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:

Above and Below Deck Condition Assessment (by PND):

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.

Underwater Dive Inspection (by GDS):

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

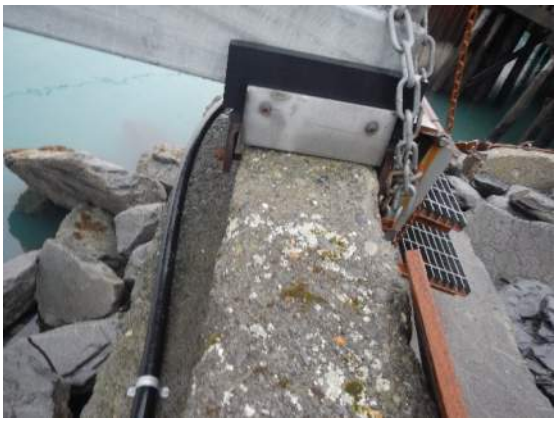
6. CONCLUSION

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** **<u>Description:</u>** **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** **<u>Description:</u>** **Observed holes in the sheet piles at (2) locations near tie back rods, at the eastern end of the dock.**
	**Photograph No. MW-3** **<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-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** **<u>Description:</u>** **Minor deterioration to tire fenders, such as, cuts, gouges, tears, etc.**
	**Photograph No. D4-5** **<u>Description:</u>** **Minor coating damage and corrosion observed.**
	**Photograph No. D4-6** **<u>Description:</u>** **Catwalk to dolphin cap connection.**

Photograph No. D4-7

Description:

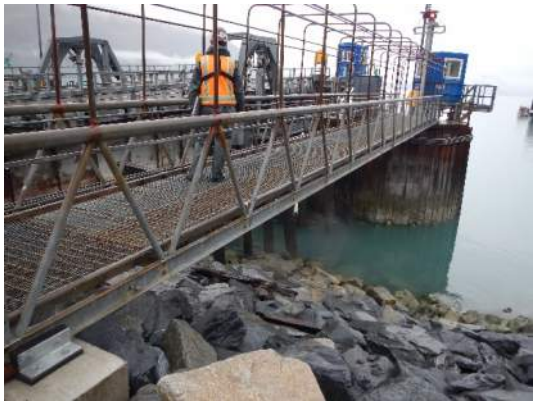
Catwalk to Marginal Wharf cap connection. Note cracking of concrete cap.

ATTACHMENT A3

BARGE RAILCAR TRANSFER RAMP, CLOSED CELLS, TRESTLE AND CATWALK – PHOTO LOG

	**Photograph No. TR-1** **<u>Description:</u>** **(2) perforations observed on the cell's south side.**
	**Photograph No. TR-2** **<u>Description:</u>** **Perforation observed on the cell's north side.**
	**Photograph No. TR-3** **<u>Description:</u>** **(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** **<u>Description:</u>** **(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** **<u>Description:</u>** **All sheet piles are affected by corrosion with visible reduction of wall thickness at pitting locations.**
	**Photograph No. TR-6** **<u>Description:</u>** **All diagonal timber braces on the pile bents (for lateral support) are severely damaged**
	**Photograph No. TR-7** **<u>Description:</u>** **Crushing transverse deck timber near the abutment.**
	**Photograph No. TR-8** **<u>Description:</u>** **Split transverse deck timber near the abutment.**

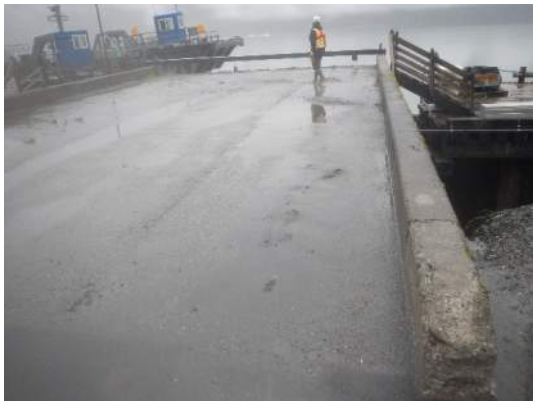
	**Photograph No. TR-9** **Description:** **Split and damaged abutment pile cap timber. Looking up.**
	**Photograph No. TR-10** **Description:** **Missing transverse deck timber and crushed/split cap beam near the abutment.**
	**Photograph No. TR-11** **Description:** **Less than 50% of the surface is 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** **Description:** **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** **Description:** **Spalling at bottom corners and edges near the face & fender, have eliminated concrete cover, exposing rebar. Platform #1 and #2.**
	**Photograph No. PP-3** **Description:** **On the east end of the most seaward pile cap, a crack extends below the deck panel. Platform #2.**
	**Photograph No. PP-4** **Description:** **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** **Description:** **Multiple cracks are propagating from torch cut holes.**
	**Photograph No. TT-2** **Description:** **The sheet pile are leaning out of plum and corroded.**
	**Photograph No. TT-3** **Description:** **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** **Description:** **Piles, and entire trestle, is leaning seaward between the winch cells.**

	**Photograph No. TT-5** **Description:** **Many diagonal timbers, i.e. lateral bracing, are split, broken, missing or otherwise damaged.**
	**Photograph No. TT-6** **Description:** **Pile not bearing on the pile cap on a bent located just west of Pass-Pass platform #1.**
	**Photograph No. TT-6** **Description:** **Pile not bearing on the pile cap at the east side of the most westerly trestle section.**
	**Photograph No. TT-7** **Description:** **Several piles are split, cracked, and in some cases section loss exceeds 50%.**

	**Photograph No. TT-8** **Description:** **Timber pile with severe section loss.**
	**Photograph No. TT-9** **Description:** **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** **Description:** **Modified interior stringers for pass pass platform supports. Note, exterior stingers remain simply supported per original design.**
	**Photograph No. TT-11** **Description:** **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.

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
Fax: (907) 563-9061

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

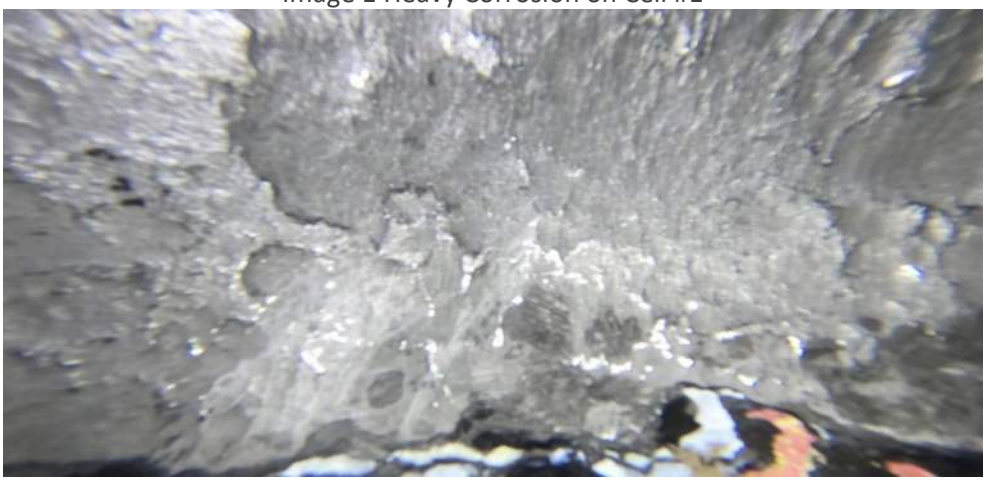


Image 2 close up of corrosion

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			

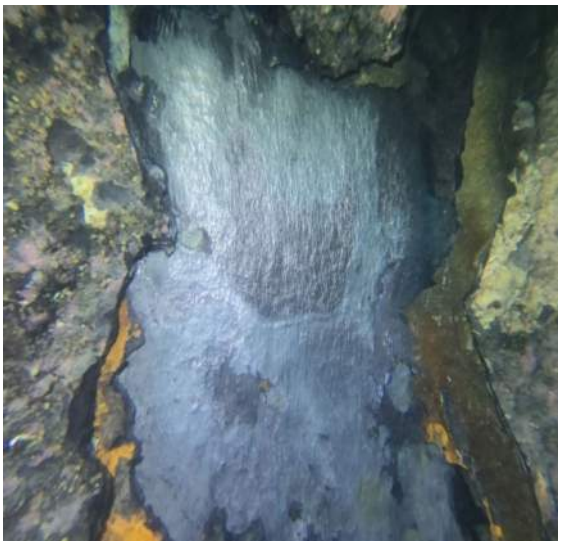


Image 8 – Heavy Corrosion

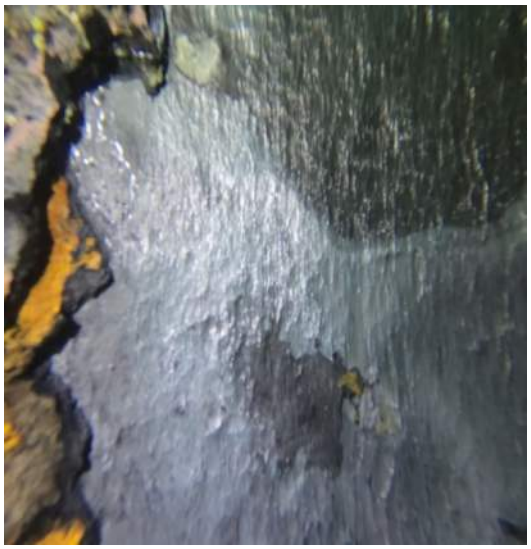


Image 9 – Close up of corrosion

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			

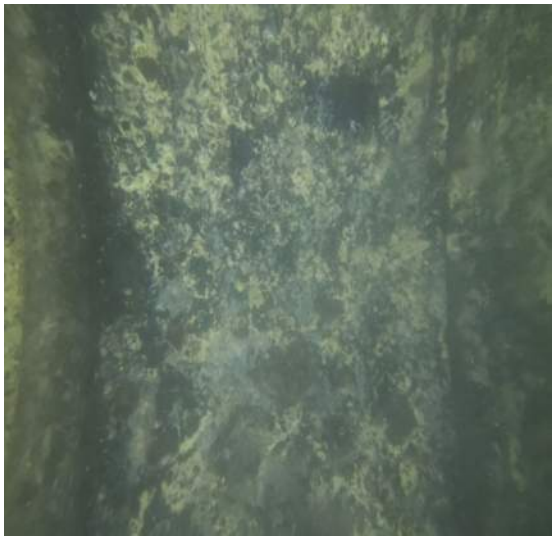


Image 13 – Typical Medium Corrosion

Image 14 – 3" Hole found (Corroded Tieback?)

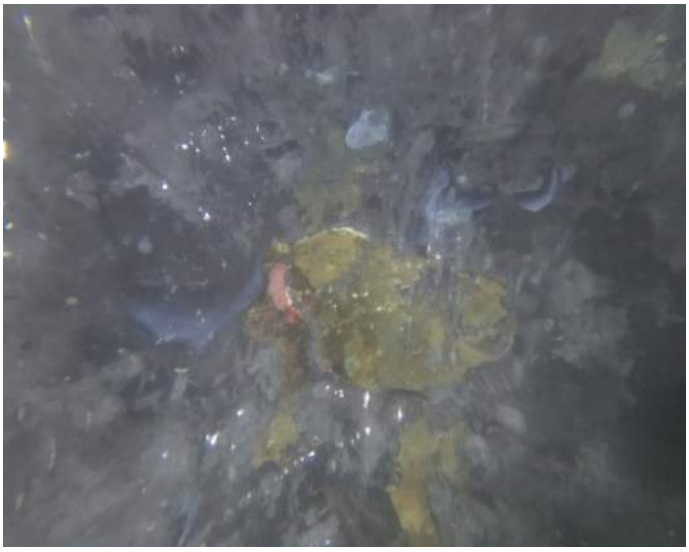


Image 15 - Close up of pitting and corrosion

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

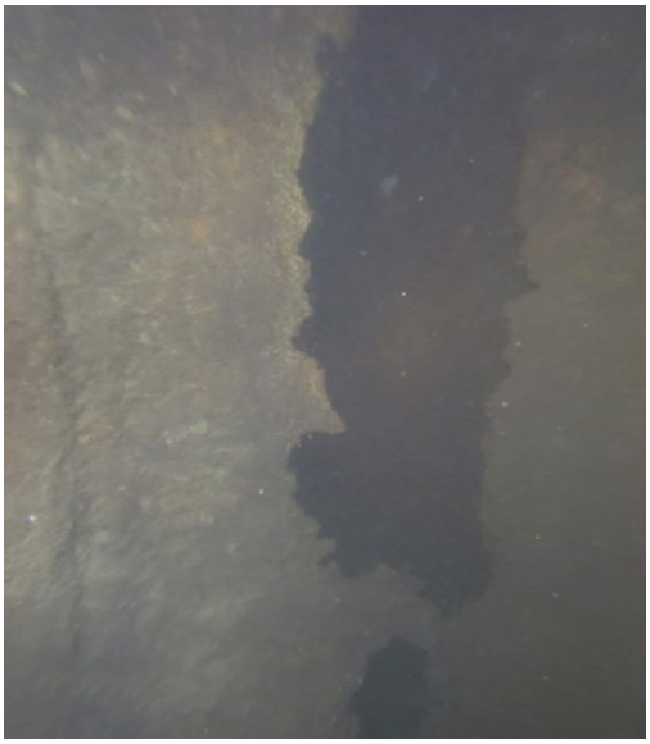


Image 18 – 8” x 5 ‘ Hole, South side cell

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.

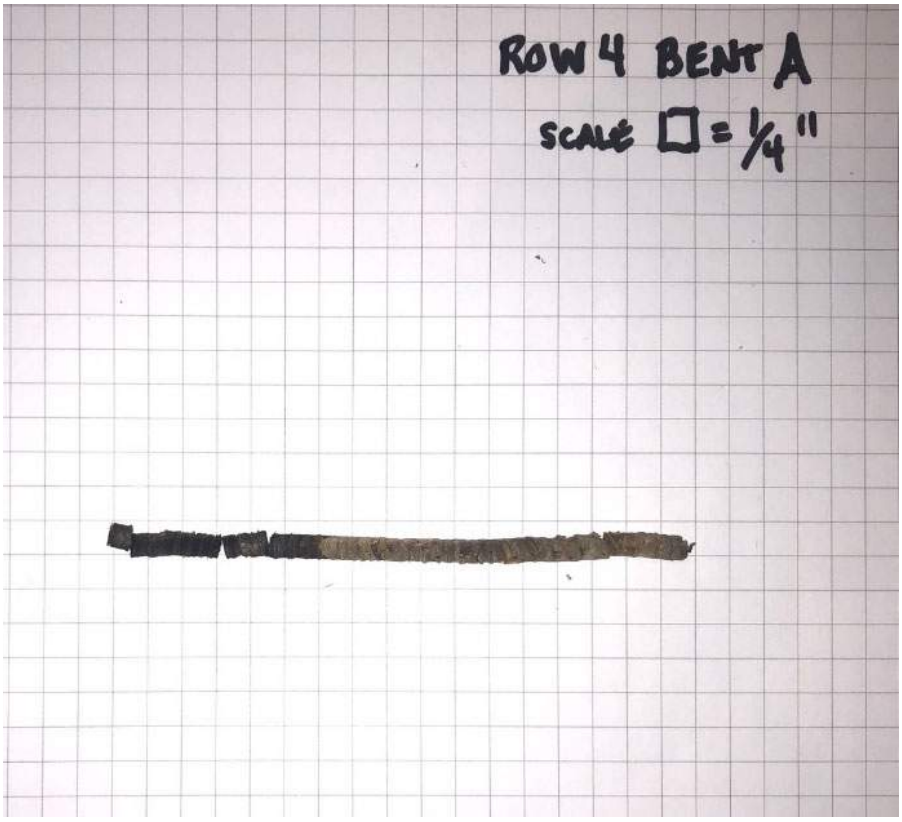
Image 26 – X-Member Beam Typical

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

ALASKA RAILROAD CORPORATION
EST. 1914

DOWL

PND ENGINEERS, INC.

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.

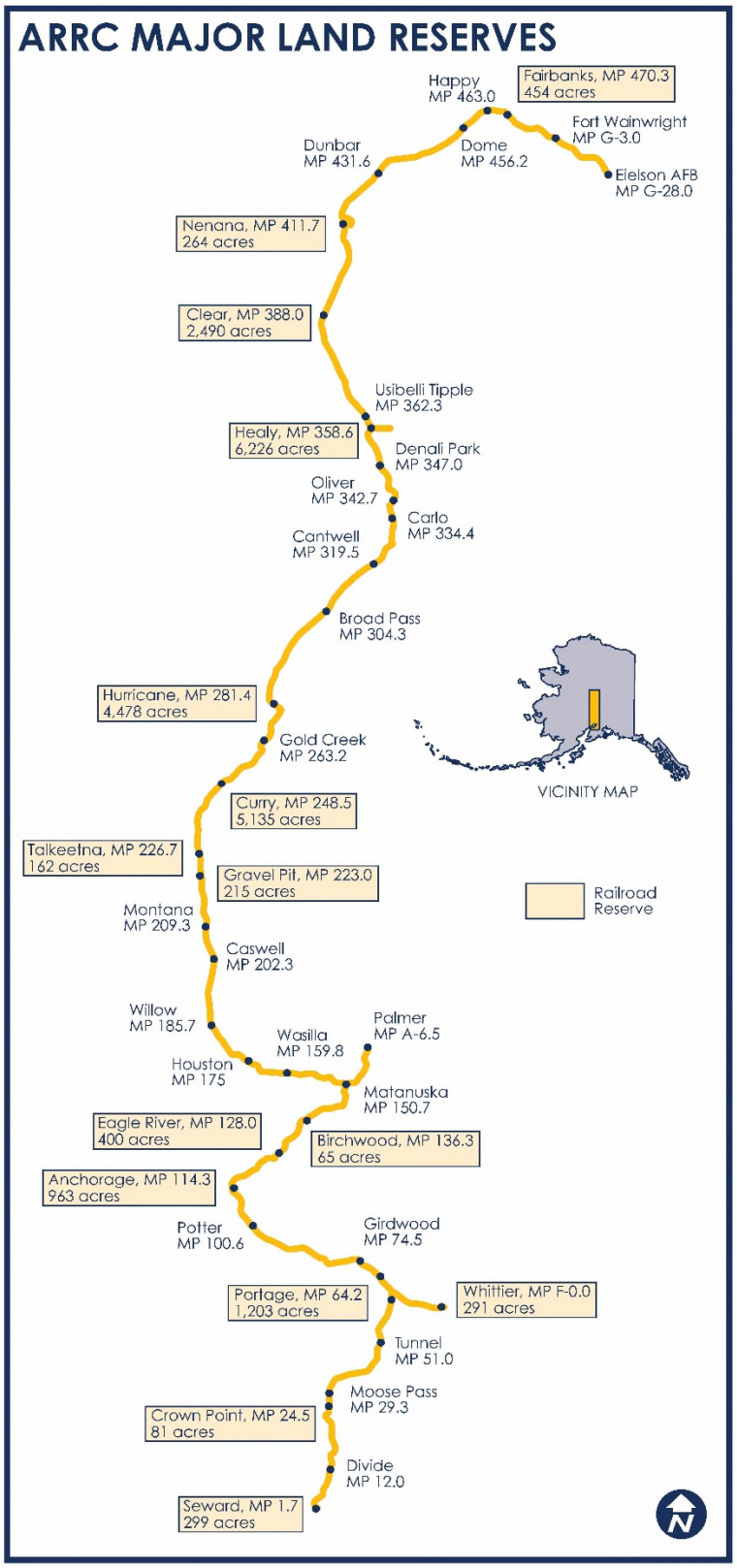


Figure 1: ARRC Network and Land Holdings[1]

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.

[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

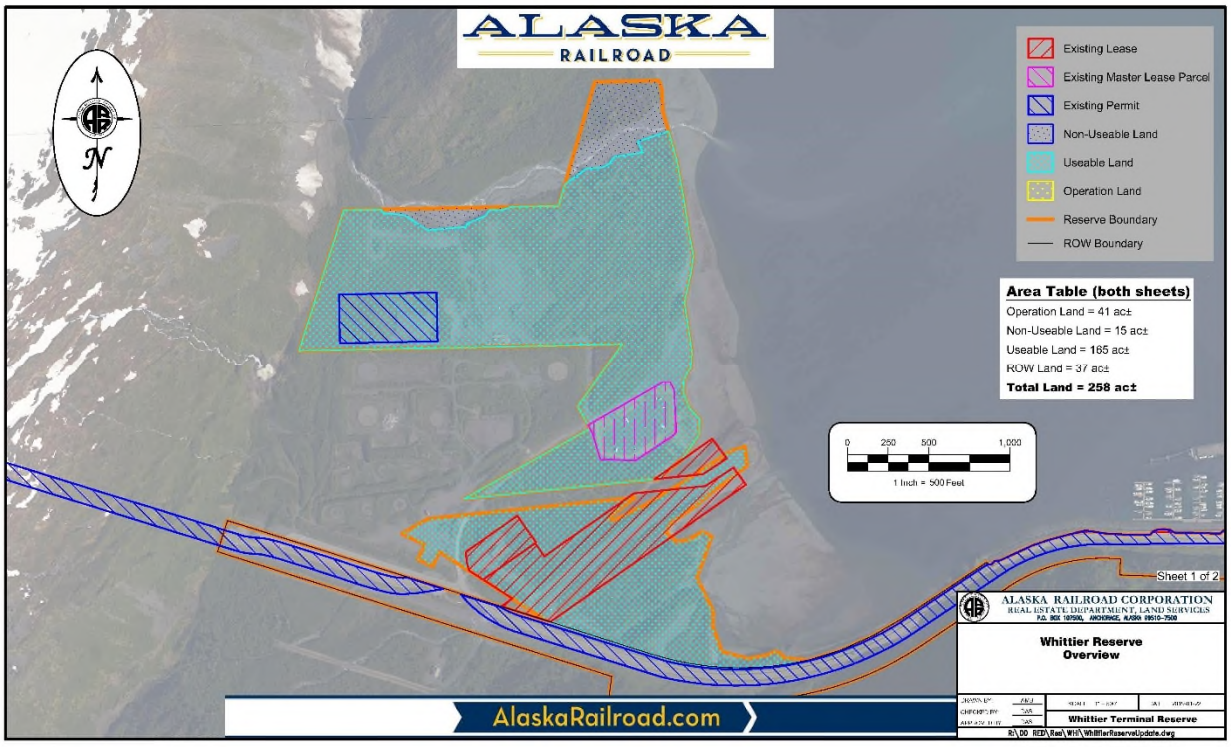


Figure 2: Whittier Terminal Reserve – Western Whittier

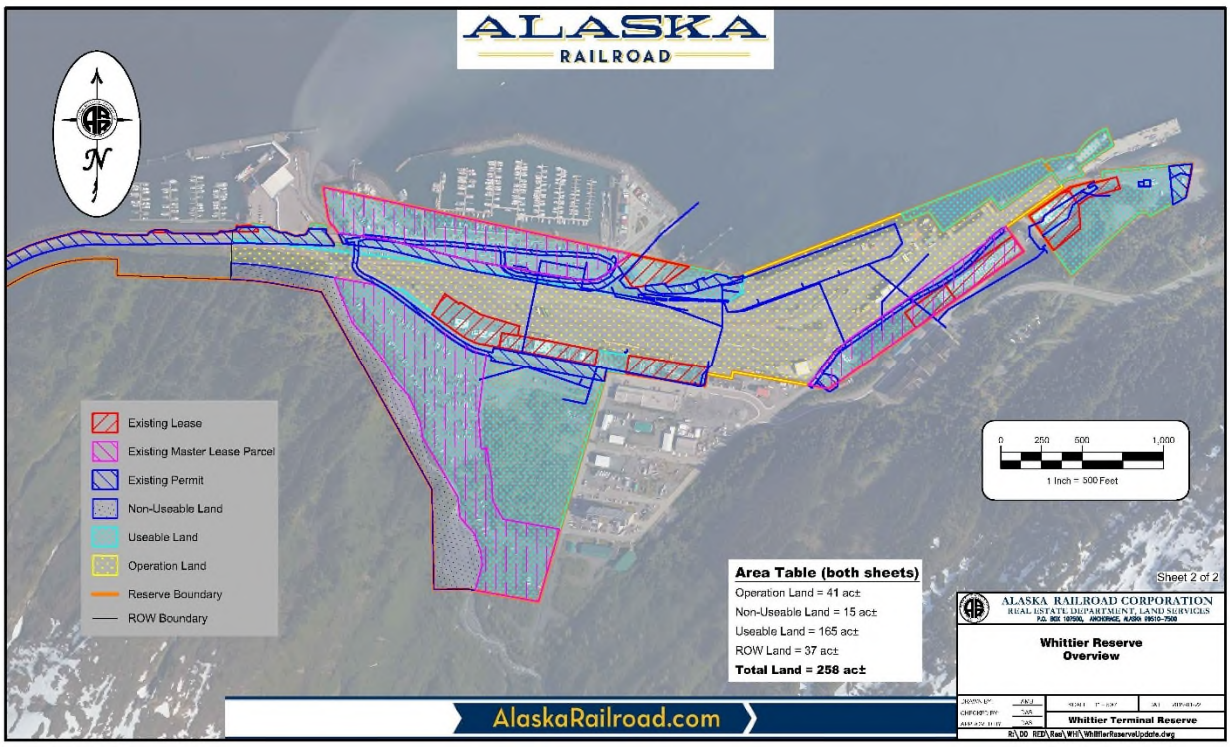


Figure 3: Whittier Terminal Reserve – Eastern Whittier

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.

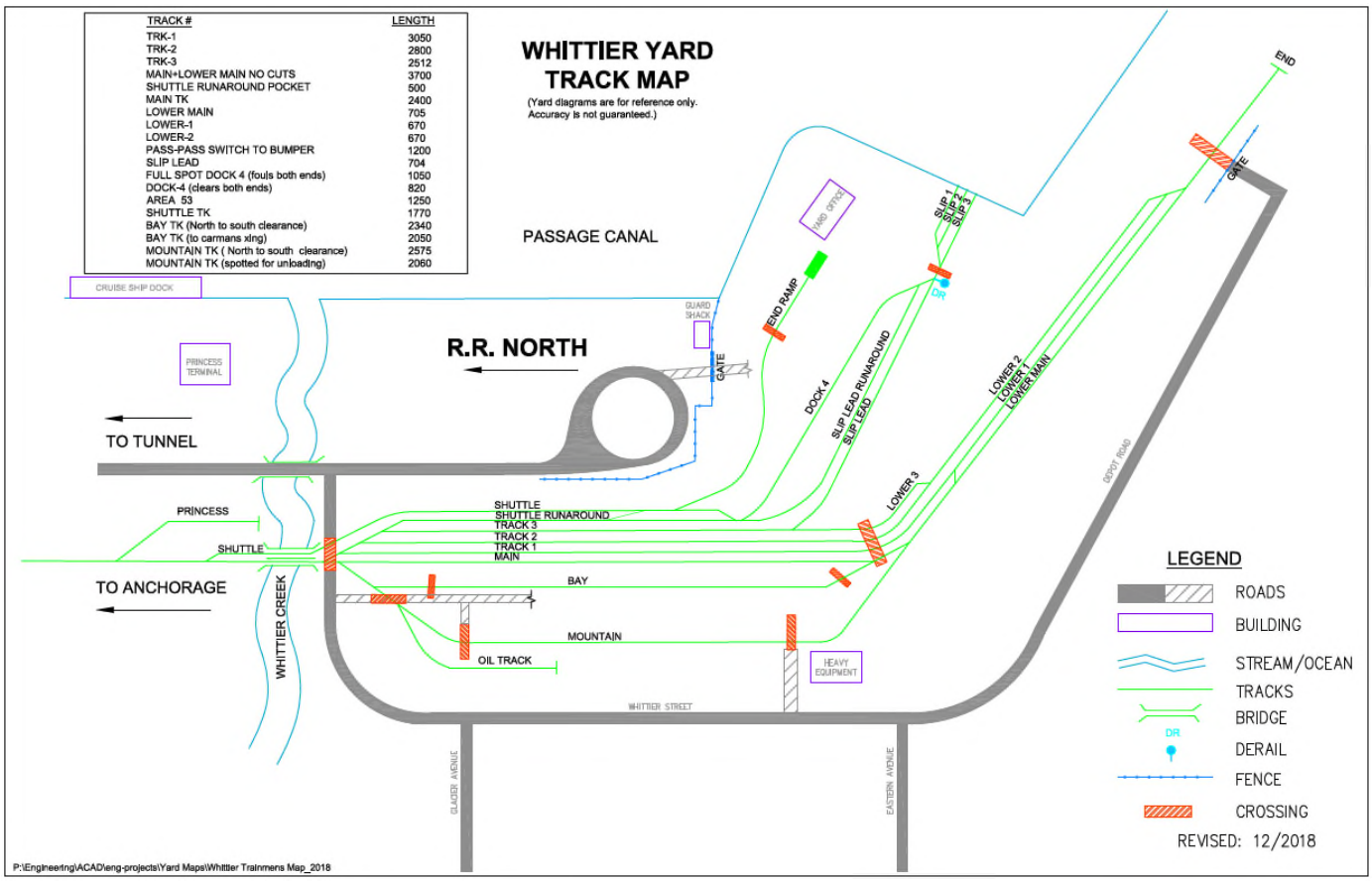


Figure 4: Whittier Track Map

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.

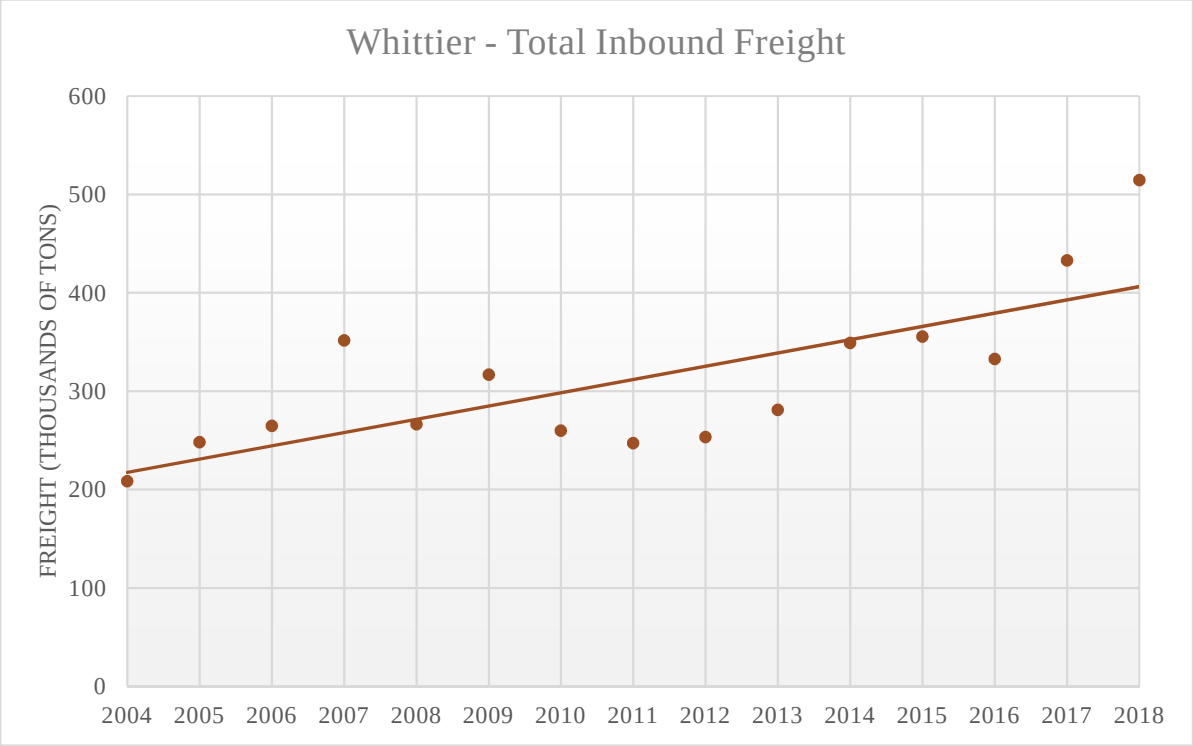


Figure 5: Whittier Inbound Freight Trends 2004 – 2018

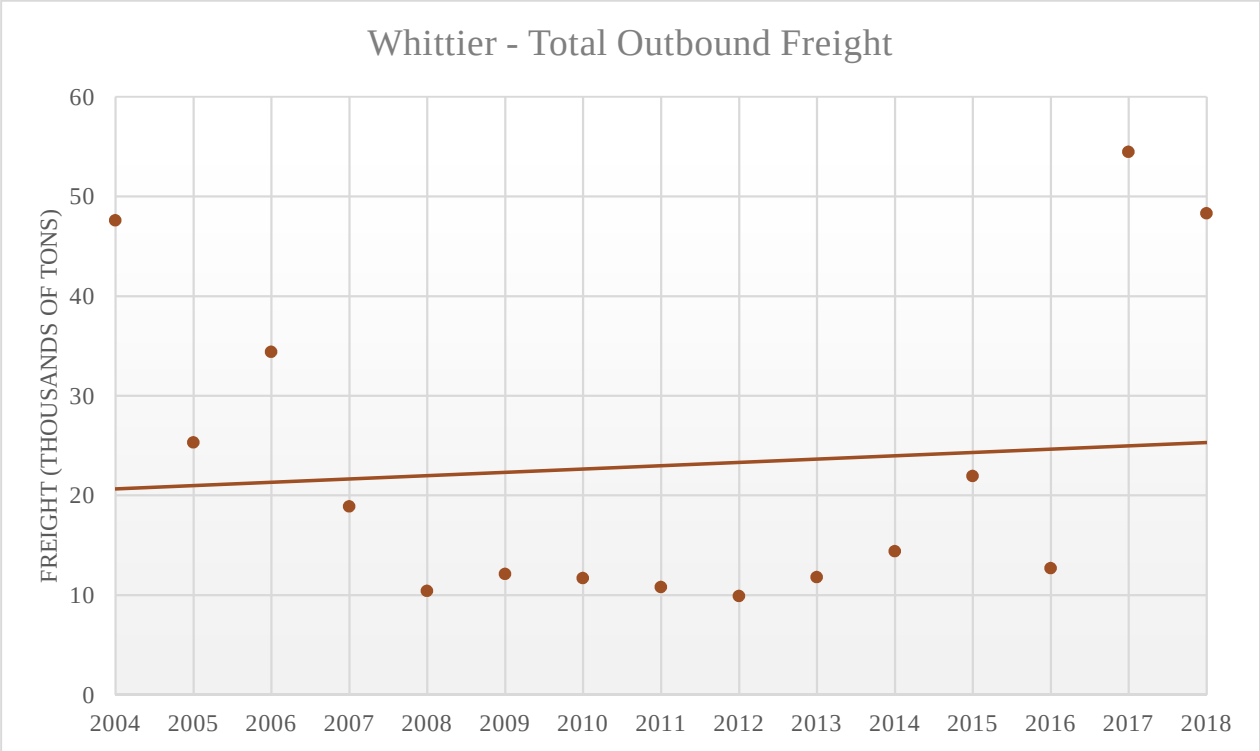


Figure 6: Whittier Outbound Freight Trends 2004 – 2018

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.

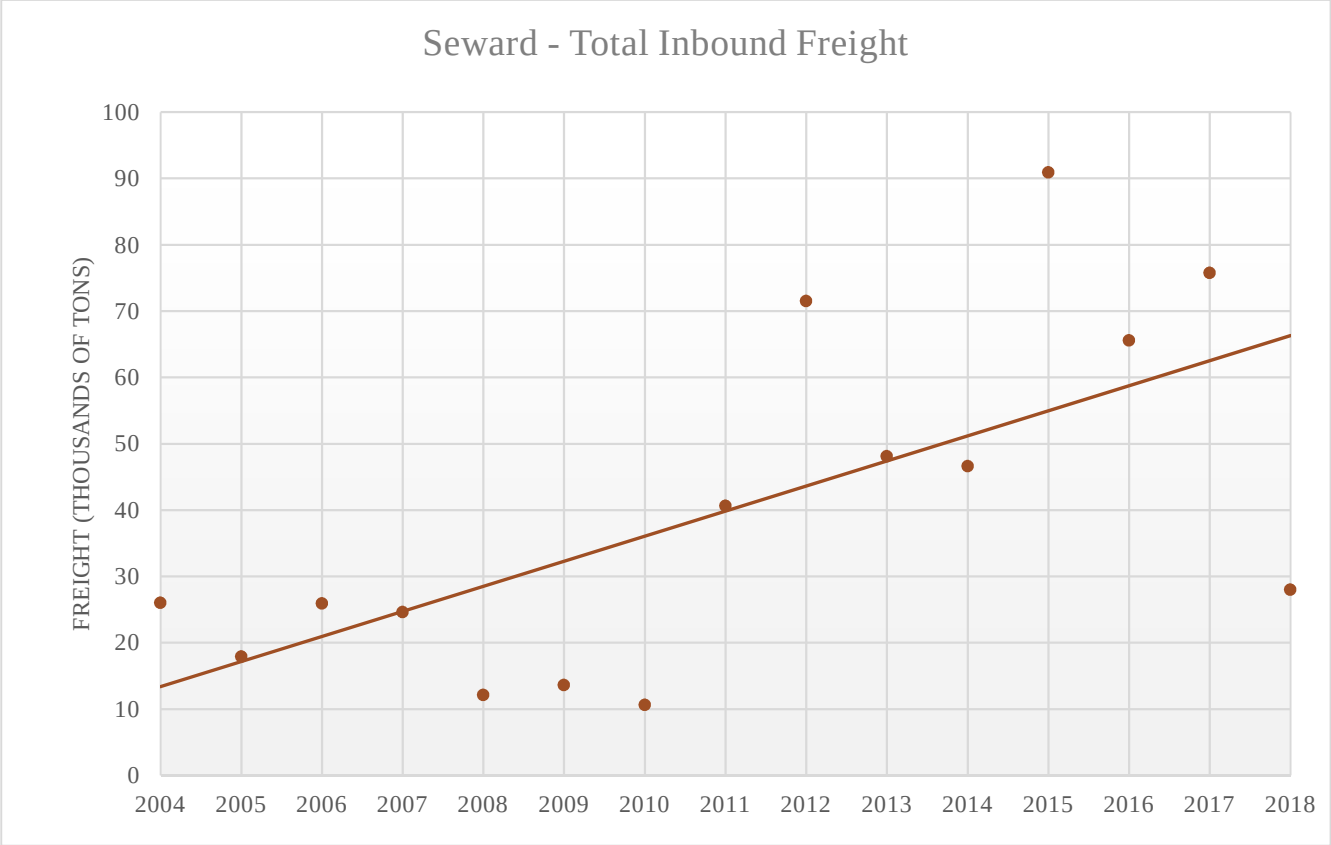


Figure 7: Seward Inbound Freight Trends 2004 – 2018

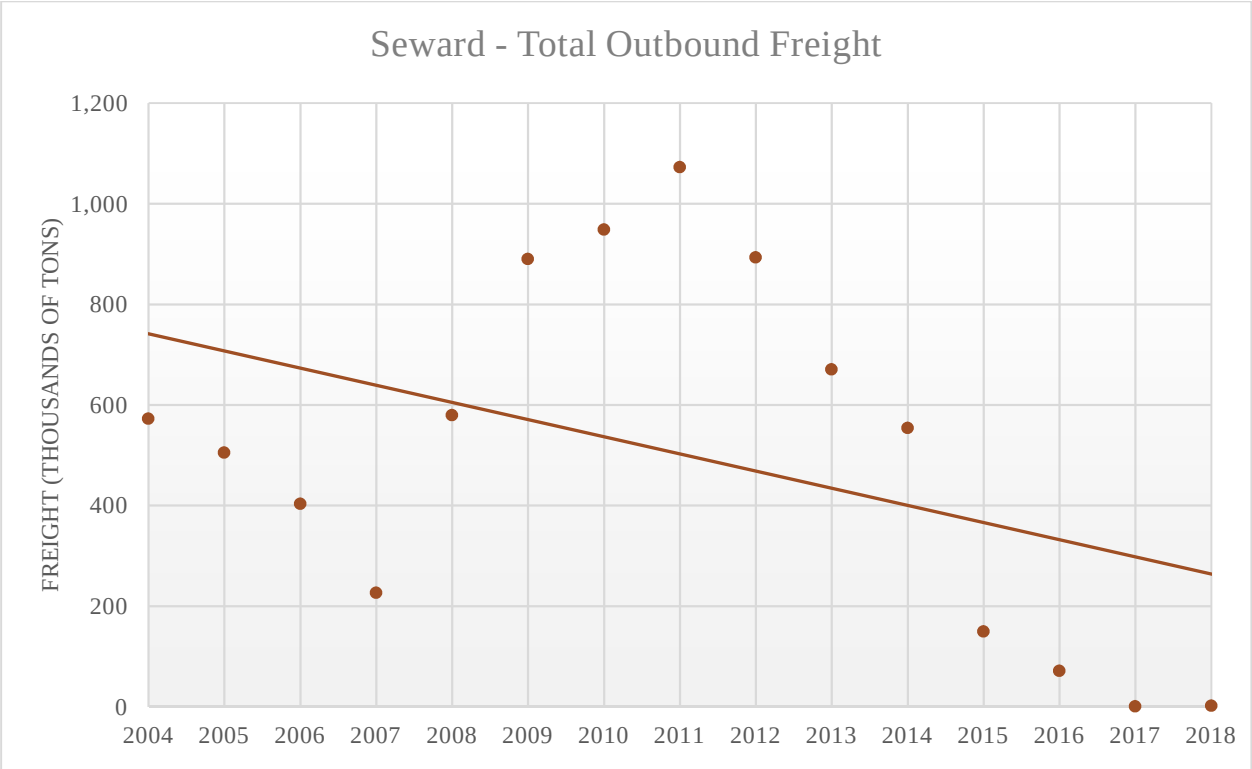


Figure 8: Seward Outbound Freight Trends 2004 – 2017

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.

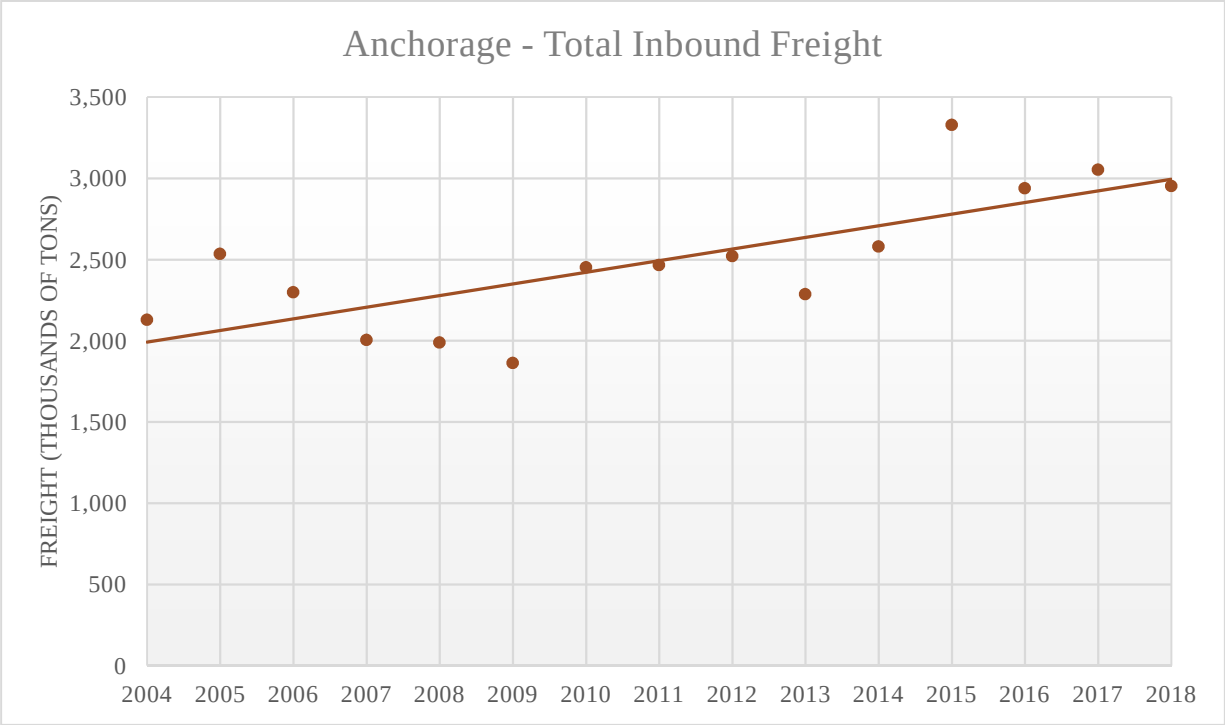


Figure 9: Anchorage Inbound Freight Trends 2004 – 2017

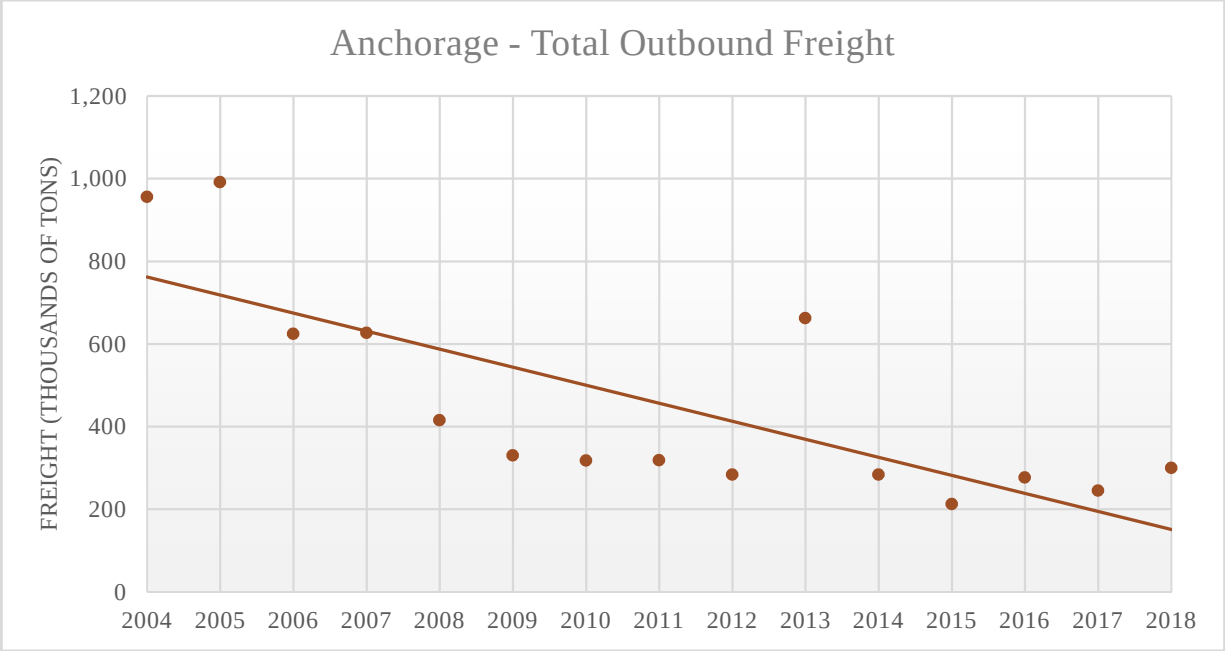


Figure 10: Anchorage Outbound Freight Trends 2004 – 2017

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.

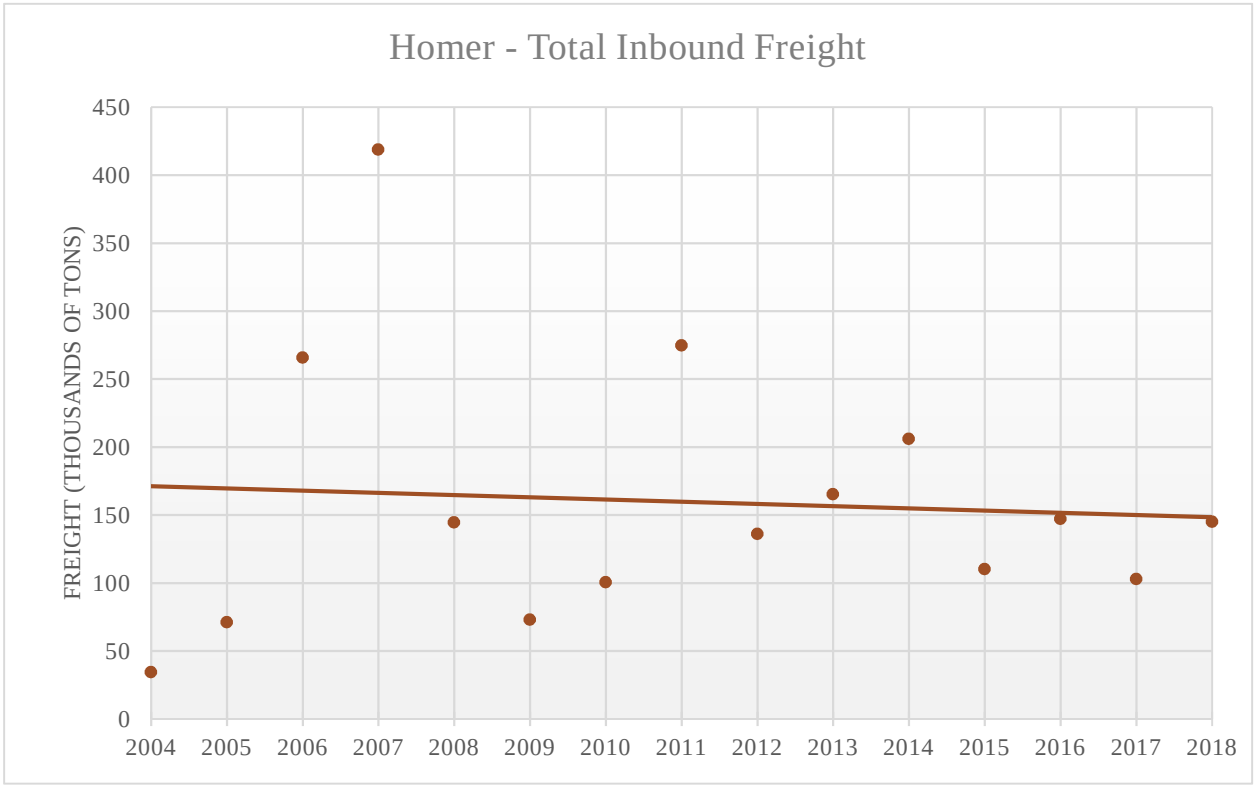


Figure 11: Homer Inbound Freight Trends 2004 – 2018

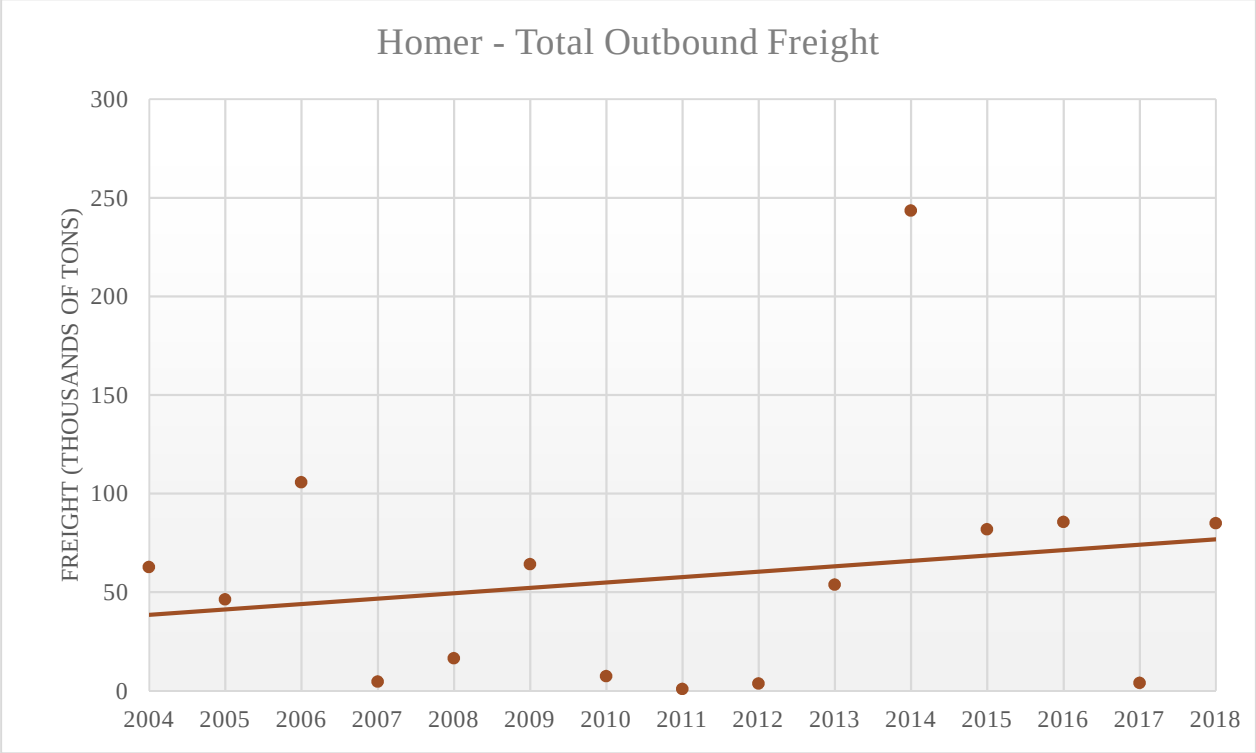


Figure 12: Homer Outbound Freight Trends 2004 – 2018

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	26	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.

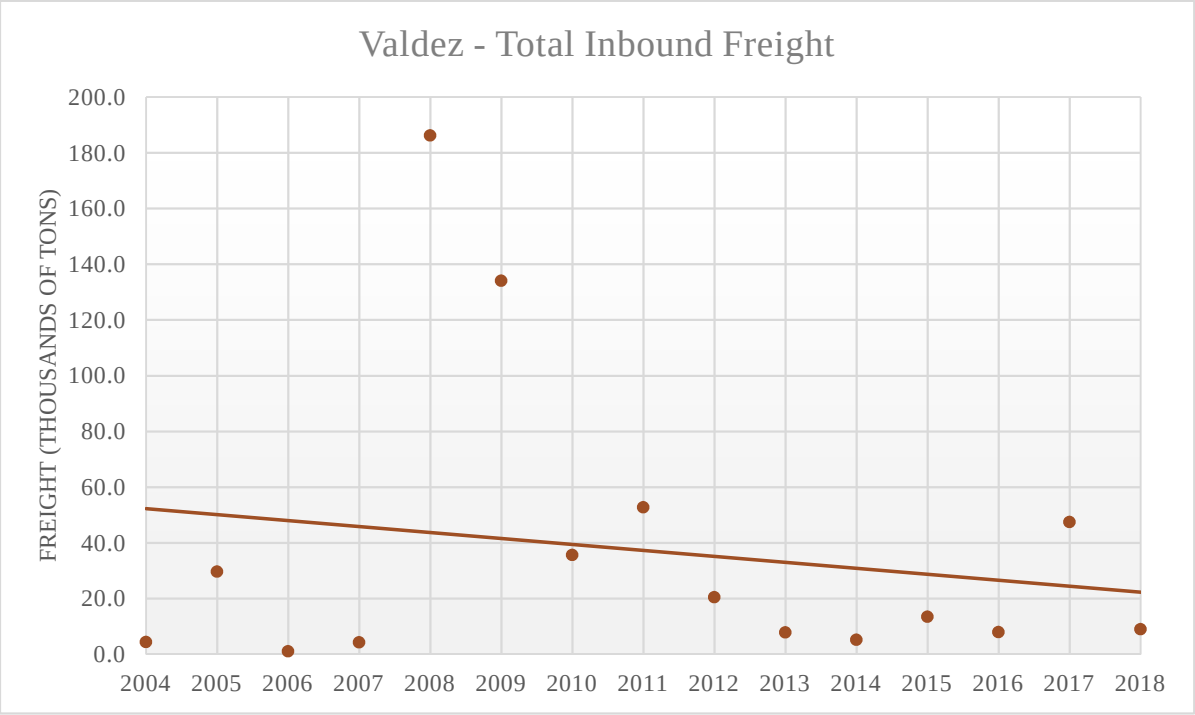


Figure 13: Anchorage Inbound Freight Trends 2004 – 2017

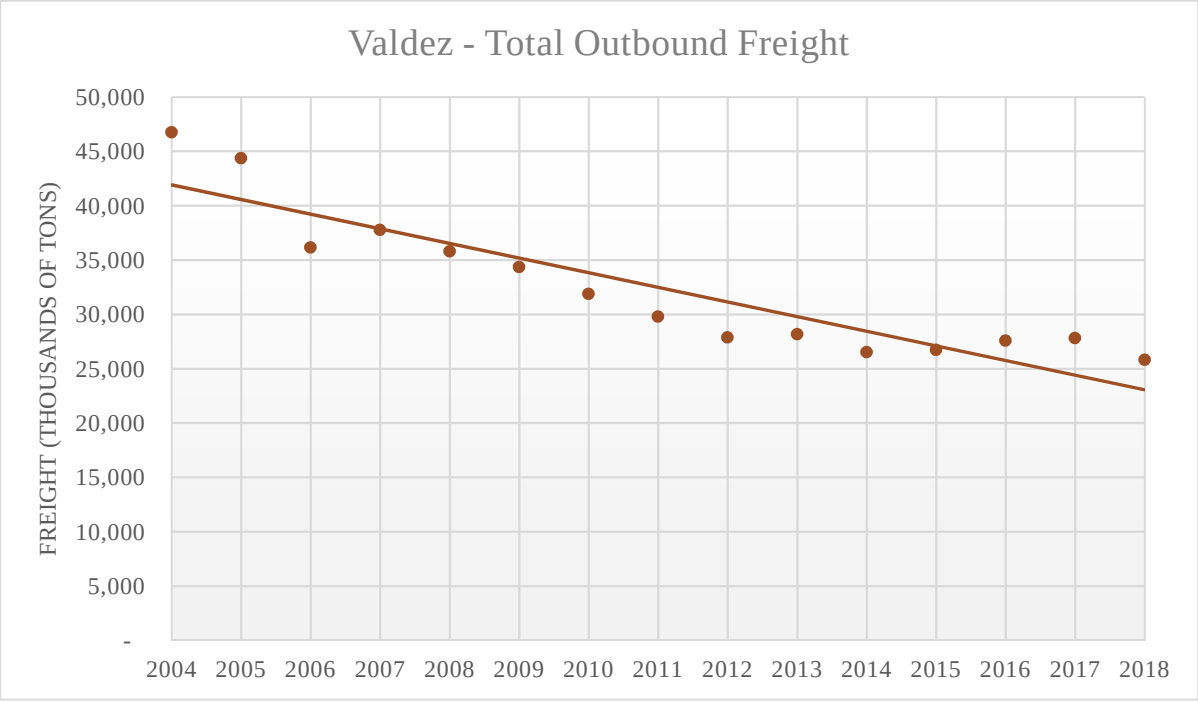


Figure 14: Anchorage Outbound Freight Trends 2004 – 2017

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.

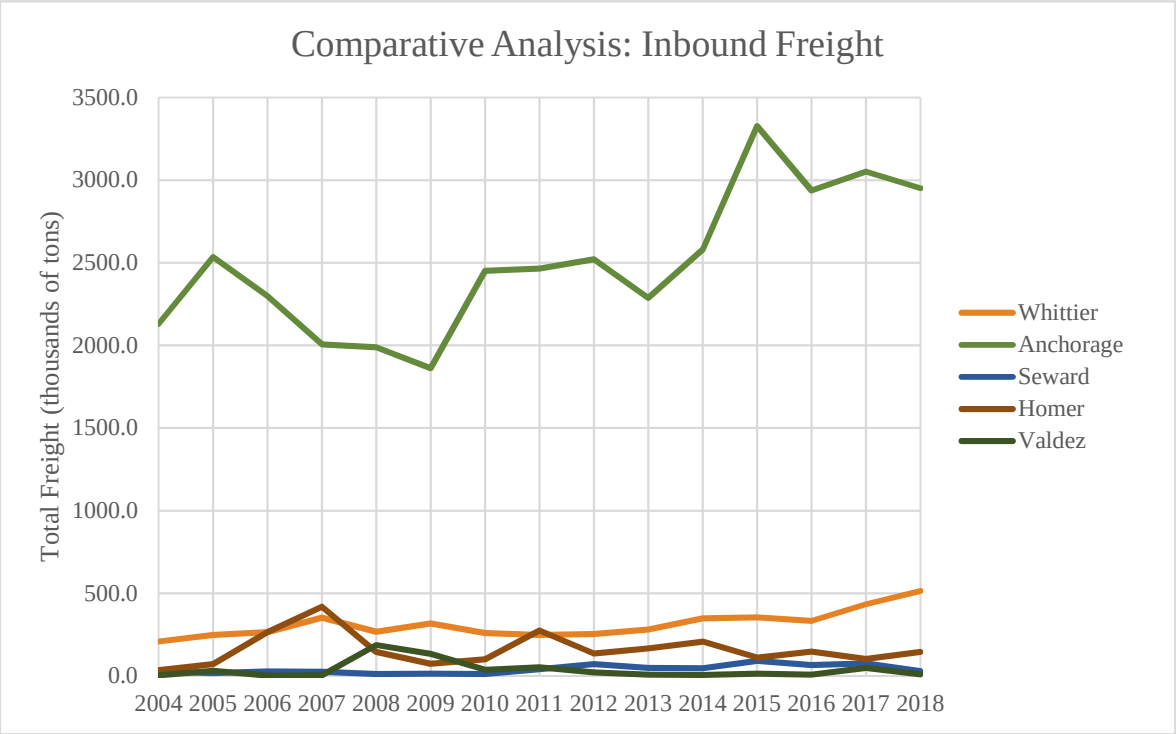


Figure 15: Whittier, Anchorage, Seward, Homer and Valdez Inbound Freight Trends 2004 – 2018

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.

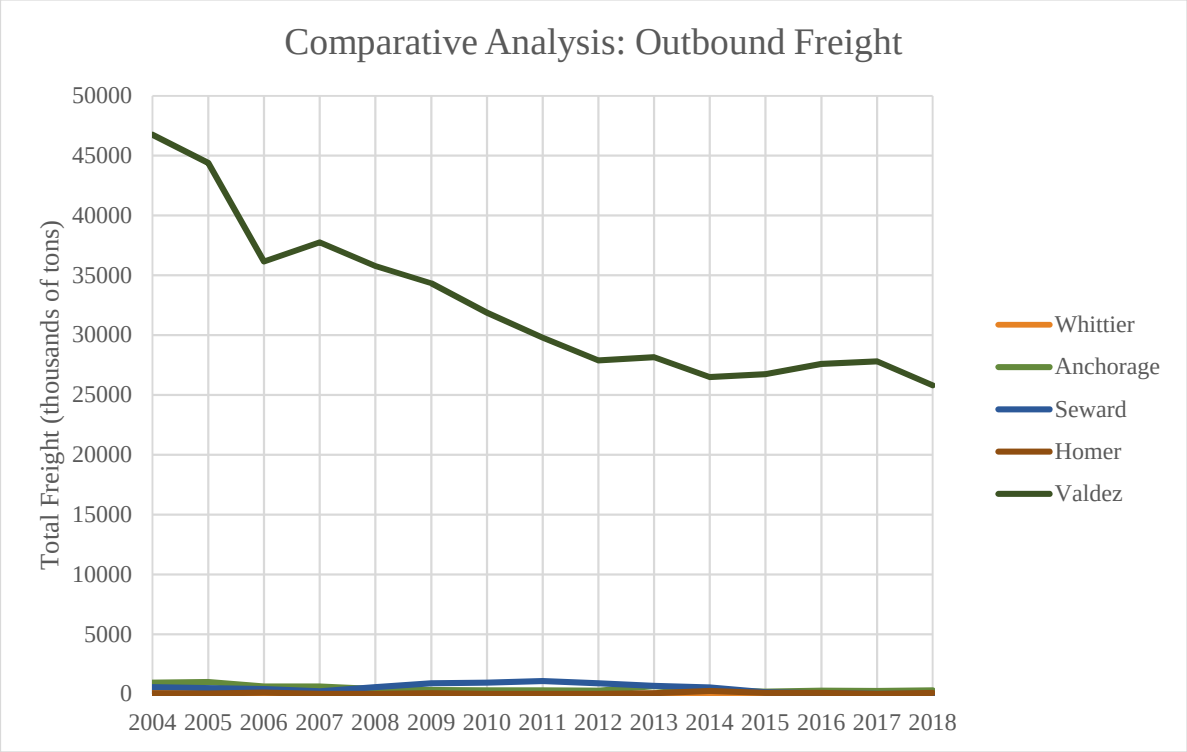


Figure 16: Whittier, Anchorage, Seward, Homer and Valdez Outbound Freight Trends 2004 – 2018

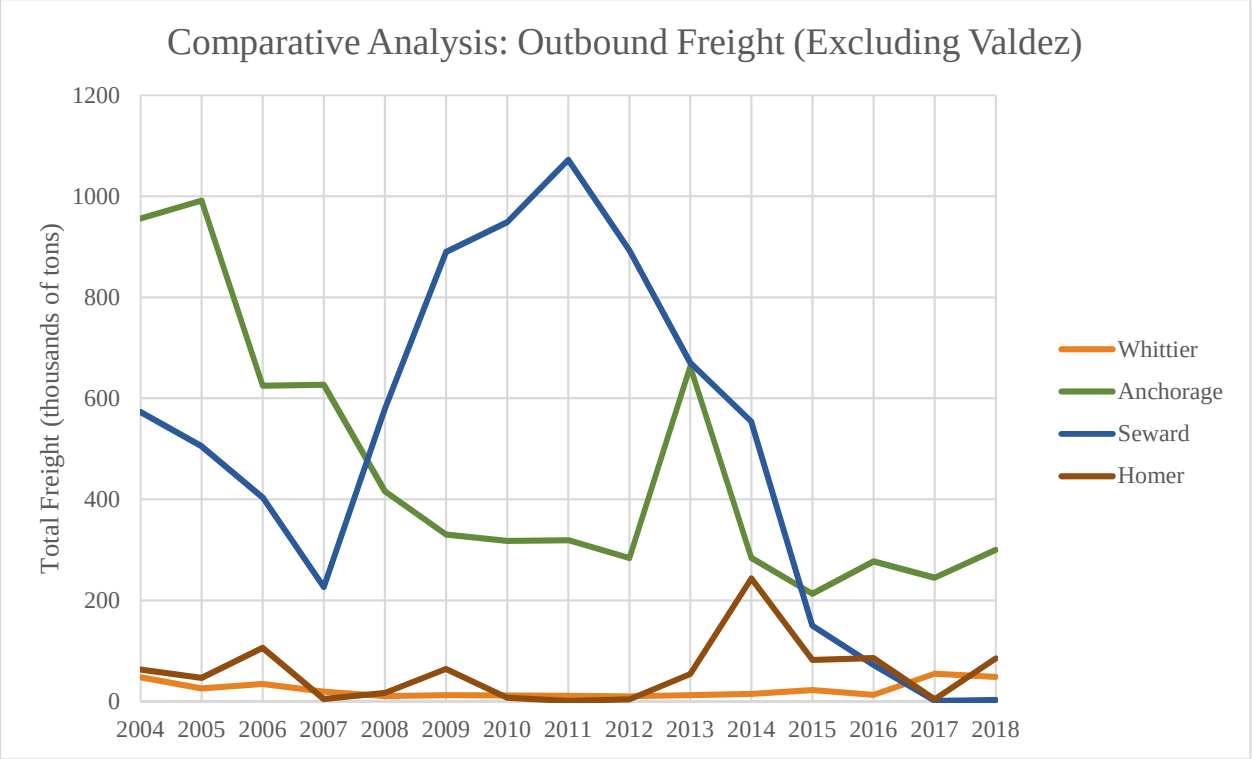


Figure 17: Outbound Freight Trends (Excluding Valdez) 2004 – 2018

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[202122]. 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-Seadfood-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.

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

---

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.

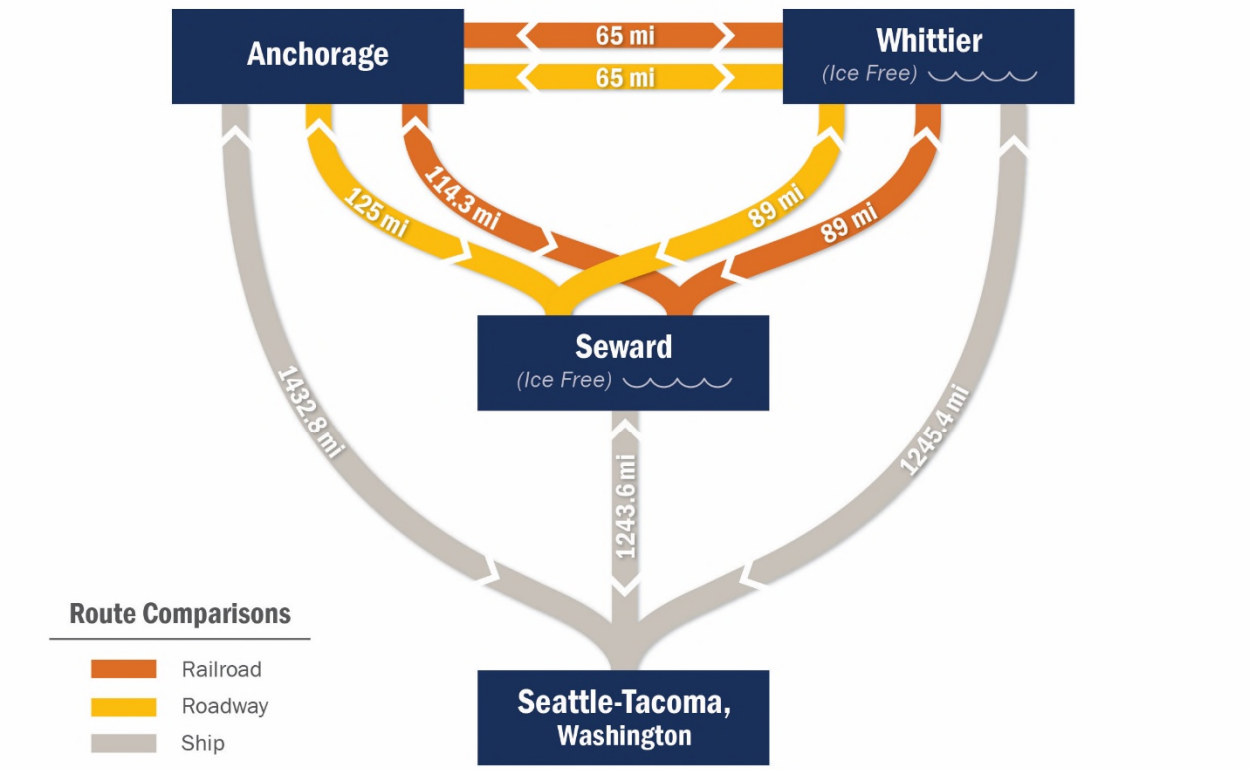
Figure 18 is drawn and updated from the Seward Marine Terminal Expansion Planning Freight Traffic Study, and provides a useful comparison of the transportation distances by water, road and rail and the associated population centers. This figure compares transportation distances by water from Seattle-Tacoma, 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 Seattle-Tacoma

To Seward		To Whittier		To Anchorage	
Ship	77 hrs @ 14 knots	Ship	77 hrs @ 14 knots	Ship	89 hrs @ 14 knots

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		

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.

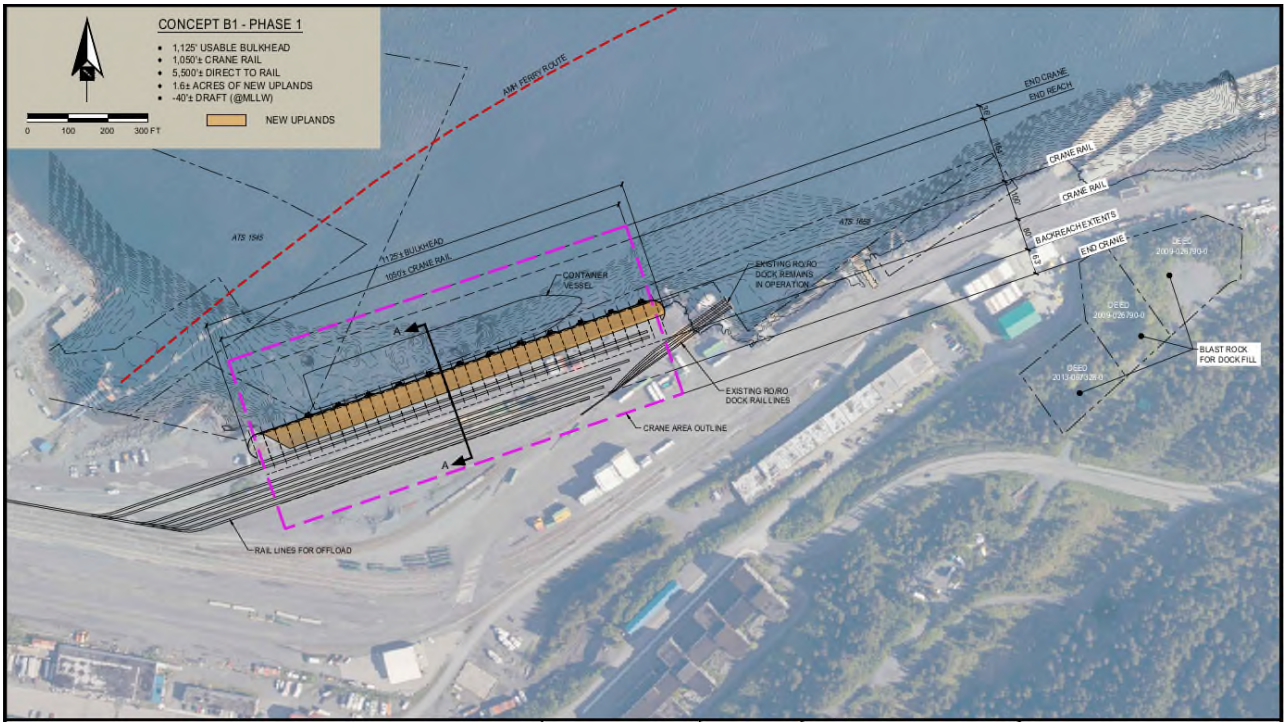


Figure 19: Phase 1 Concept Plan

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.

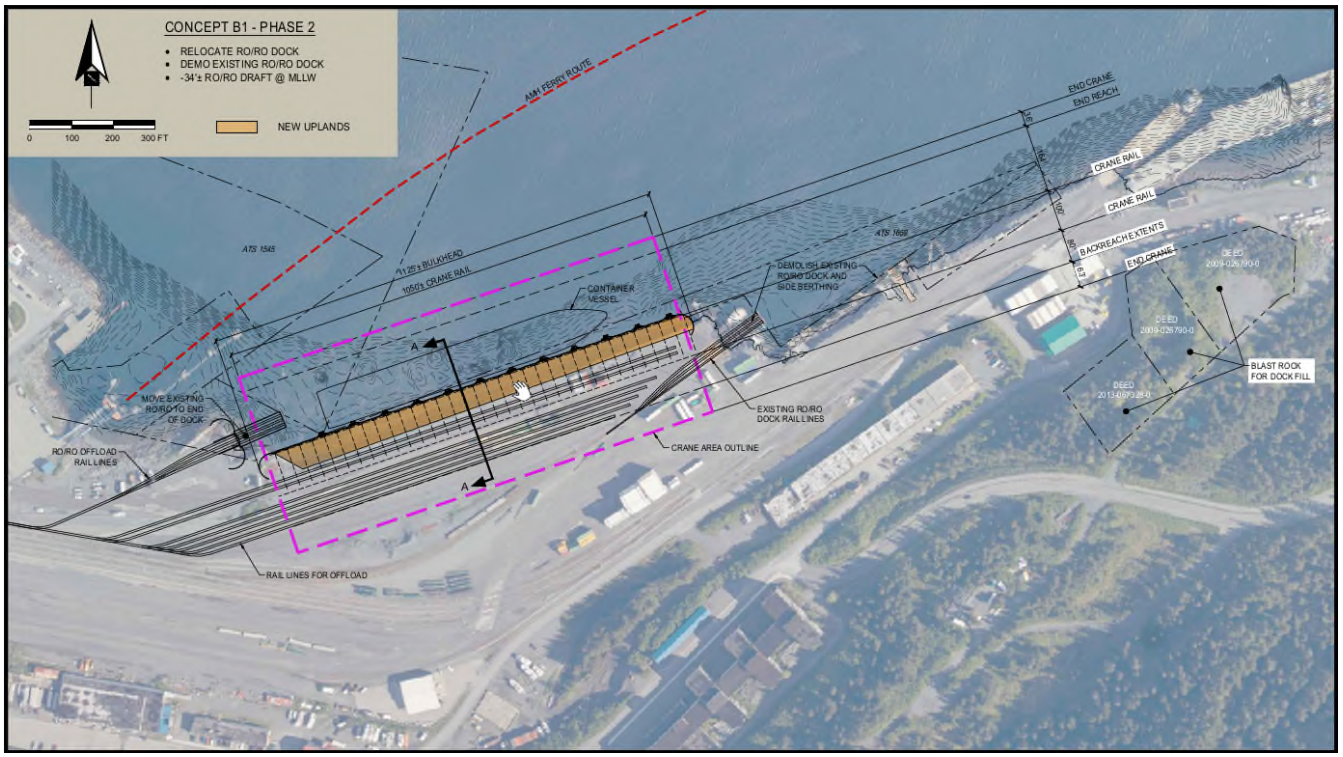


Figure 20: Phase 2 Concept Plan

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.

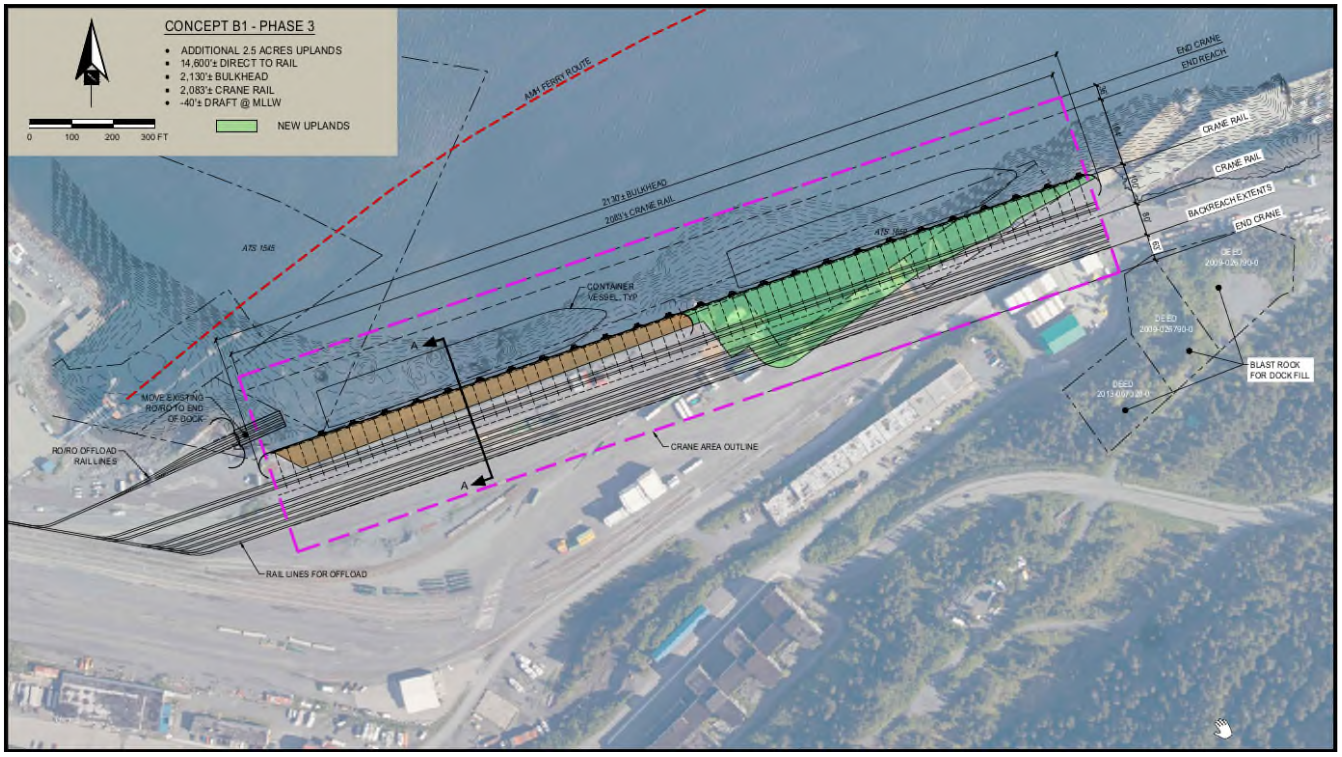


Figure 21: Phase 3 Concept Plan

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.

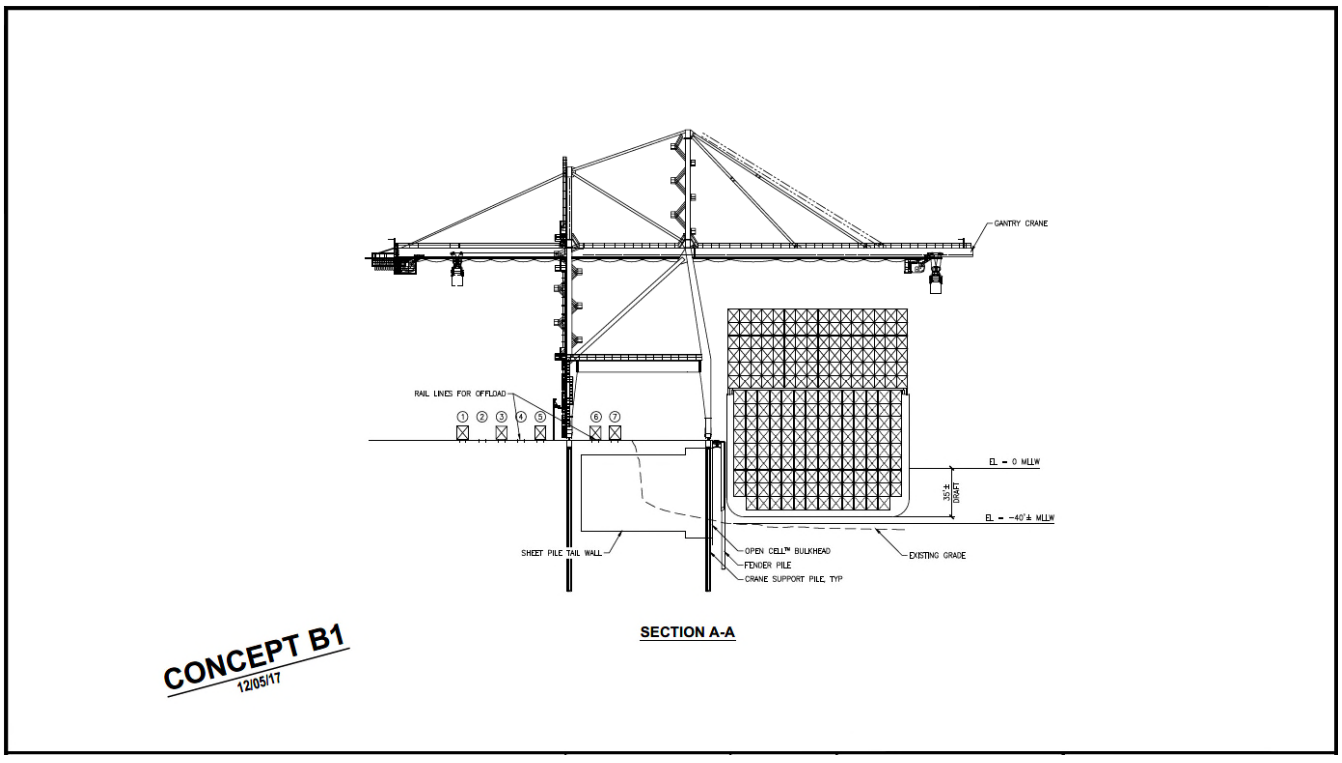


Figure 22: Proposed Dock Section – Marginal Wharf for Container Freight

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.

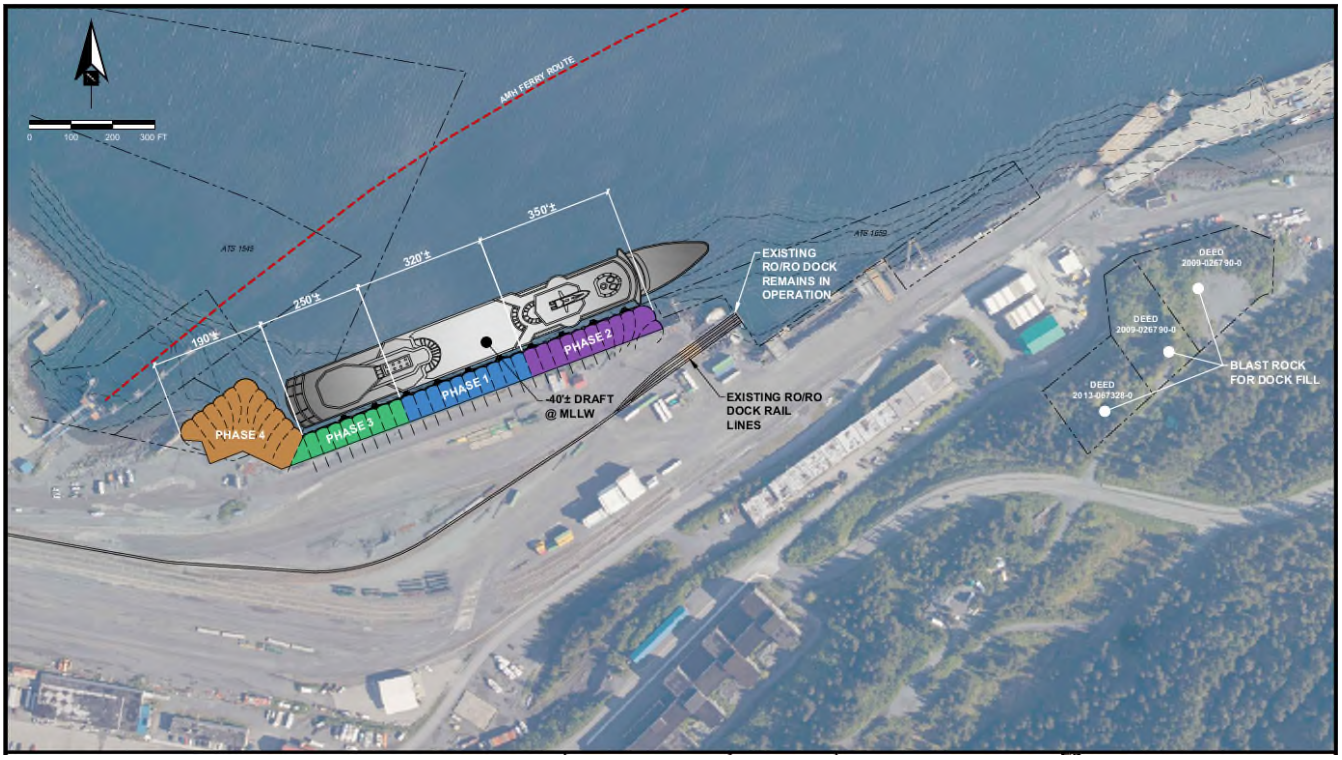


Figure 23: Freight/Cruise Marginal Wharf Concept Site Plan

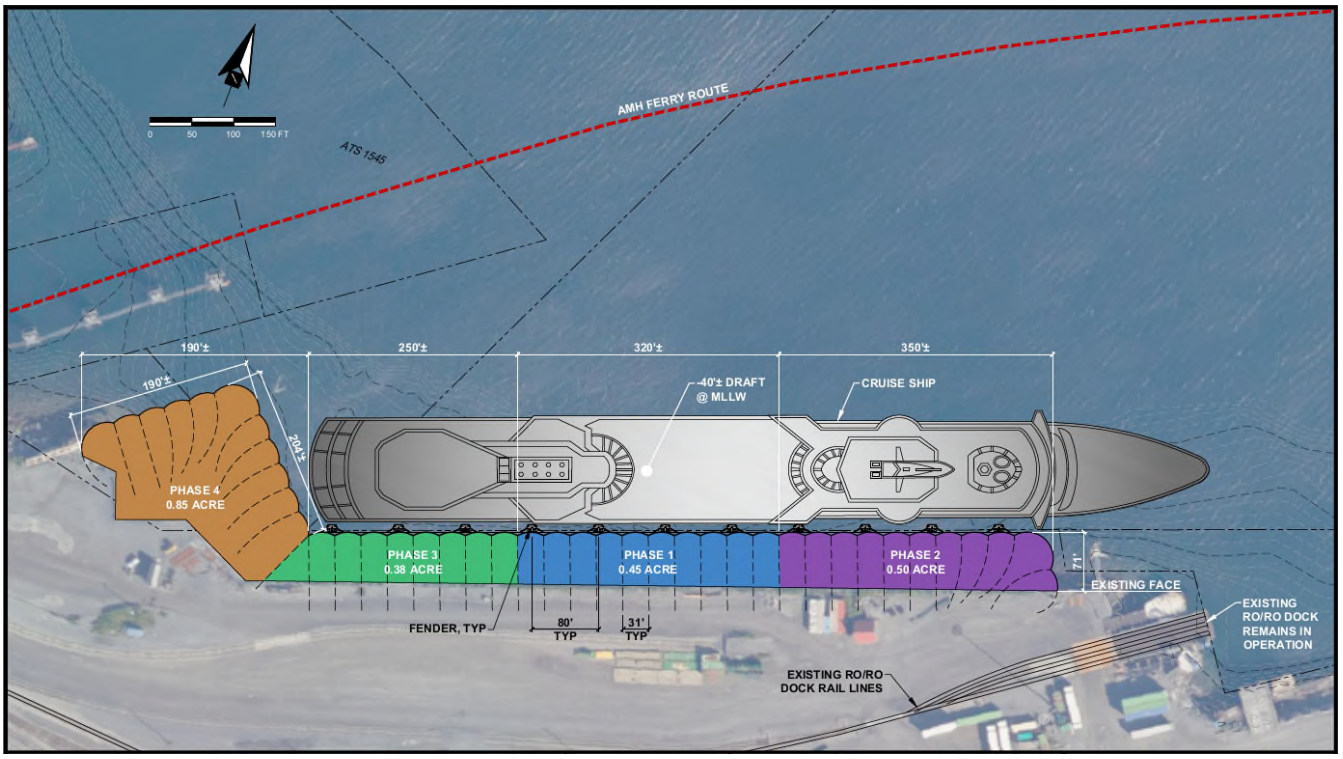


Figure 24: Freight/Cruise Marginal Wharf Concept Staging Plan

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 - PHASE 1

- 1,125' USABLE BULKHEAD
- 1,050'± CRANE RAIL
- 5,500'± DIRECT TO RAIL
- 1.6± ACRES OF NEW UPLANDS
- -40'± DRAFT (@MLLW)

0 100 200 300 FT

NEW UPLANDS

AMH FERRY ROUTE

ATS 1545

ATS 1659

1125'± BULKHEAD

1050'± CRANE RAIL

CONTAINER VESSEL

EXISTING RO/RO DOCK REMAINS IN OPERATION

EXISTING RO/RO DOCK RAIL LINES

CRANE AREA OUTLINE

RAIL LINES FOR OFFLOAD

A

A

END CRANE

END REACH

36'

164'

CRANE RAIL

CRANE RAIL

100'

80'

BACKREACH EXTENTS

93'

END CRANE

DEED 2009-026790-0

DEED 2009-026790-0

DEED 2013-067328-0

BLAST ROCK FOR DOCK FILL

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 1

DESIGNED BY:	PND	DATE:	12/05/17
CHECKED BY:	PND	PROJECT NO:	171140

SHEET NO: 1 OF 4

CONCEPT B1 - PHASE 2

- RELOCATE RO/RO DOCK
- DEMO EXISTING RO/RO DOCK
- -34'± RO/RO DRAFT @ MLLW

0 100 200 300 FT

NEW UPLANDS

AMH FERRY ROUTE

ATS 1545

ATS 1659

1125'± BULKHEAD

1050'± CRANE RAIL

CONTAINER VESSEL

DEMOLISH EXISTING RO/RO DOCK AND SIDE BERTHING

END CRANE

END REACH

36'

164'

CRANE RAIL

CRANE RAIL

100'

80'

BACKREACH EXTENTS

END CRANE

93'

DEED 2009-026790-0

DEED 2009-026790-0

DEED 2013-067328-0

BLAST ROCK FOR DOCK FILL

A

A

MOVE EXISTING RO/RO TO END OF DOCK

RO/RO OFFLOAD RAIL LINES

EXISTING RO/RO DOCK RAIL LINES

CRANE AREA OUTLINE

RAIL LINES FOR OFFLOAD

CONCEPT B1

12/05/17

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 - PHASE 3

- ADDITIONAL 2.5 ACRES UPLANDS
- 14,600'± DIRECT TO RAIL
- 2,130'± BULKHEAD
- 2,083'± CRANE RAIL
- -40'± DRAFT @ MLLW

0 100 200 300 FT

NEW UPLANDS

AMH FERRY ROUTE

2130'± BULKHEAD

2083'± CRANE RAIL

ATS 1545

ATS 1659

CONTAINER VESSEL, TYP

A

A

MOVE EXISTING RO/RO TO END OF DOCK

RO/RO OFFLOAD RAIL LINES

RAIL LINES FOR OFFLOAD

CRANE AREA OUTLINE

END CRANE

END REACH

36'

164'

CRANE RAIL

CRANE RAIL

100'

BACKREACH EXTENTS

80'

END CRANE

63'

DEED 2009-026790-0

DEED 2009-026790-0

DEED 2013-067328-0

BLAST ROCK FOR DOCK FILL

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

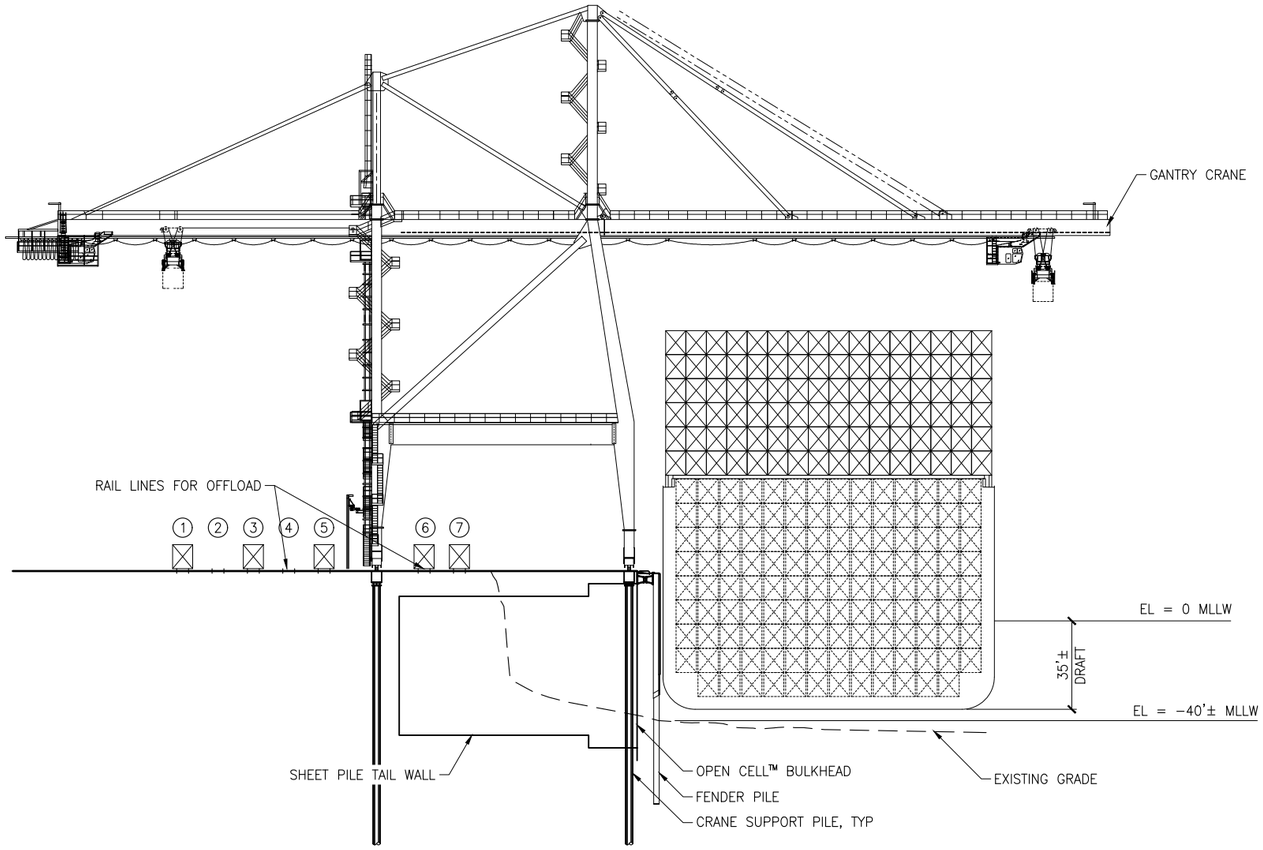
PND ENGINEERS, INC.

PROJECT: **WHITTIER ARRC PLANNING**

TITLE: PROPOSED DOCK PLAN
CONCEPT B1 PHASE 3

DESIGNED BY:	PND	DATE:	12/05/17
CHECKED BY:	PND	PROJECT NO:	171140

SHEET NO: 3 OF 4



SECTION A-A

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

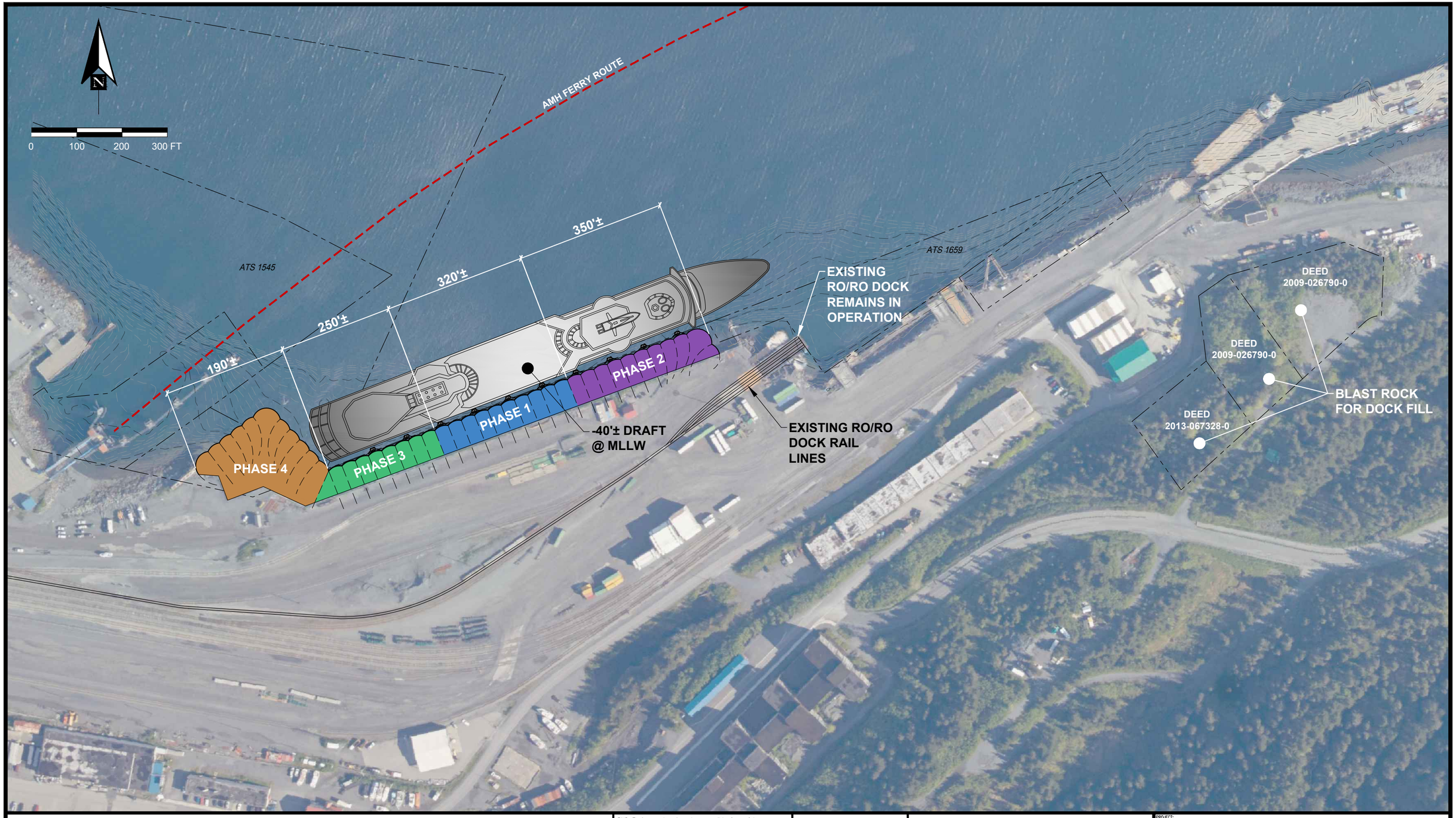
PND ENGINEERS, INC.

PROJECT: **WHITTIER ARRC PLANNING**

TITLE: PROPOSED DOCK SECTION
CONCEPT B1

DESIGNED BY:	PND	DATE:	12/05/17
CHECKED BY:	PND	PROJECT NO:	171140

SHEET NO: 4 OF 4



CONCEPT
2/27/2018

REV	DATE	DESCRIPTION

DATE: _____

1506 West 36th Avenue
Anchorage, Alaska 99503
Phone: 907.561.1011
www.pndengineers.com
AK. LIC# AECC250

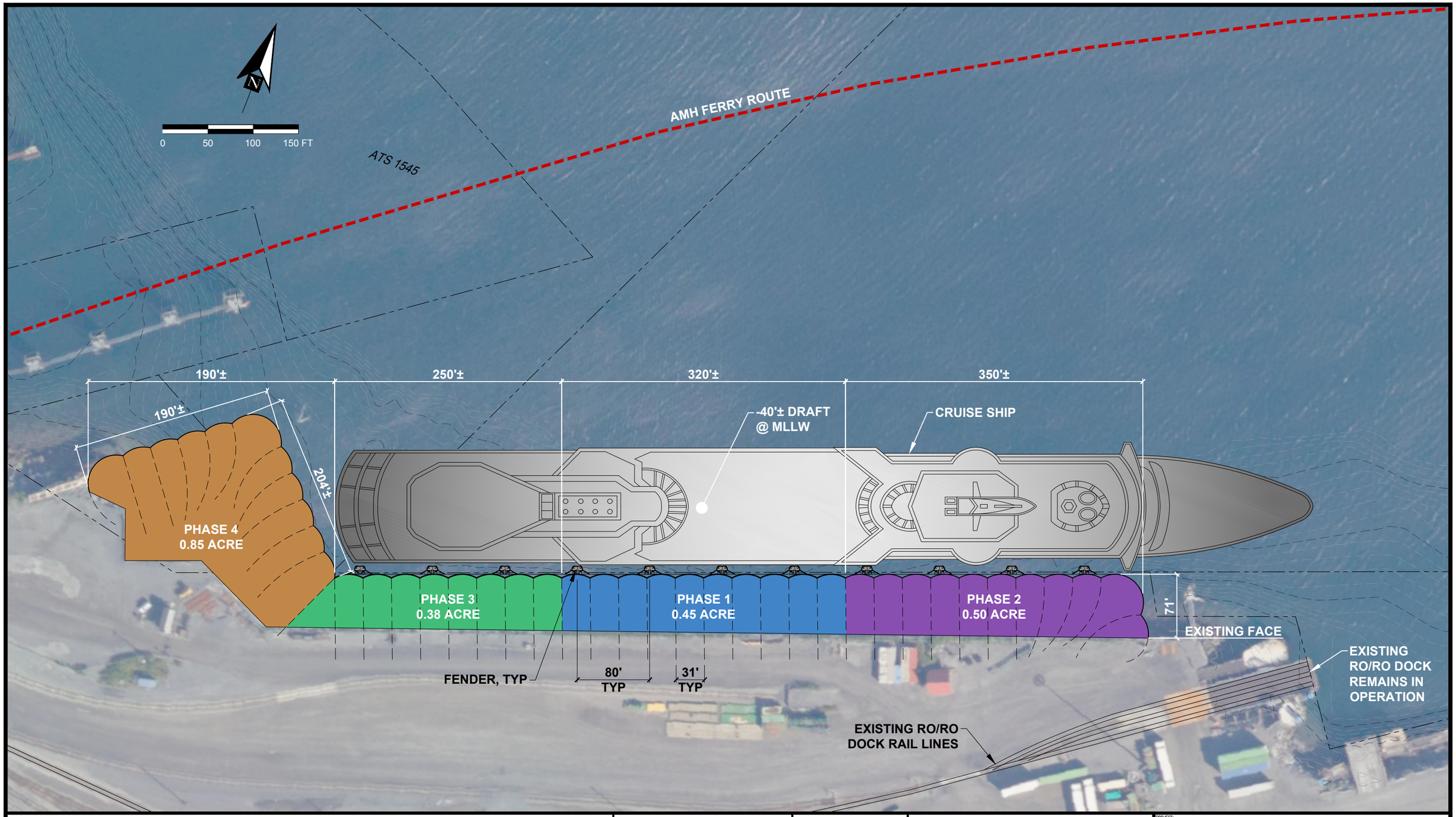
PND ENGINEERS, INC.

PROJECT: **WHITTIER ARRC PLANNING**

TITLE: PHASED MARGINAL WHARF CONCEPT

DESIGNED BY:	PND	DATE:	2/27/2018
CHECKED BY:	PND	PROJECT NO:	171140

SHEET NO: 1 OF 2



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: _____

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: PHASED MARGINAL WHARF CONCEPT

DESIGNED BY:	PND	DATE:	2/27/2018
CHECKED BY:	PND	PROJECT NO:	171140

SHEET NO: 2 OF 2

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

This page intentionally left blank.

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.

This page intentionally left blank