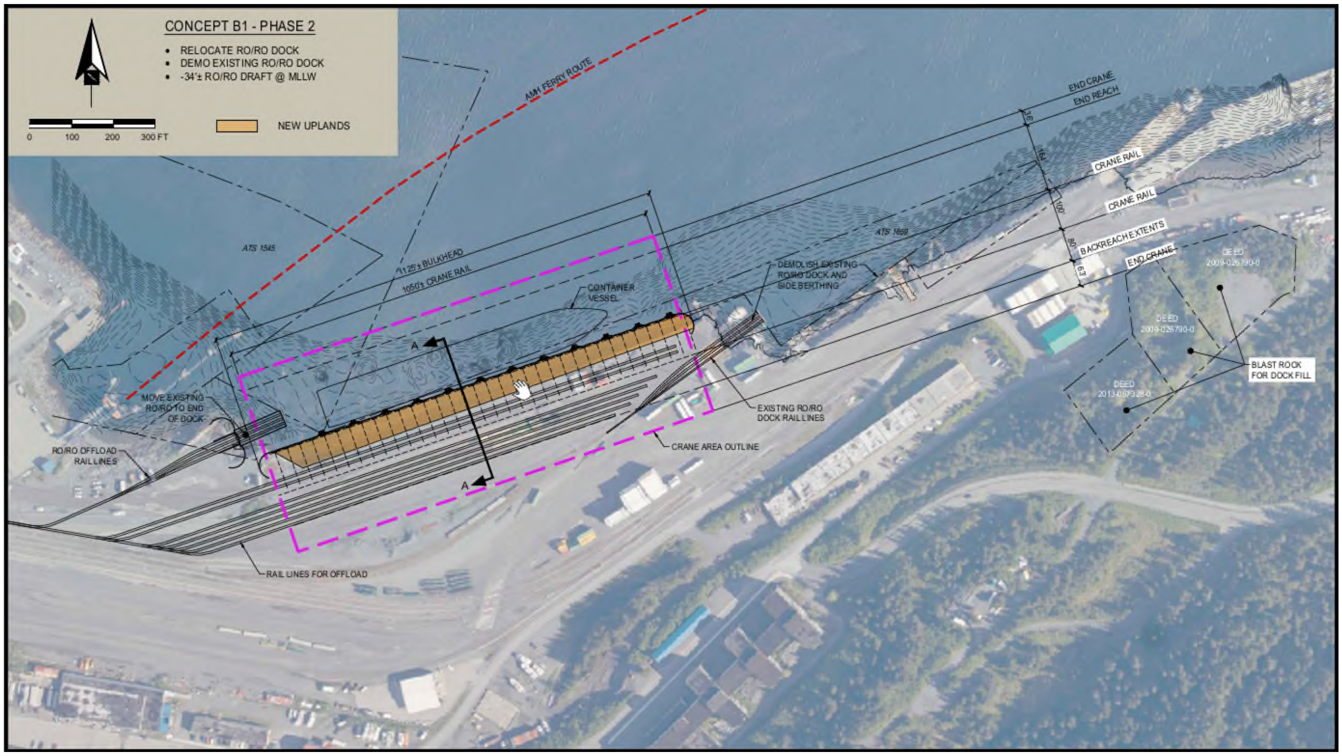


Figure 20: Phase 2 Concept Plan

Cost Estimate

A cost estimate has been developed to relocate the RO/RO dock and demolish the existing RO/RO dock and side berth as provided for in Phase 2. The high-level cost items are rounded to the nearest $100,000 and are set out in Table 22, and a detailed CBS Register is included in Appendix B.

Table 22: Marginal Wharf for Container Freight Cost Estimate – Phase 2

Description	Cost ($ Million)
Mobilization and demobilization	$0.6M
Demolition of existing structures	$0.8M
Sheet Pile Dock (includes sheet pile installation, deep compaction, layer compacted fill)	$1.3M
Fender System	$0.6M
Dock utilities (electrical and lighting)	$0.5M
ARRC Railroad Tracks	$0.4M
Contractor Indirect Costs (Marine mammal monitoring, other costs)	$0.2M
Engineering, Permitting, Construction Support	$0.5M
Contingency (Assumes 20%)	$0.9M
Phase 2 Total	**$5.8M**

6.1.3 Phase 3

Phase 3 of the Marginal Wharf redevelopment provides an additional 2.5 acres of uplands area in approximately the location of the existing RO/RO dock. The new uplands is used for the provision of a second container vessel loading area with an additional approximately 14,600 feet of direct to rail loading capacity, and approximately 2,083 feet of additional crane rail. The additional vessel space will have a draft of approximately -40 feet MLLW. The Phase 3 concept plan is shown in Figure 21. It is also reproduced in large scale in Appendix A.

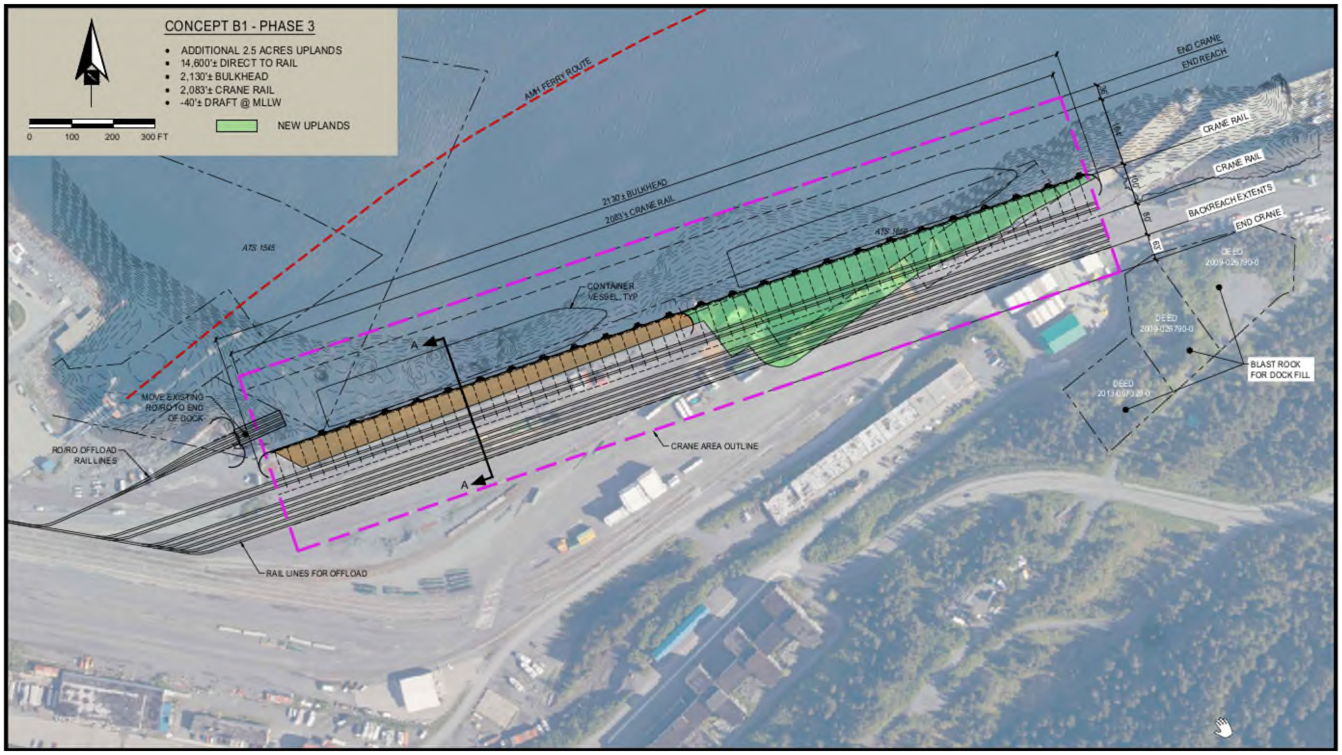


Figure 21: Phase 3 Concept Plan

Cost Estimate

A cost estimate has been developed to facilitate works identified in Phase 2. The high-level cost items are rounded to the nearest $100,000 are set out in Table 23, and a detailed CBS Register is included in Appendix B.

Table 23: Marginal Wharf for Container Freight Cost Estimate – Phase 3

Description	Cost ($ Million)
Mobilization and demobilization	$3.4M
Demolition of existing structures	$0.4M
Sheet Pile Dock (includes sheet pile installation, deep compaction, layer compacted fill)	$20.0M
Uplands Drainage	$0.7M
Fender System	$2.8M
Dock utilities (water, electrical and lighting)	$1.4M
Container Crane Foundation	$8.1M
Crane Power Infrastructure	$1.0M
ARRC Railroad Tracks	$4.6M
Dredging	$0.1M
Contractor Indirect Costs (Marine mammal monitoring, other costs)	$1.4M
Engineering, Permitting, Construction Support	$3.3M
Contingency (Assumes 20%)	$8.5M
Phase 3 Total	**$55.7M**

6.1.4 Proposed Dock Section – Marginal Wharf

The proposed dock section for Marginal Wharf development to provide for container freight activities is shown in Figure 22. As illustrated, the dock supports gantry crane that can pick containers and move then to up to seven rail lines for offload. The fixed gantry crane design would need to address localized wind conditions. This is a regular requirement for ports across the United States. The cost estimate provides for three separate gantry cranes to facilitate loading and unloading of freight.

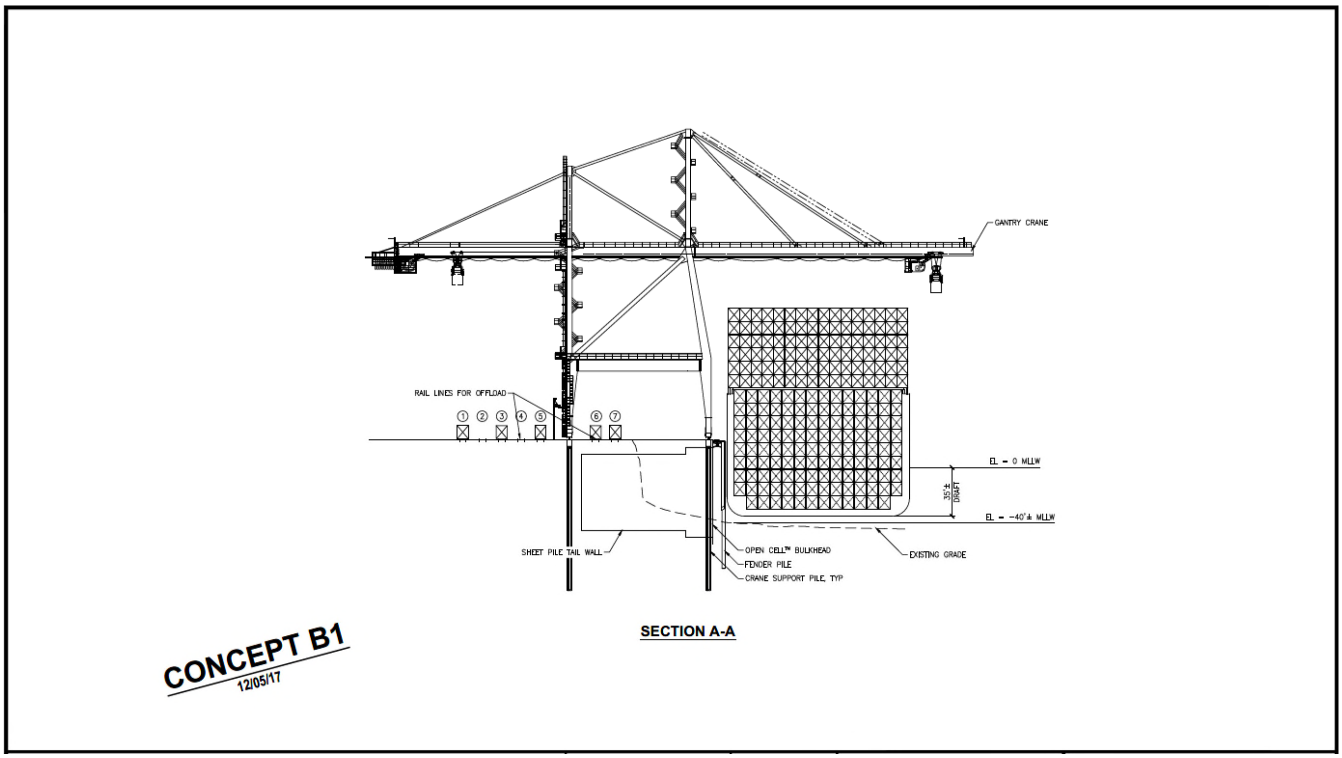


Figure 22: Proposed Dock Section – Marginal Wharf for Container Freight

6.1.5 Single Phase Marginal Wharf Redevelopment Cost Estimate

The Marginal Wharf redevelopment for container freight could be delivered as a single project (i.e., all phases combined into one construction project). A cost estimate has been developed to facilitate works to deliver the Marginal Wharf as a single phase of work. The high-level cost items are rounded to the nearest $100,000 are set out in Table 24, and a detailed CBS Register is included in Appendix B.

Table 24: Marginal Wharf for Container Freight Cost Estimate – Single Construction Phase

Description	Cost
Mobilization and demobilization	$6.2M
Demolition of existing structures	$3.9M
Sheet Pile Dock (includes sheet pile installation, deep compaction, layer compacted fill)	$36.5M
Uplands Drainage	$1.3M
Install Salvaged Barge Ramp (includes installation of ARRC tracks)	$0.6M
Fender System	$5.4M
Dock utilities (water, electrical and lighting)	$2.6M
Container Crane Foundation	$10.5M
Crane Power Infrastructure	$1.5M
ARRC Railroad Tracks	$4.6M
Dredging	$0.2M
Contractor Indirect Costs (Marine mammal monitoring, other costs)	$2.5M
Engineering, Permitting, Construction Support	$6.8M
Contingency (Assumes 20%)	$15.6M
Subtotal	**$98.2M**
Container Crane	$75.0M
Tunnel Renovations	$4.0M
Intersection Upgrade	$20.0M
Subtotal	**$99.0M**
Cost Total	**$197.2M**

6.2 Marginal Wharf Redevelopment – Combined Break Bulk Freight Dock and Cruise Ship Terminal

The Marginal Wharf redevelopment providing for both break bulk freight and a cruise ship terminal will be in the same location in the previous Marginal Wharf. The proposed dock will be a full-size sheet pile bulkhead dock creating approximately 1,110 feet of usable bulkhead dock that can be used to support either break bulk freight or cruise ship operations for cruise ships measuring up to 1,000 feet in length. The dock can be developed as a single construction project, or divided into four separate phases, measuring:

- Phase 1: Approximately 320 feet
- Phase 2: Approximately 350 feet
- Phase 3: Approximately 250 feet
- Phase 4: Approximately 190 feet.

The Marginal Wharf provides a 40-foot draft at MLLW. A concrete paver walkway will be provided on the dock surface for passenger and luggage staging and cruise ship turn activities.

A new cruise terminal building can be provided to the south-east of the Alaska Marine Highway Ferry Terminal, and a new access road and bus turnaround can provide surface transportation staging adjacent to the new terminal building. The terminal building and staging facilities are not shown on the concept plans.

This concept retains the existing barge dock, which currently allows for RO/RO train loading, and the dock rail lines will not be altered in this concept. The proposed Marginal Wharf concept for both break bulk freight and a cruise ship terminal is shown in Figures 23 and 24. It is also reproduced in large scale in Appendix A.

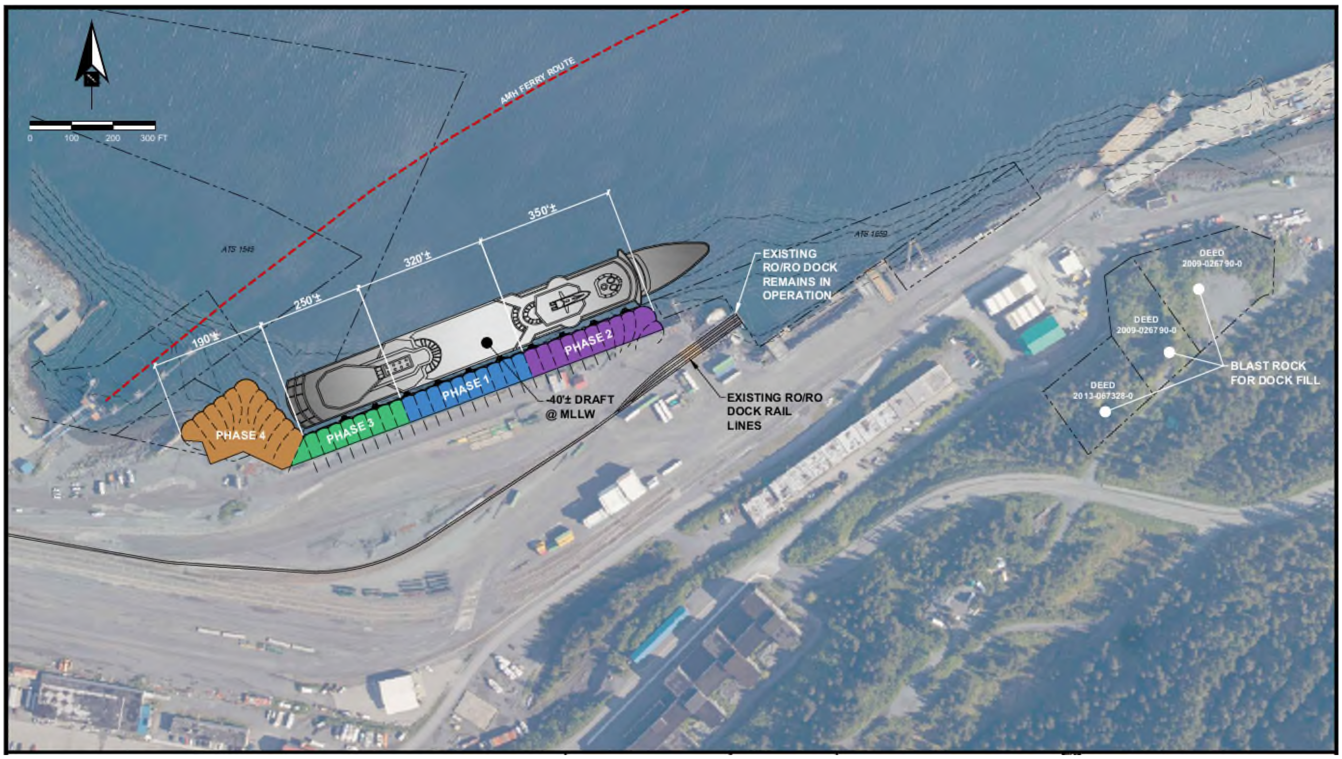


Figure 23: Freight/Cruise Marginal Wharf Concept Site Plan

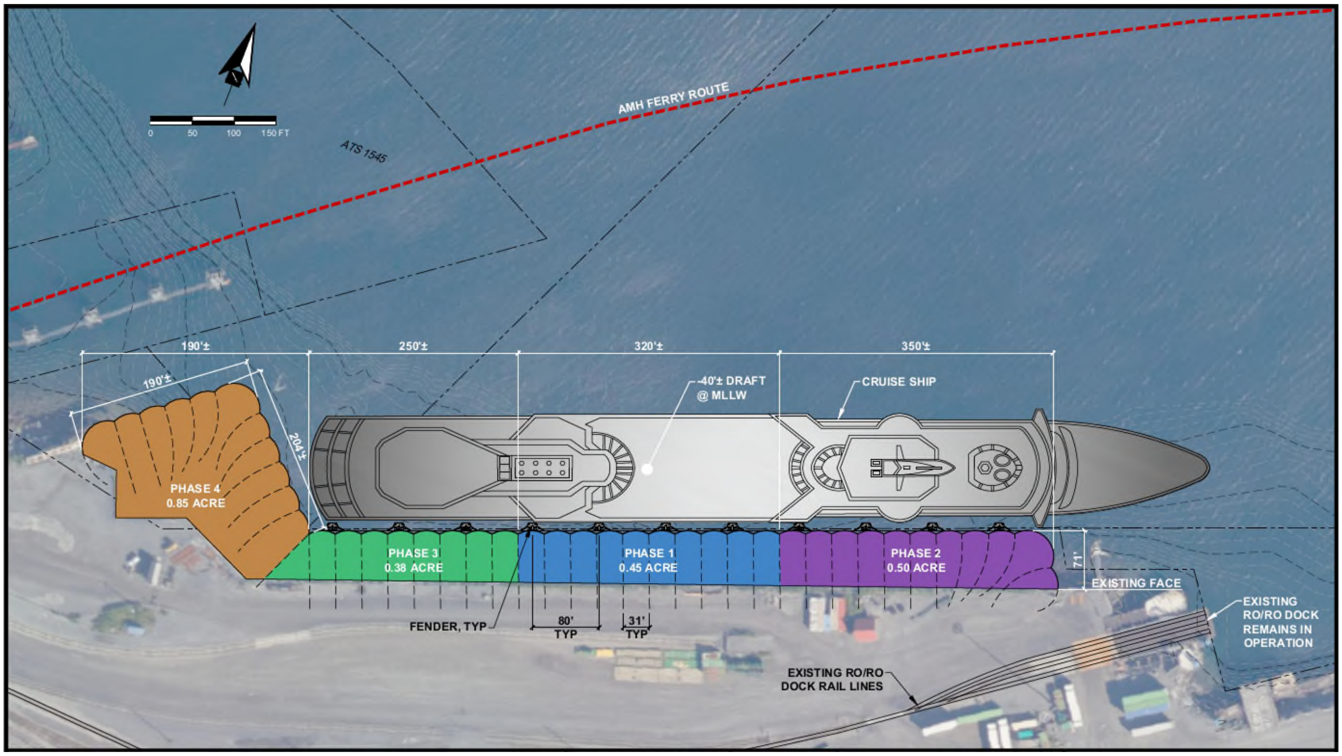


Figure 24: Freight/Cruise Marginal Wharf Concept Staging Plan

6.2.1 Freight/Cruise Marginal Wharf Concept Cost Estimate

The Marginal Wharf redevelopment for both break bulk freight and cruise ships is able to be phased or delivered as a single project (i.e., all phases combined into one construction project). Cost estimates have been developed to facilitate works to deliver the Marginal Wharf using either approach. The high level cost items rounded to the nearest $100,000 are set out in Tables 25-28 (phased approach) and 29 (single project), and a detailed CBS Register is included in Appendix B.

Phased Delivery

Table 25: Marginal Wharf for Break Bulk/Cruise Ship Terminal Cost Estimate – Phase 1

Description	Cost
Mobilization and demobilization	$1.8M
Demolition of existing structures	$0.5M
Sheet Pile Dock (includes sheet pile installation, deep compaction, layer compacted fill)	$5.5M
Uplands Drainage	$0.1M
Fender System	$0.9M
Dock utilities (water and electrical)	$0.2M
Dock Surfacing (Assumes 100-Feet Behind Dock Face)	$1.1M
Contractor Indirect Costs (Marine mammal monitoring, other costs)	$0.5M
Engineering, Permitting, Construction Support	$1.6M
Contingency (Assumes 20%)	$2.4M
Phase 1 Total	**$14.6M**

Table 26: Marginal Wharf for Break Bulk/Cruise Ship Terminal Cost Estimate – Phase 2

Description	Cost
Mobilization and demobilization	$1.8M
Demolition of existing structures	$0.5M
Sheet Pile Dock (includes sheet pile installation, deep compaction, layer compacted fill)	$6.2M
Uplands Drainage	$0.1M
Fender System	$0.9M
Dock utilities (electrical and lighting)	$0.2M
Dock Surfacing (Assumes 100-Feet Behind Dock Face)	$1.1M
Contractor Indirect Costs (Marine mammal monitoring, other costs)	$0.5M
Engineering, Permitting, Construction Support	$1.6M
Contingency (Assumes 20%)	$2.6M
Phase 2 Total	**$15.5M**

Table 27: Marginal Wharf for Break Bulk/Cruise Ship Terminal Cost Estimate – Phase 3

Description	Cost
Mobilization and demobilization	$1.8M
Demolition of existing structures	$0.5M
Sheet Pile Dock (includes sheet pile installation, deep compaction, layer compacted fill)	$4.8M
Uplands Drainage	$0.1M
Fender System	$0.4M
Dock utilities (electrical and lighting)	$0.2M
Dock Surfacing (Assumes 100-Feet Behind Dock Face)	$1.0M
Contractor Indirect Costs (Marine mammal monitoring, other costs)	$0.5M
Engineering, Permitting, Construction Support	$1.6M
Contingency (Assumes 20%)	$2.2M
Phase 3 Total	**$13.1M**

Table 28: Marginal Wharf for Break Bulk/Cruise Ship Terminal Cost Estimate – Phase 4

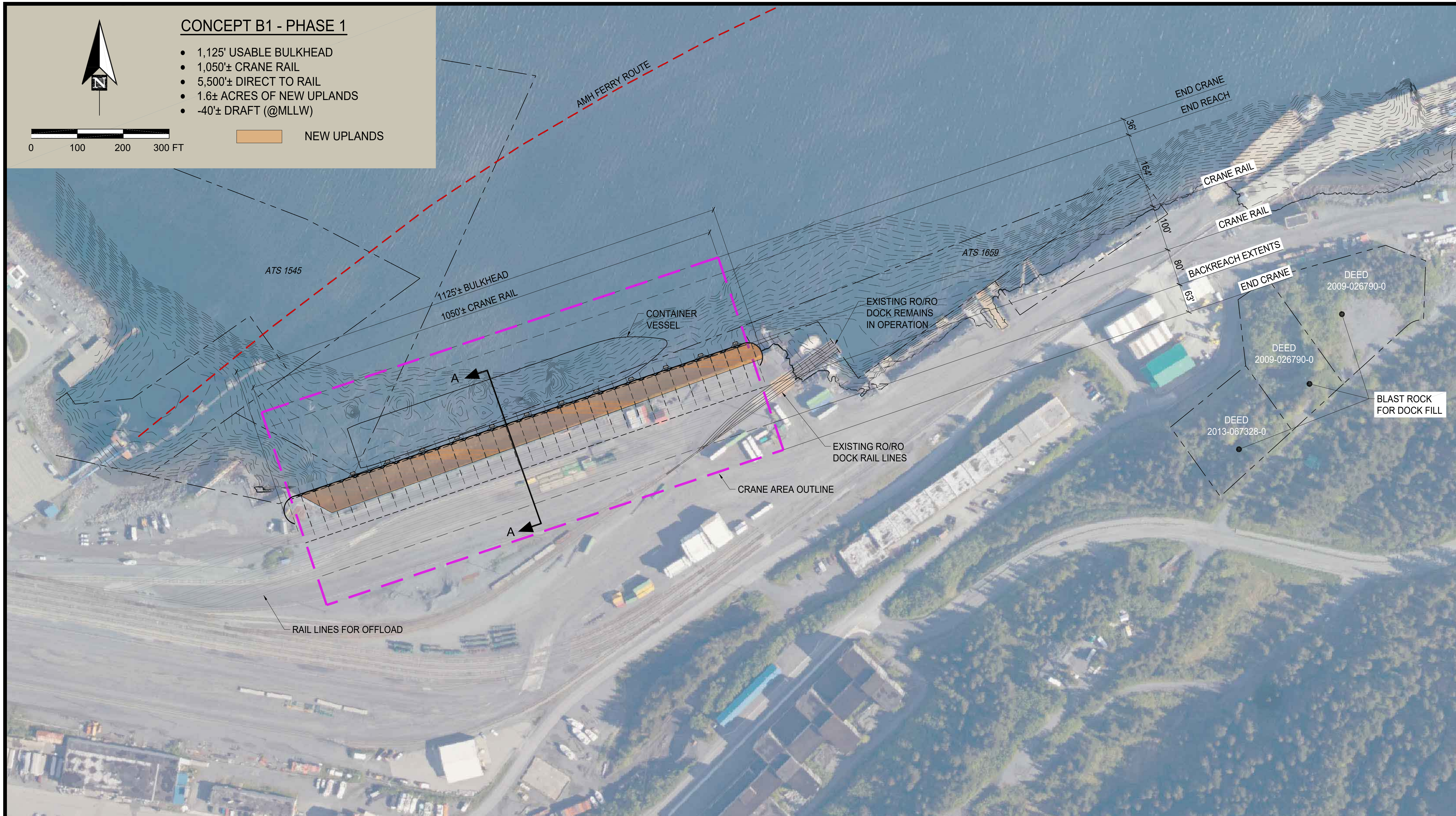
Description	Cost
Mobilization and demobilization	$1.8M
Demolition of existing structures	$0.5M
Sheet Pile Dock (includes sheet pile installation, deep compaction, layer compacted fill)	$7.4M
Uplands Drainage	$0.1M
Dock utilities (electrical and lighting)	$0.2M
Dock Surfacing (Assumes 100-Feet Behind Dock Face)	$1.4M
Contractor Indirect Costs (Marine mammal monitoring, other costs)	$0.5M
Engineering, Permitting, Construction Support	$1.7M
Contingency (Assumes 20%)	$3.0M
Phase 4 Total	**$16.6M**

Single Construction Phase

Table 29: Marginal Wharf for Break Bulk/Cruise Ship Terminal Cost Estimate – Single Construction Phase

Description	Cost
Mobilization and demobilization	$1.8M
Demolition of existing structures	$1.5M
Sheet Pile Dock (includes sheet pile installation, deep compaction, layer compacted fill)	$15.9M
Uplands Drainage	$0.3M
Fender System	$2.8M
Dock utilities (electrical and lighting)	$0.7M
Dock Surfacing (Assumes 100-Feet Behind Dock Face)	$2.7M
Contractor Indirect Costs (Marine mammal monitoring, other costs)	$0.9M
Engineering, Permitting, Construction Support	$3.2M
Contingency (Assumes 20%)	$5.3M
Construction Total	**$35.1M**

APPENDIX 1: DOCK CONCEPT PLANS



CONCEPT B1
12/05/17

PND Engineers, Inc. is not responsible for safety programs, methods or procedures of operation, or the construction of the design shown on these drawings. Where specifications are general or not called out, the specifications shall conform to standards of industry. Drawings are for use on this project only and are not intended for reuse without written approval from PND. Drawings are also not to be used in any manner that would constitute a detriment directly or indirectly to PND.

REV	DATE	DESCRIPTION

DATE: ___________

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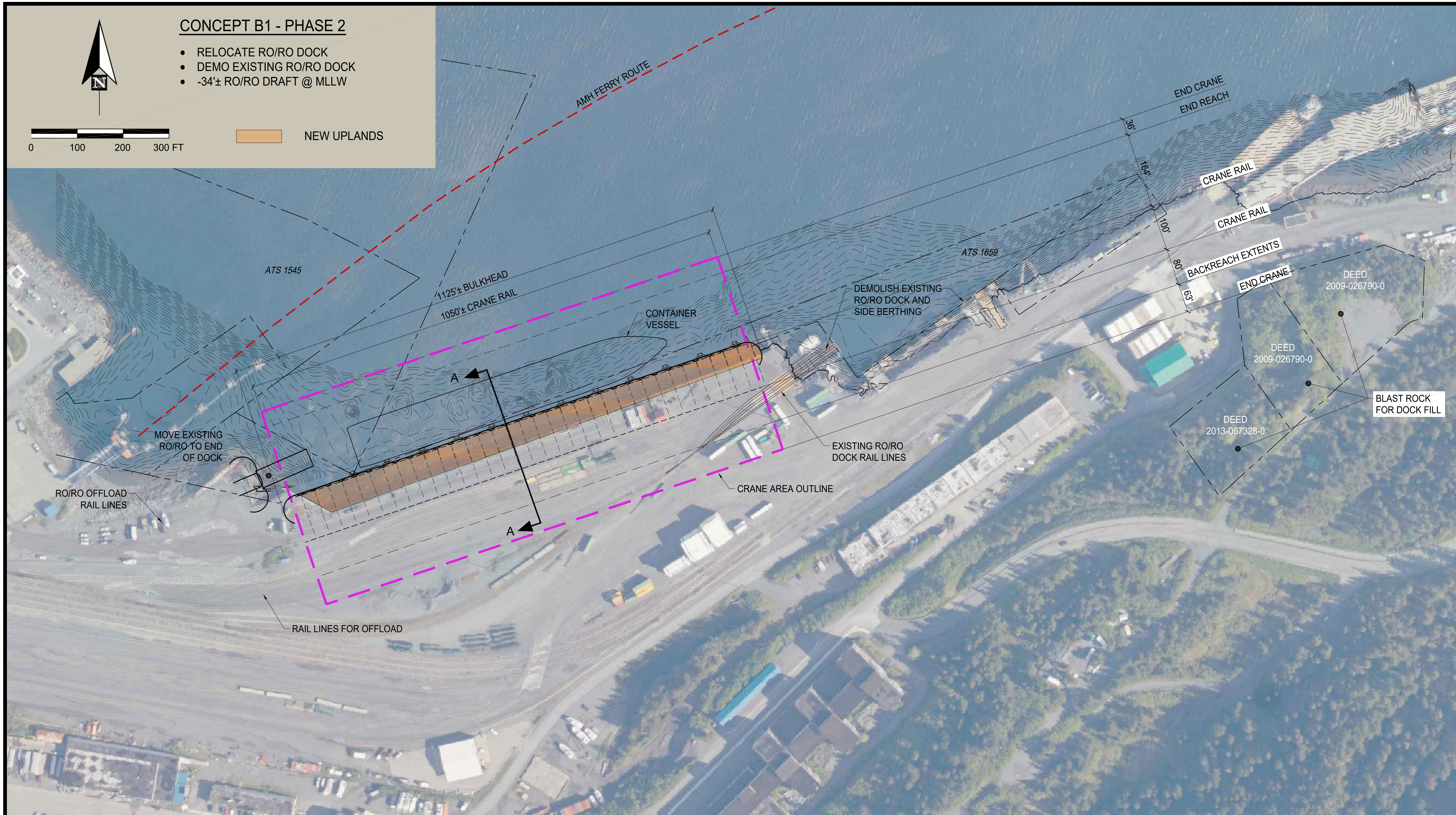
AK. LIC# AECC250

PND ENGINEERS, INC.

PROJECT: WHITTIER ARRC PLANNING

TITLE: PROPOSED DOCK PLAN
CONCEPT B1 PHASE 1

DESIGNED BY: PND	DATE: 12/05/17	SHEET NO: 1	OF 4
CHECKED BY: PND	PROJECT NO: 171140		



CONCEPT B1
12/05/17

PND Engineers, Inc. is not responsible for safety programs, methods or procedures of operation, or the construction of the design shown on these drawings. Where specifications are general or not called out, the specifications shall conform to standards of industry. Drawings are for use on this project only and are not intended for reuse without written approval from PND. Drawings are also not to be used in any manner that would constitute a detriment directly or indirectly to PND.

REV	DATE	DESCRIPTION

DATE: ____________

1506 West 36th Avenue
Anchorage, Alaska 99503
Phone: 907.561.1011
www.pndengineers.com
AK. LIC# AECC250

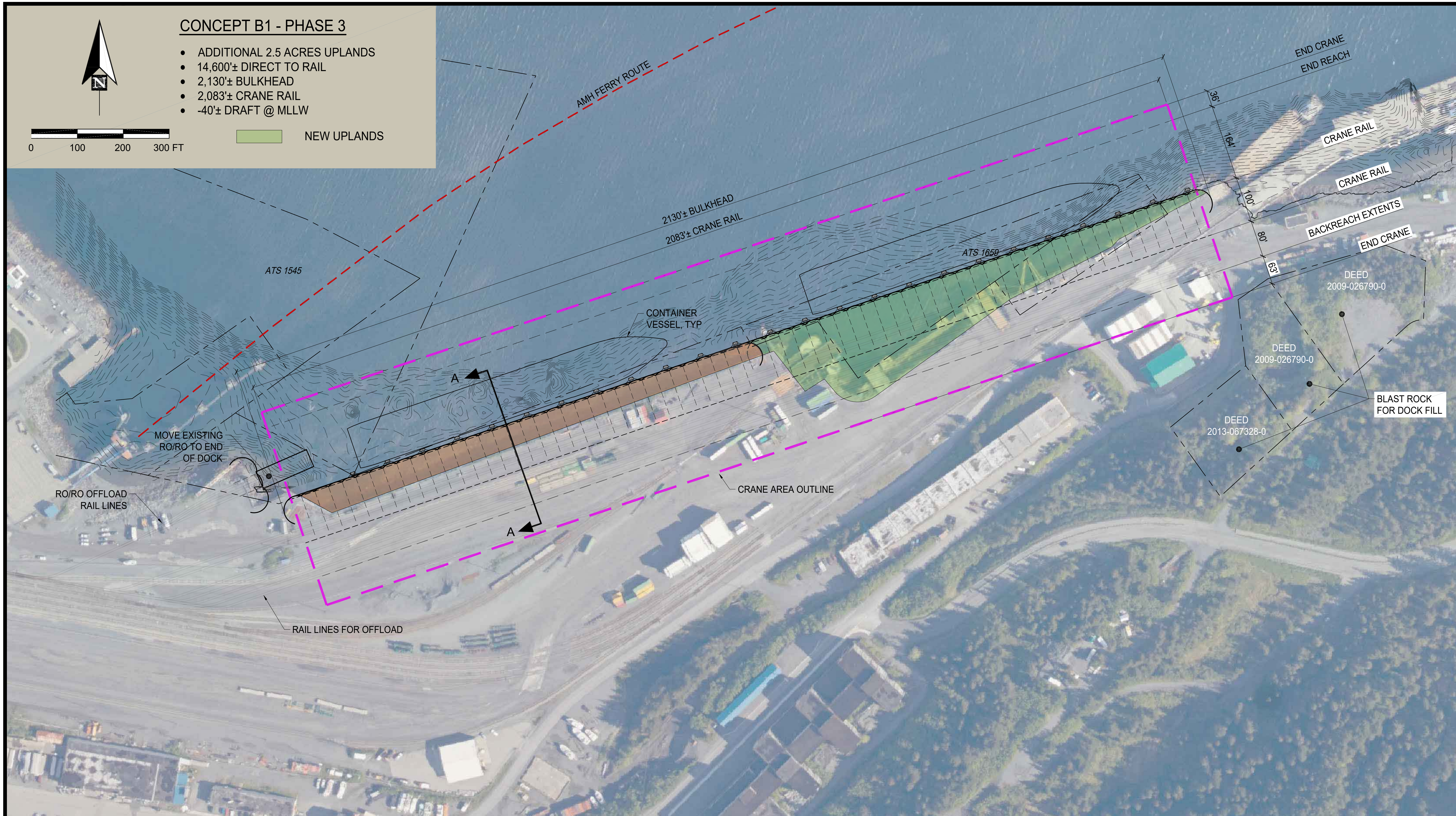
PND ENGINEERS, INC.

PROJECT:
WHITTIER ARRC PLANNING

TITLE:
PROPOSED DOCK PLAN
CONCEPT B1 PHASE 2

DESIGNED BY: PND | DATE: 12/05/17
CHECKED BY: PND | PROJECT NO: 171140

SHEET NO: **2** OF 4



CONCEPT B1

12/05/17

REV	DATE	DESCRIPTION

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P N D
ENGINEERS, INC.

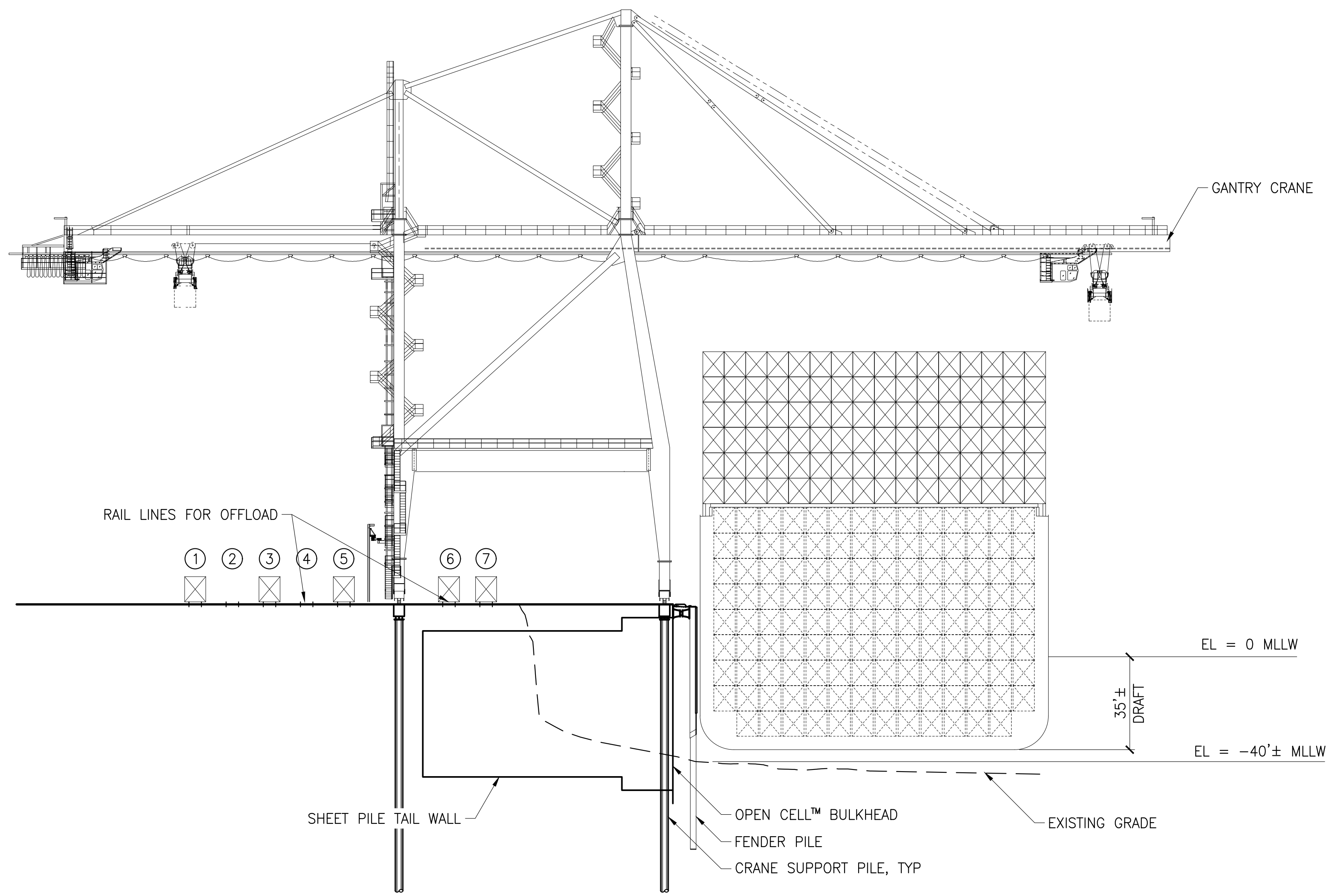
PROJECT:

WHITTIER ARRC PLANNING

TITLE:

PROPOSED DOCK PLAN
CONCEPT B1 PHASE 3

DESIGNED BY:	PND	DATE:	12/05/17	SHEET NO: 3 OF 4
CHECKED BY:	PND	PROJECT NO:	171140	



SECTION A-A

CONCEPT B1
12/05/17

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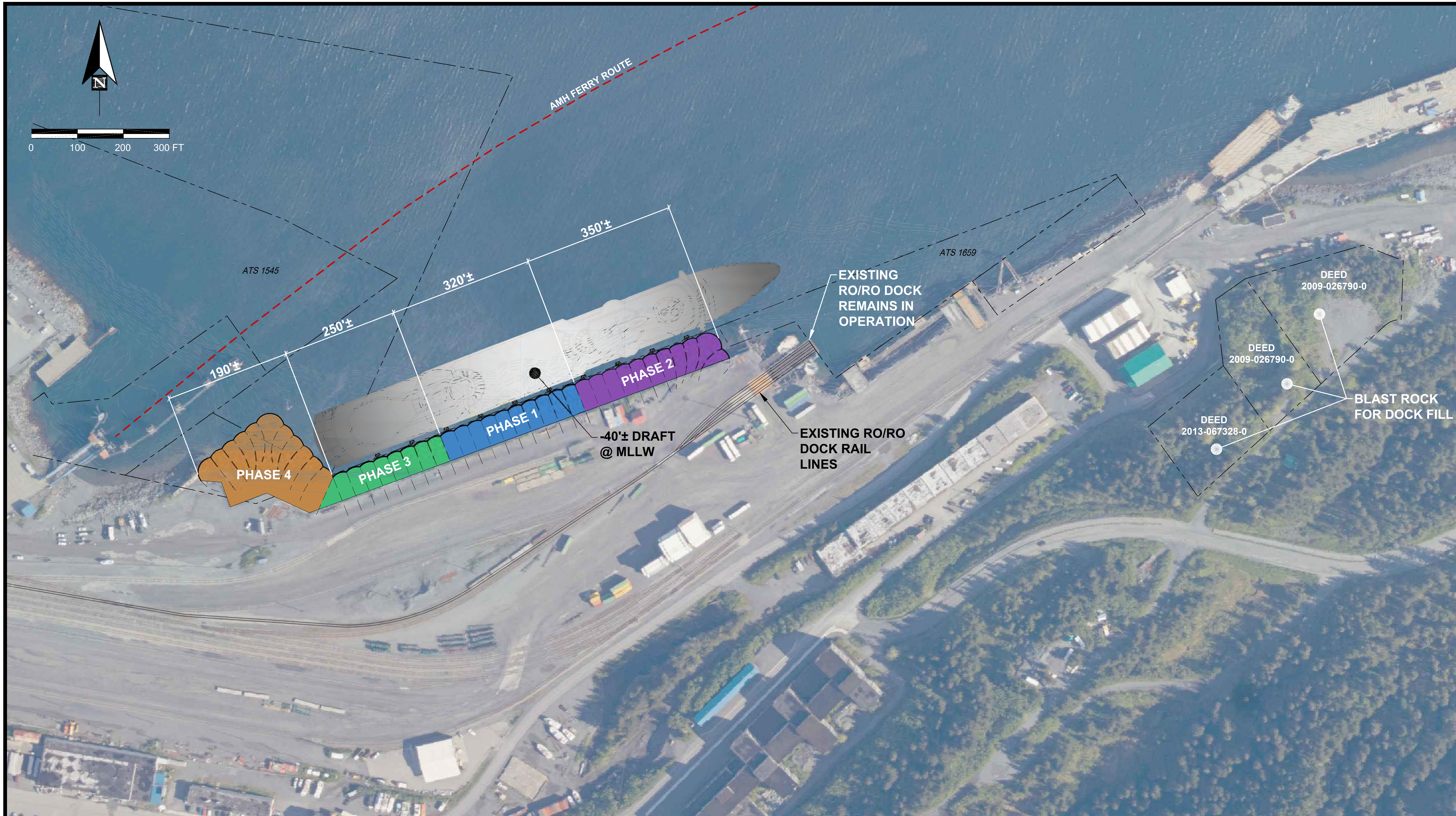
PND ENGINEERS, INC.

PROJECT: **WHITTIER ARRC PLANNING**

TITLE: PROPOSED DOCK SECTION
CONCEPT B1

DESIGNED BY: PND	DATE: 12/05/17	SHEET NO: 4 OF 4
CHECKED BY: PND	PROJECT NO: 171140	



OPEN CELL™ AND OPEN CELL SHEET PILE™ ARE REGISTERED TRADEMARKS OF PND ENGINEERS, INC.
THE OPEN CELL SYSTEM IS PATENTED
PATENT – US 6,715,964 B2
PATENT – US 8,950,981 B2
PATENT – US 7,488,140 B2

CONCEPT
2/27/2018

REV	DATE	DESCRIPTION

DATE: ____________

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Anchorage, Alaska 99503
Phone: 907.561.1011
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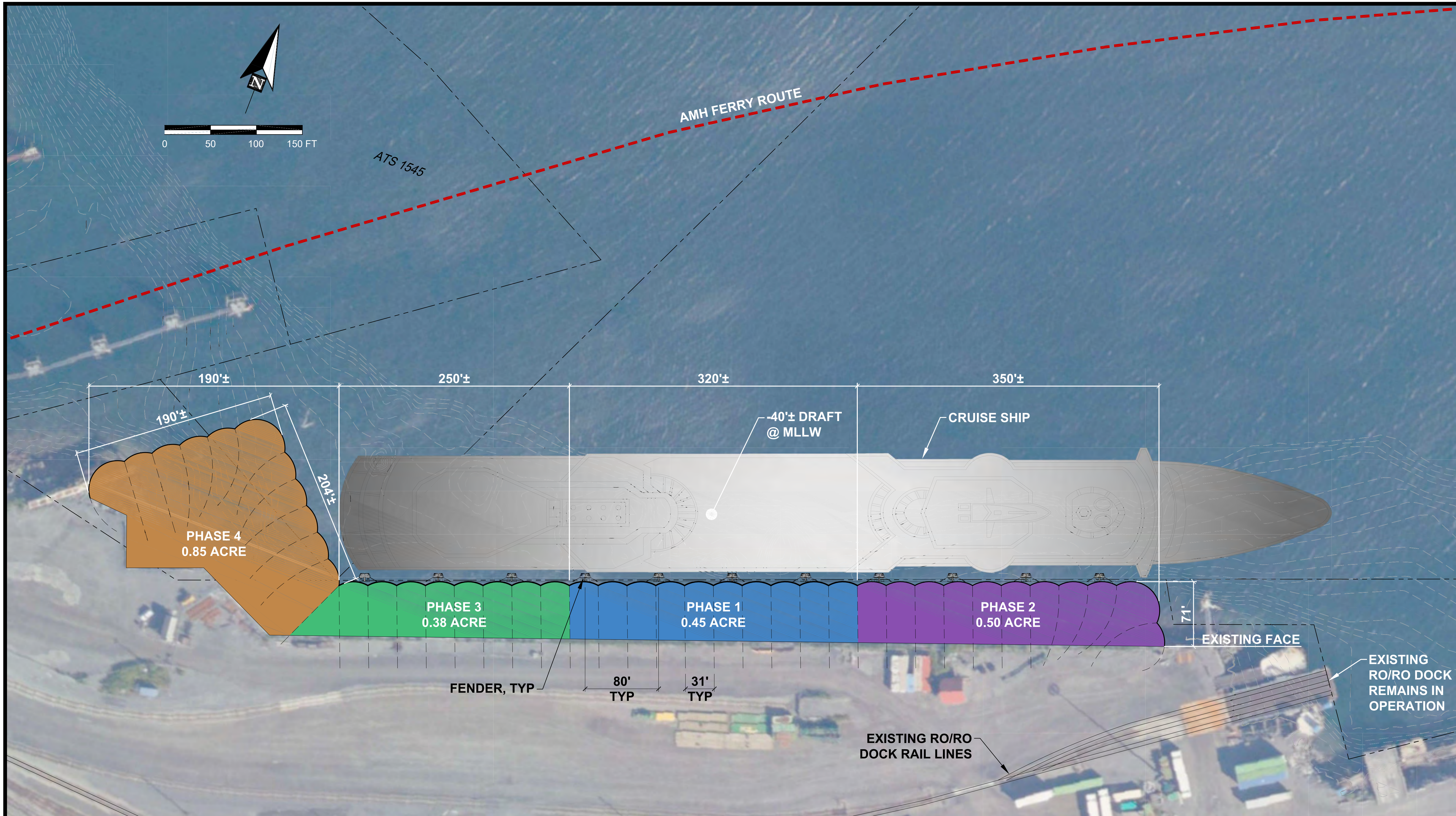
PND ENGINEERS, INC.

PROJECT:
WHITTIER ARRC PLANNING

TITLE:
PHASED MARGINAL WHARF CONCEPT

DESIGNED BY: PND	DATE: 2/27/2018	SHEET NO: 1 OF 2
CHECKED BY: PND	PROJECT NO: 171140	



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PATENT – US 6,715,964 B2
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CONCEPT
2/27/2018

REV	DATE	DESCRIPTION

DATE: ______________

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PND ENGINEERS, INC.

PROJECT:
WHITTIER ARRC PLANNING

TITLE:
PHASED MARGINAL WHARF CONCEPT

DESIGNED BY:	PND	DATE:	2/27/2018	SHEET NO: 2 OF 2
CHECKED BY:	PND	PROJECT NO:	171140	

APPENDIX 2: COST BREAKDOWN STRUCTURE REGISTER COST ESTIMATES

COST BREAKDOWN STRUCTURE (CBS)REGISTER

Marginal Wharf Redevelopment – Container Freight

Phase 1

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
5	**Container Dock – Phase 1**	1.00	Each	$153,175,450.20	$153,175,450.20
5.1	Mobilization/Demobilization	1.00	LS	$3,376,526.67	$3,376,526.67
5.1.1	Mobilization	1.00	LS	$2,483,671.72	$2,483,671.72
5.1.1.1	Yard Mobilization	1.00	LS	$568,396.87	$568,396.87
5.1.1.2	Mobilization to Site	1.00	LS	$1,868,487.63	$1,868,487.63
5.1.1.3	Assemble Crane On-Site	2.00	EA	$23,393.61	$46,787.23
5.1.2	Demobilization	1.00	LS	$892,854.95	$892,854.95
5.1.2.1	Site Demobilization	1.00	LS	$218,300.31	$218,300.31
5.1.2.2	Demobilization from Site	1.00	LS	$580,980.18	$580,980.18
5.1.2.3	Disassemble/ Remove Crane from Site	2.00	Each	$46,787.23	$93,574.45
5.2	Demolition of Existing Structures	1.00	LS	$2,700,677.29	$2,700,677.29
5.2.1	Unclassified Excavation	44,500.00	CY	$12.13	$539,982.52
5.2.2	Remove Sheet Pile	750.00	EA	$721.61	$541,206.94
5.2.3	Remove Concrete Cap	1,200.00	LF	$139.55	$167,464.82
5.2.4	Remove Anchor	1,200.00	LF	$139.55	$167,464.82
5.2.5	Load and Transport (Barge) Material	2.00	EA	$450,000.00	$900,000.00
5.2.6	Misc Demo	1.00	LS	$384,558.19	$384,558.19
5.3	OCSP Bulkhead	1.00	LS	$16,543,303.71	$16,543,303.71
5.3.1	Provide Sheet Pile	3,951.76	Ton	$1,781.96	$7,041,882.80
5.3.2	Set Template and Temporary Supports (Per Cell)	34.00	EA	$11,906.97	$404,837.11
5.3.3	Stab and Drive Sheet Piles	2,516.52	EA	$940.54	$2,366,877.31
5.3.4	Cut Off Sheet Pile and Weld Interlocks	257.58	EA	$288.31	$74,261.45
5.3.5	Dock Face Beam and Appurtenances	1.00	LS	$2,282,447.58	$2,282,447.58
5.3.5.1	Face Beam	1,040.00	LF	$1,670.63	$1,737,451.12
5.3.5.1.1	Provide and Install Steel Face Beam and Plate	1,040.00	LF	$1,062.35	$1,104,841.45
5.3.5.1.2	Provide and Place SC Concrete	139.11	CY	$535.90	$74,548.00
5.3.5.1.3	Install Concrete Beam and Slab	372.61	CY	$1,461.03	$544,395.63
5.3.5.1.3.1	Install Temporary Falsework and Embeds	1,854.63	SF	$18.52	$34,353.12
5.3.5.1.3.2	Provide and Install Reinforcement	91,045.34	Pound	$2.10	$191,565.27
5.3.5.1.3.3	Provide and Place Concrete	372.61	CY	$383.62	$142,940.05
5.3.5.1.3.4	Strip Forms and Curing	8,430.12	SF	$9.19	$77,476.10
5.3.5.1.3.5	Face Beam Studs	3,726.11	EA	$10.42	$38,813.04
5.3.5.1.3.6	Position V Steel Form Plate	85.99	LF	$689.03	$59,248.05
5.3.5.1.4	Concrete Mooring Pedestals	8.28	CY	$1,650.44	$13,666.04
5.3.5.1.4.1	Install Temporary Falsework and Embeds	257.61	SF	$18.52	$4,771.65

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
5.3.5.1.4.2	Provide and Install Reinforcement	1,592.36	Pound	$2.10	$3,350.42
5.3.5.1.4.3	Provide and Place Concrete	8.28	CY	$383.62	$3,176.45
5.3.5.1.4.4	Strip Forms and Curing	257.61	SF	$9.19	$2,367.52
5.3.5.2	Provide and Install Fixed Bullrail	520.00	LF	$158.40	$82,368.00
5.3.5.3	Provide and Install Safety Ladders	13.00	EA	$12,542.22	$163,048.88
5.3.5.4	Provide and Install Removable Bullrail	520.00	LF	$282.30	$146,798.50
5.3.5.5	Provide and Install 100t Mooring Bollards	10.40	EA	$8,720.24	$90,690.54
5.3.5.6	Provide and Install 42" Cleats	10.40	EA	$5,970.24	$62,090.54
5.3.6	Provide, Haul and Place Fill (Includes Blasting of Uplands Quarry)	71,400.00	CY	$44.54	$3,179,919.34
5.3.7	Provide and Install Anodes	128.79	EA	$4,394.02	$565,895.99
5.3.8	Vibracompaction	1.00	LS	$627,182.12	$627,182.12
5.3.8.1	Vibracompaction	500.00	EA	$1,254.36	$627,182.12
5.3.8.1.1	Vibracompaction Probing	500.00	EA	$936.58	$468,288.93
5.3.8.1.2	Vibracompaction Fill	2,843.14	CY	$55.89	$158,893.19
5.4	Uplands Drainage	1.00	LS	$807,309.59	$807,309.59
5.4.1	Provide and Install Oil Water Separator Stormceptor	6.00	EA	$41,205.60	$247,233.61
5.4.2	Provide and Install Tideflex	6.00	EA	$6,000.00	$36,000.00
5.4.3	Provide and Install Trench Drain	1.00	LS	$524,075.98	$524,075.98
5.4.3.1	Provide and Install Trench Drain	1,000.00	LF	$524.08	$524,075.98
5.4.3.1.1	Trench Drain	1,000.00	LF	$150.00	$150,000.00
5.4.3.1.2	Trench Drain Catchbasins	4.00	EA	$13,840.70	$55,362.80
5.4.3.1.3	Install Concrete Encasement	212.50	CY	$1,499.83	$318,713.18
5.4.3.1.3.1	Install Temporary Falsework and Embeds	5,000.00	SF	$18.52	$92,614.62
5.4.3.1.3.2	Provide and Install Reinforcement	46,875.00	Pound	$2.10	$98,628.03
5.4.3.1.3.3	Provide and Place Concrete	212.50	CY	$383.62	$81,518.59
5.4.3.1.3.4	Strip Forms and Curing	5,000.00	SF	$9.19	$45,951.94
5.5	Fendering	12.00	EA	$213,882.85	$2,566,594.25
5.5.1	Provide and Install Fender Unit	12.00	EA	$162,917.65	$1,955,011.85
5.5.2	Provide Fender Pin Piles 30x0.75"	2,640.00	LF	$231.66	$611,582.40
5.6	Utilities	1.00	LS	$1,384,733.33	$1,384,733.33
5.6.1	Water	2.00	LS	$85,004.70	$170,009.39
5.6.1.1	Provide and Install Water Vault	2.00	EA	$25,102.80	$50,205.60
5.6.1.2	Water Service Line	1,200.00	LF	$99.84	$119,803.79
5.6.2	Electrical and Lighting	0.50	LS	$2,429,447.89	$1,214,723.94
5.6.2.1	Provide and Install New High Mast Lights	2.00	EA	$245,217.16	$490,434.32
5.6.2.1.1	Provide and Install High Mast Lights	2.00	EA	$208,864.83	$417,729.66
5.6.2.1.2	Install New Foundation	2.00	EA	$36,352.33	$72,704.66
5.6.2.1.2.1	Provide Pile and Plate	2.00	EA	$22,800.00	$45,600.00
5.6.2.1.2.2	Install Pile and Plate	2.00	EA	$13,552.33	$27,104.66
5.6.2.2	General Site Electrical	2.00	LS	$137,500.00	$275,000.00
5.6.2.3	Electrical Vaults	2.00	LS	$224,644.81	$449,289.63

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
5.6.2.3.1	Provide Vaults	12.00	EA	$22,000.00	$264,000.00
5.6.2.3.2	Install Vaults	12.00	EA	$15,440.80	$185,289.63
5.7	Container Crane Foundation	1,050.00	LF	$7,313.62	$7,679,305.56
5.7.1	Crane Rail Piles	1,050.00	LF	$2,270.42	$2,383,938.18
5.7.1.1	Provide 24" x 0.75 Pile	158.26	EA	$11,675.26	$1,847,737.30
5.7.1.2	Install 24" x 0.75 Pile	158.26	EA	$3,388.08	$536,200.88
5.7.2	Concrete Crane Rail Beams	1,050.00	LF	$2,528.05	$2,654,452.31
5.7.2.1	Install Concrete Cap and Tie Beams	1,839.17	CY	$1,443.29	$2,654,452.31
5.7.2.1.1	Install Temporary Falsework and Embeds	43,471.34	SF	$18.52	$805,216.32
5.7.2.1.2	Provide and Install Reinforcement	353,686.92	Pound	$2.10	$744,180.13
5.7.2.1.3	Provide and Place Concrete	1,839.17	CY	$383.62	$705,537.43
5.7.2.1.3	Strip Forms and Curing	43,471.34	SF	$9.19	$399,518.43
5.7.3	Crane Rail	1,050.00	LF	$550.38	$577,894.78
5.7.3.1	Provide and Install Rail (171lb/yd)	1,050.00	LF	$361.20	$379,258.47
5.7.3.2	Grout Crane Rail	2,507.96	LF	$79.20	$198,636.31
5.7.4	Crane Tie Downs	4.00	EA	$515,755.07	$2,063,020.29
5.7.4.1	Provide and Install Pile	32.00	EA	$12,068.28	$386,184.95
5.7.4.2	Rock Anchors	32.00	EA	$35,000.00	$1,120,000.00
5.7.4.3	Crane Tie Downs and Stops	16.00	EA	$34,802.21	$556,835.34
5.8	Crane Power Infrastructure	1.00	LS	$1,138,099.79	$1,138,099.79
5.8.1	Anchor Pits	2.00	EA	$102,780.41	$205,560.82
5.8.1.1	Provide Anchor Pit	2.00	EA	$40,000.00	$80,000.00
5.8.1.2	Install Anchor Pits	2.00	EA	$62,780.41	$125,560.82
5.8.2	Provide and Install Crane Power Cable Trough	1,050.00	LF	$338.65	$335,584.55
5.8.3	Cable Trough Concrete Beam	200.00	CY	$2,884.77	$576,954.43
5.8.3.1	Install Temporary Falsework and Embeds	4,727.27	SF	$79.51	$375,860.02
5.8.3.2	Provide and Install Reinforcement	38,461.54	Pound	$2.10	$80,925.56
5.8.3.3	Provide and Place Concrete	200.00	CY	$383.62	$76,723.38
5.8.3.4	Strip Forms and Curing	4,727.27	SF	$9.19	$43,445.47
5.8.4	Offsite Electrical Generator and Flywheel?	1.00	LS	$0.00	$0.00
5.8.5	Diesel Storage?	1.00	LS	$0.00	$0.00
5.9	ARRC Railroad Tracks	9,020.00	LF	$250.00	$2,255,000.00
5.10	Dredging	3,000.00	CY	$25.00	$75,000.00
5.11	Contractor Indirect Costs	1.00	LS	$1,390,000.00	$1,390,000.00
5.11.1	Marine Mammal Monitoring	175.00	Day	$2,800.00	$490,000.00
5.11.2	Lodging and Per Diem	300.00	Day	$3,000.00	$900,000.00
5.12	Engineering, Permitting, Construction Support	1.00	LS	$5,608,900.00	$5,608,900.00
5.12.1	Geotech, Dredge Sampling, Survey and Site Studies	1.00	LS	$650,000.00	$650,000.00
5.12.2	Design Engineering	1.00	LS	$3,600,000.00	$3,600,000.00
5.12.3	Permitting (Assumes IHA Req'd)	1.00	LS	$200,000.00	$200,000.00

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
5.12.4	Construction Phase Support	1.00	LS	$1,158,900.00	$1,158,900.00
5.12.4.1	Contract Administration	350.00	Day	$1,440.00	$504,000.00
5.12.4.2	Construction Inspection	350.00	Day	$2,003.00	$600,900.00
5.12.4.3	Engineering Support	1.00	LS	$54,000.00	$54,000.00
5.13	Contingency (Assumes 20%)	1.00	LS	$8,650,000.00	$8,650,000.00
5.14	Container Crane	3.00	Each	$25,000,000.00	$75,000,000.00
5.15	Tunnel Renovations	1.00	LS	$4,000,000.00	$4,000,000.00
5.16	Intersection Upgrade	1.00	LS	$20,000,000.00	$20,000,000.00
					$153,175,450.20

Phase 2

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
6	**Container Dock – Phase 2**	1.00	Each	$5,779,785.39	$5,779,785.39
6.1	Mobilization/Demobilization	1.00	LS	$590,393.31	$590,393.31
6.1.1	Mobilization	1.00	LS	$430,537.21	$430,537.21
6.1.1.1	Yard Mobilization	1.00	LS	$56,839.69	$56,839.69
6.1.1.2	Mobilization to Site	1.00	LS	$373,697.53	$373,697.53
6.1.2	Demobilization	1.00	LS	$159,856.10	$159,856.10
6.1.2.1	Site Demobilization	1.00	LS	$43,660.06	$43,660.06
6.1.2.2	Demobilization from Site	1.00	LS	$116,196.04	$116,196.04
6.2	Demolition of Existing Structures	1.00	LS	$769,116.37	$769,116.37
6.2.1	Misc Demo	1.00	LS	$769,116.37	$769,116.37
6.3	OCSP Bulkhead	1.00	LS	$1,320,078.39	$1,320,078.39
6.3.1	Provide Sheet Pile	348.68	Ton	$1,781.96	$621,342.60
6.3.2	Set Template and Temporary Supports (Per Cell)	3.00	EA	$11,906.97	$35,720.92
6.3.3	Stab and Drive Sheet Piles	222.05	EA	$940.54	$208,842.12
6.3.4	Cut Off Sheet Pile and Weld Interlocks	22.73	EA	$288.31	$6,552.48
6.3.5	Dock Face Beam and Appurtenances	1.00	LS	$188,816.36	$188,816.36
6.3.5.1	Face Beam	75.00	LF	$1,670.63	$125,296.96
6.3.5.1.1	Provide and Install Steel Face Beam and Plate	75.00	LF	$1,062.35	$79,676.07
6.3.5.1.2	Provide and Place SC Concrete	10.03	CY	$535.90	$5,376.06
6.3.5.1.3	Install Concrete Beam and Slab	26.87	CY	$1,461.03	$39,259.30
6.3.5.1.3.1	Install Temporary Falsework and Embeds	133.75	SF	$18.52	$2,477.39
6.3.5.1.3.2	Provide and Install Reinforcement	6,565.77	Pound	$2.10	$13,814.80
6.3.5.1.3.3	Provide and Place Concrete	26.87	CY	$383.62	$10,308.18
6.3.5.1.3.4	Strip Forms and Curing	607.94	SF	$9.19	$5,587.22
6.3.5.1.3.5	Face Beam Studs	268.71	EA	$10.42	$2,799.02
6.3.5.1.3.6	Position V Steel Form Plate	6.20	LF	$689.03	$4,272.70
6.3.5.1.4	Concrete Mooring Pedestals	0.60	CY	$1,650.44	$985.53
6.3.5.1.4.1	Install Temporary Falsework and Embeds	18.58	SF	$18.52	$344.11
6.3.5.1.4.2	Provide and Install Reinforcement	114.83	Pound	$2.10	$241.62
6.3.5.1.4.3	Provide and Place Concrete	0.60	CY	$383.62	$229.07
6.3.5.1.4.4	Strip Forms and Curing	18.58	SF	$9.19	$170.73
6.3.5.2	Provide and Install Fixed Bullrail	60.61	LF	$158.40	$9,600.00
6.3.5.3	Provide and Install Safety Ladders	1.52	EA	$12,542.22	$19,003.39
6.3.5.4	Provide and Install Removable Bullrail	60.61	LF	$282.30	$17,109.39
6.3.5.5	Provide and Install 100t Mooring Bollards	1.21	EA	$8,720.24	$10,569.99
6.3.5.6	Provide and Install 42” Cleats	1.21	EA	$5,970.24	$7,236.66
6.3.6	Provide, Haul and Place Fill (Includes Blasting of Uplands Quarry)	3,000.00	CY	$44.54	$133,610.06
6.3.7	Provide and Install Anodes	11.36	EA	$4,394.02	$49,932.00
6.3.8	Vibracompaction	1.00	LS	$75,261.85	$75,261.85

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
6.3.8.1	Vibracompaction	60.00	EA	$1,254.36	$75,261.85
6.3.8.1.1	Vibracompaction Probing	60.00	EA	$936.58	$56,194.67
6.3.8.1.2	Vibracompaction Fill	341.18	CY	$55.89	$19,067.18
6.4	Fendering	3.00	EA	$213,882.85	$641,648.56
6.4.1	Provide and Install Fender Unit	3.00	EA	$162,917.65	$488,752.96
6.4.2	Provide Fender Pin Piles 30x0.75”	660.00	LF	$231.66	$152,895.60
6.5	Utilities	1.00	LS	$457,598.76	$457,598.76
6.5.1	Electrical and Lighting	1.00	LS	$457,598.76	$457,598.76
6.5.1.1	Provide and Install New High Mast Lights	1.00	EA	$245,217.16	$245,217.16
6.5.1.1.1	Provide and Install High Mast Lights	1.00	EA	$208,864.83	$208,864.13
6.5.1.1.2	Install New Foundation	1.00	EA	$36,352.33	$36,352.33
6.5.1.1.2.1	Provide Pile and Plate	1.00	EA	$22,800.00	$22,800.00
6.5.1.1.2.2	Install Pile and Plate	1.00	EA	$13,552.33	$13,552.33
6.5.1.2	General Site Electrical	1.00	LS	$137,500.00	$137,500.00
6.5.1.3	Electrical Vaults	1.00	LS	$74,881.60	$74,881.60
6.5.1.3.1	Provide Vaults	2.00	EA	$22,000.00	$44,000.00
6.5.1.3.2	Install Vaults	2.00	EA	$15,440.80	$30,881.60
6.6	ARRC Railroad Tracks	1,440.00	LF	$250.00	$360,000.00
6.7	Contractor Indirect Costs	1.00	LS	$234,000.00	$234,000.00
6.7.1	Marine Mammal Monitoring	30.00	Day	$2,800.00	$84,000.00
6.7.2	Lodging and Per Diem	30.00	Day	$3,000.00	$150,000.00
6.8	Engineering, Permitting, Construction Support	1.00	LS	$506,950.00	$506,950.00
6.8.1	Design Engineering	1.00	LS	$170,000.00	$170,000.00
6.8.2	Permitting (Assumes IHA Req’d)	1.00	LS	$100,000.00	$100,000.00
6.8.3	Construction Phase Support	1.00	LS	$236,950.00	$236,950.00
6.8.3.1	Contract Administration	80.00	Day	$1,440.00	$115,200.00
6.8.3.2	Construction Inspection	50.00	Day	$2,003.00	$100,150.00
6.8.3.3	Engineering Support	1.00	LS	$21,600.00	$21,600.00
6.9	Contingency (Assumes 20%)	1.00	LS	$900,000.00	$900,00.00
					$5,779,785.39

Phase 3

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
7	**Container Dock – Phase 3**	1.00	Each	$55,620,614.25	$55,620,614.25
7.1	Mobilization/Demobilization	1.00	LS	$3,376,526.67	$3,376,526.67
7.1.1	Mobilization	1.00	LS	$2,486,671.72	$2,486,671.72
7.1.1.1	Yard Mobilization	1.00	LS	$568,396.87	$568,396.87
7.1.1.2	Mobilization to Site	1.00	LS	$1,868,487.63	$1,868,487.63
7.1.1.3	Assemble Crane On-Site	2.00	EA	$23,393.61	$46,787.23
7.1.2	Demobilization	1.00	LS	$892,854.95	$892,854.95
7.1.2.1	Site Demobilization	1.00	LS	$218,300.31	$218,300.31
7.1.2.2	Demobilization from Site	1.00	LS	$580,980.18	$580,980.18
7.1.2.3	Disassemble/ Remove Crane from Site	2.00	Each	$46,787.23	$93,574.45
7.2	Demolition of Existing Structures	1.00	LS	$384,558.19	$384,558.19
7.2.1	Misc Demo	1.00	LS	$384,558.19	$384,558.19
7.3	OCSP Bulkhead	1.00	LS	$20,000,033.58	$20,000,033.58
7.3.1	Provide Sheet Pile	3,719.31	Ton	$1,781.96	$6,627,654.40
7.3.2	Set Template and Temporary Supports (Per Cell)	32.00	EA	$11,906.97	$381,023.16
7.3.3	Stab and Drive Sheet Piles	2,368.48	EA	$940.54	$2,227,649.24
7.3.4	Cut Off Sheet Pile and Weld Interlocks	242.42	EA	$288.31	$69,893.13
7.3.5	Dock Face Beam and Appurtenances	1.00	LS	$2,106,874.69	$2,106,874.69
7.3.5.1	Face Beam	960.00	LF	$1,670.63	$1,603,801.03
7.3.5.1.1	Provide and Install Steel Face Beam and Plate	960.00	LF	$1,062.35	$1,019,853.65
7.3.5.1.2	Provide and Place SC Concrete	128.4	CY	$535.90	$68,813.53
7.3.5.1.3	Install Concrete Beam and Slab	343.95	CY	$1,461.03	$502,519.05
7.3.5.1.3.1	Install Temporary Falsework and Embeds	1,711.96	SF	$18.52	$31,710.57
7.3.5.1.3.2	Provide and Install Reinforcement	84,041.85	Pound	$2.10	$176,829.48
7.3.5.1.3.3	Provide and Place Concrete	343.95	CY	$383.62	$131,944.66
7.3.5.1.3.4	Strip Forms and Curing	7,781.65	SF	$9.19	$71,516.40
7.3.5.1.3.5	Face Beam Studs	3,439.49	EA	$10.42	$35,827.42
7.3.5.1.3.6	Position V Steel Form Plate	79.37	LF	$689.03	$54,690.51
7.3.5.1.4	Concrete Mooring Pedestals	7.64	CY	$1,650.44	$12,614.80
7.3.5.1.4.1	Install Temporary Falsework and Embeds	237.79	SF	$18.52	$4,404.60
7.3.5.1.4.2	Provide and Install Reinforcement	1,469.87	Pound	$2.10	$3,092.70
7.3.5.1.4.3	Provide and Place Concrete	7.64	CY	$383.62	$2,932.10
7.3.5.1.4.4	Strip Forms and Curing	237.79	SF	$9.19	$2,185.40
7.3.5.2	Provide and Install Fixed Bullrail	480.00	LF	$158.40	$76,032.00
7.3.5.3	Provide and Install Safety Ladders	12.00	EA	$12,542.22	$150,506.66
7.3.5.4	Provide and Install Removable Bullrail	480.00	LF	$282.30	$135,506.31
7.3.5.5	Provide and Install 100t Mooring Bollards	9.60	EA	$8,720.24	$83,714.35
7.3.5.6	Provide and Install 42” Cleats	9.60	EA	$5,970.24	$57,314.35
7.3.6	Provide, Haul and Place Fill (Includes Blasting of Uplands Quarry)	138,600.00	CY	$44.54	$6,172,784.59

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
7.3.7	Provide and Install Anodes	121.21	EA	$4,394.02	$532,607.99
7.3.8	Vibracompaction	1.00	LS	$1,881,546.37	$1,881,546.37
7.3.8.1	Vibracompaction	1,500.00	EA	$1,254.36	$1,881,546.37
7.3.8.1.1	Vibracompaction Probing	1,500.00	EA	$936.58	$1,404,866.80
7.3.8.1.2	Vibracompaction Fill	8,529.41	CY	$55.89	$476,679.57
7.4	Uplands Drainage	1.00	LS	$665,692.79	$665,692.79
7.4.1	Provide and Install Oil Water Separator Stormceptor	3.00	EA	$41,205.60	$123,616.81
7.4.2	Provide and Install Tideflex	3.00	EA	$6,000.00	$18,000.00
7.4.3	Provide and Install Trench Drain	1.00	LS	$524,075.98	$524,075.98
7.4.3.1	Provide and Install Trench Drain	1,000.00	LF	$524.08	$524,075.98
7.4.3.1.1	Trench Drain	1,000.00	LF	$150.00	$150,000.00
7.4.3.1.2	Trench Drain Catchbasins	4.00	EA	$13,840.70	$55,362.80
7.4.3.1.3	Install Concrete Encasement	212.50	CY	$1,499.83	$318,713.18
7.4.3.1.3.1	Install Temporary Falsework and Embeds	5,000.00	SF	$18.52	$92,614.62
7.4.3.1.3.2	Provide and Install Reinforcement	46,875.00	Pound	$2.10	$98,628.03
7.4.3.1.3.3	Provide and Place Concrete	212.50	CY	$383.62	$81,518.59
7.4.3.1.3.4	Strip Forms and Curing	5,000.00	SF	$9.19	$45,951.94
7.5	Fendering	13.00	EA	$213,882.85	$2,780,477.10
7.5.1	Provide and Install Fender Unit	13.00	EA	$162,917.65	$2,117,929.50
7.5.2	Provide Fender Pin Piles 30x0.75”	2,860.00	LF	$231.66	$662,547.60
7.6	Utilities	1.00	LS	$1,384,733.33	$1,384,733.33
7.6.1	Water	2.00	LS	$85,004.70	$170,009.39
7.6.1.1	Provide and Install Water Vault	2.00	EA	$25,102.80	$50,205.60
7.6.1.2	Water Service Line	1,200.00	LF	$99.84	$119,803.79
7.6.2	Electrical and Lighting	1.00	LS	$1,214,723.94	$1,214,723.94
7.6.2.1	Provide and Install New High Mast Lights	2.00	EA	$245,217.16	$490,434.32
7.6.2.1.1	Provide and Install High Mast Lights	2.00	EA	$208,864.83	$417,729.66
7.6.2.1.2	Install New Foundation	2.00	EA	$36,352.33	$72,704.66
7.6.2.1.2.1	Provide Pile and Plate	2.00	EA	$22,800.00	$45,600.00
7.6.2.1.2.2	Install Pile and Plate	2.00	EA	$13,552.33	$27,104.66
7.6.2.2	General Site Electrical	2.00	LS	$137,500.00	$275,000.00
7.6.2.3	Electrical Vaults	2.00	LS	$224,644.81	$449,289.63
7.6.2.3.1	Provide Vaults	12.00	EA	$22,000.00	$264,000.00
7.6.2.3.2	Install Vaults	12.00	EA	$15,440.80	$185,289.63
7.7	Container Crane Foundation	1,033.00	LF	$7,845.24	$8,104,130.30
7.7.1	Crane Rail Piles	1,033.00	LF	$2,270.42	$2,345,341.09
7.7.1.1	Provide 24” x 0.75 Pile	155.70	EA	$11,675.26	$1,817,821.55
7.7.1.2	Install 24” x 0.75 Pile	155.70	EA	$3,388.08	$527,519.53
7.7.2	Concrete Crane Rail Beams	1,033.00	LF	$2,528.05	$2,611,475.47
7.7.2.1	Install Concrete Cap and Tie Beams	1,809.39	CY	$1,443.29	$2,611,475.47
7.7.2.1.1	Install Temporary Falsework and Embeds	42,767.52	SF	$18.52	$792,179.49
7.7.2.1.2	Provide and Install Reinforcement	347,960.56	Pound	$2.10	$732,131.50

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
7.7.2.1.3	Provide and Place Concrete	1,809.39	CY	$383.62	$694,114.44
7.7.2.1.3	Strip Forms and Curing	42,767.52	SF	$9.19	$393,050.04
7.7.3	Crane Rail	1,033.00	LF	$550.38	$568,538.39
7.7.3.1	Provide and Install Rail (171lb/yd)	1,033.00	LF	$361.20	$373,118.10
7.7.3.2	Grout Crane Rail	2,467.36	LF	$79.20	$195,420.29
7.7.4	Crane Tie Downs	5.00	EA	$515,755.07	$2,578,775.36
7.7.4.1	Provide and Install Pile	40.00	EA	$12,068.28	$482,731.18
7.7.4.2	Rock Anchors	40.00	EA	$35,000.00	$1,400,000.00
7.7.4.3	Crane Tie Downs and Stops	20.00	EA	$34,802.21	$696,044.18
7.8	Crane Power Infrastructure	1.00	LS	$1,029,562.30	$1,029,562.30
7.8.1	Anchor Pits	1.00	EA	$102,780.41	$102,780.41
7.8.1.1	Provide Anchor Pit	1.00	EA	$40,000.00	$40,000.00
7.8.1.2	Install Anchor Pits	1.00	EA	$62,780.41	$62,780.41
7.8.2	Provide and Install Crane Power Cable Trough	1,033.00	LF	$338.65	$349,827.46
7.8.3	Cable Trough Concrete Beam	200.00	CY	$2,884.77	$576,954.43
7.8.3.1	Install Temporary Falsework and Embeds	4,727.27	SF	$79.51	$375,860.02
7.8.3.2	Provide and Install Reinforcement	38,461.54	Pound	$2.10	$80,925.56
7.8.3.3	Provide and Place Concrete	200.00	CY	$383.62	$76,723.38
7.8.3.4	Strip Forms and Curing	4,727.27	SF	$9.19	$43,445.47
7.8.4	Offsite Electrical Generator and Flywheel?	1.00	LS	$0.00	$0.00
7.8.5	Diesel Storage?	1.00	LS	$0.00	$0.00
7.9	ARRC Railroad Tracks	7,974.00	LF	$250.00	$4,608,500.00
7.10	Dredging	3,000.00	CY	$25.00	$75,000.00
7.11	Contractor Indirect Costs	1.00	LS	$1,390,000.00	$1,390,000.00
7.11.1	Marine Mammal Monitoring	175.00	Day	$2,800.00	$490,000.00
7.11.2	Lodging and Per Diem	300.00	Day	$3,000.00	$900,000.00
7.12	Engineering, Permitting, Construction Support	1.00	LS	$3,321,400.00	$3,321,400.00
7.12.1	Geotech, Dredge Sampling, Survey and Site Studies	1.00	LS	$162,500.00	$162,500.00
7.12.2	Design Engineering	1.00	LS	$1,800,000.00	$1,800,000.00
7.12.3	Permitting (Assumes IHA Req'd)	1.00	LS	$200,000.00	$200,000.00
7.12.4	Construction Phase Support	1.00	LS	$1,158,900.00	$1,158,900.00
7.12.4.1	Contract Administration	350.00	Day	$1,440.00	$504,000.00
7.12.4.2	Construction Inspection	350.00	Day	$2,003.00	$600,900.00
7.12.4.3	Engineering Support	1.00	LS	$54,000.00	$54,000.00
7.13	Contingency (Assumes 20%)	1.00	LS	$8,500,000.00	$8,500,000.00
					$55,620,614.25

Single Phase Marginal Wharf Redevelopment Cost Estimate

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
	JOB	1.00	LS	$197,084,102.69	$197,084,102.69
1	**Container Dock**	1.00	LS	$102,084,102.69	$102,084,102.69
1.1	Mobilization/Demobilization	1.00	LS	$3,092,328.23	$6,184,656.46
1.1.1	Mobilization	2.00	LS	$2,199,473.29	$4,398,946.57
1.1.1.1	Yard Mobilization	2.00	LS	$284,198.43	$568,396.87
1.1.1.2	Mobilization to Site	2.00	LS	$1,868,487.63	$3,736,975.25
1.1.1.3	Assemble Crane On-Site	4.00	Each	$23,393.61	$93,574.45
1.1.2	Demobilization	2.00	LS	$892,854.95	$1,785,709.89
1.1.2.1	Site Demobilization	2.00	LS	$218,300.31	$436,600.61
1.1.2.2	Demobilization from Site	2.00	LS	$580,980.18	$1,161,960.37
1.1.2.3	Disassemble/ Remove Crane from Site	4.00	Each	$46,787.23	$187,148.91
1.2	Demolition of Existing Structures	1.00	LS	$3,854,351.85	3,854,351.85
1.2.1	Unclassified Excavation	44,500.00	CY	$12.13	$539,982.52
1.2.2	Remove Sheet Pile	750.00	EA	$721.61	$541,206.94
1.2.3	Remove Concrete Cap	1,200.00	LF	$139.55	$167,464.82
1.2.4	Remove Anchor	1,200.00	LF	$139.55	$167,464.82
1.2.5	Load and Transport (Barge) Material	2.00	EA	$450,000.00	$900,000.00
1.2.6	Misc Demo	1.00	LS	$1,538,232.74	$1,538,232.74
1.3	OCSP Bulkhead	1.00	LS	$36,543,337.28	$36,543,337.28
1.3.1	Provide Sheet Pile	7,671.07	Ton	$1,781.96	$13,669,537.20
1.3.2	Set Template and Temporary Supports (Per Cell)	66.00	EA	$11,906.97	$785,860.27
1.3.3	Stab and Drive Sheet Pies	4,885.00	EA	$940.54	$4,594,526.55
1.3.4	Cut Off Sheet Pile and Weld Interlocks	500.00	EA	$288.31	$144,154.59
1.3.5	Dock Face Beam and Appurtenances	1.00	LS	$4,389,322.28	$4,389,322.28
1.3.5.1	Face Beam	2,000.00	LF	$1,670.63	$3,341,252.16
1.3.5.1.1	Provide and Install Steel Face Beam and Plate	2,000.00	LF	$1,062.35	$2,124,695.11
1.3.5.1.2	Provide and Place SC Concrete	267.52	CY	$535.90	$143,361.53
1.3.5.1.3	Install Concrete Beam and Slab	716.56	CY	$1,461.03	$1,046,914.68
1.3.5.1.4	Concrete Mooring Pedestals	15.92	CY	$1,650.44	$26,280.84
1.3.5.2	Provide and Install Fixed Bullrail	1,000.00	LF	$158.40	$158,400.00
1.3.5.3	Provide and Install Safety Ladders	25.00	EA	$12,542.22	$313,555.54
1.3.5.4	Provide and Install Removable Bullrail	1,000.00	LF	$282.30	$282,304.81
1.3.5.5	Provide and Install 100t Mooring Bollards	20.00	EA	$8,720.24	$174,404.89
1.3.5.6	Provide and Install 42” Cleats	20.00	EA	$5,970.24	$119,404.89
1.3.6	Provide, Haul and Place Fill (Includes Blasting of Uplands Quarry)	210,000.00	CY	$44.54	$9,352,703.93
1.3.7	Provide and Install Anodes	250.00	EA	$4,394.02	$1,098,503.97
1.3.8	Vibracompaction	1.00	LS	$2,508,728.50	$2,508,728.50
1.3.8.1	Vibracompaction	2,000.00	EA	$1,254.36	$2,508,728.50
1.3.8.1.1	Vibracompaction Probing	2,000.00	EA	$936.58	$1,873,155.73

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
1.3.8.1.2	Vibracompaction Fill	11,372.55	CY	$55.89	$635,572.76
1.4	Uplands Drainage	1.00	LS	$1,331,385.58	$1,331,385.58
1.4.1	Provide and Install Oil Water Separator Stormceptor	6.00	EA	$41,205.60	$247,233.61
1.4.2	Provide and Install Tideflex	6.00	EA	$6,000.00	$36,000.00
1.4.3	Provide and Install Trench Drain	1.00	LS	$1,048,151.97	$1,048,151.97
1.4.3.1	Provide and Install Trench Drain	2,000.00	LF	$524.08	$1,048,151.97
1.4.3.1.1	Trench Drain	2,000.00	LF	$150.00	$300,000.00
1.4.3.1.2	Trench Drain Catchbasins	8.00	EA	$13,840.70	$110,725.61
1.4.3.1.3	Install Concrete Encasement	425.00	CY	$1,499.83	$637,426.36
1.5	Salvaged Barge Ramp	1.00	LS	$593,358.16	$593,358.16
1.5.1	Relocate and Install Ramp	1.00	LS	$42,324.20	$42,324.20
1.5.2	Abutment Piles	1.00	LS	$60,253.38	$60,253.38
1.5.2.1	Provide 24” x 0.75 Pile	4.00	EA	$11,675.26	$46,701.05
1.5.2.2	Install 24” x 0.75 Pile	4.00	EA	$3,388.08	$13,552.33
1.5.3	Concrete Abutment	30.00	CY	$1,443.29	$43,298.60
1.5.3.1	Install Temporary Falsework and Embeds	709.09	SF	$18.52	$13,134.44
1.5.3.2	Provide and Install Reinforcement	5,769.23	Pound	$2.10	$12,138.83
1.5.3.3	Provide and Place Concrete	30.00	CY	$383.62	$11,508.51
1.5.3.4	Strip Forms and Curing	709.09	SF	$9.19	$6,516.82
1.5.4	Lifting Foundation	1.00	LS	$64,764.83	$64,764.83
1.5.4.1	Foundation Piles	1.00	LS	$64,764.83	$64,764.83
1.5.4.1.1	Provide 36” x 0.75 Pile	2.00	EA	$25,606.25	$51,212.50
1.5.4.1.2	Install 36” x 0.75 Pile	2.00	EA	$6,776.17	$13,552.33
1.5.5	Provide and Install New High Mast Lights	1.00	EA	$245,217.16	$245,217.16
1.5.5.1	Provide and Install New High Mast Lights	1.00	EA	$208,864.83	$208,864.83
1.5.5.2	Install New Foundation	1.00	EA	$36,352.33	$36,352.33
1.5.5.2.1	Provide Pile and Plate	1.00	EA	$22,800.00	$22,800.00
1.5.5.2.2	Install Pile and Plate	1.00	EA	$13,552.33	$13,552.33
1.5.6	General Electrical and Mechanical	1.00	LS	$137,500.00	$137,500.00
1.5.7	ARRC Railroad Tracks?	2,400.00	LF	$0.00	$0.00
1.6	Fendering	25.00	EA	$213,882.85	$5,347,071.35
1.6.1	Provide and Install Fender Unit	25.00	EA	$162,917.65	$4,072,941.35
1.6.2	Provide Fender Pin Piles 30x0.75”	5,500.00	LF	$231.66	$1,274,130.00
1.7	Utilities	1.00	LS	$2,599,457.28	$2,599,457.28
1.7.1	Water	2.00	LS	$85,004.70	$170,009.39
1.7.1.1	Provide and Install Water Vault	2.00	EA	$25,102.80	$50,205.60
1.7.1.2	Water Service Line	1,200.00	LF	$99.84	$119,803.79
1.7.2	Electrical and Lighting	1.00	LS	$2,429,447.89	$2,429,447.89
1.7.2.1	Provide and Install New High Mast Lights	4.00	EA	$245,217.16	$980,868.63
1.7.2.1.1	Provide and Install High Mast Lights	4.00	EA	$208,864.83	$835,459.31
1.7.2.1.2	Install New Foundation	4.00	EA	$36,352.33	$145,409.32
1.7.2.2	General Site Electrical	4.00	LS	$137,500.00	$550,000.00

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
1.7.2.3	Electrical Vaults	4.00	LS	$224,644.81	$898,579.25
1.7.2.3.1	Provide Vaults	24.00	EA	$22,000.00	$528,000.00
1.7.2.3.2	Install Vaults	24.00	EA	$15,440.80	$370,579.25
1.8	Container Crane Foundation	1,380.00	LF	$7,591.26	$10,475,933.94
1.8.1	Crane Rail Piles	1,380.00	LF	$2,270.42	$3,133,175.90
1.8.1.1	Provide 24" x 0.75 Pile	208.00	EA	$11,675.26	$2,428,454.74
1.8.1.2	Install 24" x 0.75 Pile	208.00	EA	$3,388.08	$704,721.16
1.8.2	Concrete Crane Rail Beams	1,380.00	LF	$2,528.05	$3,488,708.75
1.8.2.1	Install Concrete Cap and Tie Beams	2,417.20	CY	$1,443.29	$3,488,708.75
1.8.2.1.1	Install Temporary Falsework and Embeds	57,133.76	SF	$18.52	$1,058,284.31
1.8.2.1.2	Provide and Install Reinforcement	464,845.66	Pound	$2.10	$978,065.31
1.8.2.1.3	Provide and Place Concrete	2,417.20	CY	$383.62	$927,277.77
1.8.2.1.3	Strip Forms and Curing	57,133.76	SF	$9.19	$525,081.37
1.8.3	Crane Rail	1,380.00	LF	$550.38	$759,518.85
1.8.3.1	Provide and Install Rail (171lb/yd)	1,380.00	LF	$361.20	$498,453.99
1.8.3.2	Grout Crane Rail	3,296.18	LF	$79.20	$261,064.86
1.8.4	Crane Tie Downs	6.00	EA	$515,755.07	$3,094,530.43
1.8.4.1	Provide and Install Pile	48.00	EA	$12,068.28	$579,277.42
1.8.4.2	Rock Anchors	48.00	EA	$35,000.00	$1,680,000.00
1.8.4.3	Crane Tie Downs and Stops	24.00	EA	$34,802.21	$835,253.01
1.9	Crane Power Infrastructure	1.00	LS	$1,528,250.79	$1,528,250.79
1.9.1	Anchor Pits	3.00	EA	$102,780.41	$308,341.23
1.9.1.1	Provide Anchor Pit	3.00	EA	$40,000.00	$120,000.00
1.9.1.2	Install Anchor Pits	3.00	EA	$62,780.41	$188,341.23
1.9.2	Provide and Install Crane Power Cable Trough	1,380.00	LF	$338.65	$467,339.69
1.9.3	Cable Trough Concrete Beam	260.88	CY	$2,884.77	$752,569.87
1.9.3.1	Install Temporary Falsework and Embeds	6,166.18	SF	$79.51	$490,265.63
1.9.3.2	Provide and Install Reinforcement	50,168.60	Pound	$2.10	$105,557.97
1.9.3.3	Provide and Place Concrete	260.88	CY	$383.62	$100,076.71
1.9.3.4	Strip Forms and Curing	6,166.18	SF	$9.19	$56,669.55
1.9.4	Offsite Electrical Generator and Flywheel?	1.00	LS	$0.00	$0.00
1.9.5	Diesel Storage?	1.00	LS	$0.00	$0.00
1.10	ARRC Railroad Tracks	18,434.00	LF	$250.00	$4,608,500.00
1.11	Dredging	6,000.00	CY	$25.00	$150,000.00
1.12	Contractor Indirect Costs	1.00	LS	$2,500,000.00	$2,500,000.00
1.12.1	Marine Mammal Monitoring	250.00	Day	$2,800.00	$700,000.00
1.12.2	Lodging and Per Diem	600.00	Day	$3,000.00	$1,800,000.00
1.13	Engineering, Permitting, Construction Support	1.00	LS	$6,767,800.00	$6,767,800.00
1.13.1	Geotech, Dredge Sampling, Survey and Site Studies	1.00	LS	$650,000.00	$650,000.00
1.13.2	Design Engineering	1.00	LS	$3,600,000.00	$3,600,000.00

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
1.13.3	Permitting (Assumes IHA Req'd)	1.00	LS	$200,000.00	$200,000.00
1.13.4	Construction Phase Support	1.00	LS	$2,317,800.00	$2,317,800.00
1.13.4.1	Contract Administration	700.00	Day	$1,440.00	$1,008,000.00
1.13.4.2	Construction Inspection	600.00	Day	$2,003.00	$1,201,800.00
1.13.4.3	Engineering Support	1.00	LS	$108,000.00	$108,000.00
1.14	Contingency (Assumes 20%)	1.00	LS	$15,600,000.00	$15,600,000.00
2	Container Crane	3.00	Each	$25,000,000.00	$75,000,000.00
3	Tunnel Renovations	1.00	LS	$4,000,000.00	$4,000,000.00
4	Intersection Upgrade	1.00	LS	$20,000,000.00	$20,000,000.00
					$197,084,102.69

Marginal Wharf Redevelopment – Combined Break Bulk Freight Dock and Cruise Ship Terminal

Phase 1

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
3	**Container Dock – Phase 1**	1.00	LS	$14,452,526.62	$14,452,526.62
3.1	Mobilization/Demobilization	1.00	LS	$1,776,123.40	$1,776,123.40
3.1.1	Mobilization	1.00	LS	$1,109,079.34	$1,109,079.34
3.1.1.1	Yard Mobilization	1.00	LS	$141,094.22	$141,094.22
3.1.1.2	Mobilization to Site	1.00	LS	$967,985.13	$967,985.13
3.1.2	Demobilization	1.00	LS	$667,044.06	$667,044.06
3.1.2.1	Site Demobilization	1.00	LS	$86,817.62	$86,817.62
3.1.2.2	Demobilization from Site	1.00	LS	$580,226.43	$580,226.43
3.2	Demolition of Existing Structures	0.33	LS	$1,537,058.86	$507,229.42
3.2.1	Excavate and Replace Material Behind Existing Wall	20,790.00	CY	$15.18	$315,657.22
3.2.2	Remove Sheet Pile	198.00	EA	$714.48	$141,467.88
3.2.3	Misc Demo	0.33	LS	$151,831.27	$50,104.32
3.3	OCSP Bulkhead	1.00	LS	$5,483,160.75	$5,483,160.75
3.3.1	Owner Provided Galv. Sheet Piles (Assume Face Sheets – PS31)	414.00	Ton	$1,178.00	$487,692.00
3.3.2	Provide Sheet Pile	897.00	Ton	$1,650.00	$1,480,050.00
3.3.3	Set Template and Temporary Supports (Per Cell)	10.00	EA	$11,828.22	$118,282.24
3.3.4	Stab and Drive Sheet Piles	824.00	EA	$930.04	$766,351.05
3.3.5	Cut Off Sheet Pile and Weld Interlocks	199.00	EA	$286.21	$56,955.63
3.3.6	Dock Face Beam and Appurtenances	1.00	LS	$509,192.17	$509,192.17
3.3.6.1	Face Beam	320.00	LF	$1,077.30	$344,734.45
3.3.6.1.1	Provide Face Beam and Materials	42.07	Ton	$5,280.00	$222,107.04
3.3.6.1.2	Install Face Beam	320.00	LF	$280.12	$89,638.76
3.3.6.1.3	Concrete Infill	48.08	CY	$686.19	$32,988.65
3.3.6.2	Provide and Install Fixed Bullrail	160.00	LF	$158.40	$25,344.00
3.3.6.3	Provide and Install Safety Ladders	4.00	EA	$12,483.72	$49,937.89
3.3.6.4	Provide and Install Removable Bullrail	160.00	LF	$282.09	$45,134.37
3.3.6.5	Provide and Install 100t Mooring Bollards	3.00	EA	$8,715.74	$26,147.23
3.3.6.6	Provide and Install 42” Cleats	3.00	EA	$5,965.74	$17,897.23
3.3.7	Provide, Haul and Place Fill (Includes Blasting of Uplands Quarry)	38,000.00	CY	$44.48	$1,690,410.44
3.3.8	Vibracompaction	1.00	LS	$374,227.22	$374,227.22
3.3.8.1	Vibracompaction	320.00	EA	$1,169.46	$374,227.22
3.3.8.1.1	Vibracompaction Probing	320.00	EA	$860.66	$275,411.46
3.3.8.1.2	Vibracompaction Fill	1,819.61	CY	$54.31	$98,815.76
3.4	Uplands Drainage	1.00	LS	$93,239.36	$93,239.36

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
3.4.1	Provide and Install Storm Drain System	300.00	LF	$310.80	$93,239.36
3.4.1.1	Provide and Install Drainage Pipe	300.00	LF	$105.82	$31,747.04
3.4.1.2	Provide and Install Oil Water Separator Stormceptor	0.85	EA	$40,326.86	$34,079.04
3.4.1.3	Provide and Maintain Manholes	1.41	EA	$14,663.43	$20,652.72
3.4.1.4	Provide and Install TideFlex	1.13	EA	$6,000.00	$6,760.56
3.5	Fendering	4.00	EA	$213,823.68	$855,294.72
3.5.1	Provide and Install Fender Unit	4.00	EA	$162,858.48	$650,433.92
3.5.2	Provide Fender Pin Piles 30x0.75"	880.00	LF	$231.66	$203,860.80
3.6	Utilities	0.33	LS	$696,955.45	$229,995.30
3.6.1	Water	0.33	EA	$84,461.59	$27,872.33
3.6.1.1	Provide and Install Water Vault	0.33	EA	$25,066.88	$8,272.07
3.6.1.2	Water Service Line	198.00	EA	$98.99	$19,600.26
3.6.2	Electrical and Lighting	0.33	LS	$606,429.56	$202,122.97
3.6.2.1	Provide and Install New High Mast Lights	0.33	EA	$244,983.31	$81,652.94
3.6.2.1.1	Provide and Install High Mast Lights	0.33	EA	$208,761.48	$69,580.20
3.6.2.1.2	Install New Foundation	0.33	EA	$36,221.83	$12,072.74
3.6.2.1.2.1	Provide Pile and Plate	0.33	EA	$22,800.00	$7,599.24
3.6.2.1.2.2	Install Pile and Plate	0.33	EA	$13,421.83	$4,473.50
3.6.2.2	General Site Electrical	0.33	LS	$137,500.00	$45,787.50
3.6.2.3	Electrical Vaults	0.33	LS	$224,070.01	$74,682.54
3.6.2.3.1	Provide Vaults	2.00	EA	$22,000.00	$43,995.60
3.6.2.3.2	Install Vaults	2.00	EA	$15,345.00	$30,686.94
3.7	Dock Surfacing	2,200.00	SY	$485.67	$1,068,483.68
3.7.1	1"t Bedding Sand	6.60	CY	$77.00	$508.20
3.7.2	2" Aggregate Base Course C-1	59.40	CY	$70.71	$4,200.32
3.7.3	4" Aggregate Base Course B-1	121.00	CY	$74.95	$9,069.54
3.7.4	24"t Subbase, Grading A	1,467.40	CY	$65.41	$95,981.64
3.7.5	Interlocking Concrete Block Pavers	2,200.00	SY	$435.78	$958,723.98
3.7.5.1	Mob/Demob Crew and Equipment	1.00	LS	$700,000.00	$700,000.00
3.7.5.1	Provide and Install Pavers	2,200.00	SY	$117.60	$258,723.98
3.8	Contractor Indirect Costs	1.00	LS	$452,000.00	$452,000.00
3.8.1	Marine Mammal Monitoring	90.00	Day	$2,800.00	$252,000.00
3.8.2	Lodging and Per Diem	200.00	Day	$1,000.00	$200,000.00
3.9	Engineering, Permitting, Construction Support	1.00	LS	$1,587,000.00	$1,587,000.00
3.9.1	Geotech, Dredge Sampling, Survey and Site Studies	1.00	LS	$450,000.00	$450,000.00
3.9.2	Design Engineering	1.00	LS	$350,000.00	$350,000.00
3.9.3	Permitting (Assumes IHA Req'd)	1.00	LS	$120,000.00	$120,000.00
3.9.4	Construction Phase Support	1.00	LS	$667,000.00	$667,000.00
3.9.4.1	Contract Administration	200.00	Day	$1,080.00	$216,000.00
3.9.4.2	Construction Inspection	200.00	Day	$1,715.00	$343,000.00
3.9.4.3	Engineering Support	1.00	LS	$108,000.00	$108,000.00

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
3.10	Contingency (Assumes 20%)	1.00	LS	$2,400,000.00	$2,400,000.00
					$14,452,526.62

Phase 2

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
4	**Container Dock – Phase 2**	1.00	LS	$12,900,333.89	$12,900,333.89
4.1	Mobilization/Demobilization	1.00	LS	$1,776,123.40	$1,776,123.40
4.1.1	Mobilization	1.00	LS	$1,109,079.34	$1,109,079.34
4.1.1.1	Yard Mobilization	1.00	LS	$141,094.22	$141,094.22
4.1.1.2	Mobilization to Site	1.00	LS	$967,985.13	$967,985.13
4.1.2	Demobilization	1.00	LS	$667,044.06	$667,044.06
4.1.2.1	Site Demobilization	1.00	LS	$86,817.62	$86,817.62
4.1.2.2	Demobilization from Site	1.00	LS	$580,226.43	$580,226.43
4.2	Demolition of Existing Structures	0.33	LS	$1,537,058.86	$507,229.42
4.2.1	Excavate and Replace Material Behind Existing Wall	20,790.00	CY	$15.18	$315,657.22
4.2.2	Remove Sheet Pile	198.00	EA	$714.48	$141,467.88
4.2.3	Misc Demo	0.33	LS	$151,831.27	$50,104.32
4.3	OCSP Bulkhead	1.00	LS	$6,247,474.50	$6,247,474.50
4.3.1	Owner Provided Galv. Sheet Piles (Assume Face Sheets – PS31)	492.00	Ton	$1,178.00	$579,976.00
4.3.2	Provide Sheet Pile	969.00	Ton	$1,650.00	$1,598,850.00
4.3.3	Set Template and Temporary Supports (Per Cell)	12.00	EA	$11,828.22	$141,938.68
4.3.4	Stab and Drive Sheet Piles	915.00	EA	$930.04	$850,984.47
4.3.5	Cut Off Sheet Pile and Weld Interlocks	237.00	EA	$286.21	$67,831.57
4.3.6	Dock Face Beam and Appurtenances	1.00	LS	$627,676.87	$627,676.87
4.3.6.1	Face Beam	400.00	LF	$1,077.30	$430,918.07
4.3.6.1.1	Provide Face Beam Materials	52.58	Ton	$5,280.00	$277,633.80
4.3.6.1.2	Install Face Beam	400.00	LF	$280.12	$112,048.45
4.3.6.1.3	Concrete Infill	60.09	CY	$686.19	$41,235.81
4.3.6.2	Provide and Install Fixed Bullrail	200.00	LF	$158.40	$31,680.00
4.3.6.3	Provide and Install Safety Ladders	4.00	EA	$12,483.72	$49,934.89
4.3.6.4	Provide and Install Removable Bullrail	200.00	LF	$282.09	$56,417.96
4.3.6.5	Provide and Install 100t Mooring Bollards	4.00	EA	$8,715.74	$34,862.98
4.3.6.6	Provide and Install 42" Cleats	4.00	EA	$5,965.74	$23,862.98
4.3.7	Provide, Haul and Place Fill (Includes Blasting of Uplands Quarry)	43,000.00	CY	$44.48	$1,912,832.87
4.3.8	Vibracompaction	1.00	LS	$467,784.02	$467,784.02
4.3.8.1	Vibracompaction	400.00	EA	$1,169.46	$467,784.02
4.3.8.1.1	Vibracompaction Probing	400.00	EA	$860.66	$344,264.32
4.3.8.1.2	Vibracompaction Fill	2,274.51	CY	$54.31	$123,519.70
4.4	Uplands Drainage	1.00	LS	$93,239.36	$93,239.36
4.4.1	Provide and Install Storm Drain System	300.00	LF	$310.80	$93,239.36
4.4.1.1	Provide and Install Drainage Pipe	300.00	LF	$105.82	$31,747.04
4.4.1.2	Provide and Install Oil Water Separator Stormceptor	0.85	EA	$40,326.86	$34,079.04

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
4.4.1.3	Provide and Maintain Manholes	1.41	EA	$14,663.43	$20,652.72
4.4.1.4	Provide and Install TideFlex	1.13	EA	$6,000.00	$6,760.56
4.5	Fendering	4.00	EA	$213,823.68	$855,294.72
4.5.1	Provide and Install Fender Unit	4.00	EA	$162,858.48	$651,433.92
4.5.2	Provide Fender Pin Piles 30x0.75”	880.00	LF	$231.66	$203,860.80
4.6	Utilities	0.33	LS	$696,955.45	$229,995.30
4.6.1	Water	0.33	LS	$84,461.59	$27,872.33
4.6.1.1	Provide and Install Water Vault	0.33	EA	$25,066.88	$8,272.07
4.6.1.2	Water Service Line	198.00	LF	$98.99	$19,600.26
4.6.2	Electrical and Lighting	0.33	LS	$606,429.56	$202,122.97
4.6.2.1	Provide and Install New High Mast Lights	0.33	EA	$244,983.31	$81,652.94
4.6.2.1.1	Provide and Install High Mast Lights	0.33	EA	$208,761.48	$69,580.20
4.6.2.1.2	Install New Foundation	0.33	EA	$36,221.83	$12,072.74
4.6.2.1.2.1	Provide Pile and Plate	0.33	EA	$22,800.00	$7,599.24
4.6.2.1.2.2	Install Pile and Plate	0.33	EA	$13,421.83	$4,473.50
4.6.2.2	General Site Electrical	0.33	LS	$137,500.00	$45,787.50
4.6.2.3	Electrical Vaults	0.33	LS	$224,070.01	$74,682.54
4.6.2.3.1	Provide Vaults	2.00	EA	$22,000.00	$43,995.60
4.6.2.3.2	Install Vaults	2.00	EA	$15,345.00	$30,686.94
4.7	Dock Surfacing (Assumes 100’ Behind Dock Face)	2,400.00	SY	$459.16	$1,101,982.19
4.7.1	1”t Bedding Sand	7.20	CY	$77.00	$554.40
4.7.2	2” Aggregate Base Course C-1	64.80	CY	$70.71	$4,582.17
4.7.3	4” Aggregate Base Course B-1	132.00	CY	$74.95	$9,894.05
4.7.4	24”t Subbase, Grading A	1,600.80	CY	$65.41	$104,707.24
4.7.5	Interlocking Concrete Block Pavers	2,400.00	SY	$409.27	$982,244.34
4.7.5.1	Mob/Demob Crew and Equipment	1.00	LS	$700,000.00	$700,000.00
4.7.5.2	Provide and Install Pavers	2,400.00	SY	$117.60	$282,244.34
4.8	Contractor Indirect Costs	1.00	LS	$452,000.00	$452,000.00
4.8.1	Marine Mammal Monitoring	90.00	Day	$2,800.00	$252,000.00
4.8.2	Lodging and Per Diem	200.00	Day	$1,000.00	$200,000.00
4.9	Engineering, Permitting, Construction Support	1.00	LS	$1,637,000.00	$1,637,000.00
4.9.1	Geotech, Dredge Sampling, Survey and Site Studies	1.00	LS	$450,000.00	$450,000.00
4.9.2	Design Engineering	1.00	LS	$400,000.00	$400,000.00
4.9.3	Permitting (Assumes IHA Req’d)	1.00	LS	$120,000.00	$120,000.00
4.9.4	Construction Phase Support	1.00	LS	$667,000.00	$667,000.00
4.9.4.1	Contract Administration	200.00	Day	$1,080.00	$216,000.00
4.9.4.2	Construction Inspection	200.00	Day	$1,715.00	$343,000.00
4.9.4.3	Engineering Support	1.00	LS	$108,000.00	$108,000.00
4.10	Contingency (Assumes 20%)	1.00	LS	$2,600,000.00	$2,600,000.00
					$12,900,388.89

Phase 3

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
5	**Container Dock – Phase 3**	1.00	LS	$13,119,457.93	$13,119,457.93
5.1	Mobilization/Demobilization	1.00	LS	$1,776,123.40	$1,776,123.40
5.1.1	Mobilization	1.00	LS	$1,109,079.34	$1,109,079.34
5.1.1.1	Yard Mobilization	1.00	LS	$141,094.22	$141,094.22
5.1.1.2	Mobilization to Site	1.00	LS	$967,985.13	$967,985.13
5.1.2	Demobilization	1.00	LS	$667,044.06	$667,044.06
5.1.2.1	Site Demobilization	1.00	LS	$86,817.62	$86,817.62
5.1.2.2	Demobilization from Site	1.00	LS	$580,226.43	$580,226.43
5.2	Demolition of Existing Structures	1.00	LS	$1,537,058.86	$507,229.42
5.2.1	Excavate and Replace Material Behind Existing Wall	20,790.00	CY	$15.18	$315,657.22
5.2.2	Remove Sheet Pile	198.00	EA	$714.48	$141,467.88
5.2.3	Misc Demo	0.33	LS	$151,831.27	$50,104.32
5.3	OCSP Bulkhead	1.00	LS	$4,844,736.44	$4,844,736.44
5.3.1	Owner Provided Galv. Sheet Piles (Assume Face Sheets – PS31)	331.00	Ton	$1,178.00	$389,918.00
5.3.2	Provide Sheet Pile	890.00	Ton	$1,650.00	$1,468,500.00
5.3.3	Set Template and Temporary Supports (Per Cell)	9.00	EA	$11,828.22	$106,454.01
5.3.4	Stab and Drive Sheet Piles	782.00	EA	$930.04	$727,289.46
5.3.5	Cut Off Sheet Pile and Weld Interlocks	159.00	EA	$286.21	$45,507.26
5.3.6	Dock Face Beam and Appurtenances	1.00	LS	$391,199.16	$391,199.16
5.3.6.1	Face Beam	250.00	LF	$1,077.30	$269,323.79
5.3.6.1.1	Provide Face Beam and Materials	32.86	Ton	$5,280.00	$173,521.13
5.3.6.1.2	Install Face Beam	250.00	LF	$280.12	$70,030.28
5.3.6.1.3	Concrete Infill	32.86	CY	$686.19	$25,772.38
5.3.6.2	Provide and Install Fixed Bullrail	125.00	LF	$158.40	$19,800.00
5.3.6.3	Provide and Install Safety Ladders	3.00	EA	$12,483.72	$37,451.16
5.3.6.4	Provide and Install Removable Bullrail	125.00	LF	$282.09	$35,261.23
5.3.6.5	Provide and Install 100t Mooring Bollards	2.00	EA	$8,715.74	$17,431.49
5.3.6.6	Provide and Install 42” Cleats	2.00	EA	$5,965.74	$11,931.49
5.3.7	Provide, Haul and Place Fill (Includes Blasting of Uplands Quarry)	32,000.00	CY	$44.48	$1,423,503.53
5.3.8	Vibracompaction	1.00	LS	$292,365.01	$292,365.01
5.3.8.1	Vibracompaction	250.00	EA	$1,169.46	$292,365.01
5.3.8.1.1	Vibracompaction Probing	250.00	EA	$860.66	$215,165.20
5.3.8.1.2	Vibracompaction Fill	1,421.57	CY	$54.31	$77,119.81
5.4	Uplands Drainage	1.00	LS	$93,239.36	$93,239.36
3.4.1	Provide and Install Storm Drain System	300.00	LF	$310.80	$93,239.36
5.4.1.1	Provide and Install Drainage Pipe	300.00	LF	$105.82	$31,747.04
5.4.1.2	Provide and Install Oil Water Separator Stormceptor	0.85	EA	$40,326.86	$34,079.04

CBS Pos. Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
5.4.1.3	Provide and Maintain Manholes	1.41	EA	$14,663.43	$20,652.72
5.4.1.4	Provide and Install TideFlex	1.13	EA	$6,000.00	$6,760.56
5.5	Fendering	2.00	EA	$213,823.68	$427,647.36
5.5.1	Provide and Install Fender Unit	2.00	EA	$162,858.48	$325,716.96
5.5.2	Provide Fender Pin Piles 30x0.75"	440.00	LF	$231.66	$203,860.80
5.6	Utilities	1.0	LS	$229,995.30	$229,995.30
5.6.1	Water	0.33	EA	$84,461.59	$27,872.33
5.6.1.1	Provide and Install Water Vault	0.33	EA	$25,066.88	$8,272.07
5.6.1.2	Water Service Line	198.00	EA	$98.99	$19,600.26
5.6.2	Electrical and Lighting	0.33	LS	$606,429.56	$202,122.97
5.6.2.1	Provide and Install New High Mast Lights	0.33	EA	$244,983.31	$81,652.94
5.6.2.1.1	Provide and Install High Mast Lights	0.33	EA	$208,761.48	$69,580.20
5.6.2.1.2	Install New Foundation	0.33	EA	$36,221.83	$12,072.74
5.6.2.1.2.1	Provide Pile and Plate	0.33	EA	$22,800.00	$7,599.24
5.6.2.1.2.2	Install Pile and Plate	0.33	EA	$13,421.83	$4,473.50
5.6.2.2	General Site Electrical	0.33	LS	$137,500.00	$45,787.50
5.6.2.3	Electrical Vaults	0.33	LS	$224,070.01	$74,682.54
5.6.2.3.1	Provide Vaults	2.00	EA	$22,000.00	$43,995.60
5.6.2.3.2	Install Vaults	2.00	EA	$15,345.00	$30,686.94
5.7	Dock Surfacing	1,800.00	SY	$556.38	$1,001.486.65
5.7.1	1"t Bedding Sand	5.40	CY	$77.00	$415.80
5.7.2	2" Aggregate Base Course C-1	48.60	CY	$70.71	$3,436.62
5.7.3	4" Aggregate Base Course B-1	99.00	CY	$74.95	$7,420.54
5.7.4	24"t Subbase, Grading A	1,200.60	CY	$65.41	$78,530.43
5.7.5	Interlocking Concrete Block Pavers	1,800.00	SY	$506.49	$911,683.25
5.7.5.1	Mob/Demob Crew and Equipment	1.00	LS	$700,000.00	$700,000.00
5.7.5.1	Provide and Install Pavers	1,800.00	SY	$117.60	$211,683.25
5.8	Contractor Indirect Costs	1.00	LS	$452,000.00	$452,000.00
5.8.1	Marine Mammal Monitoring	90.00	Day	$2,800.00	$252,000.00
5.8.2	Lodging and Per Diem	200.00	Day	$1,000.00	$200,000.00
5.9	Engineering, Permitting, Construction Support	1.00	LS	$1,587,000.00	$1,587,000.00
5.9.1	Geotech, Dredge Sampling, Survey and Site Studies	1.00	LS	$450,000.00	$450,000.00
5.9.2	Design Engineering	1.00	LS	$350,000.00	$350,000.00
5.9.3	Permitting (Assumes IHA Req'd)	1.00	LS	$120,000.00	$120,000.00
5.9.4	Construction Phase Support	1.00	LS	$667,000.00	$667,000.00
5.9.4.1	Contract Administration	200.00	Day	$1,080.00	$216,000.00
5.9.4.2	Construction Inspection	200.00	Day	$1,715.00	$343,000.00
5.9.4.3	Engineering Support	1.00	LS	$108,000.00	$108,000.00
5.10	Contingency (Assumes 20%)	1.00	LS	$2,200,000.00	$2,200,000.00
					$13,119,457.93

Phase 4

CBS Position Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
6	**Container Dock – Phase 4**	1.00	LS	$16,441,245.43	$16,441,245.43
6.1	Mobilization/Demobilization	1.00	LS	$1,776,123.40	$1,776,123.40
6.1.1	Mobilization	1.00	LS	$1,109,079.34	$1,109,079.34
6.1.1.1	Yard Mobilization	1.00	LS	$141,094.22	$141,094.22
6.1.1.2	Mobilization to Site	1.00	LS	$967,985.13	$967,985.13
6.1.2	Demobilization	1.00	LS	$667,044.06	$667,044.06
6.1.2.1	Site Demobilization	1.00	LS	$86,817.62	$86,817.62
6.1.2.2	Demobilization from Site	1.00	LS	$580,226.43	$580,226.43
6.2	Demolition of Existing Structures	1.00	LS	$1,537,058.86	$507,229.42
6.2.1	Excavate and Replace Material Behind Existing Wall	20,790.00	CY	$15.18	$315,657.22
6.2.2	Remove Sheet Pile	198.00	EA	$714.48	$141,467.88
6.2.3	Misc Demo	0.33	LS	$151,831.27	$50,104.32
6.3	OCSP Bulkhead	1.00	LS	$7,381,450.75	$7,381,450.75
6.3.1	Owner Provided Galv. Sheet Piles (Assume Face Sheets – PS31)	493.00	Ton	$1,178.00	$580,754.00
6.3.2	Provide Sheet Pile	969.00	Ton	$1,650.00	$1,598,850.00
6.3.3	Set Template and Temporary Supports (Per Cell)	11.00	EA	$11,828.22	$130,114.46
6.3.4	Stab and Drive Sheet Piles	915.00	EA	$930.04	$850,984.47
6.3.5	Cut Off Sheet Pile and Weld Interlocks	237.00	EA	$286.21	$67,831.57
6.3.6	Dock Face Beam and Appurtenances	1.00	LS	$535,634.65	$535,634.65
6.3.6.1	Face Beam	350.00	LF	$1,077.30	$377,053.31
6.3.6.1.1	Provide Face Beam and Materials	46.01	Ton	$5,280.00	$242,929.88
6.3.6.1.2	Install Face Beam	350.00	LF	$280.12	$98,042.40
6.3.6.1.3	Concrete Infill	52.58	CY	$686.19	$36,081.33
6.3.6.2	Provide and Install Fixed Bullrail	175.00	LF	$158.40	$27,720.00
6.3.6.3	Provide and Install Safety Ladders	3.00	EA	$12,483.72	$37,451.16
6.3.6.4	Provide and Install Removable Bullrail	175.00	LF	$282.09	$49,365.72
6.3.6.5	Provide and Install 100t Mooring Bollards	3.00	EA	$8,715.74	$26,147.23
6.3.6.6	Provide and Install 42" Cleats	3.00	EA	$5,965.74	$17,897.23
6.3.7	Provide, Haul and Place Fill (Includes Blasting of Uplands Quarry)	70,800.00	CY	$44.48	$3,149,501.56
6.3.8	Vibracompaction	1.00	LS	$467,784.02	$467,784.02
6.3.8.1	Vibracompaction	400.00	EA	$1,169.46	$467,784.02
6.3.8.1.1	Vibracompaction Probing	400.00	EA	$860.66	$344,264.32
6.3.8.1.2	Vibracompaction Fill	2,274.51	CY	$54.31	$123,519.70
6.4	Uplands Drainage	1.00	LS	$93,239.36	$93,239.36
6.4.1	Provide and Install Storm Drain System	300.00	LF	$310.80	$93,239.36
6.4.1.1	Provide and Install Drainage Pipe	300.00	LF	$105.82	$31,747.04

CBS Position Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
6.4.1.2	Provide and Install Oil Water Separator Stormceptor	0.85	EA	$40,326.86	$34,079.04
6.4.1.3	Provide and Maintain Manholes	1.41	EA	$14,663.43	$20,652.72
6.4.1.4	Provide and Install TideFlex	1.13	EA	$6,000.00	$6,760.56
6.5	Utilities	0.33	LS	$696,955.45	$229,995.30
6.5.1	Water	0.33	EA	$84,461.59	$27,872.33
6.5.1.1	Provide and Install Water Vault	0.33	EA	$25,066.88	$8,272.07
6.5.1.2	Water Service Line	198.00	EA	$98.99	$19,600.26
6.5.2	Electrical and Lighting	0.33	LS	$606,429.56	$202,122.97
6.5.2.1	Provide and Install New High Mast Lights	0.33	EA	$244,983.31	$81,652.94
6.5.2.1.1	Provide and Install High Mast Lights	0.33	EA	$208,761.48	$69,580.20
6.5.2.1.2	Install New Foundation	0.33	EA	$36,221.83	$12,072.74
6.5.2.1.2.1	Provide Pile and Plate	0.33	EA	$22,800.00	$7,599.24
6.5.2.1.2.2	Install Pile and Plate	0.33	EA	$13,421.83	$4,473.50
6.5.2.2	General Site Electrical	0.33	LS	$137,500.00	$45,787.50
6.5.2.3	Electrical Vaults	0.33	LS	$224,070.01	$74,682.54
6.5.2.3.1	Provide Vaults	2.00	EA	$22,000.00	$43,995.60
6.5.2.3.2	Install Vaults	2.00	EA	$15,345.00	$30,686.94
6.6	Dock Surfacing	4,085.00	SY	$338.85	$1,384,207.19
6.6.1	1”t Bedding Sand	12.26	CY	$77.00	$943.64
6.6.2	2” Aggregate Base Course C-1	110.30	CY	$70.71	$7,799.23
6.6.3	4” Aggregate Base Course B-1	224.68	CY	$74.95	$16,840.50
6.6.4	24”t Subbase, Grading A	2,724.70	CY	$65.41	$178,220.45
6.6.5	Interlocking Concrete Block Pavers	4,085.00	SY	$288.96	$1,180,403.38
6.6.5.1	Mob/Demob Crew and Equipment	1.00	LS	$700,000.00	$700,000.00
6.6.5.1	Provide and Install Pavers	4,085.00	SY	$117.60	$480,403.86
6.7	Contractor Indirect Costs	1.00	LS	$452,000.00	$452,000.00
6.7.1	Marine Mammal Monitoring	90.00	Day	$2,800.00	$252,000.00
6.7.2	Lodging and Per Diem	200.00	Day	$1,000.00	$200,000.00
6.8	Engineering, Permitting, Construction Support	1.00	LS	$1,652,000.00	$1,652,000.00
6.8.1	Geotech, Dredge Sampling, Survey and Site Studies	1.00	LS	$450,000.00	$450,000.00
6.8.2	Design Engineering	1.00	LS	$415,000.00	$415,000.00
6.8.3	Permitting (Assumes IHA Req’d)	1.00	LS	$120,000.00	$120,000.00
6.8.4	Construction Phase Support	1.00	LS	$667,000.00	$667,000.00
6.8.4.1	Contract Administration	200.00	Day	$1,080.00	$216,000.00
6.8.4.2	Construction Inspection	200.00	Day	$1,715.00	$343,000.00
6.8.4.3	Engineering Support	1.00	LS	$108,000.00	$108,000.00
6.9	Contingency (Assumes 20%)	1.00	LS	$2,965,000.00	$2,965,000.00
					$16,441,245.43

Single Construction Phase

CBS Position Code	Description	Material Quantity	Unit of Measure	Total Unit Cost	Total Cost
1	Marginal Wharf	1.00	LS	$35,196,741.38	$35,196,741.38
1.1	Mobilization/Demobilization	1.00	LS	$1,776,123.40	$1,776,123.40
1.1.1	Mobilization	1.00	LS	$1,109,079.34	$1,109,079.34
1.1.2	Demobilization	1.00	LS	$667,044.06	$667,044.06
1.2	Demolition of Existing Structures	1.00	LS	$1,537,058.86	$507,229.42
1.2.1	Excavate and Replace Material Behind Existing Wall	63,000.00	CY	$15.18	$956,537.03
1.2.2	Remove Sheet Pile	600.00	EA	$714.48	$428,690.55
1.2.3	Misc Demo	1.00	LS	$151,831.27	$151,831.27
1.3	OCSP Bulkhead	1.00	LS	$15,882,964.08	$15,882,964.08
1.3.1	Owner Provided Galv. Sheet Piles (Assume Face Sheets – PS31)	1,700.00	Ton	$1,178.00	$2,002,600.00
1.3.2	Provide Sheet Pile	2,478.00	Ton	$1,650.00	$4,088,700.00
1.3.3	Set Template and Temporary Supports (Per Cell)	34.00	EA	$11,828.22	$402,159.61
1.3.4	Stab and Drive Sheet Piles	2,700.00	EA	$930.04	$2,511,101.73
1.3.5	Cut Off Sheet Pile and Weld Interlocks	750.00	EA	$286.21	$214,656.88
1.3.6	Dock Face Beam and Appurtenances	1.00	LS	$1,701,634.96	$1,701,634.96
1.3.7	Provide, Haul and Place Fill (Includes Blasting of Uplands Quarry)	80,000.00	CY	$44.48	$3,558,758.83
1.3.8	Vibracompaction	1.00	LS	$1,403,352.07	$1,403,352.07
1.4	Uplands Drainage	1.00	LS	$330,999.73	$330,999.73
1.4.1	Provide and Install Storm Drain System	1,065.00	LF	$310.80	$330,999.73
1.5	Fendering	13.00	EA	$213,823.68	$2,799,707.83
1.5.1	Provide and Install Fender Unit	13.00	EA	$162,858.48	$2,117,160.23
1.5.2	Provide Fender Pin Piles 30x0.75”	2,860.00	LF	$231.66	$662,547.60
1.6	Utilities	1.00	LS	$775,476.51	$775,476.51
1.6.1	Water	1.00	EA	$168,923.19	$168,923.19
1.6.2	Electrical and Lighting	1.00	LS	$606,553.32	$606,553.32
1.7	Dock Surfacing (Assumes 100’ Behind Dock Face)	12,000.00	SY	$225.83	$2,709,910.97
1.8	Contractor Indirect Costs	1.00	LS	$860,000.00	$860,000.00
1.8.1	Marine Mammal Monitoring	200.00	Day	$2,800.00	$560,000.00
1.8.2	Lodging and Per Diem	300.00	Day	$1,000.00	$300,000.00
1.9	Engineering, Permitting, Construction Support	1.00	LS	$1,600,000.00	$1,600,000.00
1.9.1	Geotech, Dredge Sampling, Survey and Site Studies	1.00	LS	$450,000.00	$450,000.00
1.9.2	Design Engineering	1.00	LS	$1,600,000.00	$1,600,000.00
1.9.3	Permitting (Assumes IHA Req’d)	1.00	LS	$120,000.00	$120,000.00
1.9.4	Construction Phase Support	1.00	LS	$1,054,500.00	$1,054,500.00
1.10	Contingency (Assumes 20%)	1.00	LS	$5,320,000.00	$5,320,000.00
					$35,196,741.38

G.8. Alaska State Rail Plan

Alaska State Rail Plan

FINAL

Prepared for:

Alaska Department of Transportation and Public Facilities

Prepared by:

HDR, Inc.

In association with

CDM Smith

November 2016

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Executive Summary

ES-1 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) has developed this State Rail Plan to formulate a vision for rail in Alaska as well as guide the state's rail freight and passenger transportation planning activities and project development plans over the next 20 years.

Alaska's rail system plays an essential role in transporting goods to and from Alaska. Much of the food, consumer goods, and special/oversized equipment is shipped to Alaska on container/trailer ship and transported to destinations by rail. Rail also provides a cost effective, efficient way to transport heavy bulk commodities such as gravel and coal within the state. There is considerable potential for rail to support resource extraction in much of the state. Both of Alaska's railroads provide passenger service, which provides a needed transportation service to the state's residents and supports the state's tourism industry.

In 2008, the United States Congress passed the Passenger Rail Investment and Improvement Act (PRIIA) with the expressed intent of improving passenger rail service in the United States. One of the features of this legislation is the requirement that any state seeking federal assistance for either passenger or freight improvements have an updated state rail plan. Alaska Statutes assign the Alaska Department of Transportation and Public Facilities (DOT&PF) the responsibility to plan for all modes of transportation, including rail. A review of Alaska Statutes dealing with the ARRC and the role of DOT&PF should be undertaken to ensure that there is a rational link between the two and no work efforts are overlapping.

This Alaska State Rail Plan (ASRP) describes the state's existing rail network and rail-related economic and socio-economic impacts. It also describes the state rail plan process, Alaska's rail vision and supporting goals, potential capital improvements, studies, and recommended next steps.

The ASRP is intended to meet the requirements established by the Federal Passenger Rail Investment and Improvement Act to qualify for future federal funding for rail projects.

ES-2 Purpose of the State Rail Plan

The purpose of this comprehensive ASRP is to establish a vision for Alaska's passenger and freight rail system. That vision should be grounded in what the users of the rail system—the rail shippers, the passengers, the communities served, the state as a whole—and the railroads want and need for their rail service. This plan is an articulation of a vision for the Alaska rail system, a description of the process that developed that vision, and a program of improvements over time needed to implement that vision. It is important to note that this is a plan to guide the State of Alaska and DOT&PF's role in future rail transportation in Alaska; it is not a long-term plan for the Alaska Railroad Corporation (ARRC) or the White Pass & Yukon Route (WP&YR).

This ASRP was prepared to comply with the requirements of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). States are required by PRIIA to submit a State-approved Rail Plan, to be updated no less frequently than once every five years, to the U.S. Secretary of Transportation for approval.

ES-3 Alaska's Rail System

The Alaska Railroad Corporation (ARRC) operates freight and passenger rail service in Alaska on 521 miles of main and branch lines. The White Pass & Yukon Route Railroad (WP&YR), a seasonal tourist railroad, operates passenger rail service in Alaska along approximately 20 route miles of rail line.

ES-3.1 Freight Rail System

In 2015, the ARRC carried more than 4.3 million tons of freight, in 51,400 rail car shipments. The leading freight types are stone, sand and gravel (2.3 million tons), coal (900,000 tons), petroleum product (381,000 tons), chemicals (105,000 tons), iron/steel products (70,000 tons), intermodal [1](123,000 tons), and other (418,000 tons). Overall, ARRC freight tonnage was about 800,000 tons lower in 2015 than in 2013. Petroleum and coal were lower while the other commodities were stable to increasing. The reduction in coal handled reflected the reduction in exports. There are a number of potential resource development projects being considered. If these projects materialize, and if rail is used to ship the resources to market, rail traffic could increase.

As of publication of the ASRP, the WP&YR does not offer freight service. It did so in the past and it is possible that such service could be resumed.

Alaska Railroad

White Pass & Yukon Route Railroad

ES-3.2 Passenger Rail System

Alaska's passenger rail network includes passenger service provided by the ARRC and the WP&YR. The ARRC operates six different passenger trains serving resident, visitor and contract markets, each of which operates over part of the railroad between Seward and Fairbanks. The frequency of each train varies depending on the season. In 2015, approximately 475,034 passengers rode on the ARRC. The WP&YR offers excursions from Skagway to Bennett, Fraser, and White Pass Summit. In 2015, the WP&YR carried 401,905 passengers.

[1] Trailers or containers carried on railcars.

ES-4 Rail Impacts

Rail service is an important part of Alaska's economy. The railroads employ nearly 900 people on a year-round or seasonal basis. In addition to the jobs directly related to the provision of freight and passenger rail service, there are a large number of jobs related to rail users who move goods via the rail system or associated with the tourism industry.

In addition to employment benefits, the availability of rail transport provides cost and logistical advantages. The presence of rail is especially important in areas where mining, military, and other industries move heavy loads of freight over long distances.

Rail is more fuel efficient than truck on the basis of fuel burned per ton-mile transported. Greenhouse gasses are related to fuel consumption, so every ton-mile of freight moved by rail instead of truck reduces related greenhouse gas emissions by up to 75 percent. The movement of freight by rail also improves safety and functionality of the state's highway system.

ARRC passenger rail service connects communities, which is important given the lack of intercity bus service. Through their whistle-stop service, the ARRC also provides the only land access to certain parts of the state. In addition, passenger travel generates income not only for rail operations but also for restaurants, hotels, and other visitor service businesses.

ES-5 Rail Plan Development Process

The ASRP was developed under the guidance of the DOT&PF, which is responsible for planning for all modes of transportation including rail planning transportation in Alaska. The railroads and DOT&PF apply for federal funding for rail improvement projects. The DOT&PF coordinated with other agencies responsible for rail-related functions in the development of the ASRP.

A State Rail Plan Steering Committee and a Technical Advisory Group (TAG) were established to ensure that the ASRP development was guided, reviewed, and supported by a wide range of state public agencies and included representation from both public and private transportation and economic development entities in the state.

The rail plan website: http://dot.alaska.gov/railplan/ was used during the preparation of the ASRP to provide updates on development of the plan and to provide a medium for public review and comment. The Draft ASRP was posted to the website prior to the finalization of the plan, and an on-line "open house" was held to solicit comments on the draft plan.

Both railroads in Alaska were contacted to solicit information about their operations, projects, or other needs as well as their opinions regarding what the public sector could do to assist or improve the efficiency and expansion of rail in the state. Similar interviews were conducted for freight shippers.

A series of seven public meetings were held at different locations around the state to educate stakeholders and the general public regarding the State Rail Plan process, obtain input for developing a rail vision, and provide a forum for discussions of specific rail issues in the state. The public meetings were held in the following communities:

- Skagway – May 21, 2013

- Haines – May 22, 2013
- Wasilla – May 29, 2013
- Seward – May 30, 2013
- Anchorage – June 4, 2013
- Fairbanks – June 5, 2013
- Nome – June 6, 2013

ES-6 Key Rail Issues, Challenges, and Opportunities

Stakeholders and the general public expressed their interest in the value and potential of the state's passenger and freight rail operations.

The key rail freight issues and recommendations expressed during the outreach included the need to:

- Diversify the commodities carried
- Explore future rail extensions/new railroads to support resource development
- Maintain and expand intermodal transport and facilities
- Maintain the existing rail infrastructure

The key passenger rail issues and recommendations were:

- Development of commuter rail in Southcentral Alaska and the Fairbanks area
- Implementation of Positive Train Control (PTC)

ES-7 Rail Vision, Goals, and Objectives

Alaska's rail vision was developed by the Steering Committee and DOT&PF, and refined based on comments received during the plan development process.

Preamble:

> *The pioneering ambition that built Alaska was both practical and visionary; using roads, waterways, air, and rail to haul resources to market and connect communities to each other and the world.*

Vision:

> *The State of Alaska will use rail to foster growth and trade, build prosperity, connect and support communities, and provide safe and efficient freight and passenger services coordinated with other transportation modes, regionally and internationally.*

Goals and objectives aligned with the rail vision were developed based on the rail-related benefits, issues, and obstacles that had been identified. These goals and objectives are as follows:

Goal 1: Promote Economic Development in Alaska

- Objective – Support rail extensions to new locations to serve energy and resource development, general economic development, import/export, and defense needs as well as passenger service that support personal travel and the tourism industry.

- Objective – Support Corridors to Resources. Corridors can include road, rail, pipelines, and utilities such as transmission lines.
- Objective – Support improvements to the rail system that make it more capable of serving existing and new customers and offering more competitive service.
- Objective – Specifically plan for rail support for the Alaska LNG projects, including both addressing the capability and service area of the existing system as well as prospective rail extensions supporting the gas project.

Goal 2: Enhance Safety

- Objective - Implement Positive Train Control (PTC) to comply with federal mandate intended to enhance safety.
- Objective - Separate the remaining at-grade crossings on Alaska's National Highway System (NHS) routes.
- Objective – Separate as many non-NHS at-grade crossings that have significant traffic volume as funding allows.

Goal 3: Encourage Partnership and Collaboration

- Objective - Harmonize State policy on railroads especially right-of-way selection, acquisition, development, and management.
- Objective - Participate in local government land use and transportation planning along existing and potential transportation corridors.
- Objective - Include rail in emergency service planning.
- Objective – Assure state administration involvement and assistance in considering rail service for large-scale projects.
- Objective –Ensure that the rail mode of transportation gets full and balanced consideration in state and regional freight and passenger transportation planning and other transportation-related activities.
- Objective – Continue to participate in Department of Defense's Strategic Rail Corridor Network (STRACNET).

Goal 4: Support Improvements to System Preservation, Efficiency, and Capacity

- Objective - Improve the capability of Alaska rail freight lines and structures to safely and efficiently accommodate rail cars with loaded weights of at least 286,000 pounds per car.
- Objective – Improve efficiency of the rail system through longer passing sidings and tunnel improvements.
- Objective - Implement line relocations to enhance operations, speed, safety, and capacity.
- Objective – Protect and preserve operating railroad ROWs for safety and sustainable economic development.
- Objective – Establish and reclaim corridors to preserve right-of-way for future use.
- Objective – Support railroads' efforts to keep the rail system in a state of good repair.
- Objective – Support railroads' efforts to address deferred maintenance.

Goal 5: Improve Connectivity of the Transportation System

- Objective – Support scheduled public rail passenger service to the Ted Stevens Anchorage International Airport.
- Objective - Pursue enabling legislation that authorizes regional transportation authorities to implement commuter rail service.
- Objective - Emphasize interconnectivity with other planning efforts and modes of transportation.

Goal 6: Enhance Quality of Life and Environmental Sustainability

- Objective – Support community planning to reduce rail related noise.
- Objective - Improve wildlife crossings and culverts for fish passage.
- Objective - Support rail service as a part of an overall energy conservation policy.
- Objective - Support rail service as a means of improving air quality through reduction of emissions resulting from more efficient movement of goods by rail.

Goal 7: Address Community Issues that Arise from Urban Development around Railroads

- Objective – Separate at-grade crossings wherever possible giving the higher priority to those with the worst crash histories.
- Objective –Support a community-based rail plan for the greater Fairbanks area to establish a long-term plan for rail bypass, separated crossings, potential relocation of the rail yard, and other elements.
- Objective – Support the ARRC's vision to relocate their Anchorage railyard to a new location depending on the future of the Knick Arm Crossing.

Goal 8: Establish a Recurring Public Capital Investment Program

- Objective - Fund rail-related projects that solve public problems and create public and private opportunities.
- Objective - Fund rail-related projects that the rail system itself cannot fund but which will be of mutual benefit to the rail system and the public.
- Objective – Establish the rail capital investment program as a routine and reliable element of the state capital budget so that project developers have a steady source of support and several projects can be underway at the same time.

ES-8 Proposed Investment and Future Studies

Based on the identified needs and available funding sources, short- and long-term proposed rail investment programs and projects were developed. The programs/projects identified have been separated into short term (including those projects that are underway at publication of the ASRP or can secure partial funding in years 1-4) and long term (5-20 years). Most projects benefit passenger and freight service but they are only listed once.

Passenger Rail – Short Term

- ARRC Positive Train Control

- US Forest Service Complete Chugach National Forest Whistle Stop Development
- WP&YR Passenger Depot
- WP&YR Acquire New Passenger Equipment
- WP&YR Skagway Depot Passenger Handling Capability Expansion

Passenger Rail – Long Term

- Commuter Rail service in Southcentral Alaska
- ARRC Ship Creek Intermodal Transportation Center
- WP&YR New Intermodal, International Passenger Depot
- WP&YR Continued Upgrades to Avalanche Control System
- WP&YR Expansion of the Railroad Dock

Freight Rail – Short Term

- Seward Marine Terminal Improvements
- MSB Port MacKenzie Rail Extension Project
- ARRC Fairbanks Area Line Relocation - Phase 1
- Cantwell Intermodal Facility
- ARRC South Wasilla Rail Line Relocation
- ARRC Nenana Rail Line Relocation
- ARRC Portage and Divide Tunnels
- Fairbanks Area Rail Plan

Freight Rail – Long Term

- ARRC Anchorage to Seward Track Rehabilitation
- ARRC Whittier Wharf Replacement and Staging Areas
- ARRC Whittier Yard Improvements
- ARRC Northern Rail Extension
- ARRC Healy Canyon Stabilization
- Port of Anchorage Track Improvements
- ARRC Fairbanks Airport Branch and Eielson Branch Staging Areas
- ARRC Fairbanks Freight Intermodal Terminal Rail/Truck Staging Area
- Grade-separation of All NHS At-grade Rail Crossings
- Grade-Separation of Significant Non-NHS at-grade Crossings
- Susitna-Watana Dam Support Spur
- Extending Transportation Facilities to Provide Surface Access to Resource Development Opportunities
- Standardize Alaska's Track to 286,000 Pound Capacity
- WP&YR Construction and Expansion of Docking and Port Facilities (West Basin)

In addition to the projects listed above, projects proposed for economic analysis, periodic re-evaluation, and study include:

- Nenana/Dunbar to Livengood Railroad Extension
- Rail Extension to North Slope
- Alaska-Canada Rail Link (ACRL)
- Island Railroad[2] to Yukon Territory
- Rail Extension to Nome
- ARRC Knik Arm Crossing and new central railyard
- Rail extension to west of the Susitna River

ES-9 Project Findings

Key findings have emerged from the current rail planning effort:

- Maintenance of a strong and fully functional Alaska Railroad and White Pass and Yukon Route will be important to the future economy of the State of Alaska.
- Alaska needs its existing railroads if it is to realize the economic development goals it has as a state and as a society. In fact, some of these State goals may require expansion of the rail system to serve other locations and/or new development.
- Railroads are the most efficient means of overland freight transportation, and they allow some forms of development, such as resource extraction, to be economically feasible.
- Alaska's rail systems typically generate sufficient revenue to operate existing service and perform routine maintenance. The downturn in traffic and revenues that began with the recent economic recession has put pressure on the ARRC's ability to earn sufficient revenues to both operate service and adequately maintain the railroad.
- The existing ARRC ownership structure, with the railroad as a state-owned independent corporation, is appropriate and in the best long-term interest of the railroad and the state.
- Additional funding beyond existing revenues is needed for projects that are beyond the scope of ARRC's existing operations such as expanding the rail system to new destinations and capital improvements.

ES-10 State Rail Plan Recommendations and Next Steps

For the purposes of meeting Alaska's rail vision, goals, and objectives—and to address the identified rail issues and opportunities identified in preparation for future Rail Plan updates—the following actions are proposed:

- The State of Alaska should continue to support the Alaska Railroad's work to develop and implement the federally-mandated, but unfunded, Positive Train Control system. The estimated cost of the system strains the railroad's ability to pay for its development and implementation.
- The State should invest in short and long-term passenger and freight projects that will be of positive economic benefit to the State. This plan and analysis prioritizes and recommends a group of economically promising projects.

[2] An island railroad is a railroad that is not connected to the regional or national rail network. The White Pass & Yukon is an example of an island railroad.

- The State of Alaska should examine in detail the economic benefits and costs of the rail extensions listed above in Section ES-8. Projects that would be economically beneficial and that would provide a financial return to the state competitive with other investment options should be pursued.

ES-11 Summary

The state has undertaken a comprehensive study of its passenger and freight rail network, and identified key issues and opportunities through a wide-ranging rail stakeholder and public outreach process. This State Rail Plan serves to document this information and provide direction for Alaska rail planning and project development into the future while meeting the federal requirements to qualify the state for future federal rail funding.

The development of this state rail plan was paid for with State of Alaska general funding. DOT&PF would like to take this opportunity to thank all the individuals and parties who were involved in this effort and encourages continued public input into Alaska's rail planning efforts in the future.

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