Master Plan Appendices

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Seward Marine Terminal Expansion Planning

Appendix A:
Stakeholder Visioning Report

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SEWARD MARINE TERMINAL EXPANSION PLANNING

FINAL STAKEHOLDER VISIONING REPORT

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1 Introduction

Stakeholder outreach for Seward Marine Terminal Expansion Planning began in October 2015 and continued through May 2017 to assess the immediate priorities and concerns of the stakeholders regarding project benefits and challenges. The goal for stakeholder engagement was to provide a foundation for the project and establish context for the Passenger Traffic, Freight Traffic, and Transportation Connectivity studies, which support the Seward Marine Terminal Expansion Master Plan.

To identify current deficiencies and concerns around transportation at the Alaska Railroad Corporation's (ARRC) Seward Marine Reserve, the project team gathered input from people, businesses, agencies, and ARRC Divisions who use or have a relationship with the Seward facilities. The sections below detail the stakeholder engagement process, identify the individual stakeholders involved, and describe specific outreach activities conducted and key priorities observed.

2 Description of Stakeholders

2.1 Internal Stakeholders

Internal stakeholders are staff employed by ARRC. They included personnel from ARRC Engineering, Marketing, Security, Real Estate, Technology and Executive divisions. Invitations were sent to the head of each division, and attendees were at the discretion of the division head. The project team documented the involved persons and made note of selected points of contact for future project interactions.

Photo 1 Visioning Meeting

2.2 External Stakeholders

External stakeholders included vessel support service agencies, multi-modal shippers, commodity export industry representatives, fuel and chemical suppliers, mooring companies, fisheries, marine construction companies, scientific research vessel operators, freight logistics consultants, passenger vessel support service providers, cruise line industries, tour companies, rental car agencies, local schools, government agencies, local and state elected officials, Seward citizen planning commissions, and commercial property owners and leaseholders near the Seward Marine Reserve. External stakeholder organizations/businesses were initially identified via ARRC's list of entities holding permits for ARRC facility use, and of real estate leaseholders in the Seward Marine Reserve. It also included parties identified as interested in future transactions with ARRC in the Seward area. The project team added to the stakeholder list based on additional Internal and External stakeholder input during the stakeholder engagement process.

3 Methodology

Stakeholder engagement sought to identify common goals between the ARRC, ARRC customers, and the local community in an effort to prioritize local infrastructure investment needs. Meetings were divided into two types, Visioning and subsequent Subject Matter Expert (SME) Meetings. In-person meetings,

surveys, email and telephone correspondence, workshops, newsletters, and a website were utilized to initiate and maintain outreach during the course of the planning process. Throughout engagement, the project team sought to educate stakeholders about the project, inform stakeholders how and when they can provide input, and establish points of contact with subject matter experts in the community or business.

The project documented stakeholder data on passenger and freight traffic demands, modes, and flow in Seward and throughout Southcentral Alaska. The project team gathered ideas on how to improve ARRC's facilities and real estate to serve the region and the state. For the purpose of continuing to meet local and global economic fluctuations, the project Vision remained fluid throughout the life of the project.

3.1 Project Branding and Logo

In order to solidify the project's identity as distinct from other ARRC or City of Seward projects, stakeholder input from Seward focus groups helped develop a logo to graphically convey the project purpose (see Final Branding Report in Appendix A). The goal was to create a project brand to carry Master Plan projects past the planning and into the design and construction phases. After Internal stakeholder review and approval, the Seward Marine Terminal Expansion Plan Project was branded "Railport Seward: Reimagining Travel and Trade." Once established, the project brand was incorporated into all stakeholder outreach.

3.1.1 Vision Statement

In response to stakeholder input, the project team crafted a Vision Statement to guide the project studies. The statement is a living guide for the planning process as the project looks at Seward's and the region's transportation needs. It took into account stakeholder input, the ARRC's core values, economic forecasting, and the requirements of the project's TIGER grant funding. At the time of this report, the Vision Statement is as follows:

Reimagining travel and trade to enhance economic vitality and increase opportunities in the region by balancing port, rail, and real estate to meet transportation demands.

The Vision Statement is a "living" document and will receive revisions and updates throughout the course of the project.

The Vision Statement provides a concise purpose for prospective design alternatives, and will assist planners in considering the best uses of the ARRC's assets in Seward. The statement will continue to evolve and serve the project through planning and beyond, and ensure this nationally and regionally significant port continues to meet current and future demand.

4 Visioning Meetings

To ensure consistent and appropriate qualitative stakeholder data, meeting collateral for Visioning included high level PowerPoint presentations, a survey questionnaire, and a tabletop aerial map of the project area to orient and document stakeholder comments around the Seward Marine Terminal assets. The survey questionnaire was provided to stakeholders in hard copy format at each meeting and also emailed as a fillable PDF.

4.1 Internal Stakeholder Meetings

Internal stakeholder meetings for Visioning were either in person or via teleconference. Copies of Internal meeting materials and presentations are included in Appendix B, Internal Meeting Collateral.

All stakeholder meetings were documented with meeting minutes and aerial map notes when applicable. Survey questionnaires allowed for follow up comments, or comments in lieu of meeting participation. Stakeholders were encouraged to forward or share the survey questionnaires with personnel in their department with subject matter expertise. A total of 3 Internal stakeholder survey questionnaires were returned. Internal meeting minutes and returned surveys are included in Appendix C, Internal Feedback.

Table 4-1 Internal Stakeholder Meetings

Division	Meeting date	Type	# Stakeholders	# Team
ARRC Engineering	10/13/2015	In-person	5	4
ARRC Real Estate	10/13/2015	In-person plus survey	5	4
ARRC Security	10/13/2015	In-person plus survey	2	4
ARRC Marketing	10/15/2015	In-person	4	4
ARRC Executives	10/16/2015	In-person	4	4
ARRC Technology	10/16/2015	In-person plus survey	5	4

4.2 External Stakeholder Meetings

An intense schedule of 53 small External stakeholder meetings and presentations began in Seward in October 2015 and continued through December 2015. Additional meetings and other outreach efforts occurred through May 2017 as new stakeholders were identified or requested information. Meetings were either in person or via teleconference. Copies of External meeting materials and presentations are included in Appendix D, External Outreach Collateral.

Stakeholder meetings were documented with meeting minutes and aerial map notes. Survey questionnaires allowed for follow up comments, or comments in lieu of interactive meetings. Stakeholders were encouraged to forward or share the survey questionnaires with personnel in their organization with subject matter expertise. A total of 19 External stakeholder survey questionnaires were returned. Meeting minutes, returned surveys, and additional outreach through emailed comments, etc. are included in Appendix E, External Feedback. ($\pm$ indicates a small group meeting).

Table 4-2 External Stakeholder Meetings

Stakeholder	Outreach Date	Type	# Stakeholders	# Team
Alaska Logistics	10/21/2015	Teleconference	1	4
Alaska Marine Coatings	10/13/16	Website comment	1	
Alaska Maritime Agencies	12/10/2015	In-person ±	3	3
Alaska Sealife Center	10/6/2015	In-person	1	4
Alaska West	10/21/2015	In-person ±	1	4
Aldrich Offshore	10/6/2015	In-person ±	1	4
Alyeska Pipeline	10/22/2015	Teleconference	1	4
Anderson Tug	10/6/2015	In-person ± Plus survey	2	4
AVTEC	10/16/2015	Teleconference	2	4
Brice Marine	10/12/2015	In-person plus survey	1	4
Carlile	10/23/2015	In-person	2	4
Catalyst Marine	10/7/2015	In-person	2	4
Clock (Chamber participant)		Survey only	-	-
Cook Inlet Tug	10/21/2015	In-person ±	1	4

Stakeholder	Outreach Date	Type	# Stakeholders	# Team
Crowley	10/27/2015	In-person plus surveys (2)	1	4
Cruise Lines International Association, Alaska (CLIA)	3/10/2016	Phone call	-	-
CVRF	10/20/2015	Teleconference	1	4
Delta Western	10/13/2015	In-person ±	1	4
Disney Cruises	8/25/2016	email	-	-
Edison Chouest	10/20/2015	In-person	2	4
GCI		Survey only	-	-
Granite Construction	10/12/2015	In-person ±	1	4
Hertz / Major Marine Tours (Tom Tougas)	10/12/2015	Teleconference ±	1	4
Holland America Line	2/9/2016	email		
Holland America-Princess	10/23/2015	In-person	1	4
Icicle Seafoods	10/7/2015	In-person	1	4
Inlet Fish	10/20/2015	Teleconference ±	1	4
Jaffa Construction	10/11/16	Website comment	1	
Kelly-Ryan, Inc.	11/4/2015	In-person	1	3
Kenai Fjords Tours		Survey only	-	-
Kirby Offshore Marine	10/23/2015	In-person ± plus survey	1	4
Neptune Shoreside Services	12/10/2016	In-person ±	1	3
North Star Terminal and Stevedoring	10/13/2015	In-person	2	4
Norwegian Cruise Lines	7/14/2016	email	-	-
Ocean Marine	10/12/2015	In-person	1	4
Orion	10/12/2015	In-person ± plus surveys (2)	2	4
Pacific Pile and Marine	10/12/2015	In-person ± plus survey	1	4
Pacific Rim Logistics	10/15/2015	In-person ± plus survey	1	4
Premier Tours	10/6/2015 and 10/12/15	In-person ± plus survey	1 and 3	4 and 4
Royal Caribbean Cruise Lines		Survey only	-	-
Samson Tug	10/23/2015	In-person ±	1	4
Seward Chamber of Commerce	5/20/2016	In-person	24	2
Seward Chamber of Commerce, Director	10/21/2015	Teleconference	1	4
Seward City Council	12/14/2015 and 5/19/16	In-person	10 and 12	1 and 4
Seward City Manager	10/21/2015	Teleconference	1	4
Seward Historic Preservation Commission	10/28/2015	In-person	7	1
Seward PACAB	10/7/2015	In-person	7	4
Seward Planning Commission	10/6/2015	In-person	6	4
Seward Rotary	7/19/2016	In-person	15	4
Shoreside Petroleum	10/6/2015 and 10/13/2015	In-person ±	1 and 1	4 and 4
Silversea Cruise Lines	7/14/2016	email	-	-
Southeast Stevedoring	10/13/2015	Teleconference ±	1	4
TOTE		Survey only	-	-
Turnagain Build	10/12/2015	In-person ±	1	4
UAF	10/7/2015	In-person plus survey	2	4
Univar	11/5/2015	In-person plus survey	1	3
Urbach (Chamber participant)		Survey only	-	-
Usibelli	10/15/2015	Teleconference	1	4
Vigor	10/6/2015	In-person	2	4
Vitus Marine	10/15/2015	In-person ± plus survey	3	4

4.3 Agencies and Other Governmental Outreach

Agency outreach sought to identify points of contact for future interaction and to assess desire to provide input on the Master Plan. Points of contact for potentially interested agencies were established via phone calls and emails. The following agencies were contacted.

Table 4-3 Agency Outreach

Agency	Notes
United States Coast Guard (USCG)	Planning Branch Chief for Civil Engineering in Juneau interested in Master Plan
US Fish & Wildlife Service (USFWS)	Commercial Fisheries not interested, but Anchorage Field office would like to be updated on Master Plan
Alaska Department of Transportation and Public Facilities, Aviation (DOT&PF)	DOT&PF will handle aviation outreach in lieu of FAA
Alaska Department of Transportation and Public Facilities, Roads (DOT&PF)	Interested in Master Plan
Alaska Division of Fish and Game (ADF&G)	Interested in Master Plan
State Historic Preservation Office (SHPO)	Several points of contact wish to be included
US Army Corps of Engineers (USACE	Section Chief will be point of contact
US Navy	Not interested in involvement because they use Whittier for their ships
Federal Aviation Administration (FAA)	Deferred to DOT&PF Aviation
United States Customs and Border Protection (USCBP)	Only involved if Seward plans to attract passengers coming direct from foreign countries

DOT&PF Roads and Aviation

On February 15, 2017, a meeting was held at DOT&PF to gather input on scheduled highway improvements and potential Seward Airport improvements and how improvements may align or conflict with ARRC's planning efforts. Areas of particular interest were potential improvements to Airport Road, the Seward Highway intersection, track crossings, FAA participation, jetty improvements, and operations equipment such as cranes in the approach elevations. In attendance were six DOT staff, the contractor for Seward Airport improvement planning, one ARRC representative, and three project representatives. Meeting collateral and summary notes are included in Appendix F, Agency Outreach. Discussions will continue as the project moves forward.

4.4 Declined Stakeholders

The following stakeholders were contacted and declined further interaction with the project.

Table 4-4 Declined Stakeholders

Stakeholder	Notes
Amerigas	Declined. No conflicts with ARRC
Captain Jack's Seafood Locker	Person who answered interested, but unsure owner would be. I left our contact information
Coastal Villages Region Fund	Declined, no plans for future activity in Seward
Shell	Declined due to layoffs

4.5 Additional Visioning Activities

Anchorage Transportation Fair

ARRC hosted a booth at the Anchorage Transportation Fair on February 4, 2016, with project representatives in attendance to answer questions. A poster and a fact sheet were developed to support stakeholder education. Copies can be viewed in Appendix D, External Outreach Collateral.

Missing Stakeholders

Contact was attempted with additional External stakeholders without success. For stakeholders who missed meetings, a follow-up email to offer a second meeting was sent. All stakeholders on Table 4-5 were emailed a survey questionnaire and the Visioning PowerPoint presentation on October 26, 2015' in a final effort to afford them input prior to the project moving into the study phase.

Table 4-5 Missing Stakeholders

Stakeholder	Notes
A.N.P Shipping Company	2 emails plus phone call
Alaska Marine Transport	1 email plus 2 voice messages
All Alaska Transport	2 emails plus voicemail
Alta Logistics	1 phone call, 1 email, 1 voice message
Amak Towing	Meeting scheduled, no-show
Boyer Towing	Emailed
Cruz Construction	1 phone call, 1 email
Fisherman's Finest	2 emails, 1 voicemail
Foss Maritime	3 emails, missed meeting, follow up meeting offered
Norseman Maritime	emailed & TC, asked to be kept in loop, but can't meet
Northland Services - past affiliation	emailed
Quality Asphalt Paving, Inc.	2 voice messages 3 emails
Qutekcak Tribe	1 phone call, no answer, 5 emails
Raibow Fiberglass & Boat Repair	1 voice message, 1 email
Sam Barging Inc.	Not a working number
Seatac Marine Services	Meeting scheduled, no-show
Seward Ship Chandlery	Voice message
The Storage Option	Meeting scheduled, no-show
Top Side Services	voicemail
Unimak Fisheries, LLC	voicemail
US Seafoods	Meeting scheduled, no-show
Western Tow Boat	Voicemail and email

5 Subject Matter Expert (SME) Meetings

Data gathering for the freight and passenger studies required technical input from users familiar with the Seward Marine Terminal assets and with various types of freight and passenger transportation using marine, rail, and road operations. The project team identified a suitable list of subject matter experts (SMEs) by synthesizing data from the Visioning process. SME participants included company-wide Alaska Railroad departments as well as External stakeholders including passenger vessel support service

providers; cruise line industries; tour companies; rental car agencies; freight service providers for marine, road, and rail; marine fabrication and repair companies; fuel and chemical companies; bulk commodities industries; large project logistics management companies; fisheries; local and state elected officials; and Seward citizen planning commissions.

Technical and economic information gathered from SMEs was used to determine feasibility and to support alternatives selection for the Master Plan. Pedestrian traffic and Americans with Disabilities Act compliance were also considered as a part of the overall study. Activities included small meetings, workshops, presentations, site visits, and design charrettes.

5.1 SME Meetings and Correspondence

SMEs were contacted as multi-disciplinary team members requested information, and small meetings or teleconferences were arranged when possible. Other SME data was gathered through email. During meetings, detailed notes were taken regarding existing deficiencies and priorities for the railroad's assets within the Seward Marine Reserve. SME comments were categorized into a question-tracking matrix, and key issues were identified to help refine potential projects for the Master Plan. Meeting minutes and other records of correspondence are included in Appendix G, SME Outreach, and should be considered confidential. The following stakeholders were contacted via face-to-face meetings in Anchorage, telephone calls, and emails. Table 5-1 summarizes the primary topic of each stakeholder meeting.

Table 5-1 SME Outreach

Stakeholder	Outreach Date	Topics
Catalyst Marine	12/7/2015	Technical Q/A's about the Freight Dock, moorage, roll on/off, facilities, and safety. Local view of passenger needs in Seward
Kenai Fjords	12/8/2015	Marine to rail passenger needs
Pacific Rim Logistics	12/8/2015	Technical Q/A's about facilities use, potential large construction project needs, and improvements/future needs.
Samson Tug	12/8/2015	Technical Q/A's about facilities use, advantages of Port of Seward, security, connectivity.
Vitus	12/8/2015	Technical Q/A's about barge vessels, moorage, economics, future, and port competition.
Alaska Logistics	12/9/2015	Technical Q/A's about vessel size, barge uplands, use of facilities, costs in Seward, and needs.
North Star Terminal and Stevedoring	12/9/2015	Technical Q/A's about operations/use of docks and facilities, improvements needed, and military freight.
Shoreside Petroleum	12/10/2015	Technical Q/A's regarding fuel shipment needs.
ARRC Technology	12/14/2015	Technical Q/A's about technology's support in security, communication capability, fiber, and electric signage
ARRC Engineering	12/15/2015	Technical Q/A's for passenger dock and terminal designs
ARRC Executives	12/15/2015	Overview of railroad passenger services. Technical Q/A's about freight, year-round facility use, and priorities.
Univar	12/16/2015	Technical Q/A's about using Port of Seward for chemical shipping and future needs for operations.
ARRC Marketing	12/17/2015	Passenger service opportunities. Technical Q/A's about fuel, docks, facilities, and priorities.
ARRC Real Estate	12/17/2015	Passenger service facility needs. Technical Q/A's about planned improvements, potential development/use of zones.
ARRC Security	12/17/2015	Homeland security and safety requirements

Stakeholder	Outreach Date	Topics
Alaska West	12/18/2015	Technical Q/A's about the passenger dock, fendering, operations, track use, and future growth.
Major Marine Tours / Hertz (Tom Tougas)	12/18/2015	Passenger movement by marine and vehicle
Orion Marine	12/18/2015	Technical Q/A's about lease/use, improvements needed, use of facilities, vessel repair operations, and competition.
ARRC Engineering	12/29/2015	Lessons learned from Port Mac fiber upgrades.
Alaska Maritime Agencies / Cruise Line Agencies of Alaska	1/7/2016	Technical Q/A's about vessel size, use of docks, international freight, needs/concerns for docks.
ARRC Passenger Services	1/7/2016	Technical Q/A's regarding Passenger Terminal, Depot, connectivity and signage
Premier Tours	1/18/2016	Passenger movement from marine to motor coach and rail
ARRC Mechanical	1/20/2016	Technical Q/A's about facility use/needs and locomotives information.
Southeast Stevedoring	1/20/2016	Prioritize Longshoremen requirements for passenger support activities
ARRC Operations	1/22/2016	Technical Q/A's about locomotive capacity, current usage, and future needs.
Crowley	1/22/2016	Technical Q/A's about facility and track use, improvement needs, and moorage ideas.
Holland-America Princess	2/1/2016	Passenger movement from marine to motor coach and rail
Orion Marine	2/1/2016	Gravel sources and shipping
ARRC AOC	2/2/2016	Technical Q/A's about types of railcars, locomotives, track usage, track needs outside of Seward, and timeline of getting trains to/from Anchorage.
ARRC Grants	2/2/2016	Technical Q/A's about federal requirements to be compliant with grants.
Metco	2/2/2016	Information on shipping gravel.
Icicle	2/3/2016	Economic data on Alaskan fisheries.
Alaska Sealife Center	2/4/2016	Potential use of Passenger Terminal
Lynden Freight	2/4/2016	Information on shipping to and from Seward.
ARRC PTC	2/5/2016	Technical Q/A's about PTC needs including technology, timeline, maintenance, storage, etc.
Delta Western	2/5/2016	Technical Q/A's about competition, freight dock needs, moorage.
North Star Terminal and Stevedoring	2/7/2016	Crane and forklift specs
Holland America Group	2/9/2016	Passenger movement forecasting
Northwest ADA Center	2/9/2016	Technical Q/A's about current ADA accommodations or lack of in Seward, any plans for non-ARRC facilities to become compliant, and ADA requirements for ARRC facilities to be compliant
TOTE Maritime	2/16/2016	Technical Q/A's about freight operations, port needs, and future growth.
ARRC Legal Counsel	2/17/2016	Technical Q/A's about FTA and FRA requirements for ADA improvements.
Seward Chamber of Commerce	2/25/2016	Event center questions, cruise ship traffic estimates.

Stakeholder	Outreach Date	Topics
Inlet Fish	3/10/2016	Technical Q/A's on fishing tender offload and fish processing operations, dock use, and real estate needs.
Cruise Lines International Association of Alaska (CLIA)	3/11/2016	Overall current and future economic cruise line data
Carlile	3/24/2016	Shipping rates to and from Seward.
ARRC Seward Port	5/9/16	Request details for inbound / outbound fuel shipments for 2014-15
Premier Tours	5/20/2016	Embark and debark information
ARRC Seward Port	5/23/17	Request information on which ships use luggage conveyor
Holland-America Princess	5/25/2016	Embark and debark information
Holland-America Princess	6/1/2016	Passenger rail feedback
Premier Tours	6/1/2016	Passenger rail feedback
ARRC Seward Port	6/6/16	Seward Dock sewer and water information
Southeast Stevedoring	6/16/2016	Estimates for port disbursements throughout southcentral Alaska
Norwegian Cruise Lines	7/14/2016	Shell door configurations
Silversea Cruise Lines	7/14/2016	Shell door configurations
ARRC Seward Port	7/19/16	Details on upgrade to key on freight dock
Premier Tours	8/2/2016	Passenger operations information for double cruise ship day
ARRC Seward Port	8/5/17	Request for previous years cruise ship schedules
ARRC Seward Port	8/9/16	Information on roof design for Seward conditions
Royal Caribbean Cruise Lines	8/16/2016	Shell door configurations
ARRC Seward Port	8/25/16	Provided overview of discussion with Disney Cruise Lines and ship specifications
Premier Tours	8/26/2016	Cruise ship pedestrian feedback
ARRC Seward Port	8/31/16	TWIC card information
ARRC Seward Port	9/26-28/16	Luggage information, discussion about phasing construction to maintain current operations
ARRC Seward Port	10/4/16	Information on Coast Guard requirements for luggage screening and lease rates in the terminal
ARRC Seward Port	10/12/16	Info on equipment weights for passenger dock and on oil/water separator at the roundhouse
Norwegian Cruise Lines	10/20/16	Requested technical information for larger ship configurations. No response from stakeholder
ARRC Financial	10/17/16 and 10/29/16	Request rates for cruise trains
ARRC Seward Port	1/25/17	2017 cruise ship schedule
ARRC Seward Port	2/10/17	Information regarding Tom Tougas's desire to have lease space for rental car facility near passenger terminal, fishing tender information, and updates to new dockings through 2019
ARRC Seward Port	3/31/17	Information on seafood freight at dock
ARRC Seward Port	4/6/17	Information about cross-gulf ships, provided drone photos

Stakeholder	Outreach Date	Topics
ARRC Seward Port	4/11/17	Provided info on Icicle Seafoods plans, info on Carlile trucks, containerized freight numbers, and City of Seward improvement plans
ARRC Seward Port	5/3/17	Connectivity information, marine maintenance, and fuel

5.2 Site Visits

Site visits to the Seward Marine Terminal and to other transit stations were conducted to gather stakeholder and operations data. The team documented information about what was working well and what was not, future plans, and other topics such as environmental or city development. The following table summarizes the location, purpose, and stakeholders involved for each site visit.

Photo 2 Site Visit Team

Table 5-2 Site Visit Summaries

Location	Date	Stakeholders	Purpose
Seward	11/16/15	ARRC	View and discuss operation of facilities, conduct a site walkover, and inventory facilities for the Facility Fact Sheets. The assets reviewed were the Freight Building, the Uplands real estate, the Roundhouse, the Railyard including the Wye and the Jesse Lee Main, the Depot, the Seward Loading Facility, the Passenger Dock, the Freight Dock, and the Passenger Terminal.
Whittier	12/11/15	ARRC	View example of passenger Terminal design and dock configuration, methods for segregating passengers from freight
Seward	3/23/16	City of Seward	Site walk-through to discuss Port Ave. connectivity.
Seward	5/20/16	ARRC, Premier Tours	Data gathering for passenger movement within the Terminal and between Terminal, Depot, and City.
Seward	6/5/16	ARRC, Holland America-Princess	Data gathering for passenger movement within the Terminal and between Terminal, Depot, and City.
Anchorage	7/1/16	Premier Tours	View passenger loading to trains and example of level platform loading for ADA compliance
Whittier	8/24/16	Holland America-Princess	View passenger operations
Anchorage	9/21/16	ARRC	Measurements of waiting and queueing spaces at Sheffield Station
Seward	3/30/17	ARRC	Site walkover for Connectivity Study

5.3 Workshops, Charrettes, and Presentations

5.3.1 Internal Workshops

To keep Internal stakeholders apprised of the project's progress and alternatives development, periodic workshops and presentations were held with key staff members from ARRC. The purpose of these workshops was to allow continued input on project development and screening in accordance with the project Vision. Dates and topics covered at each workshop follows. Copies of Internal presentations can be found in Appendix B, and feedback is included in Appendix C.

ARRC Visioning Workshop

An overview of the project's Visioning efforts was presented to the ARRC in a Visioning Workshop on December 10, 2015 with 5 team members and 23 ARRC staff and members of the project team in attendance. A summary of comments received during the stakeholder engagement process provided context for each division to decide how to participate and represent ARRC interests during upcoming project development and can be viewed in Table 5-3 Visioning Comment MatrixTable 5-3 Visioning Comment Matrix. These comments seek to identify common goals between the ARRC and the local community.

Table 5-3 Visioning Comment Matrix

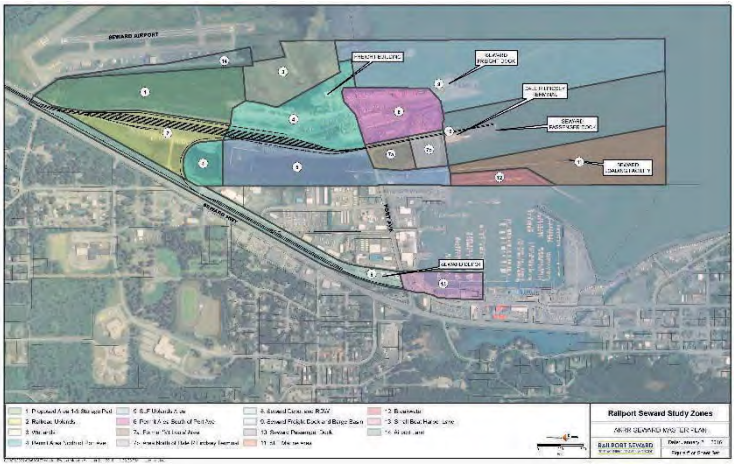
Topic	Internal Stakeholder Comments	External Stakeholder Comments
Passenger Dock	• Cruise ships are getting larger and require accommodations for different luggage and gangway configurations. • Shoreside Petroleum has a fuel line on the dock, but still takes trucks out to fuel vessels. • Current weight restrictions prevent heavy freight use. • Making the dock dual purpose would allow year-round use.	• Tour companies would like to continue to drive motor coaches onto the dock and/or have rail on the dock for passenger loading. They also mentioned separating passengers from luggage vehicles for better safety. • Cruise ships would like hard data lines on both sides of dock, a floating dock, accommodations for larger ships and configurations, and fresh water. • Freight companies said security coming and going is a hassle, the dock is not configured for small vessels, and they would like year-long use. Also noted was Shoreside Petroleum has a fuel line on the dock, but still takes trucks out to fuel vessels. • Moorage during winter is useful, but the dock is exposed to weather.
Terminal	• Upgrade technology (i.e. electronic signs and free wi-fi). • Keep terminal rates competitive to retain current customers. • Seward's current terminal layout allows passengers to transition in and out quickly, giving Seward a high rating with cruise operators. • The community appreciates space large enough to hold events and use in an emergency situation. • Maintaining and operating the building during winter is costly due to its design characteristics and age. • Upgrade technology for freight office spaces.	• Tour companies like technology such as electronic signs and free wi-fi, improved exterior aesthetics, wayfinding signage, stationary check-in podiums, covered pedestrian walkways, and dry space for luggage drop off and sorting. • Cruise companies appreciate: competitive rates, Seward's current terminal layout (which allows passengers to transition in and out quickly), and secure storage space for pre-cleared cargo. • The community appreciates a space large enough to hold events. • Other customers want upgraded technology in office spaces and the ability to use it to stage sensitive freight during the off season.

Topic	Internal Stakeholder Comments	External Stakeholder Comments
Depot	• Wayfinding signage to and from the Depot needs to be clearer, and traffic flow needs to be improved. • Improve aesthetics and modernize. • A better luggage system and additional space to shelter waiting passengers are needed. • The location of the Depot is important to downtown Seward businesses. • Moving the Depot closer to the terminal might alleviate pedestrian vs. freight conflicts on Port Avenue.	• The Depot requires improved aesthetics and modernization, primarily with luggage handling and shelter for waiting passengers. • Alleviating pedestrian vs. freight conflicts on Port Avenue is important, as well as providing wayfinding signage that is clear and will help to improve traffic flow. Additional ideas included moving the Depot closer to the passenger terminal. • Proximity to downtown is important to Seward businesses.
Freight Dock	• Current fendering is dangerous and needs improvement. • Traffic congestion is a problem. Pilots do not like to take their vessels all the way in at the landward end of the Port because of current draft. Weather and tide conditions can prevent loading or offloading. • Roll on, roll off ramps would make moving freight easier. • Ability to load directly from ship to railcars would be ideal for pipe and containers. • The freight dock gets muddy which makes it hard to move equipment and requires constant cleaning of the tracks. • Put track all the way to the end of the freight dock extension.	• Current fendering is dangerous and needs to be improved. • Traffic congestion is a problem. Pilots do not like to bring vessels all the way in to the landward edge of the Port because of current draft. Weather and tide conditions can prevent loading or offloading and delays are expensive. • Large ships cannot access all their holds at once because the dock is too short, and small barges find the dock too high for offload. Roll on, roll off ramps would make moving freight easier, as well as the ability to offload on both sides of the dock. • Freight operators want mooring dolphins at the current barge ramp, paving to support heavy equipment, better lighting, fresh water for vessels, restrooms for freight workers, and a wider gate in the fence surrounding the freight dock uplands area. • Independent barge operators prefer the option to be self-sufficient. • Vessel-mounted cranes cannot reach the second set of rails currently installed on the freight dock. The ability to load pipe or containers directly from ship to railcars would be ideal.
Seward Loading Facility	• Run a fuel line down Seward Loading Facility (SLF) Dock to keep fuel vessels out of the way of other vessels at freight dock. • Repurposing the SLF for aggregate loading, wood chips, sand, gravel, limestone, and gypsum were suggested. • The amount of horsepower (in terms of number of locomotives) required to haul items to or from Seward renders most commodities not cost-effective. • Use SLF Dock for mooring when it is not running coal. • The height of the dock limits its purpose for other things.	• Repurposing the SLF for aggregate loading, wood chips, sand, gravel, limestone, and gypsum were suggested. It was also noted the infrastructure, if removed, would be expensive to replace. • Other ideas included mooring and developing an energy dock (running fuel lines for vessels). Vessels also need cement, mud, fuel and water, which a retrofitted dock could be used for. • If the SLF is repurposed, the dock piles need to be improved, including the ladders and catwalks. The dock height currently limits other uses.
Rail	• Include rail on the new passenger dock. • Put track all the way to the end of the freight dock extension. • Current marine/rail interface requires extra handling of freight to move it off the dock.	• The passenger and freight dock should include rail tracks, with double tracks extended from the freight dock to the uplands to ease loading and handling. • Freight operators also want rail switching closer

Topic	Internal Stakeholder Comments	External Stakeholder Comments
	More ideal to load directly to rail. • Rail is the best way to move freight from Seward to Fairbanks. • Tunnels and highway overpass outside Seward preclude double stacking. • Seward has a lot of 70 lb rail which is outdated for freight.	to the freight dock to alleviate delays in moving railcars. • In general, rail is the best way to move freight from Seward to Fairbanks. Tour companies also prefer passenger rail to motor coaches. • There is a general consensus that coal is on the downturn and tourism is not sufficient to support the ongoing long-term operation of the Railroad.
Uplands	• More laydown area is needed. There are few ports on Alaska's road system with area like this. • Office space with utilities would be great, or at least a commercial user spot with RV hookups to water, sewer, and electricity. • Bring utilities into the uplands with capacity and redundancy to support commercial businesses. • Create an area for explosives laydown. If the mining industry picks up there will be a need. • Build a new communications shelter with fenced-off areas for vendors. • Everyone around the Terminal uses radio now, and it causes interference. Put wireless telecommunication towers on railroad property to increase revenue and benefit community.	• Many stakeholders remarked on the lack of long-term lease options in Seward. • Suggestions for use of ARRC real estate included retail business lease opportunities in the parking lot outside the terminal, vessel pull-out for repair and maintenance at the barge uplands, potential for fish processing or cold storage areas, and increased laydown requirements. • Some freight operators who set up mobile offices requested a place for RV hookups to water, sewer, and electricity. • Future considerations for improvement include incorporating better lighting through the uplands for laydown and installing buried utilities to prevent accidents while moving tall freight.
Roads	• The pedestrian traffic between the Depot and the Terminal on Port Avenue is dangerous because it conflicts with freight traffic. • Find a way to separate passengers and freight, such as a restricted freight corridor. • Connect Port Avenue to Airport Road. • Eliminate blind spots, potholes and drainage issues.	• The pedestrian traffic between the Depot and the Terminal (Port Avenue) is a major concern articulated by many stakeholders. Requested improvements include: improving the sidewalk condition, sidewalks on both sides of the road, a covered walkway, and wayfinding signage. • Freight operators asked for paving and/or repairing potholes and drainage within the site. They also asked for wider roads, to eliminate blind spots, and to improve at-grade rail crossings. • There is a desire to separate passengers and freight. Connecting Port Avenue to Airport Road or creating a restricted freight corridor was suggested.
Economics	• Seward is a safe tourist destination; tourism business will increase. • Some companies are looking at the opportunity to offload fishing tenders or a place for a new fish processing facility. • Compress Liquefied Natural Gas in Seward and transport it by rail. • Development of key private partnerships is necessary.	• Seward is considered a safe tourist destination. • Alaska needs options for other industries, such as fishing, liquefied natural gas (LNG), fuel and chemicals. Seward has potential for these development areas. • Full-time, year-round employment is important to Seward's economy.

Topic	Internal Stakeholder Comments	External Stakeholder Comments
Economics, Competition	• Cruise line customers are not going away anytime soon. • There is discussion of TOTE ships coming into Seward. • Seward Marine Industrial Center (SMIC) will have minor amounts of freight coming across dock, but will be mostly for marine repair. • Port Mackenzie is a good import/export facility, but the tide range is bad and vessels need pumps and filters. • Whittier is limited in growth potential. • The amount of cargo projected if AKLNG moves forward will be enormous. All ports in Alaska will have to be on board. Seward has key resources that appeal to the project. • Shoreside Petroleum needs to move 4 million gallons of fuel by rail.	• Valdez's floating dock is nice, but lack of rail makes it less competitive. • SMIC will have minor amounts of freight coming across dock, but will be mostly for marine repair. • Port MacKenzie would be a good import/export facility, but the tide range is bad and vessels need pumps and filters. • Anchorage's barge dock goes dry and is difficult to use. • Homer does not have a good roll on, roll off dock. Cranes and bulk handling are difficult there. • Whittier is limited because of real estate. • The amount of cargo coming if AKLNG moves forward will be enormous. All ports in Alaska will have to be on board. Seward has key resources like laydown and access to rail and the road system. • Seward could be competitive for chemical and fuel needs in the state. There has been discussion of TOTE ships coming into Seward. • Cruise lines to southeast Alaska are reaching capacity, and Seward might be a good alternative.

ARRC Projects Report Workshop



On January 26, 2016 a Projects Review Workshop presented 8 ARRC division representatives with baseline findings and preliminary suggested projects for the Master Plan. A map dividing the Seward Marine Terminal Reserve into fourteen asset zones was introduced and a PowerPoint presentation was used to discuss potential projects across the asset zones. At this time, 143 potential projects had been identified for further review. High-level projects included ideas for dock replacement, passenger terminal replacement, passenger depot improvements, track re-alignment, and road configurations. Stakeholder feedback and additional project ideas were documented for further review.

ARRC Project Screening Workshop

A hands-on workshop to screen prospective projects was held on March 29, 2016 to evaluate 105 site-wide projects and 14 business opportunities currently under economic evaluation by the project team. The purpose of the workshop was to ground-truth priorities and deficiencies for ARRC assets in Seward, develop alternative project packages in alignment with the project Vision, identify fatal flaws, and guide the project team on which projects would be moving forward. A three-dimensional reminder of the project's Vision Statement was included to guide participant efforts.

Eighteen ARRC participants were separated into three groups and given tabletop maps with toys and cards representing project ideas to allow participants to envision connectivity of projects throughout the Seward Marine Reserve. Members of the project team acted as facilitator and recorder at each table. Each group evaluated the projects, selected desired prospects, and placed the representative toy on the map in the area they preferred to see the project developed. Subject matter experts from the project team and from within ARRC were available to answer project-specific questions.

Figure 5-1 Sample Workshop Materials

In addition to three project package alternatives, several new project ideas were gathered from workshop attendees. At the end of the workshop, a representative from each table presented an overview to the rest of the workshop attendees on the projects chosen by their group and the reasoning for the selection. The purpose of the workshop was to identify common projects among the ARRC participants.

ARRC Cornerstone Projects Workshop

On July 20, 2016, a workshop was held with ARRC division representatives to introduce four Project Cornerstones. Updates on project Visioning and stakeholder outreach, the project screening and decision making process, and economic study results were presented. Out of 188 projects initially identified for consideration, four cornerstones had been identified with 38 supporting projects to move forward. The cornerstones identified were: Passengers, Freight, Land Development, and Infrastructure. Draft concepts and project narratives were offered for review and comment.

The purpose of the workshop was to identify any residual fatal flaws, gather additional input, and to verify ARRC support on selected alternatives.

ARRC Board Presentations

Formal presentations were provided to the ARRC Board of Directors on February 9, 2016 to outline the results from the Visioning meetings and a second time October 5, 2016 to present the cornerstone projects and alternatives. The aim of the meetings was to identify fatal flaws and to solidify commitment to the project alternatives.

5.3.2 External Presentations

Additional outreach to the City of Seward and its citizens and business owners was performed through follow-up presentations in Seward. The purpose of this outreach was to allow continued input on project development and screening in accordance with the project Vision. Dates and topics covered at each workshop follows. Copies of External presentations can be found in Appendix D, and feedback is included in Appendix E.

Seward Chamber of Commerce Luncheon

A presentation was given at the Seward Chamber of Commerce Luncheon on May 20, 2016 to update local business owners on the project and allow opportunity for input. Each attendee had stickers labeled high, medium, low, and opposed, and were asked to place them on a foam-core mounted site map to indicate levels of interest in each project area. Twenty-three people attended and

Photo 3 Chamber of Commerce Luncheon

provided feedback.

Table 5-4 Chamber of Commerce Feedback

Project Area	High	Medium	Low	Opposed
Roads and Connectivity (Connect to Airport Road)	1	1		
Freight Dock	5			
Groin	1			
Passenger Dock	1			
Seasonal Terminal		1	1	
Year-round Terminal		1		
Co-Locate Depot			1	4
Upgrade Depot		1	1	
Uplands Improvements		1	1	
Rail Upgrades		**1**		

It should be noted that some participants at the Seward Chamber of Commerce Luncheon had also participated and provided feedback at the City Council Workshop the previous day, and therefore some data in the table below may be considered duplicate.

Several key items were identified during the meeting, such as:

- A general verbal agreement that road improvements and connectivity is a concern for the area
- Participants prefer a Terminal as an event center rather than a seasonally functional one
- There was verbal opposition to co-locating the Terminal and Depot
- Several participants asked specifically for aesthetic improvements to the Roundhouse and surrounding area, such as screening, landscaping, and painting the building
- Rail track upgrade feedback specifically requested improving switch locations
- Participants were very vocal that a single public meeting isn't enough for Seward, and concern over who would have the final say on projects was raised
- Also noted was a particular resistance to bringing in national chains for retail or hotel options over locally owned and operated businesses
- One participant asked the team to reconsider housing as an economic option

Seward Rotary Presentation

On July 20, 2016, the project team provided a presentation during the Seward Rotary Luncheon to show the project's progress to date. Feedback was gathered with the use of a recorder and transcribed into notes found in Appendix E. Nineteen people attended.

City of Seward Advisory Presentations

Advisory meetings were held with Seward Leadership to apprise them of project status on October 11, 2016 and on May 9, 2017. These meetings were provided as an opportunity for city input prior to Public meetings. In attendance were the City Mayor and the City Manager, along with two ARRC staff and two project team members. Full meeting notes can be viewed in Appendix E.

5.3.3 Terminal and Depot Design Charrettes

Table 5-5 Terminal Design Charrettes

Stakeholder	Date	Attendance (excl. team)
ARRC	8/8//2016	4
ARRC	9/2/2016	5
External stakeholders	9/21/2016	1
External stakeholders	9/30/2016	12

Multiple design charrettes were conducted with stakeholders involved in operations and maintenance at the Terminal and Depot in Seward. The concept presented was a model for Seward passenger operations if the existing rail Depot was relocated to the marine passenger Terminal. A PowerPoint presentation as well as a tabletop exercise were used to solicit feedback, with each subsequent charrette building upon the information gathered at the previous interaction.

The key components the exercise sought to refine included:

- Site planning, parking, and traffic flow
- Luggage handling
- Interior floor plan
- Arrival and departure operations
- Security requirements

Copies of charrette presentations and summary notes can be found in Appendix G.

6 Public Meetings

Seward City Council Work Session

The project team traveled to Seward May 19, 2016 to present a project update to the Seward City Council during one of their work sessions. The meeting was open to the public, and was advertised to stakeholders through the project newsletter, via the project website, and through direct email invitation to stakeholders who had previously provided feedback on the project. The meeting had sixteen people in attendance. A PowerPoint presentation on the planning progress was given. Each attendee had stickers labeled high, medium, low, and opposed, and were asked to place them on a foam-core mounted site map to indicate levels of interest in each project area. A general overview of feedback follows. Summary notes may be viewed in Appendix E.

Table 6-1 City Council Workshop Feedback

Project Area	High	Medium	Low	Opposed
Roads and Connectivity (Connect to Airport Road)	1			
Freight Dock	4			
Groin				1
Multi-Purpose Passenger Dock		2		
Seasonal Terminal			2	
Year-round Terminal				
SLF			1	
Co-Locate Depot				1
Upgrade Depot			2	
Uplands Improvements		2		
Rail Upgrades		**1**		

Seward Community Open House #1

An Open House was held on October 11, 2016 at the Dale R. Lindsey Terminal in Seward. The purpose of the meeting was to introduce the Project Cornerstones and potential design concepts for the Passenger Dock, Terminal, and Depot, and to gather community input. The meeting was held in two parts; an initial informal open house style opportunity followed by a brief presentation with a question and answer session.

Photo 4 Seward Open House 10/11/16

Advertising for the meeting included:

- Online ads: Alaska Dispatch News, Seward City News, the Seward Chamber Calendar, Radio Kenai Calendar, and the City Spark calendar
- Print media: A print ad ran in the October 6th edition of the Seward Phoenix Log, and printed flyers were placed around Seward and Whittier.
- Radio: Public Service Announcements aired on KBAY, KPEN, and KWAVE in Seward.
- Email: Announcement in the What's Up email loop, through the project newsletter, and via direct email invitation to stakeholders who had previously provided feedback on the project.
- Website: The project website provided the date for the public meeting.

Thirty-eight stakeholders attended, three ARRC staff, and six team members. Project posters graphically displayed updates on the project's process to date, potential concepts for passenger traffic improvements, and upcoming project milestones. Members of the project team were available to answer questions. Key stakeholder comments from the meeting included:

- Questions about future construction funding
- Eagerness to begin construction
- Concerns regarding disruption of existing operation schedules during construction
- Concern about losing freight opportunities to passenger operations

Full summary notes and meeting materials may be viewed in Appendix D and Appendix E.

Seward Community Open House #2

Photo 5 Welcome Table
Seward Open House 5/9/17

An Open House was held on May 9, 2017 at the Dale R. Lindsey Terminal in Seward. The purpose of the meeting was to review the current direction of the Master Plan with special focus on the Passenger Dock replacement and Passenger Terminal options. The meeting was held in two parts; an initial informal open house style opportunity followed by a brief presentation with a question and answer session.

Advertising for the meeting included:

- Online ads: Alaska Dispatch News, Seward City News, the Seward Chamber Calendar, Radio Kenai Calendar, and the City Spark calendar
- Print media: Printed flyers were distributed to locations in Seward and Whittier.
- Radio: Public Service Announcements aired on KBAY, KPEN, and KWAVE in Seward.
- Email: Announcement in the What's Up email loop, through the project newsletter, and via direct email invitation to stakeholders who had previously provided feedback on the project.
- Website: The project website provided the date for the public meeting.

Photo 6 Seward Open House 5/9/17

Thirty-nine stakeholders attended, three ARRC staff, and five team members. Project posters graphically displayed updates on the project's process to date, potential concepts for passenger facility improvements, and upcoming project milestones. Members of the project team were available to answer questions. A PowerPoint presentation provided information on the alternatives for the Passenger Dock, as well as an overview of other Seward Marine Terminal development options under review.

Key stakeholder comments from the meeting included:

- Questions about utilities
- Questions about the timeline for construction
- Questions about funding options
- Support for combining the Terminal and Depot as long as train schedules can still allow passengers to meet local marine tour schedules

Full summary notes and meeting materials may be viewed in Appendix D and Appendix E.

7 Other Stakeholder Engagement

7.1 Project Website

An interactive public website was developed for the project. The site (http://www.railportseward.com/) provides project information and updates for persons with Internet access, and was designed with mobile friendliness in mind. The website went live on April 15, 2016. As of this report, the following pages and information are included on the Railport Seward website:

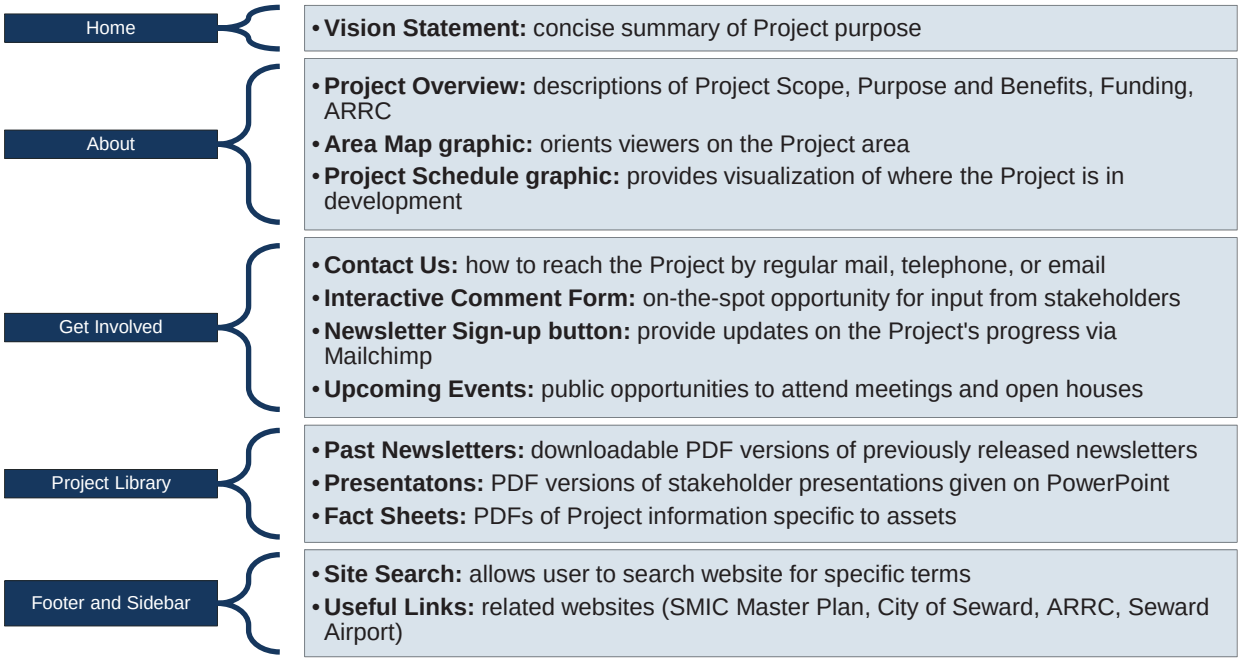


Figure 7-1 Website Map

The website was designed to serve the project through planning and to provide outreach through the design and construction phases, and may be updated and maintained after Master Planning is complete at the discretion of ARRC project managers.

7.2 Newsletters

In an effort to keep stakeholders apprised of the project's progress, a newsletter mailing list was set up using MailChimp. As of this report, the list has a distribution of 177 email addresses. Sent newsletters had an overall open rate of 40.5%. Copies of these newsletters are included in Appendix D.

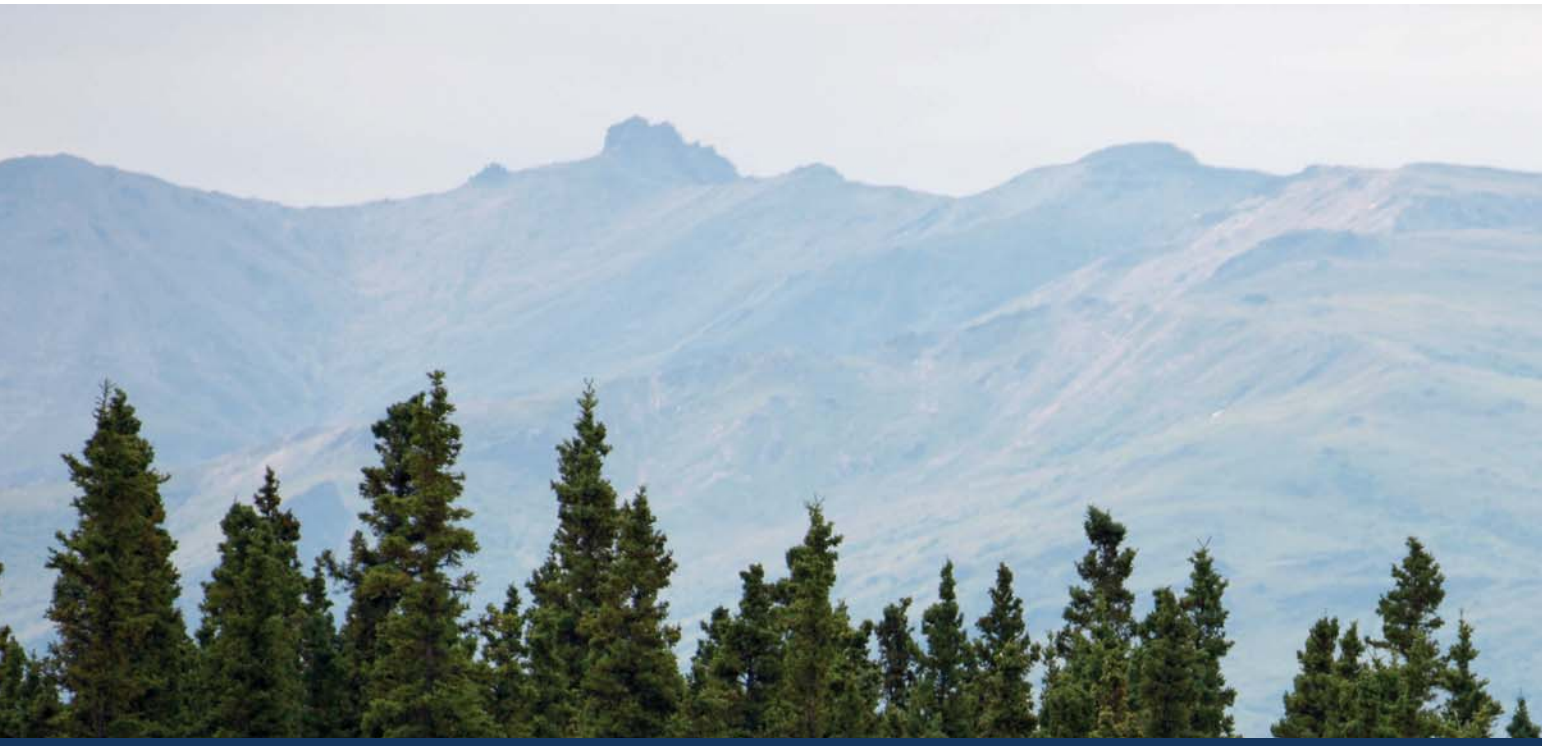
Table 7-1 Newsletters

Publication Date	Distribution	Topics
5/18/16 and 5/27/16	129 plus 29 new sign ups	• Stakeholder outreach to date • Visioning Statement • Schedule update • Project website
7/20/16 and 7/21/16	156 plus 10 new sign ups	• Stakeholder outreach to date • Link to Presentations • Schedule update • Public Meeting announcement

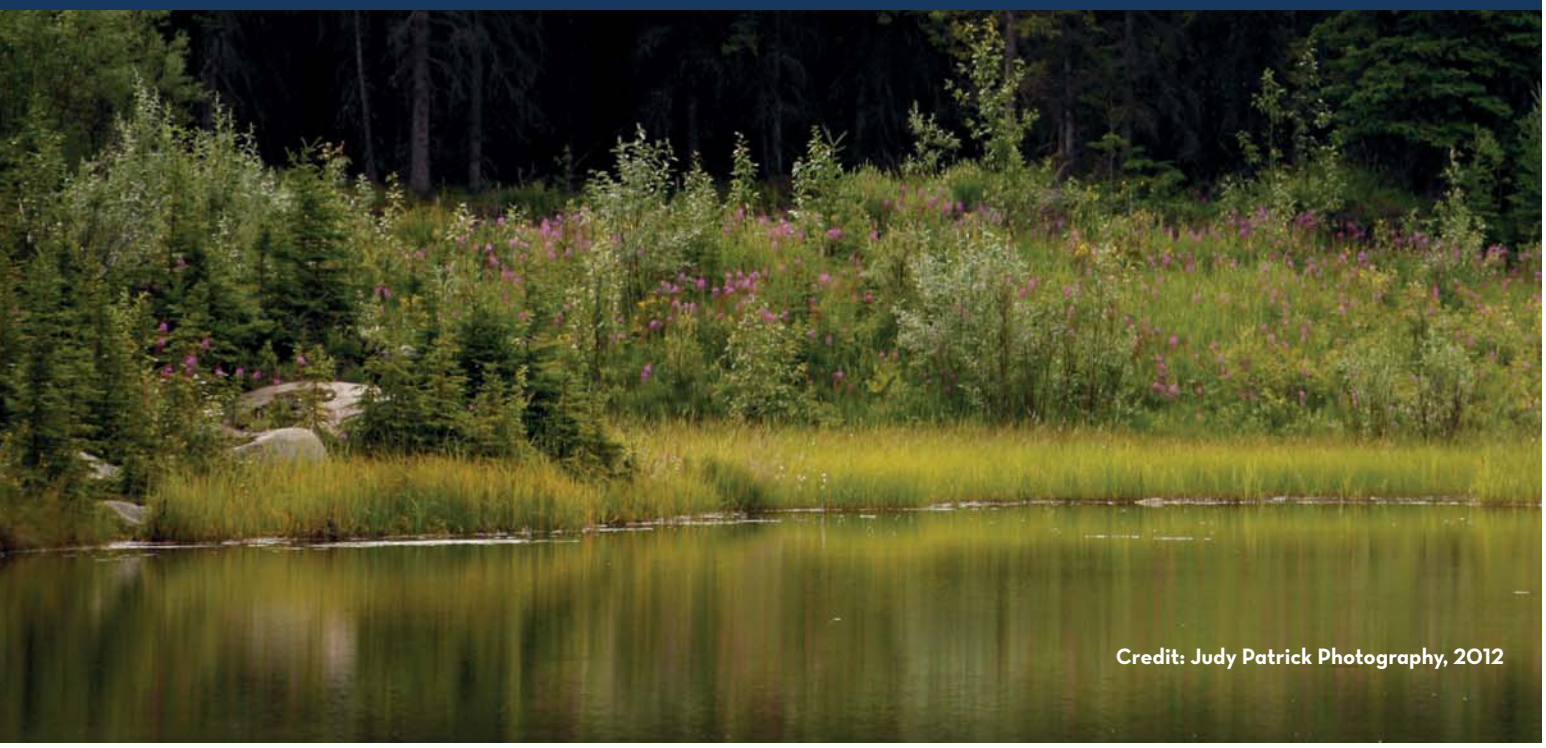
Publication Date	Distribution	Topics
9/19/16	168	• Project update • Cornerstone concepts introduction • Public Meeting announcement
10/10/16	170	• Meeting reminder flyer
12/22/16	175	• Holiday Greetings
4/25/17	172	• May Public Meeting reminder

8 Conclusion

The purpose for stakeholder outreach during Seward Marine Terminal Master Planning was to identify common goals between the ARRC and the local community for local infrastructure investment needs. Stakeholders who participated in the process included: Internal stakeholders across company-wide ARRC divisions; and External stakeholders comprised of current ARRC customers, local elected officials, Seward citizen planning commissions, and commercial property owners and leaseholders near the Seward Marine Reserve. Outreach efforts consisted of in-person meetings, surveys, email and telephone correspondence, workshops, design charrettes, newsletters, and a website. Key priorities and deficiencies around the Seward Marine Reserve were identified, and the Vision Statement will continue to provide context for the Master Plan.



Appendix B:
Environmental Considerations



Credit: Judy Patrick Photography, 2012

SEWARD MARINE TERMINAL EXPANSION PLANNING

ENVIRONMENTAL CONSIDERATIONS

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Acronyms

°F	degrees Fahrenheit
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AHRS	Alaska Heritage Resources Survey
ANS	Aquatic Nuisance Species
ARRC	Alaska Railroad Corporation
CFR	Code of Federal Regulations
dB	decibel
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMPs	Fishery Management Plan(s)
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fisheries Management Council
NRHP	National Register of Historic Places
SLF	Seward Loading Facility

USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1 Environmental Considerations

This section outlines specific environmental concerns related to the Seward Marine Terminal site, and summarizes the more in-depth analysis of environmental considerations. After project selection, these issues will need further evaluation to determine potential project impacts and mitigation. For the purposes of this environmental analysis, it is assumed funding would include federal sources, specifically the TIGER Discretionary Grants administered by the U.S. Department of Transportation, thus necessitating environmental documentation required under the National Environmental Policy Act (NEPA).

1.1 National Environmental Policy Act

Any project funded by federal funds, requiring federal authorization or using federal land requires environmental review under NEPA. Based on the anticipated funding mechanism (Transportation Investment Generating Economic Recovery (TIGER) grant program under U.S. Department of Transportation (DOT), we foresee the appropriate level of NEPA documentation (i.e., categorical exclusion, environmental assessment, or environmental impact statement) to be an Environmental Assessment (EA), based on the potential to cause significant environmental effects. Under U.S. DOT NEPA guidelines, the project must demonstrate "independent utility," which means the project is "usable and represents a reasonable expenditure of DOT funds even if no other improvements are made in the area, and will be ready for intended use upon completion of that component's construction."

The EA will most likely take from **6 months to 2 years to complete**, which is dependent on a number of factors including project scope and coordination time if Alaska DOT&PF is involved. An EA of this type is typically signed for projects beyond the 65% design stage.

1.2 Floodplains and Flood Hazards

Floods occur when runoff from rain or snowmelt exceeds the capacity of rivers, stream channels, or lakes and overflows onto adjacent land. Floodplains are land areas susceptible to being inundated by floodwaters from any source. They are generally low-lying areas adjacent to streams or coastlines. Floodplains are valuable hydrological and ecological resources that serve many functions, including stormwater storage, erosion and sediment control, and wildlife habitat.

Floods can also be caused by storm surges and waves that inundate areas along coastlines. Storm surge is a coastal phenomenon associated with low-pressure weather systems. The surge of ocean water inland above the high tide mark is a result of low barometric pressure combined with high winds pushing on the ocean surface causing the water to "pile up" higher than ordinary sea level. The storm surge effect is enhanced if it occurs at high tide.

Activities in floodplains are subject to regulatory oversight at the state and federal level. Federally sponsored projects are subject to Executive Order (EO) 11988, Floodplain Management, and EO 13690, Establishing a Federal Flood Risk Management Standard and Process for Further Soliciting and Considering Stakeholder Input. EO 11988 requires that federal agencies consult with the Federal Emergency Management Agency (FEMA) to ensure that facilities are constructed consistent with National Flood Insurance Program guidance (Water Resources Council 2015). EO 13690 amends EO 11988 to ensure that federal agency procedures (as well as federally funded projects) are consistent with the Federal Flood Risk Management Standard. EO 13690 emphasizes using natural systems, ecosystem processes, and nature-based approaches when developing alternatives. The new EO changes the definition of a floodplain from the 100-year base flood (i.e., 1 percent annual chance flood) to:

> (1) the elevation and flood hazard area that result from using a climate-informed science approach that uses the best-available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding based on climate science…this revised approach will also include an emphasis on whether the action is a critical action as one of the factors to be considered when conducting the analysis; (2) the elevation and flood hazard area that result from using the freeboard value, reached by adding an additional 2 feet to the base flood elevation for non-critical actions, and by adding an additional 3 feet to the base flood elevation for critical actions; or (3) the area subject to flooding by the 0.2 percent annual chance flood [500-year flood] (Water Resources Council 2015).

The City of Seward administers the FEMA floodplain management program in the Seward Marine Terminal and requires a permit for development within special flood hazard areas, as designated on the current Flood Insurance Rate Maps (FIRM) published by FEMA in 2016. Floods on the Resurrection River (located east of the Seward Marine Terminal and discharging into Resurrection Bay) and local streams most frequently result from fall storm events. Surge release floods can exacerbate flooding when temporary debris dams form on tributaries and block flows until the dam breaks, releasing a sudden pulse of water (Barber 2006). Documented floods on the Resurrection River and Salmon Creek (the largest tributary of Resurrection River) occurred in 1946, 1949, 1951, 1957, 1960, 1961, 1962, 1966, 1974, 1976, 1982, 1986, 1989, 1993, 1995, 2002, 2006, 2009, and 2013. The largest historical flood event occurred in October 1986 due to Typhoon Carmen and caused extensive damage to residences and the Seward Airport (Coastline Engineering 2013; FEMA 2013). The main runway on the Seward Airport adjacent to the Seward Marine Terminal has flooded on multiple occasions, most recently in 2016 (Coastline Engineering 2013; Alaska Department of Transportation and Public Facilities 2017).

Several flood frequency studies have been conducted for the Seward area. A study in 2006 for the Seward Airport Master Plan used regional regression equations developed by the U.S. Geological Survey (USGS) to estimate a 1 percent annual chance flood on the Resurrection River at Seward to be 24,840 cubic feet per second, while the most recent 2013 FEMA study estimates the 1 percent annual chance flood at 29,160 cubic feet per second (Barber 2006; FEMA 2013).

Flood Insurance Rate Maps (FIRM), published by FEMA, show the extent of flood zones as Special Flood Hazard Areas (SFHAs). Four types of SFHAs associated with the 100-year floodplain of the Resurrection River, other drainages and the coastal flood zone are within the Seward Marine Terminal as described on Figure 1.1-1. Coastal flooding due to high tides and storm surges (designated as flood zone VE) of up to 17 feet could occur along the coastline, which extends across the Seward Loading Facility (SLF), passenger dock, and parts of the freight dock. The 1964 tsunami that destroyed much of coastal Seward with multiple waves up to 30 feet has been estimated to exceed a 0.2 percent annual chance flood event (Coastline Engineering 2013; FEMA 2013). The level of inundation for a 0.2 percent annual chance tsunami at Seward is estimated to be below the 1 percent annual chance storm event, and so would be covered by the FIRM coastal flooding VE zone (FEMA 2013).

Coastal flooding due to high tides and storm surges (designated as flood zone VE) of up to 17 feet could occur along the coastline from the Seward Small Boat Harbor to Resurrection River Delta The VE zone extends across the SLF, Seward Passenger Dock, and parts of the Seward Freight Dock. Furthermore, coastal flooding without an identified base flood elevation (designated as flood zone A) could occur within the Seward Small Boat Harbor.

Placement of fill or structures in FEMA-designated flood zones has the potential to be affected by and alter flooding within the Seward Marine Terminal. Future projects would need to be designed and permitted to ensure that new developments would be protected from future base floods and would not cause increased flooding elsewhere.

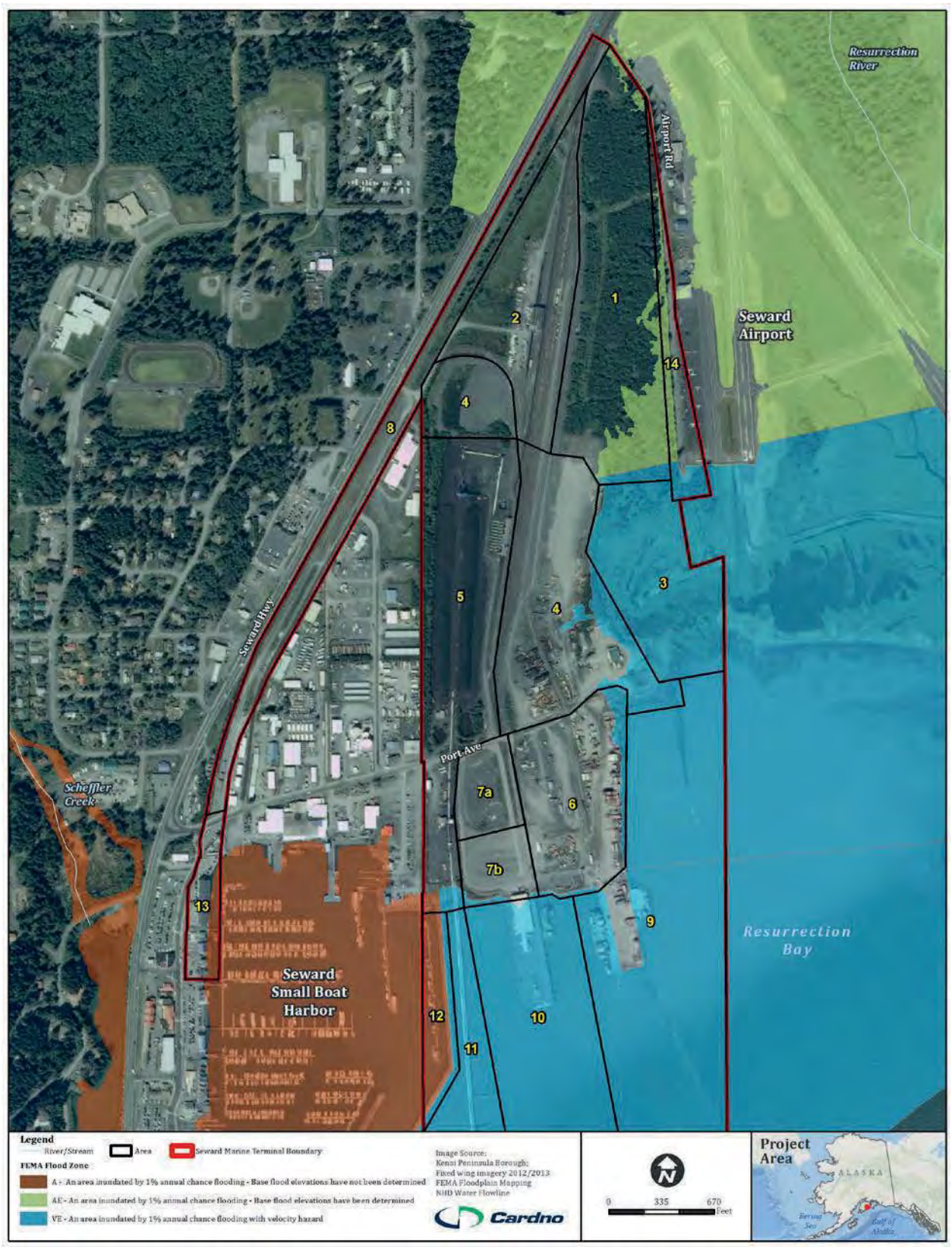

Figure 1.1-1 FEMA-Designated Flood Zones within the Seward Marine Terminal

1.3 Wetlands and Waters

Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support vegetation typically adapted for life in saturated soil conditions (33 Code of Federal Regulations [CFR] 328.3(b)). Wetlands must possess wetland indicators for hydrology, vegetation, and soils. Abundant precipitation and braided streams contribute to saturated soils that support black spruce muskeg, tall scrub-shrub thickets, low scrub-shrub bogs, and wet graminoid and forb herbaceous wetlands in the Resurrection River watershed.

Section 404 of the Clean Water Act (33 U.S. Code [USC] 1344) and Section 10 of the Rivers and Harbors Appropriation Act (33 USC 403) establish programs to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Regulatory protection of wetlands focuses first on avoidance of impacts, followed by minimization of impacts, and finally may require compensatory mitigation for unavoidable impacts to wetlands and waters. Protection of wetlands is further defined as the avoidance of long- and short-term adverse impacts from destruction or modification of wetlands and avoidance of direct or indirect support of new construction in wetlands wherever there is a practicable alternative (EO 11990). Section 404(b)(1) of the Clean Water Act requires that the U.S. Army Corps of Engineers (USACE) permit only the least environmentally damaging practicable alternative. Compensatory mitigation may be required to ensure that activities requiring a 404 permit comply with Section 404(b)(1) guidelines.

Regulations for compensatory mitigation to offset unavoidable impacts to wetlands and waters of the United States were established on April 10, 2008, under 33 CFR 332 (USACE) and 40 CFR 230 (U.S. Environmental Protection Agency [EPA]). Compensatory mitigation may include the restoration (reestablishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources to offset unavoidable impacts. Compensatory mitigation may be accomplished through purchase of credits from mitigation banks or in-lieu fee programs, or through permittee-responsible mitigation, or may be accomplished by a combination of the three.

1.3.1 Wetland and Water Types

Along with riverine habitat, wetland habitats mapped within the Seward Marine Terminal include freshwater wetlands, intertidal and subtidal wetlands and ponds (See Figure 1.2-1; Table 1.2-1). Of the freshwater wetlands identified, there are six specific types of wetlands per the National Wetlands Inventory (NWI) classification system (HDR 2013a) .Of the intertidal and subtidal wetlands, there are nine NWI types; for ponds there are five NWI types, and for riverine habitats there are three NWI types.

Settings and typical wetland plants and animals are described below.

1.3.1.1 Freshwater Wetlands

Wetlands dominated by deciduous scrub-shrub and persistent emergent vegetation are located in low-lying areas next to streams and ditches or on the edges of wetter emergent wetlands. Common shrubs include Sitka alder (*Alnus viridis*), speckled alder (*Alnus incana*), diamond-leaf willow (*Salix pulchra*), and Barclay's willow (*Salix barclayi*). Common emergent plants include bluejoint (*Calamagrostis canadensis*), and where flooding is prolonged leafy tussock sedge (*Carex aquatilis*) and water horsetail (*Equisetum fluviatile*) are common. These wetland sites vary from saturated to semi-permanently flooded.

Wetlands located on the edge of the saltwater-influenced coastal wetlands and in areas surrounded by fill in the northwest corner of the Seward Marine Terminal are dominated by leafy tussock sedge, bluejoint, or both, along with water horsetail, field horsetail (*Equisetum arvense*), seacoast angelica (*Angelica lucida*), kneeling angelica (*Angelica genuflexa*), hoary sedge (*Carex canescens*), and beach-head iris (*Iris setosa*). These wetland sites vary from saturated to permanently flooded.

Table 1.2-1 Wetland and Water Types within the Seward Marine Terminal

Habitat Type	Seward Marine Terminal	
	Area (acres)	Proportion (%)
Freshwater Wetlands	7.6	4.6%
Ponds	1.0	0.6%
Intertidal Wetlands	39.1	23.5%
Subtidal Wetlands	116.8	70.1%
Riverine	2.2	1.3%
Total	166.7	100.0%

Sources: Alaska Railroad Corporation 2016; HDR 2013a.

1.3.1.2 Ponds

Of the nine ponded areas mapped within the Seward Marine Terminal, two are excavated sedimentation ponds for the SLF. Two other mapped ponded areas are drainage ditches that have been excavated to tie into culverts. The remaining ponds are low-lying depressions surrounded by flooded emergent vegetation.

1.3.1.3 Riverine

Three streams are mapped within the Seward Marine Terminal. The stream that runs along the Jesse Lee Main begins as a drainage ditch and continues crossing under Port Avenue and the Seward Highway to flow into Scheffler Creek west of the Seward Marine Terminal. The stream on the west side of the Seward Marine Terminal begins at a culvert that connects to emergent wetlands, continues through a ditch to the south, and finally enters a culvert that connects to Resurrection Bay. The stream on the east side of the Seward Marine Terminal driven by groundwater discharge, beginning as an unvegetated mud bottom ditch that slowly accumulates water from numerous seeps as the stream continues to the south, flowing into tidally influenced estuarine emergent wetlands and then into Resurrection Bay.

1.3.1.4 Intertidal Wetlands

Intertidal wetlands occur to the east of the Alaska Railroad Corporation [ARRC] Railyard between Resurrection Bay and vegetated uplands. Lyngbye's sedge (*Carex lyngbyei*), four-leaf mare's tail (*Hippuris tetraphylla*), Pacific silverweed (*Potentilla anserine*), and common spikerush (*Eleocharis palustris*) are common. These wetlands are a source of exported organic matter and freshwater for Resurrection Bay and may aid in coastline stabilization. Small unvegetated mud bottom depressions are scattered throughout this wetland type. These intertidal wetlands vary from regularly to irregularly flooded.

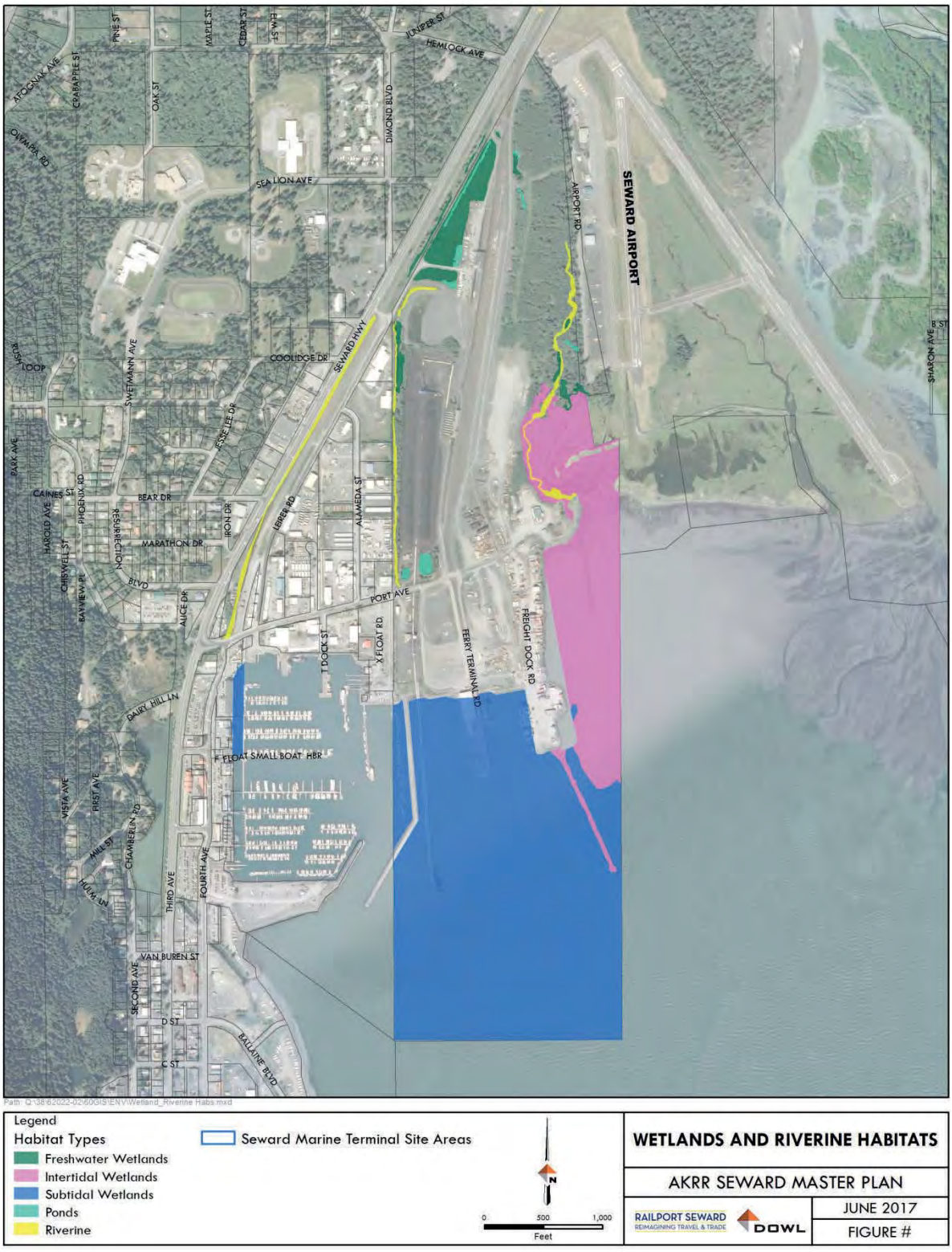

Figure 1.2-1 Wetland and Water Types within the Seward Marine Terminal

1.3.1.5 Subtidal

Subtidal wetland habitats are the most common, covering open water and unvegetated shoreline portion of Resurrection Bay. Water varies from subtidal to irregularly flooded. A sediment groin has been created to prevent Resurrection River sediments from accumulating in the basin surrounding ARRC's docks. Some subtidal areas are periodically dredged to maintain cruise ship and freight barge access.

Tidal habitats at the head of Resurrection Bay contain several types of macroalgae, benthic invertebrates, and fish. Generally the Resurrection River mudflats have low diversity, particularly for sessile macroalgae and marine invertebrates (clams, barnacles, mussels, snails, and crabs), because of the movement and deposition of sediments at the river delta (Schively 2013). Small changes in topography and the influence of artificial structures are currently serving to create more favorable habitat by reducing sediment deposition and providing rocky substrate for settlement and attachment of intertidal organisms.

ShoreZone mapping characterizes shoreline habitats from the SLF to the Freight Dock as Protected/Partially Mobile/Sediment or Rock and Sediment with patchy or continuous blue mussel (*Myrilus edulis*), dune grass (American lyme grass [*Leymus mollis*]), or green algae (National Oceanic and Atmospheric Administration [NOAA] 2016a). The shoreline along the east side of the Freight Dock to south of the airport is characterized as Semi-Protected/Immobile/Rock with patchy barnacles, green algae, and red algae (NOAA 2016a). A summer survey of tidelands around the Freight Dock found two types of green algae (*Ulva intestinalis* and *Ulva linza*) and several types of red algae (Schively 2013) (see Figure 1.2-2, Intertidal Macroalgae East of the Seward Freight Dock). Rockweed (*Fucus distichus*) was also common throughout the area on small cobbles along the low gravel berm and on boulders of the sediment groin (Schively 2013).

A dive survey conducted east of the Freight Dock in 1994 found the sea floor to consist of smooth mud with no visible plant or animal life at depths of 20 to 35 feet below the mean lower low water (MLLW) (Schively 2013). A video survey of the ocean floor about 2,200 feet south-southeast of the Freight Dock at depths of about 200 feet below MLLW also found a mud bottom with no vegetation and a few sea pens, small flatfish, other small fish, and a starfish (Schively 2013).

Figure 1.2-2 Intertidal Macroalgae East of the Seward Freight Dock

Source: Schively 2013.

Notes:

Left: Green macroalgae (*Ulva intestinalis, Ulva linza*) growing on small cobbles and gravels.

Right: Rockweed (*Fucus distichus*) growing on rocky substrate of the sediment groin.

1.3.2 Functions

Wetlands and and riverine habitats within the Seward Marine Terminal were evaluated for 10 wetland functions: Flood Flow Alteration, Sediment Removal, Nutrient and Toxicant Removal, Erosion Control and Shoreline Stabilization, Production of Organic Matter and its Export, General Habitat Suitability, General Fish Habitat, Native Plant Richness, Educational or Scientific Value, and Uniqueness and Heritage. Functional capacity varied within individual wetland and water type depending on the specific conditions at the site (HDR 2013a). Summary categories are as defined by the USACE for compensatory mitigation (USACE 2014):

- Category I – wetlands that 1) provide habitat for threatened or endangered species that have been documented; 2) represent a high-quality example of a rare wetland type; 3) are rare within a given region; 4) provide habitat for very sensitive or important wildlife or plants; and/or 5) are undisturbed and contain ecological attributes that are impossible or difficult to replace within a human lifetime, if at all.

- Category II – wetlands that can be important for a variety of wildlife species and can be critical for the watershed depending on where they are located. Category II wetlands do not provide critical habitat for any threatened or endangered species or species of concern. Generally these wetlands are pristine, not fragmented, and common but more productive and sustain higher biodiversity compared to Category III wetlands.

- Category III – wetlands that are usually plentiful in the watershed, often with the least biodiversity. Category III wetlands are not rare or unique, and their overall productivity and species diversity are relatively low. These wetlands may be impacted by humans (or by fire or other natural events) and are not considered to be “pristine” examples.

Most wetlands and waters within the Seward Marine Terminal fall under Category III as shown in Table 1.2-2, Wetland and Water Function Categories within the Seward Marine Terminal. Types that fall within Category II include estuarine emergent wetlands; palustrine emergent wetlands next to estuarine emergent wetlands; undisturbed streams; and seasonally flooded scrub-shrub wetlands next to undisturbed streams (HDR 2013a).

Table 1.2-2 Wetland and Waters Function Categories within the Seward Marine Terminal

Function Category	Seward Marine Terminal	
	Area (acres)	Proportion (%)
Category I	0	0%
Category II	12.6	8%
Category III	154.1	92%
Wetland Total	**166.7**	**100%**

Sources: ARRC 2016; HDR 2013a.

Placement of fill or structures during construction and excavation during dredging have the potential to affect wetlands and waters within the Seward Marine Terminal. Future projects would need to be designed and permitted to ensure that new developments would avoid and minimize fill in wetlands and waters. Compensatory mitigation may be required for unavoidable impacts.

1.4 Essential Fish Habitat

Nearshore construction can affect Essential Fish Habitat (EFH) directly through fill, dredging, or shading, and indirectly through altered water circulation, water quality, sediment deposition, and transport of aquatic nuisance organisms.

Habitat provisions added to the Magnuson-Stevens Fishery Conservation and Management Act in 1996 established requirements to describe and identify EFH in fishery management plans (FMPs), minimize adverse impacts on EFH, and propose actions to conserve and enhance EFH. Consultation between federal permitting or action agencies and National Marine Fisheries Service (NMFS) Habitat Conservation Division is required by the Magnuson-Stevens Fishery Conservation and Management Act when an action may adversely affect designated EFH. EFH is defined as waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (50 CFR 600). For the purposes of this definition, "waters" means aquatic areas and their associated physical, chemical, and biological properties; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and healthy ecosystem; and "spawning, feeding, and breeding" is meant to encompass the complete life cycle of a species (50 CFR 600).

EFH species and habitats are designated within Resurrection Bay, Resurrection River watershed, and the Seward Marine Terminal under:

- FMP for the Salmon Fisheries in the U.S. Exclusive Economic Zone (North Pacific Fishery Management Council [NPFMC] et al. 2012);
- FMP for Gulf of Alaska Groundfish (NPFMC 2015a); and
- FMP for Bering Sea and Aleutian Islands Groundfish (NPFMC 2015b).

Most life stages of the five Pacific salmon species (*Oncorhynchus* spp.) that occur in the Resurrection River watershed managed under the FMP for salmon may occur within the Seward Marine Terminal, although eggs and larvae of only coho salmon (*O. kisutch*) are likely to occur within the Seward Marine Terminal (see Table 1.3-1, Essential Fish Habitat Life Stages within the Seward Marine Terminal). Pacific salmon spawn in freshwater rivers and streams and die after spawning. Eggs incubate in the gravel and hatch at various times depending on the species and run timing for the stock. Alevins (larvae) remain in the gravel until the yolk sack is absorbed, after which they wiggle out of the gravel to become free-swimming parr. Parr live and grow in the river for variable lengths of time (in the case of Chinook [*Oncorhynchus tshawytscha*]; coho; and sockeye [*O. nerka*]) or move out of the river into marine waters soon after emerging from the gravel (in the case of pink [*O. gorbuscha*] and chum [*O. keta*]).

One unnamed tributary to Scheffler Creek (Catalog Number 231-30-10070-2016) runs along the western edge of the Jesse Lee Main and empties into the Seward Lagoon as shown in Figure 1.3-1, Essential Fish Habitat including Anadromous Streams within the Seward Marine Terminal. This stream supports spawning coho salmon (Johnson and Litchfield 2015). An unnamed anadromous stream located east of the Seward Marine Terminal, south of the Seward Airport, supports spawning pink salmon (Catalog Number 231-30-10075). The Resurrection River (Catalog Number 231-30-10080) supports spawning and rearing for all five Pacific salmon. Sampling at the channelized stream on the west side of the Seward Marine Terminal found use by juvenile Dolly Varden (*Salvelinus malma*) and sticklebacks in 2011 (Alaska Department of Fish and Game [ADF&G] 2016a). Dolly Varden and sticklebacks are not EFH species.

No designated Habitat Areas of Particular Concern were identified for the Seward Marine Terminal at the head of Resurrection Bay (NOAA 2016b).

Groundfish with mapped EFH covered under the Gulf of Alaska and Bering Sea and Aleutian Islands FMPs that potentially occur in the Seward Marine Terminal include flathead sole (*Hippoglossoides elassodon*), Pacific cod (*Gadus microcephalus*), and walleye pollock (*Theragra chalcogramma*) (NOAA 2016b). Flathead sole spawn from February through May, releasing buoyant pelagic eggs that drift with currents (Froese and Pauly 2016). Juvenile Pacific cod were collected east of the Seward Marine Terminal in upper Resurrection Bay in eelgrass during late August (NOAA 2016a). Pacific cod spawn in deep waters in winter where eggs stick to benthic surfaces; larvae hatch in 15 to 20 days and move upward in the water column (Hauser 2011). Walleye pollock spawn from February to as late as May throughout their range in deep pelagic waters. Eggs sink, hatching after 17 to 25 days, and larvae and early juveniles are pelagic (Hauser 2011). Of these marine fishes, late juveniles are most likely to occur within the Seward Marine Terminal.

Table 1.3-1 Essential Fish Habitat Life Stages within the Seward Marine Terminal

Habitat Type	Freshwater			Estuarine	Marine				
EFH Species Common Name, Scientific Name	Egg	Larvae/ Juvenile	Adult	Juvenile	Juvenile	Late Juvenile	Immature/ Maturing Adult	Adult	All
Chinook salmon, *Oncorhynchus tshawytscha*	1[a]	1	1	1	1	–	1	1	–
Sockeye salmon, *Oncorhynchus nerka*	1	1	1	1	1	–	1	1	–
Coho salmon, *Oncorhynchus kisutch*	1	1	1	1	1	–	1	1	–
Chum salmon, *Oncorhynchus keta*	1	1	1	1	1	–	1	1	–
Pink salmon, *Oncorhynchus gorbuscha*	1	1	1	1	1	–	1	1	–
Flathead sole, *Hippoglossoides elassodon*	–	–	–	–	–	1	–	1	1
Pacific cod, *Gadus macrocephalus*	–	–	–	–	–	1	–	1	1
Walleye pollock, *Theragra chalcogramma*	–	–	–	–	–	1	–	1	1

Sources: Johnson and Litchfield 2015; NOAA 2016b.

Notes:

[a] 1 = life stage with defined EFH in the Resurrection River watershed and/or Resurrection Bay; – = not applicable.

1.4.1 Other Essential Fish Habitat Species and Forage Fish Complex

Specific spatial extents for some EFH species and groups are poorly known such that EFH has not been completely described (NPFMC 2015a, 2015b). EFH species and groups found in shoreline habitats in upper Resurrection Bay are listed in Table 1.3-2, Essential Fish Habitat Species and Groups Collected in Upper Resurrection Bay. As indicated in the table, a variety of sculpins and flatfishes occur in upper Resurrection Bay. Sculpins found in Resurrection Bay generally spawn during winter in benthic habitats, sometimes in nests prepared by the male, who guards the egg mass until the larvae hatch and become planktonic (Froese and Pauly 2016). Flatfish spawning is variable. Starry flounder (*Platichthys stellatus*) spawn in winter and spring producing buoyant eggs that rise toward the water surface, drift with the currents, and hatch into bilaterally symmetrical larvae in 3 to 5 days. The larvae drift until they metamorphose into their flattened form and settle onto the bottom (Hauser 2011). Starry flounder move offshore into deeper water in winter, avoiding areas of high salinity, and move inshore into estuaries and often upstream in rivers during spring and summer (Hauser 2011).

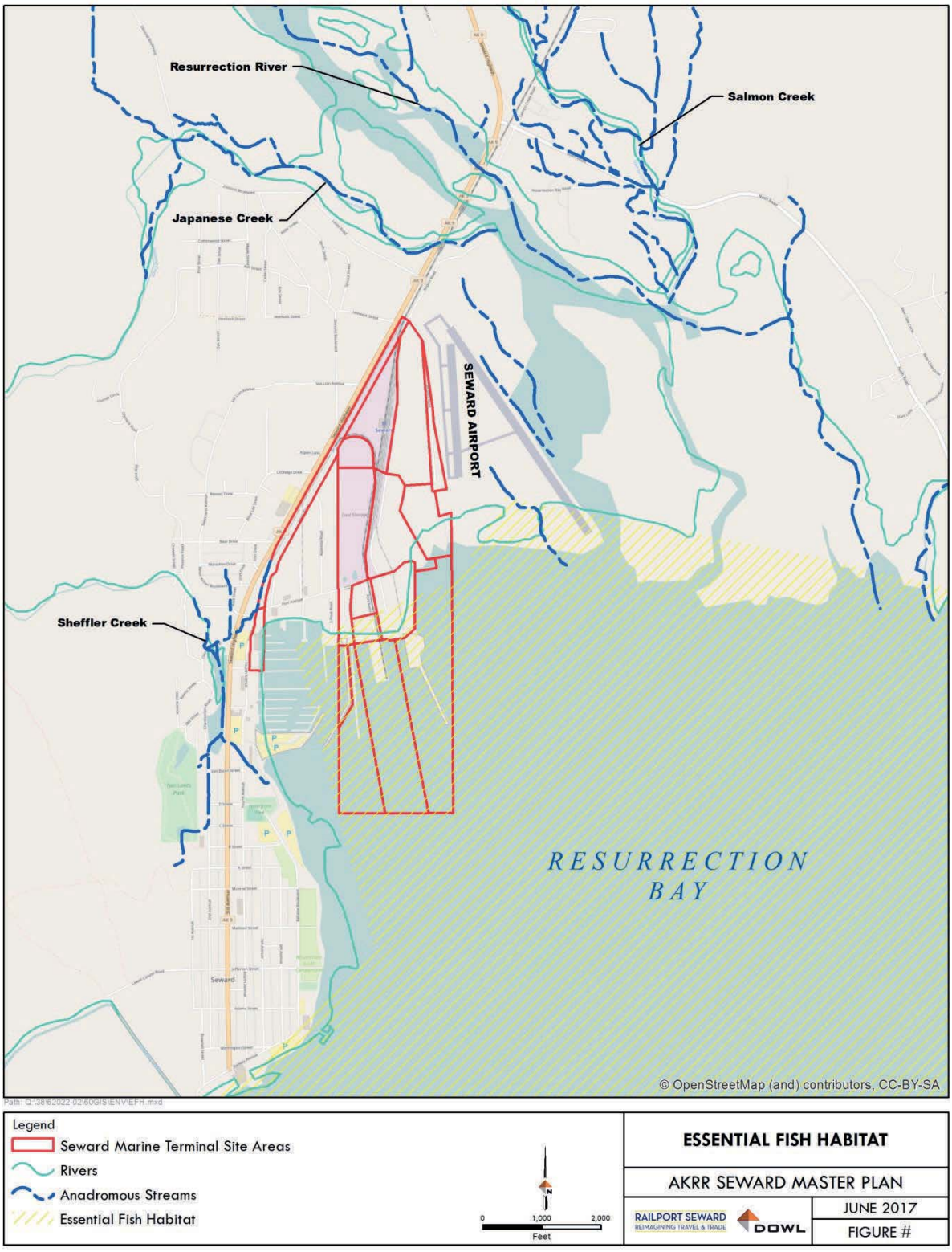

Figure 1.3-1 Essential Fish Habitat including Anadromous Streams within the Seward Marine Terminal

Forage fish in the area include eulachon (hooligan, *Thaleichthys pacificus*), Pacific herring (*Clupea pallasii*), surf smelt (*Hypomesius pretiosus*), Pacific sand lance (*Ammodytes hexapterus*), and crescent gunnel (*Pholis laeta*). Eulachon are anadromous and broadcast spawn adhesive eggs over coarse gravels in the lower reaches of the Resurrection River and Japanese Creek (Catalog Number 231-30-10080-2021). Eulachon spawn in early spring when water temperatures reach 37 to 42 degrees Fahrenheit (°F); eggs hatch in 30 to 40 days, and larvae drift downstream to marine waters primarily at night (Hauser 2011). Pacific herring broadcast spawn in shallow, vegetated intertidal and subtidal habitats in April and May. Eggs stick to substrates and intertidal vegetation, hatching in about 10 days; larval stages drift with the current after hatching, and then juveniles form large schools and rear in sheltered bays and inlets. Adults move to deeper waters, feed on zooplankton, and are not known to migrate long distances (Hauser 2011). Surf smelt spawn on sand and gravel beaches with light to moderate surf during the incoming or high tide during July through September (Froese and Pauly 2016). Pacific sand lance spawn by burrowing into the sand in intertidal areas where they release slightly sticky eggs during late September. Sand lance form dense schools when feeding in nearshore waters early and late in the day; they spend the winter in the sand in a form of hibernation (Hauser 2011).

Table 1.3-2 Essential Fish Habitat Species and Groups Collected in Upper Resurrection Bay

Common Name	Scientific Name	Life Stage	Station – B01		Station – B02	
			Number Caught	Average Length (mm)[a]	Number Caught	Average Length (mm)[a]
EFH SPECIES WITH DEFINED EFH						
Yellowfin sole	*Limanda aspera*	Juvenile (spawn June/July)	–	–	1	152.0
Pacific cod	*Gadus macrocephalus*	Juvenile	–	–	3	164.3
EFH GROUPS WITHOUT DEFINED EFH						
Shallow Water Flatfish – Pleuronectiformes						
English sole	*Parophrys vetulus*	Juvenile (spawn January – March)	–	–	2	149.5
Sand sole	*Psettichthys melanostictus*	Juvenile (spawn variable)	2	38.0	–	–
Speckled sanddab	*Citharichthys stigmaeus*	Juvenile (spawn variable)	1	35.0	–	–
Starry flounder	*Platichthys stellatus*	Juvenile (spawn winter/spring)	1	33.0	–	–
Juvenile flatfish	Various	Juvenile	8	16.5	–	–
Sculpins – Cottidae						
Buffalo sculpin	*Enophrys bison*	Juvenile	3	76.0	–	–
Great sculpin	*Myoxocephalus polyacanthocephalus*	Juvenile	1	152.0	1	188.0
Pacific staghorn sculpin	*Leptocottus armatus*	Juvenile	–	–	1	198.0
Padded sculpin	*Artedius fenestralis*	Juvenile	–	–	1	97.0
Juvenile sculpin	Various	Juvenile	5	41.0	–	–
Forage Fish Complex						
Pacific herring	*Clupea pallasii*	Young-of-the-year / Juvenile	775	48.4	3	56.7
Surf smelt	*Hypomesius pretiosus*	Juvenile	–	–	1	86.0
Pacific sand lance	*Ammodytes hexapterus*	Juvenile	76	76.3	–	–
Crescent gunnel	*Pholis laeta*	Juvenile	–	–	3	129.0

Table 1.3-2 Essential Fish Habitat Species and Groups Collected in Upper Resurrection Bay

Common Name	Scientific Name	Life Stage	Station – B01		Station – B02	
			Number Caught	Average Length (mm)[a]	Number Caught	Average Length (mm)[a]

Sources: ADF&G 2016a; Froese and Pauly 2016; Hauser 2011; NOAA 2016a.

Notes:

Station B01 was located along the eastern shoreline of Resurrection Bay approximately 3 miles north of the Seward Marine Terminal and Station B02 was located along the eastern shoreline of Resurrection Bay at the mouth of Fourth of July Creek.

[a] Length = Total Length; – = not collected or measured.

1.4.2 Aquatic Nuisance Organisms

Aquatic nuisance organisms have the potential to degrade EFH. To combat the spread of invasive aquatic organisms and limit their potential effects on Alaska's ecosystems, ADF&G developed an Aquatic Nuisance Species (ANS) Plan, which focuses on organisms that have or could be introduced into Alaskan waters (ADF&G 2002). Of most concern for Seward are ANS that can be transported by vessels on fouled hulls or in ballast or cooling water systems as listed in Table 1.3-3, High Priority Threat Aquatic Nuisance Species for Alaska. Monitoring for ANS under the Plate Watch Program is conducted annually and was initiated in Resurrection Bay in 2010. No non-native aquatic organisms have been found during monitoring at the Seward Small Boat Harbor or the Seward Marine Industrial Center. Sampling at the Passenger Dock was initiated, but was discontinued due to issues with security (Smithsonian Environmental Research Center 2016).

Table 1.3-3 High Priority Threat Aquatic Nuisance Species for Alaska

Life Form	Common Name	Scientific Name	Present in Resurrection Bay?
Crustacean	Chinese mitten crab	*Eriocheir sinensis*	No
Crustacean	Green crab	*Carcinus maenas*	No
Crustacean	Signal crayfish	*Pacifastacus leniusculus*	No
Mollusk	New Zealand mudsnail	*Potamopyrgus antipodarum*	No
Mollusk	Zebra mussel	*Dreissema polymorpha*	No
Mollusk	Quagga mussel	*Dreissena rostriformis bugensis*	No
Marine Invertebrate	Golden star tunicate	*Botryllus schlosseri*	No
Marine Invertebrate	Violet tunicate	*Botrylloides violaceous*	No
Marine Invertebrate	Glove leather tunicate	*Didemnum vexillum*	No
Marine Invertebrate	Common sea squirt	*Ciona intestinalis*	No
Marine Invertebrate	Pacific transparent sea squirts	*Ciona savignyi*	No

Sources: ADF&G 2002; USGS 2016.

Nearshore dock construction; impact vibrations such as from pile and sheet driving; and vessel operations at docks within the Seward Marine Terminal have the potential to affect EFH and EFH species. Future projects would need to be designed, permitted, and operated to ensure that new developments would minimize impacts to EFH and EFH species.

1.5 Marine Mammals

Marine mammals are protected under the Marine Mammal Protection Act (MMPA). In the Resurrection Bay region, the U.S. Fish and Wildlife Service (USFWS) is responsible for the conservation and

management of northern sea otters (*Enhydra lutris kenyoni*) and NMFS is responsible for management of seals, sea lions, whales, dolphins, and porpoises.

To comply with the MMPA, an Incidental Harassment Authorization (IHA) application is submitted to NMFS to determine if an activity will result in a “take” of a marine mammal. A “take” is defined as “to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal”. Harassment is defined as any act of pursuit, torment, or annoyance that (A) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A Harassment); or (B) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing distribution of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B Harassment; 16 USC 1362 (18)(a)).

Any activity with the potential to impact marine mammals requires consultation with the NMFS and the USFWS to determine if a permit is needed. This includes demolition of existing structures or installation of new structures within the marine environment

An IHA only authorizes harassment (injury or disturbance) of species; it does not apply toward serious injury, mortality, or on-going, long-term harassment. The following information is needed to complete an IHA application:

- Type of piles (e.g., steel or concrete) to be installed and/or removed
- Size(s) of piles
- Number of each size of pile
- Type and size of hammer (e.g. impact vs. vibratory hammer; APE 200-6 model vibratory driver or equivalent)
- Estimated number of strikes per minute and total number of strikes per pile (e.g., 1,000 strikes per 30-inch dock support pile; 400 strikes per dolphin pile). This includes any temporary piles that may be used.
- If dredging is to occur, will need to know size of equipment proposed to be used and amount of dredge material to be removed.
- Estimated number of days required to install piles (e.g. support pile installation has 52 piles that will take 13 days to install)
- Time of year (e.g. work will take place over a total of approx. 32 working days within a 5 month window beginning August 1, 2018).

Marine mammals potentially occurring in Resurrection Bay and that may occur in nearshore areas around the Seward Marine Terminal are listed in Table 1.4-1, Marine Mammals Potentially Occurring in Resurrection Bay. The marine mammals listed in the table that are also protected as threatened or endangered under ESA are discussed in Section 1.6, Threatened and Endangered Species. Steller sea lions (*Eumetopias jubatus*) and humpback whales (*Megaptera novaeangliae*) that occur within Resurrection Bay could belong to both ESA-listed and unlisted Distinct Population Segments (DPSs). Because their DPS identity would not be known, both Steller sea lions and humpback whales are discussed in Section 1.6.

Table 1.4-1 Marine Mammals Potentially Occurring in Resurrection Bay

Common Name (ESA Status[a])	Scientific Name	Occurrence Near the Seward Marine Terminal	Seasonal Presence in Resurrection Bay	Habitats
Sea Otters				
Northern sea otter	*Enhydra lutris kenyoni*	Likely	Year-round	Coastal
Seals and Sea Lions				
Harbor seal	*Phocis vitulina richardii*	Likely	Year-round	Near coast, estuaries, may travel miles up rivers
Northern fur seal	*Callorhinus ursinus*	Unlikely	Summer	Pelagic – rookeries on remote islands
Steller sea lion Western DPS (E) Eastern DPS (NL)	*Eumetopias jubatus*	Likely	Year-round	Coastal
Whales				
Killer whale	*Orcinus orca*	Unlikely	Summer	Coastal waters
Fin whale	*Balaenoptera physalus*	No	July–October	Pelagic
Gray whale	*Eschrichtius robustus*	Unlikely	July–October	Coastal shelf waters
Humpback whale Mexico DPS (T) Hawaii DPS (NL)	*Megaptera novaeangliae*	Unlikely	July–October	Pelagic and coastal
Minke whale	*Balaenoptera acutorostrata*	Unlikely	Summer	Pelagic and bays, shallow coastal waters near ice
North Pacific right whale (E)	*Eubalaena japonica*	No	July–October	Pelagic
Sperm whale (E)	*Physeter macrocephalus*	No	July–October	Pelagic
Porpoises and Dolphins				
Dall's porpoise	*Phocoenoides dalli*	Unlikely	Year-round, summer	Pelagic and coastal
Harbor porpoise	*Phocoena phocoena*	Likely	Year-round, summer	Coastal waters
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	Unlikely	Summer	Mostly pelagic but also shelf waters

Sources: Allen and Angliss 2015; NMFS 2016a.

Notes:

[a] ESA status (highlighted blue): E = Endangered; T = Threatened; NL = Not ESA Listed; DPS = Distinct Population Segment. All marine mammals are protected under the MMPA.

The MMPA includes a mechanism for authorizing take of a small number of marine mammals incidental to activities other than commercial fishing and defines the term "harassment" as any act of pursuit, torment, or annoyance that (A) has the potential to injure a marine mammal or marine mammal stock in the wild; or (B) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (16 USC 1362 (18)(a)).

NMFS issued new guidance in 2016 for assessing the effects of sound on marine mammal hearing and has established acoustic threshold criteria for the onset of temporary and permanent threshold shifts in hearing (NMFS 2016b). Threshold values are derived for marine mammals by functional hearing groups: low-frequency cetaceans (baleen whales); mid-frequency cetaceans (dolphins, toothed whales, beaked whales), high-frequency cetaceans (true porpoises), Phocid pinnipeds (true seals), and Otariid pinnipeds (sea lions and fur seals), as listed in Table 1.4-2, Temporary and Permanent Threshold Shift Onset

Acoustic Thresholds by Marine Mammal Hearing Groups. Marine mammals in each of the hearing groups occur within Resurrection Bay. Marine mammal hearing groups that are most likely to occur within the Seward Marine Terminal are high-frequency cetaceans (harbor porpoises [*Phocoena phocoena*]), Phocid pinnipeds (harbor seals [*Phocis vitulina richardii*]), and Otariid pinnipeds (Steller sea lions).

Table 1.4-2 Temporary and Permanent Threshold Shift Onset Acoustic Thresholds by Marine Mammal Hearing Groups

Hearing Group	Generalized Hearing Range	Temporary Threshold Shift		Permanent Threshold Shift	
		Impulsive	Non-impulsive	Impulsive	Non-impulsive
Low-Frequency (LF) Cetaceans	7 Hz to 35 kHz	L_{pk} = 213 dB $L_{E,24h}$ = 168 dB	$L_{E,24h}$ = 179 dB	L_{pk} = 219 dB $L_{E,24h}$ = 183 dB	$L_{E,24h}$ = 199 dB
Mid-Frequency (MF) Cetaceans	150 Hz to 160 kHz	L_{pk} = 224 dB $L_{E,24h}$ = 170 dB	$L_{E,24h}$ = 178 dB	L_{pk} = 230 dB $L_{E,24h}$ = 185 dB	$L_{E,24h}$ = 198 dB
High-Frequency (HF) Cetaceans	275 Hz to 160 kHz	L_{pk} = 196 dB $L_{E,24h}$ = 140 dB	$L_{E,24h}$ = 153 dB	L_{pk} = 202 dB $L_{E,24h}$ = 155 dB	$L_{E,24h}$ = 173 dB
Phocid Pinnipeds (PW) (underwater)	50 Hz to 86 kHz	L_{pk} = 212 dB $L_{E,24h}$ = 170 dB	$L_{E,24h}$ = 181 dB	L_{pk} = 218 dB $L_{E,24h}$ = 185 dB	$L_{E,24h}$ = 201 dB
Otariid Pinnipeds (OW) (underwater)	60 Hz to 39 kHz	L_{pk} = 226 dB $L_{E,24h}$ = 188 dB	$L_{E,24h}$ = 199 dB	L_{pk} = 232 dB $L_{E,24h}$ = 203 dB	$L_{E,24h}$ = 219 dB

Sources: NMFS 2016b.

Notes:

Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa^{2}s. Cumulative sound exposure level thresholds incorporate the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and the recommended accumulation period of 24 hours (24h).

dB = decibel

Marine mammals that are likely to occur within or near the Seward Marine Terminal, including northern sea otters, harbor seals, and harbor porpoises, are discussed below. ESA-protected marine mammals potentially occurring within Resurrection Bay including Steller sea lions, humpback whales, North Pacific right whales (*Eubalaena japonica*), and sperm whales (*Physeter microcephalus*) are discussed in Section 1.6.

1.5.1 Northern Sea Otters

Sea otters, the largest member of the weasel family, are covered by a thick brown, black, or silver coat and are equipped with webbed feet for swimming. Adult sea otters are 5 feet long and weigh 50 to 100 pounds; females are smaller than males. Females give birth each year, usually in the late spring in Alaska, to a single pup weighing 3 to 5 pounds. Sea otters live for 15 to 20 years and feed on fish and invertebrates, including clams, octopus, crabs, and sea urchins, which they find in shallow coastal waters (ADF&G 2016b).

The Alaska subspecies of the northern sea otter ranges from southeast Alaska through the Aleutian Islands. Within this range, three stocks have been distinguished based on morphological and genetic differences, as well as physical barriers to movement across the upper and the lower portions of Cook Inlet (70 Federal Register 46366). The southwest DPS, which includes sea otters along the Alaska Peninsula and Bristol Bay Coasts and the Aleutian, Barren, Kodiak, and Pribilof Islands, was listed as threatened in August 2005 (70 FR 46366) due to substantial observed population declines. Sea otters within Resurrection Bay belong to the southeast DPS, which is not considered threatened or endangered and not protected under the ESA.

1.5.2 Harbor Seals

Harbor seals are light gray with dark spots or dark with light rings. They are true seals and fall within the Phocid pinnipeds hearing group as listed in Table 1.4-2. Their pelvic bones are fused, so they move

awkwardly on land, although they are graceful swimmers and are well adapted for extended diving. Adult harbor seals weigh about 180 pounds and are 5 to 6 feet long, with males generally larger than females. Females give birth to a single pup annually, which is born between May and mid-July (ADF&G 2016c). Harbor seals inhabit coastal and estuarine waters throughout the Gulf of Alaska, where they haul out on rocks, reefs, beaches, and drifting glacial ice and forage on a wide variety of schooling fish, flatfish, crustaceans, and squid in marine, estuarine, and, occasionally, freshwater environments. Harbor seals are considered nonmigratory, but make local movements associated with tides, weather, season, food availability, and reproduction (Allen and Angliss 2015).

Harbor seals in Alaskan waters are assigned to 12 separate stocks; harbor seals in Resurrection Bay belong to the Prince William Sound stock. The Prince William Sound harbor seal stock was estimated at 31,503 seals in 2006 and is considered stable and likely increasing (Allen and Angliss 2015).

1.5.3 Harbor Porpoises

Harbor porpoises are small cetaceans with blunt snouts and teeth; they fall within the high-frequency cetacean hearing group as listed in Table 1.4-2. They are generally dark grey, fading to lighter grey on the sides, with a white belly. Harbor porpoises average about 5 feet long and 130 pounds, with females slightly larger than males. Females give birth to a single calf weighing 14 to 22 pounds about every 2 years (ADF&G 2016d). Harbor porpoises are widely distributed and occur year-round in coastal areas on the south side of the Alaska Peninsula and Aleutian Islands. They generally occur in coastal waters less than 300 feet deep where they can feed on schooling fish and invertebrates, including herring, mackerel, smelt, and squid. Harbor porpoises travel alone or in small groups and are often found concentrated in nearshore areas, bays, tidal areas, and river mouths.

Three stocks of harbor porpoises have been defined for Alaskan waters; harbor porpoises in Resurrection Bay belong to the Gulf of Alaska stock. No reliable population estimate or trend is available for this stock; the previous estimate from 1998 was 25,987 porpoises (Allen and Angliss 2015).

Noise generated during construction has the potential to impact marine mammals, especially activities such as impact vibratory pile and sheet driving. Future projects would need to be designed, constructed, and operated to ensure that new developments would avoid and minimize impacts to marine mammals.

1.6 Threatened and Endangered Species

The ESA requires federal agencies that authorize or fund projects that could jeopardize the continued existence of any endangered, threatened, or proposed species or result in the destruction or adverse modification of critical habitat to consult with NMFS and/or USFWS. Consultation is generally initiated by the federal action agency or its designated non-federal representative after the action agency determines that a threatened or endangered species or its critical habitat may be affected. The results of the consultation are presented in a biological opinion by NMFS or USFWS if there is a potential to adversely affect a listed species. If the action is consistent with the requirements of ESA Section 7(a)(2), an incidental take statement and recommended reasonable and prudent measures would be developed. In addition to ESA protection, migratory birds are federally protected by the Migratory Bird Treaty Act and marine mammals are federally protected by the MMPA.

ESA-protected animals that could potentially be affected by projects within the Seward Marine Terminal are listed in Table 1.5-1, Threatened and Endangered Species in Resurrection Bay (NMFS 2015, 2016a; USFWS 2016). All ESA-protected species potentially occurring within or near the Seward Marine Terminal are under the jurisdiction of the NMFS.

Table 1.5-1 Threatened and Endangered Species in Resurrection Bay

Common Name	Scientific Name	Occurrence Near the Seward Marine Terminal	Seasonal Presence	Habitat	Status
Marine Mammals					
Humpback whale Mexico DPS	*Megaptera novaeangliae*	Unlikely	July–October	Coastal/pelagic	Threatened
North Pacific right whale	*Eubalaena japonica*	Unlikely	July–October	Pelagic	Endangered
Sperm whale	*Physeter macrocephalus*	No	July–October	Pelagic	Endangered
Steller sea lion Western DPS	*Eumetopias jubatus*	Likely	Year-round	Coastal	Endangered
Fish[a]					
Chinook salmon ESUs	*Oncorhynchus tshawytscha*				
	Lower Columbia River Spring	Possible	Year-round	Coastal/pelagic	Threatened
	Upper Columbia River Spring	Possible	Year-round	Coastal/pelagic	Endangered
	Puget Sound	Possible	Year-round	Coastal/pelagic	Threatened
	Snake River Fall	Possible	Year-round	Coastal/pelagic	Threatened
	Snake River Spring/Fall	Possible	Year-round	Coastal/pelagic	Threatened
	Upper Willamette River	Possible	Year-round	Coastal/pelagic	Threatened
Coho salmon ESU	*Oncorhynchus kisutch*				
	Lower Columbia River	Possible	Year-round	Coastal/pelagic	Threatened
Steelhead trout DPSs	*Oncorhynchus mykiss*				
	Lower Columbia River	Possible	Year-round	Coastal/pelagic	Threatened
	Middle Columbia River	Possible	Year-round	Coastal/pelagic	Threatened
	Upper Columbia River	Possible	Year-round	Coastal/pelagic	Threatened
	Snake River Basin	Possible	Year-round	Coastal/pelagic	Threatened
	Upper Willamette River	Possible	Year-round	Coastal/pelagic	Threatened

Sources: NMFS 2015, 2016a.

Notes:

[a] These fishes/stocks (evolutionarily significant units [ESUs] or DPSs) spawn on the West Coast outside of Alaska, but may occur in Gulf of Alaska waters during the marine phase of their life cycle.

1.6.1 Steller Sea Lion – Western Distinct Population Segment

Steller sea lions are the largest member of the eared seal family and are within the Otariid pinniped hearing group listed in Table 1.4-2. Sea lions have external ear flaps, use long forearms resembling flippers for propulsion, and are capable of quadrupedal locomotion on land via rotatable hind flippers. Adult females are buff colored, average about 8.6 feet long, and weigh about 579 pounds. Adult males are darker on the front of the neck and chest, are about 10.6 feet long, and weigh about 1,245 pounds. Male Steller sea lions are 9 to 13 years old before they hold territories on breeding rookeries. Females breed in June and give birth the following June to a single pup that weighs about 35 to 50 pounds. They do not migrate, but move their haulouts to follow prey concentrations, feeding on seasonally available fish and cephalopods. Steller sea lions may live for 20 to 30 years (ADF&G 2016e).

Steller sea lions occur throughout the Aleutian chain, the central Bering Sea, the Gulf of Alaska, and southeastern Alaska (ADF&G 2016e). The Steller sea lion was listed throughout its range as a threatened species in 1990 because of significant population declines (55 FR 49204). Potential reasons for the declines include marine habitat regime change that lowered the carrying capacity of the environment; competition for prey with other predators and commercial fisheries; and predation by sharks and killer

whales. In 1997, NMFS reclassified Steller sea lions as two DPSs under the ESA based on genetic studies and phylogeographic analyses (62 FR 24345). The western DPS includes those animals found west of Cape Suckling, Alaska (144°W) through Prince William Sound and Cook Inlet, along the Alaska Peninsula, through the Aleutian Islands and Bering Sea, to the Kuril Islands, Sea of Okhotsk, and the northern coast of Japan. The western DPS was listed as endangered, and the eastern DPS was listed as threatened (ADF&G 2016e). A recovery plan was developed in 2008 (NMFS 2008). In November 2014, the eastern DPS was removed from the threatened and endangered species list (78 FR 66140). In 1993, critical habitat was designated for the Steller sea lion that includes a 20-nautical-mile buffer around all major haulouts and rookeries, as well as associated terrestrial, air, and aquatic zones (58 FR 45269). Rookeries in lower Resurrection Bay are designated as critical habitat, but critical habitat does not extend into the vicinity of the Seward Marine Terminal.

1.6.2 Humpback Whale

Humpback whales are large baleen whales within the low-frequency cetacean hearing group, as listed in Table 1.4-2. They are predominately dark gray to black with white on the throat, belly, flippers, and flukes. Their most distinguishing features are their long flippers and ventral pleats running from the lower jaw to the belly. Humpbacks may congregate in groups of 2 to 12 in pelagic and coastal shallow waters. Adult females are about 49 feet long and weigh about 35 tons; males are slightly smaller. Breeding and calving take place in tropical waters (e.g., Hawaii and Mexico) during the winter months, and females give birth to a single calf every 1 to 3 years. Calves are 10 to 15 feet long and nurse for about 6 to 10 months. Humpback whales feed by filtering euphausiids (i.e., krill) and small schooling fish through their baleen, although they tend to fast during winter and while migrating. Their summer feeding grounds extend from Washington State to the Chukchi Sea (ADF&G 2016f).

Humpback whales were listed as endangered in 1970 primarily due to overexploitation in commercial fisheries (35 FR 8491). This listing was revised in September 2016 to remove the original species level designation, to divide the species into 14 DPSs, and to remove all but five DPSs from listing (81 FR 62260). The two DPSs of humpback whales most likely to occur in Resurrection Bay are the California/Oregon/Washington stock (Mexico DPS), which winters in coastal Central America and Mexico and migrates to areas ranging from the coast of California to the Gulf of Alaska west to Kodiak Island in summer/fall (Carretta et al. 2015), and the Central North Pacific stock (Hawaiian DPS), which winters in the Hawaiian Islands and migrates to northern British Columbia, southeast Alaska, and Prince William Sound west to Kodiak in summer/fall (Allen and Angliss 2015). The Hawaii DPS was delisted, while the listing for the Mexico DPS was revised to threatened (81 FR 62260). Critical habitat has not been designated for humpback whales belonging to the Mexico DPS.

1.6.3 North Pacific Right Whale

North Pacific right whales are large, slow-swimming baleen whales that are mostly black with white patches and lack a dorsal fin; they are within the low-frequency cetacean hearing group as listed in Table 1.4-2. Right whales are rare and are sometimes confused with bowhead whales, although their heads have wart-like callosities while bowheads have smooth skin. Right whales may gather in groups of 2 to 12 in pelagic and coastal shallow waters. Females can grow up to 55 feet in length and weigh 11 tons; males are smaller. Females give birth at lower latitudes during winter. Calves are 13 to 15 feet long, weigh 1 ton, and nurse for a year. Right whales feed primarily on zooplankton (e.g., krill and copepods) by skimming through schools with their mouths and filtering prey through their baleen; they generally forage in the spring and fall. Their summer foraging range includes the southern Bering Sea and Gulf of Alaska (ADF&G 2016g).

Right whales were listed worldwide as endangered in 1970 primarily due to overexploitation in commercial fisheries (35 FR 8491). In 2008, the North Pacific right whale was recognized as a separate species, *Eubalaena japonica*, and relisted as endangered (73 FR 12024). The principal habitat component for right whales is any habitat with dense concentrations of invertebrate prey species

(Shelden and Clapham 2006). Critical habitat for North Pacific right whales has been designated in the southeastern Bering Sea and in the Gulf of Alaska south of Kodiak Island.

1.6.4 Sperm Whale

Sperm whales, the largest of the toothed whales, are within the mid-frequency cetacean hearing group as listed in Table 1.4-2. They are mostly dark gray with single blowhole on the left side. Their head makes up 25 to 35 percent of their total body length of 36 to 52 feet. Sperm whales can weigh 15 to 45 tons, with males considerably larger than females. They occur in social groups with an average of 12 females with their young, small male bachelor groups, or single mature males in deep pelagic waters. Sperm whale females produce a single calf at 5-year intervals, with calves born during winter at low latitudes. Sperm whales specialize in feeding on large squid, but will also feed on sharks, skates, and other fish. They migrate to higher latitudes in summer, and some males may occur as far north as the Bering Sea (NMFS 2016c).

Sperm whales were listed as endangered in 1970 primarily due to overexploitation in commercial fisheries (35 FR 8491). Their listing covers the entire species throughout its entire range. Summer surveys have found sperm whales most frequently in the coastal waters around the central and western Aleutian Islands (Allen and Angliss 2015). Acoustic surveys have detected sperm whales year-round in the Gulf of Alaska, although they appear to be more common in summer than in winter (Mellinger et al. 2004). Critical habitat has not been designated for sperm whales.

1.6.5 Fish – Pacific Salmon Evolutionarily Significant Units and Steelhead Trout Distinct Population Segments

The majority of Pacific salmon and steelhead trout (*Oncorhynchus mykiss*) populations that spawn in freshwaters of the Pacific Northwest, including Alaska and Canada, are healthy and meet management objectives. Seven Chinook and coho salmon Evolutionarily Significant Units (ESUs) and five steelhead trout DPSs or populations that are listed as threatened or endangered are known or suspected to occur in Alaskan waters (refer to Table 1.5-1). These listed salmon and steelhead populations spawn in Washington, Oregon, or Idaho and migrate to forage as juveniles and adults in North Pacific waters. Differentiating marine distribution for specific salmon ESUs and steelhead DPSs is challenging. It is apparent that salmon and steelhead populations share feeding grounds and are found in a variety of depths and distances from shore. Marine migration patterns of salmon and steelhead are influenced by ocean currents and prey concentrations, which are in turn driven by seasonal plankton production and cold water upwelling (Bracis 2010).

Twelve Pacific salmon ESUs and steelhead DPSs are recognized by NMFS as potentially present in the Gulf of Alaska (NMFS 2015):

- one endangered and five threatened Chinook salmon ESUs;
- one threatened coho salmon ESU; and
- five threatened steelhead trout DPSs.

These ESUs and DPSs have experienced declines in recent decades as a result of multiple impacts: freshwater habitat reduction, modification, degradation, and elimination; estuarine rearing habitat reduction, modification, degradation, and elimination; juvenile and adult mortality from hydroelectric and flood control structures; overfishing and bycatch; detrimental effects from invasive aquatic organisms; interactions, genetic, and disease impacts from hatchery practices; and climate changes that affect hydrologic cycles and marine water productivity. The primary factors leading to the listing of these EUSs and DPSs include loss and degradation of freshwater spawning and rearing habitat in Washington,

Oregon, and Idaho. No critical habitat is designated in Alaska waters for ESA-listed Chinook or Coho ESUs, or steelhead DPSs.

Noise generated during construction and vessel traffic during operations has the potential to impact marine mammals, especially activities such as impact and vibratory pile and sheet driving. Future projects would need to be designed, constructed, and operated to ensure that new developments would avoid and minimize impacts to ESA-protected marine mammals. Nearshore dock construction, impact vibrations such as from pile and sheet driving, and vessel operations at docks within the Seward Marine Terminal have the potential to affect EFH, which could be used by ESA-protected salmon ESUs and steelhead trout DPSs. Future projects would need to be designed, permitted, and operated to ensure that new developments would minimize impacts to ESA-protected salmon and steelhead stocks.

1.7 Cultural Resources

Cultural resources are prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for traditional, religious, scientific, or any other reason. Cultural resources within the Seward Marine Terminal may include sites and materials of prehistoric Native American (e.g., stone quarries, game lookouts, tool manufacturing sites, house and cache pits, camp sites, villages, and stone tent rings), historic Russian, European, and Euro-American, and historic Eskimo and Athabascan (e.g., traditional cabin sites, camp sites, burial grounds, traditional subsistence harvest sites, other traditional land use areas, landscapes, and place names) origin.

Historic properties, as defined by the National Historic Preservation Act (16 USC 470 et seq.) and its implementing regulations at 36 CFR 800, are a subset of cultural resources listed on or eligible for inclusion in the National Register of Historic Places (NRHP). The fundamental goal of the National Historic Preservation Act process is to ensure that federal agencies consult with interested parties to identify and evaluate historic properties that may be affected by any project carried out by the agencies or that receives federal financial assistance, permits, or approvals; assess the effects of their undertakings on historic properties; and attempt to negotiate an outcome that will balance project needs and historic preservation values.

The criteria applied to evaluate properties for the NRHP are listed as follows. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

- Criteria A: That are associated with events that have made a significant contribution to the broad patterns of our history; or
- Criteria B: That are associated with the lives of significant persons in our past; or
- Criteria C: That embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criteria D: That have yielded or may be likely to yield, information important in history or prehistory.

A property that meets at least one of the criteria is eligible for listing in the NRHP. Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the

past 50 years shall not be considered eligible for the NRHP. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

- Category A: a religious property deriving primary significance from architectural or artistic distinction or historical importance; or
- Category B: a building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or
- Category C: a birthplace or grave of a historical figure of outstanding importance if there is no other appropriate site or building directly associated with their productive life; or
- Category D: a cemetery that derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or
- Category E: a reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or
- Category F: a property primarily commemorative in intent if design, age, traditional, or symbolic value has invested it with its own historical significance; or
- Category G: a property achieving significance within the past 50 years if it is of exceptional importance.

Traditional cultural properties are properties that are eligible for inclusion in the NRHP because of their association with the cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community (Parker and King 1998). In Alaska, these sites are rarely identified during archaeological surveys, but rather during interviews with the community, through oral histories, specific studies, or written documents. Paleontological sites are not eligible for listing in the NRHP.

1.7.1 Documented Cultural and Historic Properties in the Seward Marine Terminal

The Alaska Department of Natural Resources, Office of History and Archaeology has a data repository called the Alaska Heritage Resources Survey (AHRS) with over 45,000 reported cultural resources (archaeological sites, buildings, structures, objects, or locations, etc.) from prehistoric to modern times and some paleontological sites within the state of Alaska. A desktop analysis of the AHRS was conducted for all cultural resources and historic properties near the Seward Marine Terminal. Those data were supplemented with a windshield and pedestrian reconnaissance survey conducted for ARRC's Freight Dock Expansion project in 2013 (HDR 2013b). The results of the desktop analysis and survey are included in Table 1.6-1, Cultural Resources and Historic Properties within the Seward Marine Terminal.

Table 1.6-1 Cultural Resources and Historic Properties within the Seward Marine Terminal

AHRS Site Number	Common Name	NRHP Status	Action Needed
SEW-00007	Russian Trail	Unevaluated; previously identified as potentially eligible	Not located during survey. No action needed.

Table 1.6-1 Cultural Resources and Historic Properties within the Seward Marine Terminal

AHRS Site Number	Common Name	NRHP Status	Action Needed
SEW-00029	Jesse Lee Main	Nomination canceled/ unevaluated	NRHP evaluation required if not avoided
SEW-01550	Roundhouse	Unevaluated	NRHP evaluation required if not avoided
SEW-01551	Dale R. Lindsey Railroad Intermodal Terminal	Unevaluated	NRHP evaluation required if not avoided
SEW-01552	Collapsed hangar	Not eligible	No action needed
SEW-01553	Isolated felled tree	Not eligible	No action needed
SEW-01554	Marshy area of 30 tree stumps and felled trees	Not eligible	No action needed
SEW-01555	Airport Bay Road	Not eligible	No action needed

Sources: Alaska Heritage Resource Survey 2015; HDR 2013b.

As noted in Table 1.6-1, there are four sites listed as not eligible for listing in the NRHP within the Seward Marine Terminal: a collapsed hangar (SEW-01552), an isolated felled tree (SEW-01553), an area of historic logging (SEW-01554), and Airport Bay Road (SEW-1555). Sites that are not eligible for the NRHP do not require consideration of potential impacts.

The Russian Trail (SEW-00007) is unevaluated for the NRHP, although it was previously identified as potentially eligible. The trail was originally recorded through oral history and was thought to be located near the Seward Marine Terminal; however, it was not located during the 2013 survey (HDR 2013b). The Dale R. Lindsey Railroad Intermodal Terminal (SEW-01551) and the Roundhouse (SEW-1550) were previously documented during the survey (HDR 2013b); however, neither has been evaluated for listing in the NRHP. If future projects cannot avoid these two buildings, an assessment of their NRHP eligibility would be required. A section of the mainline called the Jesse Lee Main (SEW-00029), which runs along the western boundary of the Seward Marine Terminal, was initially nominated for listing in the NRHP due to its historic significance; however, the nomination was subsequently canceled. If future projects cannot avoid this section of the mainline, an assessment of its NRHP eligibility would be required.

The desktop analysis and survey found no known traditional cultural properties within the Seward Marine Terminal. However, additional information may obtained through consultation with the Alaska Office of History and Archaeology, State Historic Preservation Office, and affected tribes.

1.8 Contaminated Sites

The regulatory framework for the management of hazardous materials, hazardous wastes, and contamination is complex, with both federal and state jurisdictions. The following defines these classes of contamination:

- Hazardous material: any material that, because of its quantity, concentration, or physical and chemical characteristics, poses a significant present or potential hazard to human health and safety, or to the environment, if released into the workplace or the environment.
- Hazardous wastes: hazardous substances that can pose a substantial or potential hazard to human health or the environment when improperly managed.
- Contamination: hazardous materials or wastes that have been released into air, soil, surface water, or groundwater.
- Contaminated site: location where hazardous substances, including petroleum products, have been improperly disposed of, spilled, or leaked from their containers.

Part of the due diligence for any construction project is to identify potentially-contaminated sites in order to avoid excavating where soil disturbance is prohibited, or to avoid unknowingly subjecting a contractor to hazardous materials. To understand these risks, a search of the Alaska Department of Environmental Conservation (ADEC) contaminated sites database was conducted to determine the types of contamination documented within 500 feet of the Seward Marine Terminal.

Contaminated sites often threaten public health or the environment and can cause economic hardship to people and communities (Alaska Department of Environmental Conservation [ADEC] 2011). The regulatory framework for the management of hazardous materials, hazardous wastes, and contamination is complex, with both federal and state components.

According to the State of Alaska Contaminated Sites database, there are seven contaminated sites within the Seward Marine Terminal and nine within 500 feet of the Seward Marine Terminal that have been affected by contamination and required cleanup (see Figure 1.7-1 and Table 1.7-1, Contaminated Sites within the Seward Marine Terminal) (ADEC 2017).

All sites have a status of “Cleanup Complete;” four sites have a Cleanup Complete status, with Institutional Controls (IC) assigned. An IC is instituted when contamination remains above the established cleanup levels without an unacceptable risk to human health or the environment. Sites with ICs usually require coordination with ADEC if construction is on or immediately adjacent to the site boundary. ICs may also be implemented when contaminants remain after cleanup is completed to the extent practical. High-risk site IC types include equitable servitudes, conservation easements, and compliance orders. Lower-risk sites may have public informational IC types, including deed notices, ADEC online database notations, and letters to the landowner. Most ICs will have use restrictions and possible monitoring requirements, and these may include soil or groundwater monitoring, groundwater use restrictions, air quality monitoring, maintenance of engineering controls like fencing or asphalt caps, and soil and groundwater removal restrictions. With ICs, ADEC is able to manage land use decisions and require a number of different conditions, such as notification requirements for certain actions and further remediation in the future.

Table 1.7-1 Contaminated Sites within the Seward Marine Terminal

Hazard ID	Within Seward Marine Terminal	Within 500 feet of Seward Marine Terminal	Site Name	Cause		Contaminated Medium		Actions	IC
				UST Removal	Other	Soil	Groundwater		
22982	x		Seward Railyard Tanks 3 and 4	x		x		Soil removal limited due to proximity of railroad tracks; removed contaminated soil was thermally treated.	x
25411	x		Seward Railyard Tank 5	x		x		Soil removal limited due to proximity of railroad tracks; removed contaminated soil was thermally treated.	x
1529	x		ARRC Seward Rail Yard	x		x	x	Soil removal limited due to proximity to the railroad tracks and dock building retaining wall.	x
4416	x		Freight Building*		x	x		Contaminated soil stockpiled, removed, and thermally treated.	
26002	x		U.S. Coast Guard Seward Mustang Mooring Building	x		x		Contaminated soil removed and thermally treated.	
1820	x		Seward Small Boat Harbor		x	x	x	Contaminated soil was excavated and stockpiled for bioremediation.	
23061	x		Alaska Vocational Technical Center	x		x		25 cubic yards of contaminated soils were excavated	
1514		x	City of Seward Fort Raymond Substation		x	x	x	Remediation activities	
1523	x		Shoreside Petroleum		x	x	x	Corrective Action Plan	x
2070		x	Harbor Air Service		x	x		15 cubic yards of contaminated soil was removed and thermally remediated	
3333		x	Seward Ship Chandlery-2		x	x		90 cubic yards of contaminated soil remediated	
22976			Seward Tesoro - 93	x		x		110 cubic yards of soil was excavated and then placed back into the excavation along with an additional 60 cubic yards of imported soil	
24661			Seward Tesoro - 97	x		x		345 tons of soil were excavated and sent to Alaska Soil Recycling for thermal remediation. Groundwater was not encountered.	
24741		x	Gateway Texaco-Seward	x		x		5 cubic yards of contaminated soil excavated	
25167		x	Seward, City of-Sewer Lift Station #1	x		x		8-10 cubic yards of contaminated soil excavated and used as backfill in the top two feet of the excavation.	
25250		x	Residence- 217 Marathon Drive, Seward		x	x		100 cubic yards impacted; 29 cubic yards were removed and stored on site.	

Sites with ICs would require coordination with ADEC and should be considered during the risk analysis of any project development. These sites are summarized below:

1. ARRC Seward Rail Yard (Hazard #1529): This site is located approximately 1,500 feet north of the Roundhouse and less than 1,000 feet west of the airport. In 1993, diesel range organic (DRO) contamination was encountered during the closure of two 10,000 gallon heating oil Underground Storage Tanks (UST). Contamination reached approximately 10 feet below ground surface (bgs), and groundwater was impacted. In 2009, ADEC determined that remaining contaminant concentrations do not pose an unacceptable risk to human health or the environment, and no further remedial action be required as long as the site is in compliance with ICs, which contained these conditions:
    - If land use and/or ownership changes, current institutional controls may not be protective and ADEC may require additional remediation and/or institutional controls. Therefore, ARRC will report to ADEC every five years to document land use, or as soon as ARRC becomes aware of any change in land ownership and/or use. The report can be sent to the local ADEC office or electronically to DEC.ICUnit@alaska.gov
    - A Notice of Environmental Contamination will be recorded on the ADEC database to document that there is residual contamination remaining on site above the most stringent ADEC cleanup levels.
    - Any proposal to transport soil or groundwater off site requires ADEC approval in accordance with 18 AAC 75.325(i). A “site” [as defined by 18 AAC 75.990 (115)] means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.
    - Movement or use of potentially contaminated soil in a manner that results in a violation of 18 AAC 70 water quality standards is unlawful.
    - The soil contamination located under the asphalt at the T1 location and near the railroad tracks at the T2 location is currently inaccessible (see attachment B). When the soil becomes accessible, the soil must be evaluated and contamination addressed in accordance with an ADEC approved work plan
    - ADEC recommends that the 2-tier PVC gallery at the T2 excavation be decommissioned.
    - Groundwater wells may not be installed on site without ADEC approval.
2. Shoreside Petroleum (Hazard #1523): This site is located at 700 Port Avenue and Alameda Street. This site has a history of multiple spills: leaking equipment and leaking valves on a Fuel Transfer Line, contaminated soil transferred off site and not placed on liner (criminal action was taken); drippings onto soils from a truck; a leak from a flange from an above ground tank spilled 100 gallons to a drip pan and 100 gallons to the dike; an a spill at pump house #1. Some of these were minor, however both groundwater and soil were impacted by the spill at pump house #1 and required corrective action plan. The site ICs include the following:
    - Additional corrective action may be required in the future is land use changes
    - Additional excavation and remediation of the contaminated soils may be required if the soils are excavated in the future. If contaminated soils are excavated in the future, Leirer Enterprises are responsible for insuring that any contaminated soil originating from this site is properly and lawfully managed. All soils excavated from this site must be screened and tested, and if contaminated is detected, considered a hazardous substance. Prior ADEC approval is required for the ultimate disposal of soil contaminated with a hazardous substance.
    -

1. ARRC Seward Rail Yard Tank 5 (Hazard #25411) ARRC Seward Rail Yard Tanks 3 and 4 (Hazard ID #22982): The ICs associated with this site are somewhat standard and include the following:

3. ARRC Seward Rail Yard Tank 5 (Hazard #25411) ARRC Seward Rail Yard Tanks 3 and 4 (Hazard ID #22982): The ICs associated with this site are somewhat standard and include the following:

    - Any proposal to transport soil or groundwater off site requires ADEC approval in accordance with 18 AAC 75.325(i). A “site” [as defined by 18 AAC 75.990 (115)] means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.
    - If land use and/or ownership changes, current institutional controls may not be protective and ADEC may require additional remediation and/or institutional controls. Therefore, ARRC will report to ADEC every five years to document land use, or as soon as ARRC becomes aware of any change in land ownership and/or use. The report can be sent to the local ADEC office or electronically to DEC.ICUnit@alaska.gov

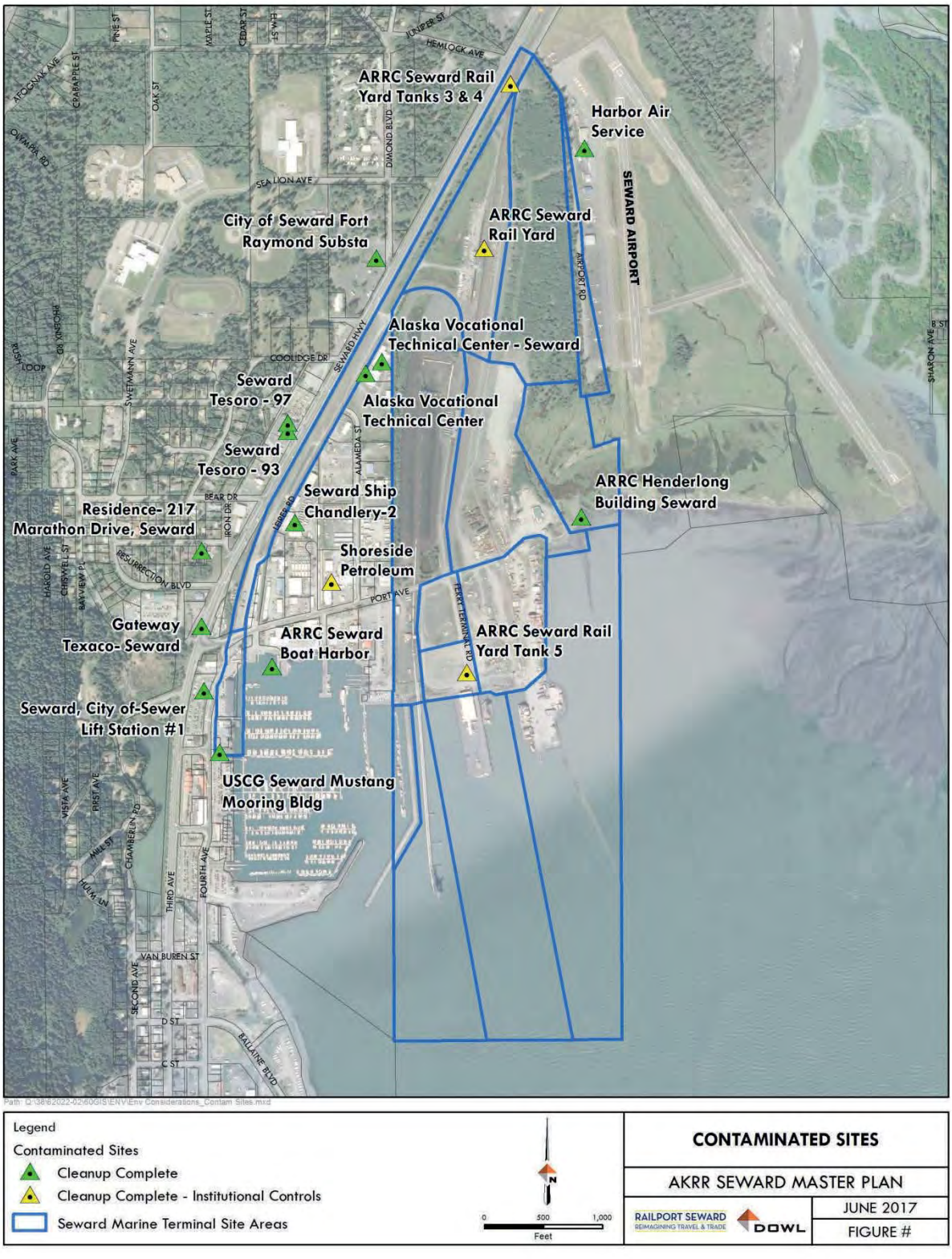

Figure 1.7-1 Contaminated Sites within the Seward Marine Terminal

1.9 Environmental Benchmarks

Analyzing environmental resources, completing NEPA documentation, and obtaining needed permits are typically one of the 'critical paths' between project initiation and construction. For example, obtaining an IHA requires a minimum of 12 months, and typically is completed in 18+ months primarily because all IHA requests are routed through NMFS headquarters in Washington D.C., and they get backlogged. An IHA can occasionally take as long as 24 months. To assist with planning and preliminary design, the following is a generalized guide to design-based triggers for starting and finishing environmental activities.

Design Initiation - 10% Complete (NTP & Project Kickoff)

- Initiate Purpose and Need
- Initiate Location/Vicinity Map
- Define Project Limits
- Determine Needed Permits & Studies
- Initiate Scoping Documents
- Determine necessary graphics and figures

Design 20%

- Finalize Purpose and Need
- Finalize Location/Vicinity Map
- Confirm Project Limits
- Confirm Needed Permits & Studies
- Initiate Scoping and Section 106 consultation
- Begin Agency Coordination to Identify Needed Permits. These will likely include:
  - USACE Section 10
  - USACE Section 404 of CWA
  - Section 401 of CWA
  - NMFS ESA Section 7 Consultation
- Initiate IHA analysis (can take up to two years to complete)
- Begin Biological Assessment
- Begin Marine Mammal Monitoring Plan
- Identify Alternatives
- Determine if any Studies are required

Design 35%

- Summarize Scoping Results
- Refine Project Description
- Initiate Resource Studies & Needed Analysis
- Confirm Alternatives
- Initiate NEPA/Environmental Documentation(from 6 months to 2 years to complete)
- Determine need for right-of-way acquisition
- Initiation Section 7 consultations with NMFS and USFWS
- Begin drafting IHA application

Design 65% (Study Report)

- Conclude Resource Studies & Needed Analysis
- Initiate Permit Applications
- Submit Draft NEPA/Environmental Documentation
- Formally initiate IHA process (from 12-24 months to complete)

Design 95% (Complete)

- Finalize Permits
- Sign NEPA/Environmental Documents

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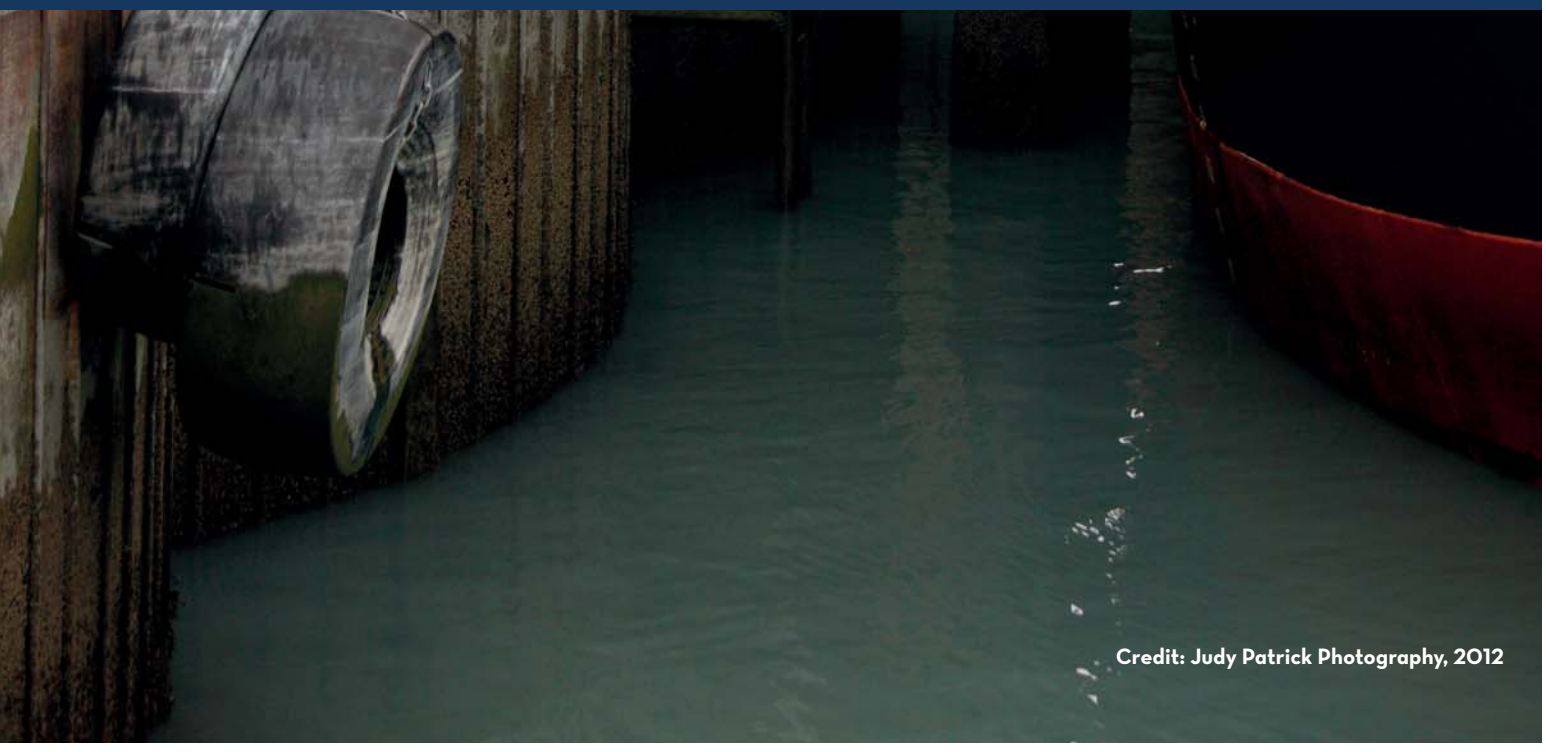
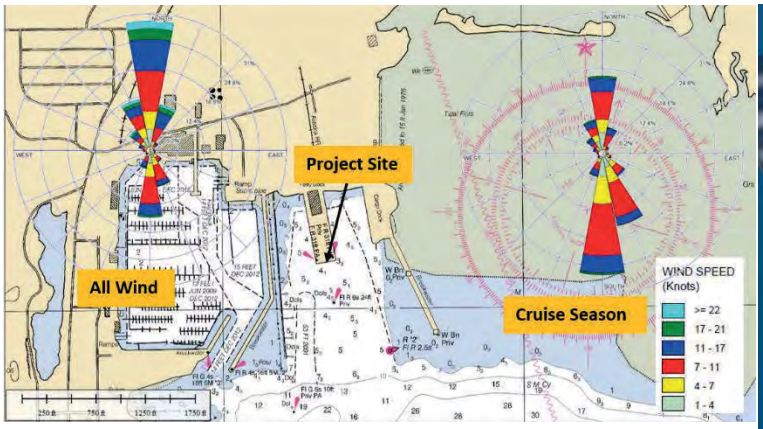
Appendix C:
Wave Analysis

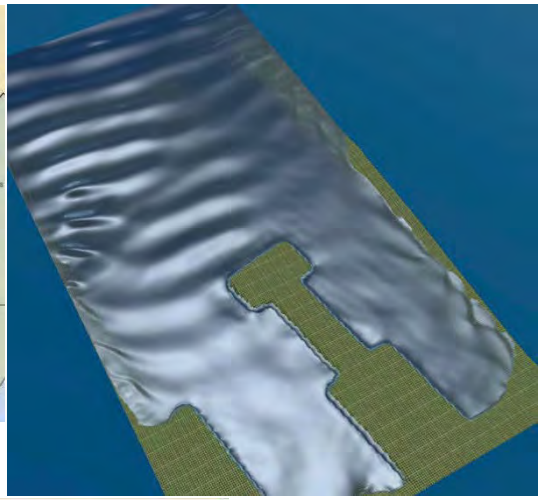


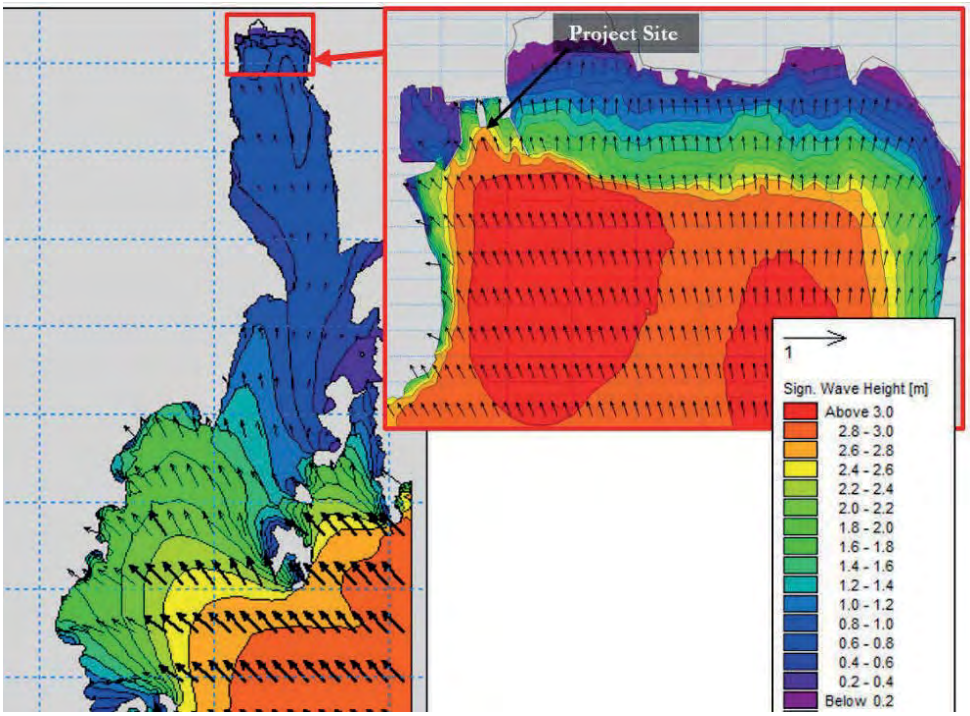
Credit: Judy Patrick Photography, 2012

ALASKA RAILROAD CORPORATION SEWARD MARINE FACILITIES

MET-OCEAN and NUMERICAL WAVE MODEL STUDY







Prepared For:

RAILPORT SEWARD

Prepared By:

PND ENGINEERS, INC.

July 2017

Executive Summary

This report has been prepared by PND Engineers, Inc., (PND) for the Alaska Railroad Corporation (AKRR) and contains the results of a met-ocean study for the AKRR marine facilities in Seward, Alaska, including the analysis of available data on wind, water levels, and waves. Desktop calculations, MIKE21, OpenFOAM, and CELERIS numerical models have been applied to estimate the design wave conditions at the project site and around the proposed OPEN CELL™ cruise ship dock site. The main purpose of this study was to identify the design environmental conditions (i.e., waves and water levels) that could have an impact on the design of the marine facilities.

Key Findings

An extreme high water elevation of +16 feet above Mean Lower Low Water (MLLW) is appropriate for design. The 100-year return period omnidirectional wind speed was calculated to be 137 MPH; the 100-year southerly wind speed during the cruise season from May 15-September 15 was calculated to be 56 MPH (2-minute average wind speeds); and the 100-year return period wave height immediately in front of the planned dock site was 9.2 feet for wind waves from the south. The project site is relatively protected from the large, long-period wave storms approaching from the Gulf of Alaska. The largest predicted 100-year swell wave height from the south penetrating the site was found to be 0.7 feet. Long period waves are an important design consideration because they influence the motion of the floating structure more than smaller wavelength wind waves. Based on the Boussinesq wave numerical model incident, waves of 5 feet and greater are possible behind either the proposed OPEN CELL™ or closed cell dock concepts.

The dynamic motions for the floating dock were analyzed using the OpenFOAM numerical model. The float motion is limited with a maximum pitch of 1 degree for a 50-year design event. This indicates that the OPEN CELL™ provides relatively sufficient protection and float motion is unlikely to cause significant problems during operations. However, only a portion of the OPEN CELL (front face) was modeled to analyze the float motions. It is expected that the float motions may be somewhat higher due to wave reflection from the back wall when the full dock is modeled. Further analysis is recommended prior to final design.

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1. Introduction

This report analyzes met-ocean criteria and provides numerical modeling results for the three concepts of the railroad marine facility in Seward, Alaska. Included is an analysis of wind, wave, and water elevation from measured and hindcast data. This report has been prepared by PND for AKRR.

The project site is in the northwest corner of Resurrection Bay, approximately 125 miles south of Anchorage, Alaska. Resurrection Bay is a 19-mile-long fjord with north-south orientation and a 3-mile opening to the Gulf of Alaska. **Figure 1** shows the project location and straight-line fetch wave directions approaching the site. **Figure 2** is a south-facing oblique aerial image of the Resurrection Bay.

The project site is exposed to waves generated along relatively long-fetch distances to the south and southeast. These waves can reach the project site on a straight-line fetch, as shown in **Figure 1**. Waves from north (Gulf of Alaska) can reach the proposed dock site only by diffracting and refracting around headlands and islands.

This report describes a numerical (computer) wave model study. Included is a description of the model set-up, input conditions, analysis of the output, and interpretations. The wave numerical models (e.g. MIKE21, OpenFOAM, and CELERIS) have been used to estimate the wave conditions at the project site and around three proposed cruise ship dock alternatives. The results will also be applied to develop the Design Environmental Conditions (DEC) for the AKRR project.

The proposed facility is intended to service multiple users, including accommodation of two full-size cruise ships. Various concepts of the AKRR dock configuration have been developed, and PND has performed wave numerical modeling for three of these concepts. The initial OPEN CELL™ concept consists of an OPEN CELL™ T-Dock with a large north passenger dock and without any revetment in front of the vertical walls. A modified T-Dock, consisting of an OPEN CELL™ T-Dock without the large north dock, but with the revetment added in front of the front cells to minimize wave reflection, is the second concept. The third modeled concept consists of a closed-cell island with the pile-supported approach dock and with the revetment added in front of the northern vertical wall. **Figure 3 through Figure 5** shows each of these three modeled concepts.

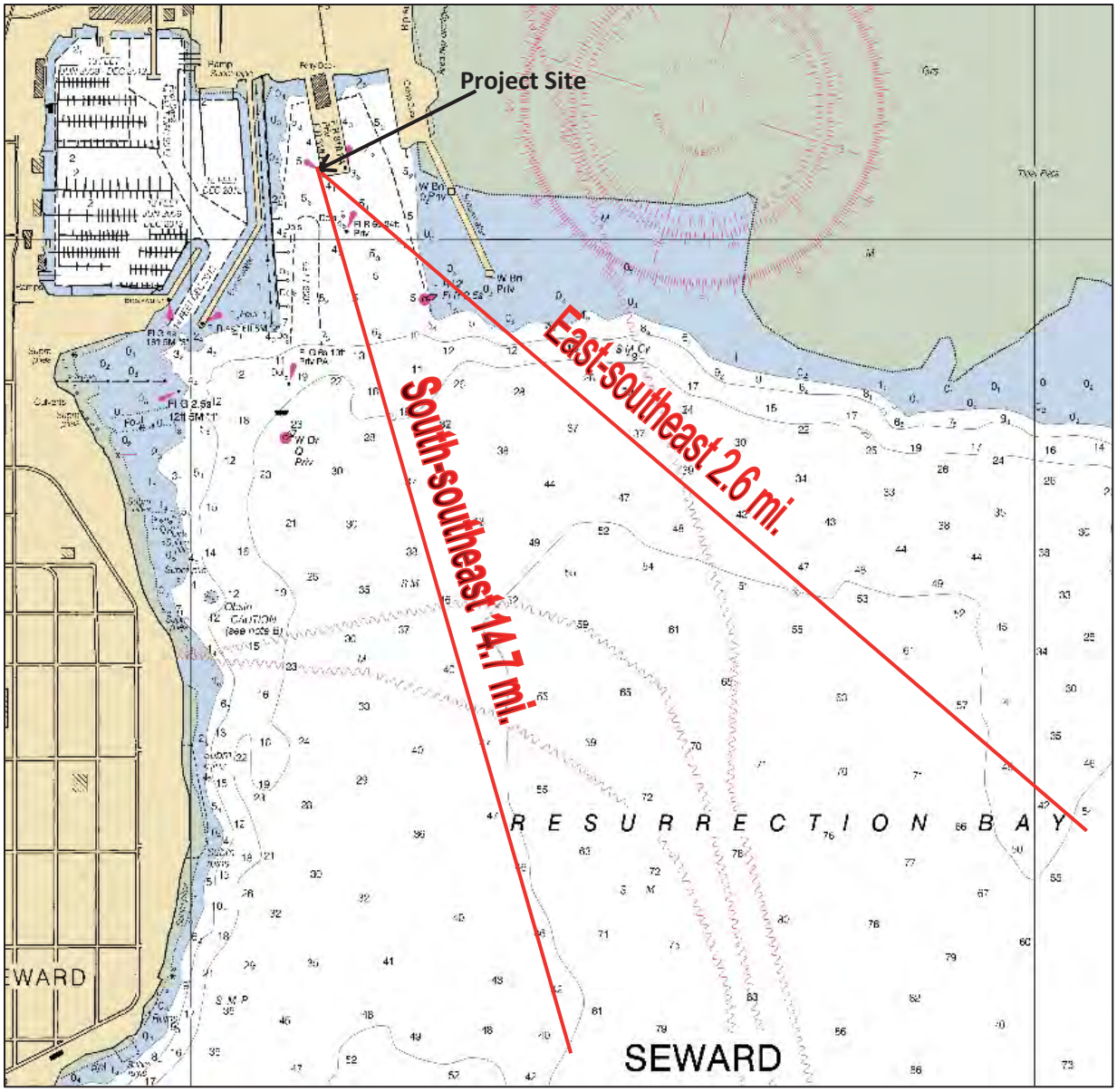


Figure 1. Area Map and Wave Directions (NOAA Chart 16682)

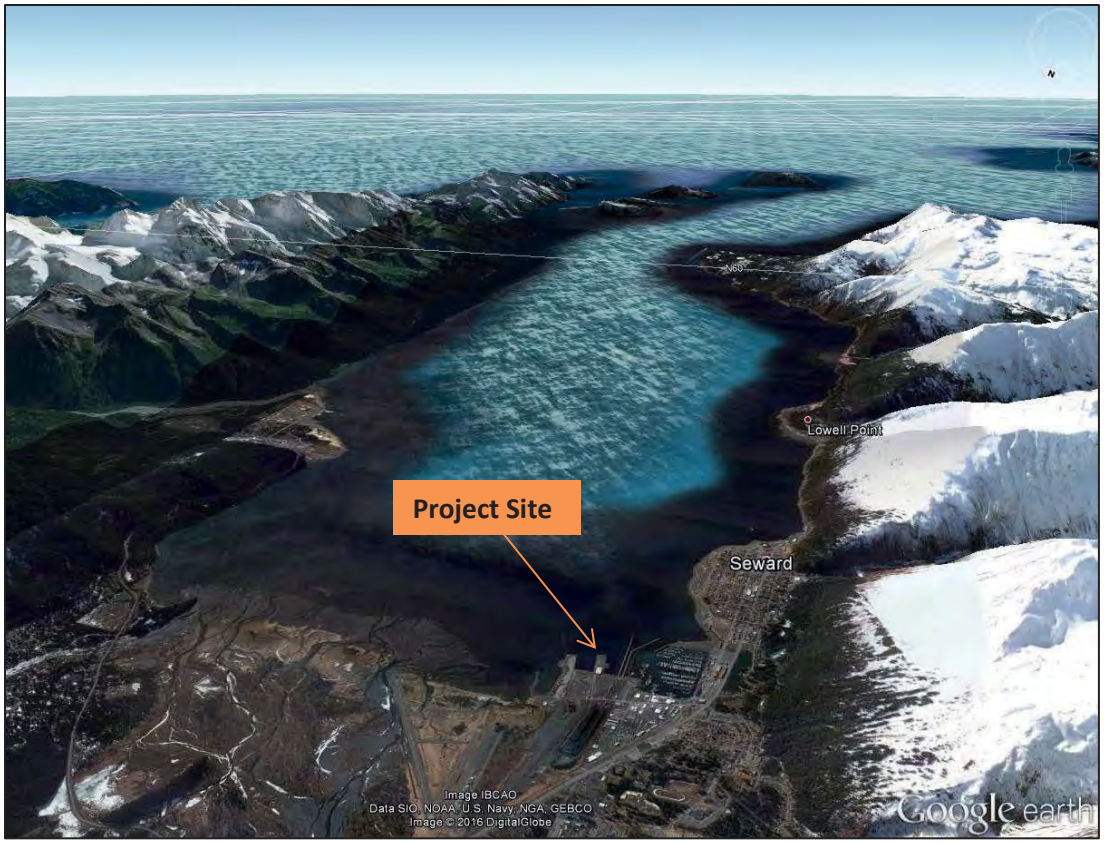
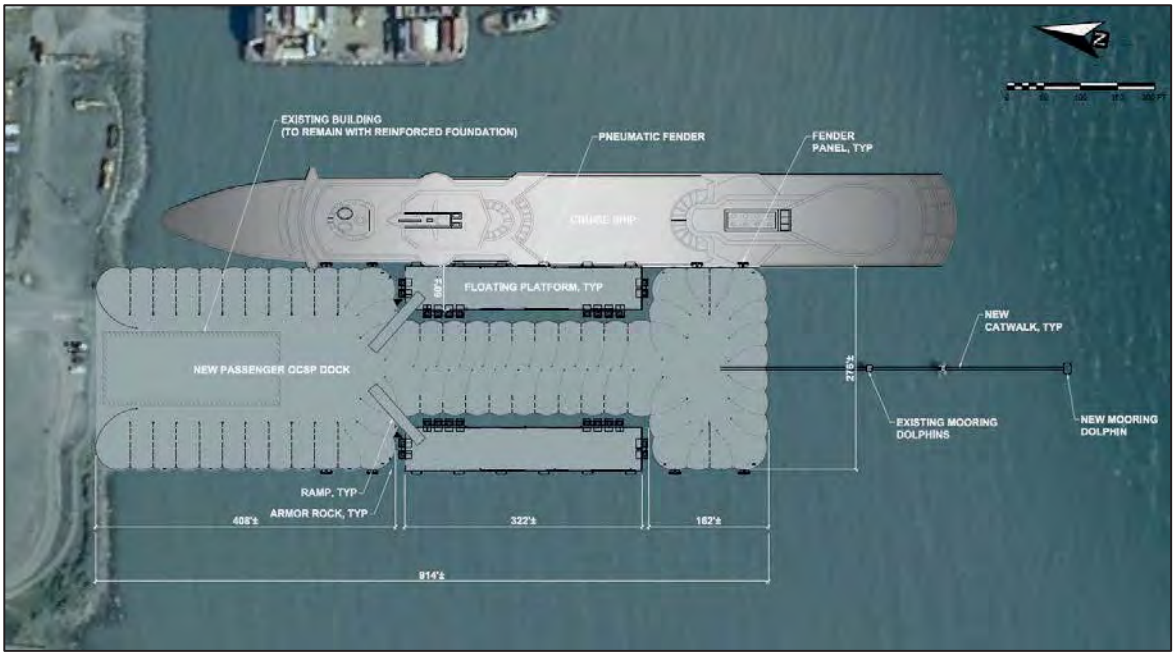


Figure 2. Oblique Aerial Image – Facing South (Google Maps, 2014)
Figure 3. Initial concept of the OPEN CELL™ T-Dock without revetment



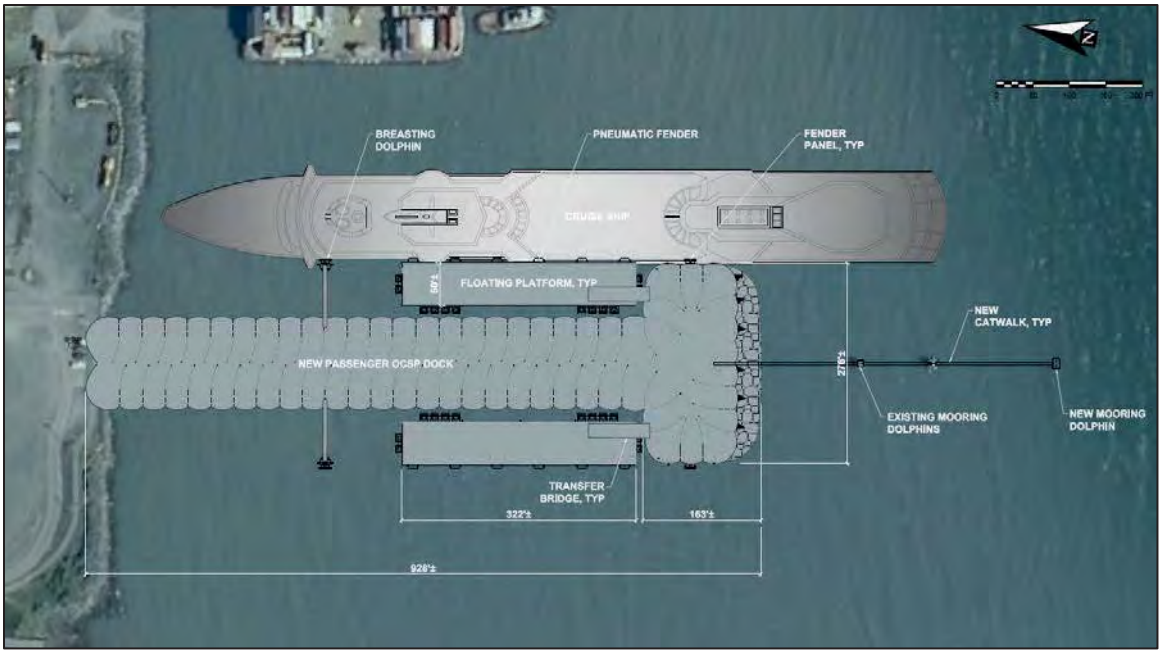


Figure 4. Modified concept of the OPEN CELL™ T-Dock with revetment

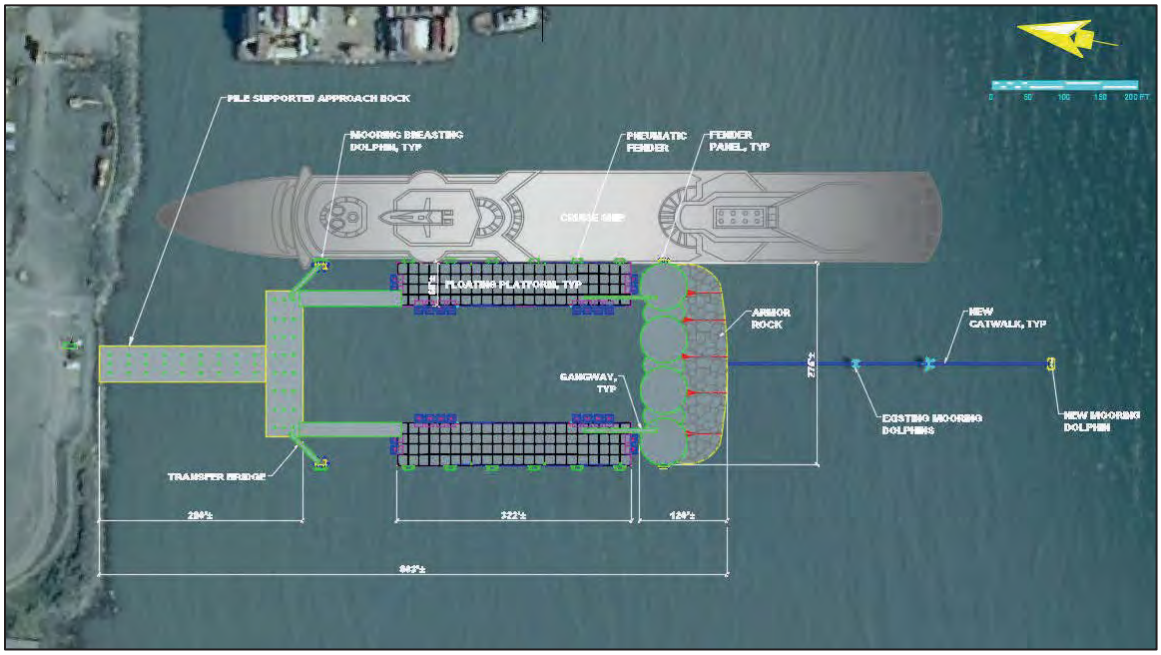


Figure 5. Closed Cell Island with revetment and pile supported approach dock concept

2. Tides and Water Levels

Tide and water level data are available from an NOAA tide gage at Seward (Station 9455090), in operation since 1925 (NOAA, 2015).

shows tidal datum information for Seward NOAA tide gage.

The highest recorded tide in Seward occurred on January 1, 1987, elevation +15.7 feet. The lowest observed water level of -5.0 feet was recorded on December 14, 2008. Tide elevations have been recorded in Seward since 1925 and show a net falling sea level at a rate of -2.66 mm (0.009 feet) per year, with a 95% confidence interval of +/- 0.71 mm/year. This is equivalent to a change of -0.87 feet in 100 years (NOAA, 2015), as shown in **Figure 6**. Note that most of Alaska's coasts are known to experience relative sea level fall, possibly related to glacial rebound and/or tectonic uplift. For an assumed project design life of 100 years, it may be appropriate to design for a potential decrease in sea level of 1.0 feet.

The recommended Design High Water elevation for the sites at the end of Resurrection Bay is +16.0 feet MLLW based on the water levels at Seward Tide Station. The recommended Design Low Water is –5.0 feet MLLW.

Table 1. Tide Datum Information – Seward Tide Station 9455090

Water Levels	Elevation (feet, MLLW)
Highest Observed Water Level (01/01/1987)	15.7
Mean Higher High Water	10.6
Mean High Water	9.7
Mean Tide Level	5.5
Mean Sea Level	5.6
Mean Low Water	1.4
Mean Lower Low Water	0.0
Lowest Observed Water Level (12/14/2008)	-5.0

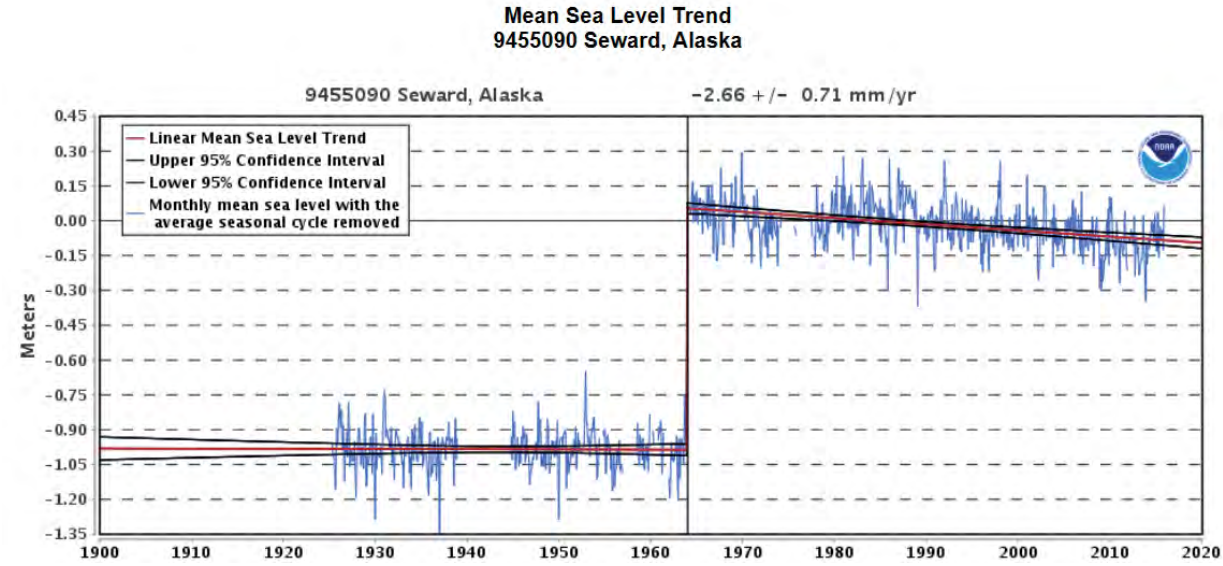


Figure 6. Sea Level Rise Trend – Seward

3. Wind

Measured wind data is available from a number of sites in the region. The following organizations maintain the weather stations and buoys where the data was collected:

1. National Oceanic and Atmospheric Administration (NOAA)
2. National Data Buoy Center (NDBC)
3. U.S. Air Force (USAF)
4. U.S. Army Corps of Engineers (USACE) – Wave Information Studies (WIS)
5. National Climatic Data Center (NCDC)

Table 2 summarizes the data available from nearby stations. The wind data are 2-minute average wind speeds for land stations and 8-minute averages for the offshore buoys.

Table 2. Wind Data Summary

No.	Site	Distance from Site (miles)	Start-End Years	No. of Years*	Max Wind Speed (mph)
1	Seward Airport	>1	1945-2016	48	129
2	Pilot Rock NDBC Station PILA2	26	1999-2016	16	63
3	Cape Clear NDBC Station 46076	66	2005-2016	11	53
4	Portlock Bank NDBC Station 46080	152	2002-2016	15	49
5	USACE WIS Station 81014	78	1980-2011	31	57

*Number of years of data with gaps removed.

Wind data from the Seward Airport station was selected for extremal wind analysis due to its location and data availability. The directional wind data extremes annual and seasonal (cruise season from May 15-September 15) were analyzed to determine the wind speed associated with a given return period. Wind direction is defined as the direction winds are travelling from. Wind roses from Seward Airport for the entire year and for the cruise season are presented in **Figure 7**.

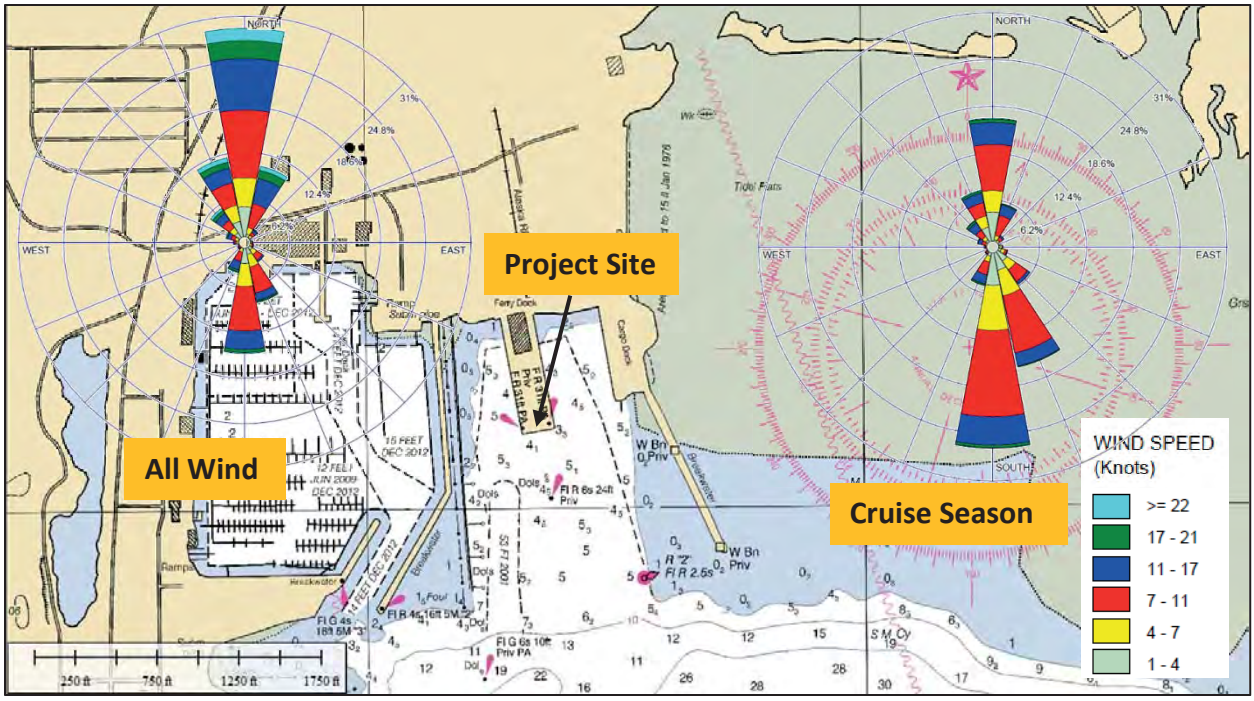


Figure 7. Seward Airport Wind Roses (Right – Cruise season from May 15-September 15; Left – All wind) – 1945-2016.

The airport wind roses show that the prevailing winds are from the north during winter and from the south during summer season. The highest recorded wind speed was westerly 129 MPH at Seward Airport station on June 20, 1996.. The estimated 100-year return period wind speed during cruise season is 52 MPH for winds from the east-southeast and 56 MPH for winds from the south-southeast.

Table 3 shows the 10 largest wind speeds from all directions measured at Seward Airport. **Table 4** shows the largest recorded winds filtered by east-southeast and south-southeast directions; **Table 5** shows winds from Seward Airport filtered by fetch direction and cruise season (May 15-September 15); **Table 6** summarizes the return period wind speeds. The estimated 100-year return period wind speed during cruise season is 52 MPH for winds from the east-southeast and 56 MPH for winds from the south-southeast.

Table 3. Seward Airport – Largest Recorded Annual Wind Speeds – All Directions

	Seward Airport		
Rank	Date	Speed (MPH)	Dir (deg)
1	6/20/1996	128.8	250°
2	10/22/1994	109.2	310°
3	7/17/1983	87.5	200°
4	8/10/1985	76.1	150°
5	9/4/1980	72.5	290°
6	4/8/1981	70.2	150°
7	10/12/1985	69.1	130°
8	1/31/1987	69.1	100°
9	8/20/1991	69.1	220°
10	12/7/1978	68.9	220°

Table 4. Largest Recorded Wind Speeds – Filtered by fetch direction

Rank	East-Southeast (110°- 140°)			South-Southeast (150°- 180°)		
	Date	Speed (MPH)	Dir (deg)	Date	Speed (MPH)	Dir (deg)
1	10/18/1985	69.1	130°	8/10/1985	76.1	150°
2	2/19/1987	69.1	130°	4/8/1981	70.2	150°
3	7/3/1975	60.8	120°	2/21/1987	69.1	150°
4	11/13/1994	57.5	110°	3/17/1993	68.9	180°
5	1/18/1996	51.7	130°	9/16/1982	51.7	160°

Table 5. Largest Recorded Wind Speeds – Filtered by fetch direction and Cruise Season (May 15-September 15)

Rank	East-Southeast (110°- 140°)			South-Southeast (150°- 180°)		
	Date	Speed (MPH)	Dir (deg)	Date	Speed (MPH)	Dir (deg)
1	7/3/1975	60.8	120	8/10/1985	76.1	150°
2	6/9/1982	45.9	120	9/6/1982	51.7	160°
3	6/17/1976	33.3	130	5/27/1982	40.3	180
4	7/9/1980	29.8	140	6/28/1996	34.4	160
5	5/28/1947	26.4	135	7/11/1991	31.1	170

Table 6. Return Period Wind Speed Analysis Summary – Seward, Airport Station

Direction	2-yr Return Period Wind Speed (MPH)	50-yr Return Period Wind Speed (MPH)	100-yr Return Period Wind Speed (MPH)
All Directions	48	117	137
East-Southeast (110°- 140°)	25	73	86
South-Southeast (150°- 180°)	33	77	89
East-Southeast (110°- 140°) Cruise Season (May 15-September 15)	21	45	52
South-Southeast (150°- 180°) Cruise Season (May 15-September 15)	27	50	56

4. Waves

The only reliable measured wave data is available from the NOAA offshore buoys 46076 and 46080, located 66 and 152 miles south of the project site, respectively. Offshore wave information is also available from a numerical model hindcast study at points offshore of Alaska (USACE, 2016).

MIKE21 wave numerical model was applied to predict the wave environment near the project sites. The inputs for the wave models included the 100-year return period, wind and offshore waves, and existing water depths. CELERIS numerical wave models were used to calculate wave reflection and diffraction around and inside the proposed T-Dock site area. An OpenFoam numerical model was used to predict floating dock motion due to waves inside the proposed T-Dock OPEN CELL™ structure. The inputs for the

CELERIS and OpenFoam models were derived from the MIKE21 model output. All modeling work is described in Section 5.

A simplified wave hindcast calculation using measured wind data was also used to estimate waves at the project site and is discussed in the following sections.

Note that tsunami effects in the area are significant and are beyond the scope of this study.

4.1 Measured Wave Data

Non-directional measured wave data is available from NOAA Buoy 46076 from 2004-2016 (NDBC, 2016), located approximately 66 miles southeast from the project site. Non-directional wave data is also available from NOAA Buoy 46080, located approximately 152 miles south from the project site. The wave data extremes were analyzed to determine the wave height associated with a return period event.

Non-directional measured wave data is also available inside Resurrection Bay from September-November 1995 from Coastal Data Information Program (CDIP). However, available wave information is very sparse, and the lack of quality control and the metadata information from this station made this wave data unreliable for the model calibration and verification.

Table 7 shows the 10 largest wave heights and periods measured from offshore buoys. Wave data from Buoy 46076 was selected for extremal wave analysis. This information was used as the boundary condition for the MIKE21 model to evaluate large wave storms originating from the Gulf of Alaska inside Resurrection Bay.

Table 8 shows the results of the extremal analysis. The estimated 100-year return period significant wave height is approximately 46 feet.

Table 7. Largest Recorded Wave Heights – All Directions – Buoy 46075

Rank	Buoy 46076			Buoy 46080		
	Date	Wave Height (feet)	Wave Period (seconds)	Date	Wave Height (feet)	Wave Period (seconds)
1	11/1/2010	34.2	12	10/21/2005	33.2	13
2	11/26/2007	33.5	11	2/9/2010	32.6	14
3	12/29/2006	33.4	16	3/10/2005	32.5	17
4	10/21/2005	33.3	13	12/23/2006	31.2	13
5	2/10/2006	33.3	14	12/29/2006	30.3	17
6	12/31/2012	31.5	16	12/30/2015	30.0	14
7	11/19/2005	30.6	17	12/17/2015	29.9	11
8	11/23/2009	28.9	13	9/24/2003	29.6	11
9	2/24/2016	28.4	14	2/24/2016	29.3	15
10	9/27/2005	28.1	11	12/12/2011	29.2	13

Table 8. Return Period Significant Wave Height (Hs), Non-directional

Return period	Buoy 46076	Buoy 46080

	Hs (feet)	Hs (feet)
2 year	30.0	28.8
50 years	42.5	42.5
100 years	46.0	46.2

4.2 Offshore Waves – Wave Information Study (WIS)

Offshore wave information is available from a numerical model hindcast study at points offshore of Alaska (USACE, 2016).

The wave rose for WIS Station 81014, located 78 miles south from the proposed site, is presented in **Figure 8**. It shows that the dominant wave direction is from the south and southeast. **Figure 9** shows analysis of return period wave heights at Station 81014 with associated peak period and direction tabulated for the 10 largest events during the 31-year hindcast. The 100-year return period significant wave height offshore is estimated to be about Hs = 36 feet (11 meters). A peak wave period of Tp = 13 to 18 seconds is a reasonable assumption for extreme storm modeling.

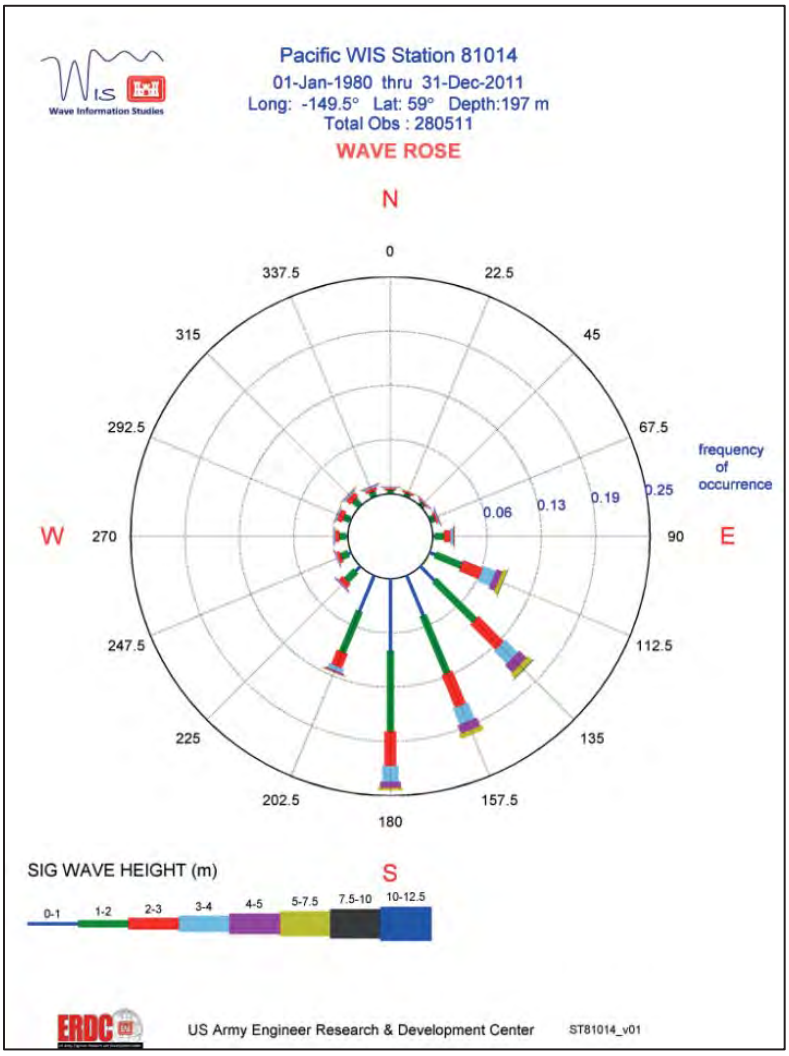


Figure 8. Wave rose – WIS Station 81014, 78 miles south from proposed site (USACE, 2016)

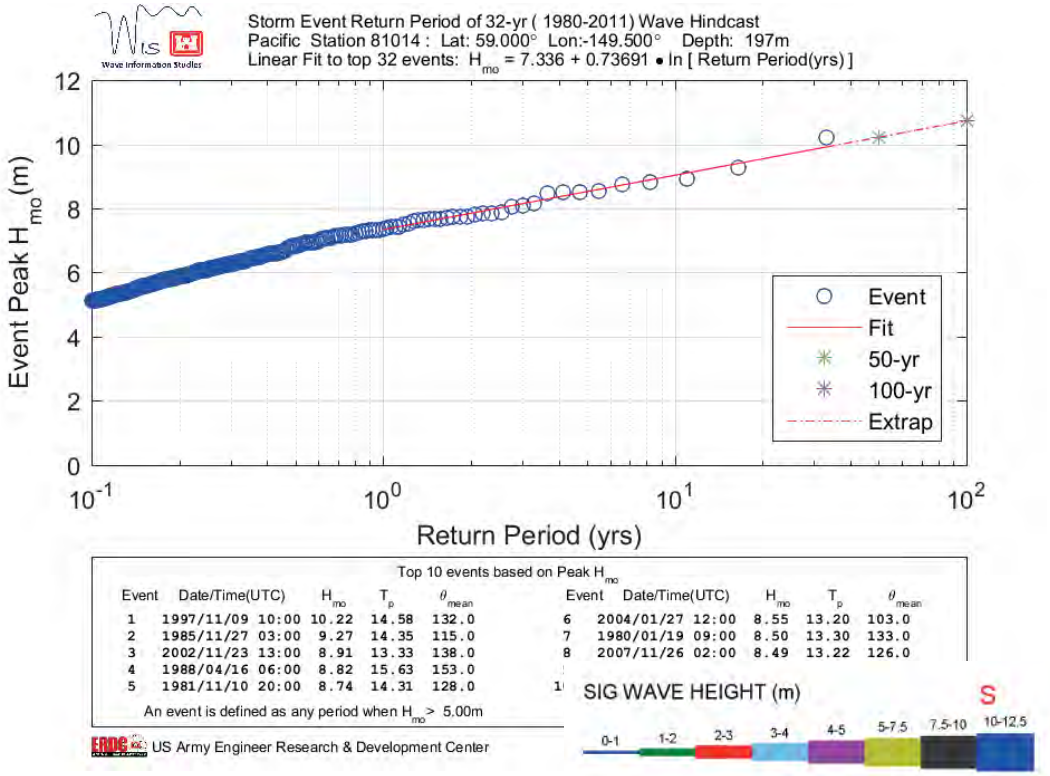


Figure 9. Return Period Wave Height – WIS Station 81014, 78 miles south from proposed site (USACE, 2016)

4.3 Wave Hindcast Calculations

Waves at the project site were estimated using wind data and hindcast formulae found in the U.S. Army Corps of Engineers Coastal Engineering Manual (USACE, 2016). The project site is exposed to wave energy from the open ocean waves that refracts around islands and headlands. However, the straight line fetch distance for local waves is limited to about 2.6 statute miles from east-southeast and 14.7 miles from south-southeast, as shown in **Figure 1.**

Fetch-limited wave calculation methods were applied to determine the wave height and period associated with the wind speeds and fetch lengths. The hindcast significant wave height (Hs), peak period (Tp), and maximum wave height (Hmax) are calculated and listed in **Table 9**. The wave heights estimated are for the 'deepwater', meaning they originate in a depth offshore before they can feel the bottom and shoal or refract.

The 100-year return period significant wave height at the project is approximately 7.2 feet for winds blowing from the south-southeast along an assumed fetch of 14.7 miles. The calculated wave height is approximately 2.9 feet for winds blowing from the east-southeast.

The significant wave height (Hs) is the average wave height of the one-third largest waves. The maximum wave height is the largest single wave during a storm event and is assumed equal to 1.7 times

the significant wave height. The wind speed analysis for hindcast calculations was directional, meaning the return period winds aligned with the associated fetch direction were used to calculate the return period wind speed.

Wind-wave desktop calculation results are in good agreement with MIKE21 model output results; however, the MIKE 21 Spectral Wave model (discussed in the following section) output is generally considered a better estimate of wave heights than calculations based on fetch distance-wind speed formulae.

Table 9. Wave Hindcast Analysis – Seward Dock Site

No.	Direction - Fetch	Wind Speed (MPH)	H_s (feet)	H_{max} (feet)	T_p (s)
2-Year Return Period					
1	East-southeast – 2.6 mi	21	1.0	1.9	1.6
2	South-southeast – 14.7 mi	27	2.9	5.4	3.1
50-Year Return Period					
3	East-southeast – 2.6 mi	45	2.5	4.6	2.2
4	South-southeast – 14.7 mi	50	6.1	11.4	4.0
100-Year Return Period					
5	East-southeast – 2.6 mi	52	2.9	5.5	2.3
6	South-southeast – 14.7 mi	56	7.2	13.4	4.2

5. Wave Numerical Modeling

5.1 MIKE21 Spectral Wave (SW) Model

The MIKE 21 Spectral Wave (SW) numerical wave model was applied to estimate the design wave conditions immediately offshore in front from the project site, in addition to desktop calculations to compare the output results. The model has been developed by the Danish Hydraulics Institute (DHI) and is widely used in industry for the analysis and design of coastal structures. The SW model is capable of simulating the growth, decay, and transformation of wind-generated waves and swell in offshore and coastal areas.

Bathymetry data obtained from NOAA National Geophysical Data Center (NGDC) was used to develop the model grid for the project site. The model domain includes part of Blying Sound, Harding Gateway, the entire Resurrection Bay, and the islands to the west from Cape Resurrection.

The mesh resolution varies throughout the model domain with a very dense resolution near the project area. This nodal spacing is sufficient to resolve the bathymetry for wave transformation over a large area and to keep computational times reasonable. The mesh contains a total of 26’372. The model domain, bathymetry, and location of the observation stations (wave parameters output) are shown in **Figure 10**.

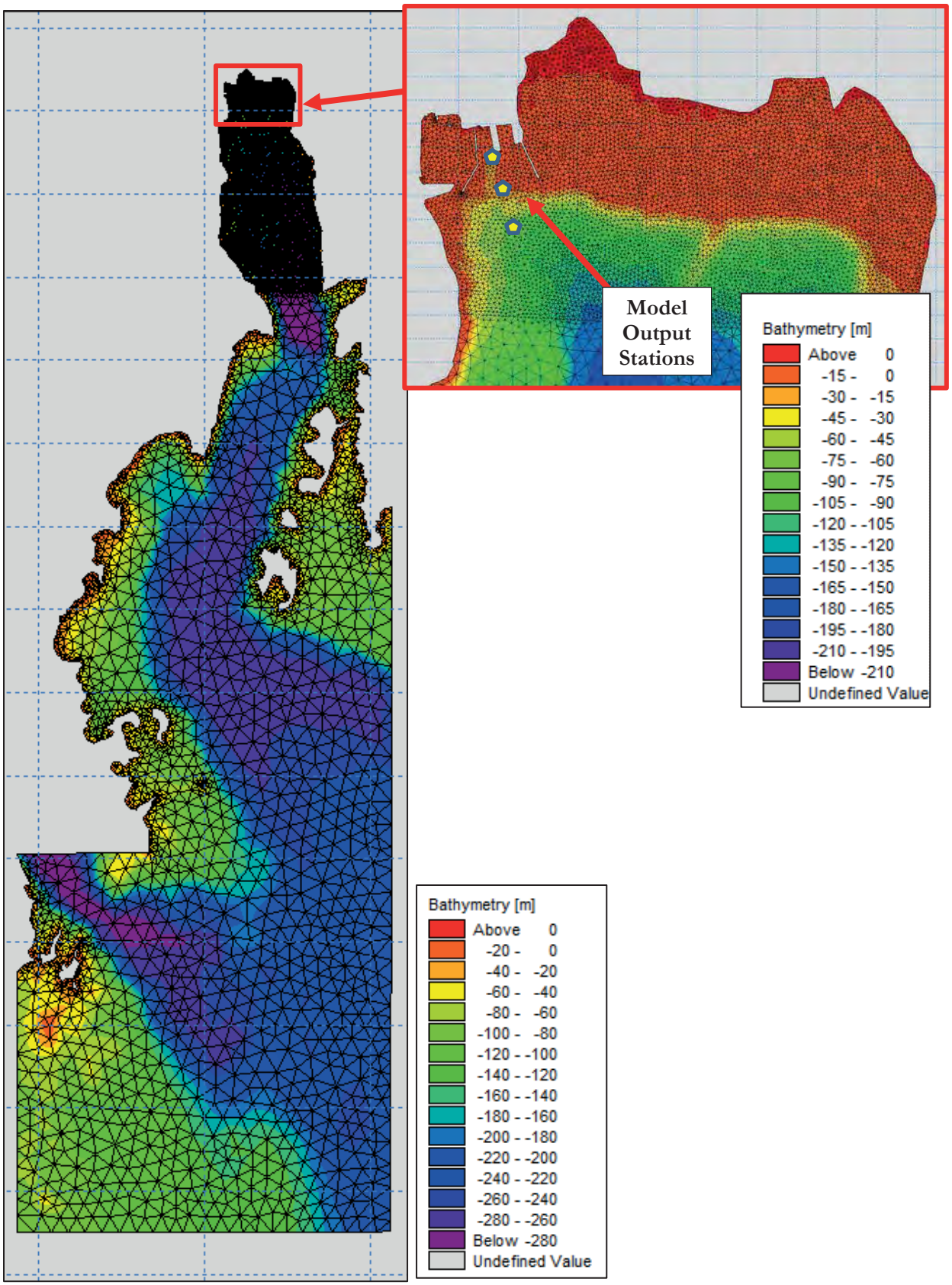


Figure 10. MIKE 21 Numerical Model Domain and Bathymetry. (Yellow dots show the model output locations.)

Wind input used in the model was based on the results of the return period analysis presented in **Table 6**. Wave input at the MIKE21 model sea boundary was based on offshore buoys wave return period analysis, shown in

Table 8. The mean sea level (MSL) of +5.6 feet from chart level (MLLW) was used for all modeling exercises. A total of four offshore extreme conditions associated with the deep water wind and wave climate were propagated within the MIKE21 model to predict waves near the proposed dock location. The model was not calibrated due to the lack of measured wave data at the project site. However, the results of the model simulations are comparable to the desktop calculations and appear reasonable.

The significant wave height and period were calculated at every grid point. The output includes color map plots; examples are shown in **Figure 11 through Figure 13**. The plots show the wave height distribution and the peak wave direction. Several output points were selected to represent wave conditions at certain depths immediately offshore from the proposed dock. The input and output conditions (about 150 feet from the dock) for the MIKE21 model are summarized in **Table 10**.

Figure 11 demonstrates how the wave refraction and shoaling are responsible for the substantial wave height reduction when propagating from the open ocean to the project site. Model results shows that the large, long-period swell waves originated in the Gulf of Alaska are greatly reduced in height on the northwest side of the Resurrection Bay and at the proposed location due to refraction and shoaling. Nevertheless, even small, long-period waves are an important component for the design of floating dock structures due to their great ability to transmit energy and affect the motion of the floating structures. PND recommends collecting in-situ wave information for at least one season to accurately analyze wave climate in vicinity of proposed dock and calibrate numerical wave models.

Based on the MIKE21 model output, the 100-year return period wave height in front of the planned dock is 9.2 feet for local wind waves from the south-southeast direction.

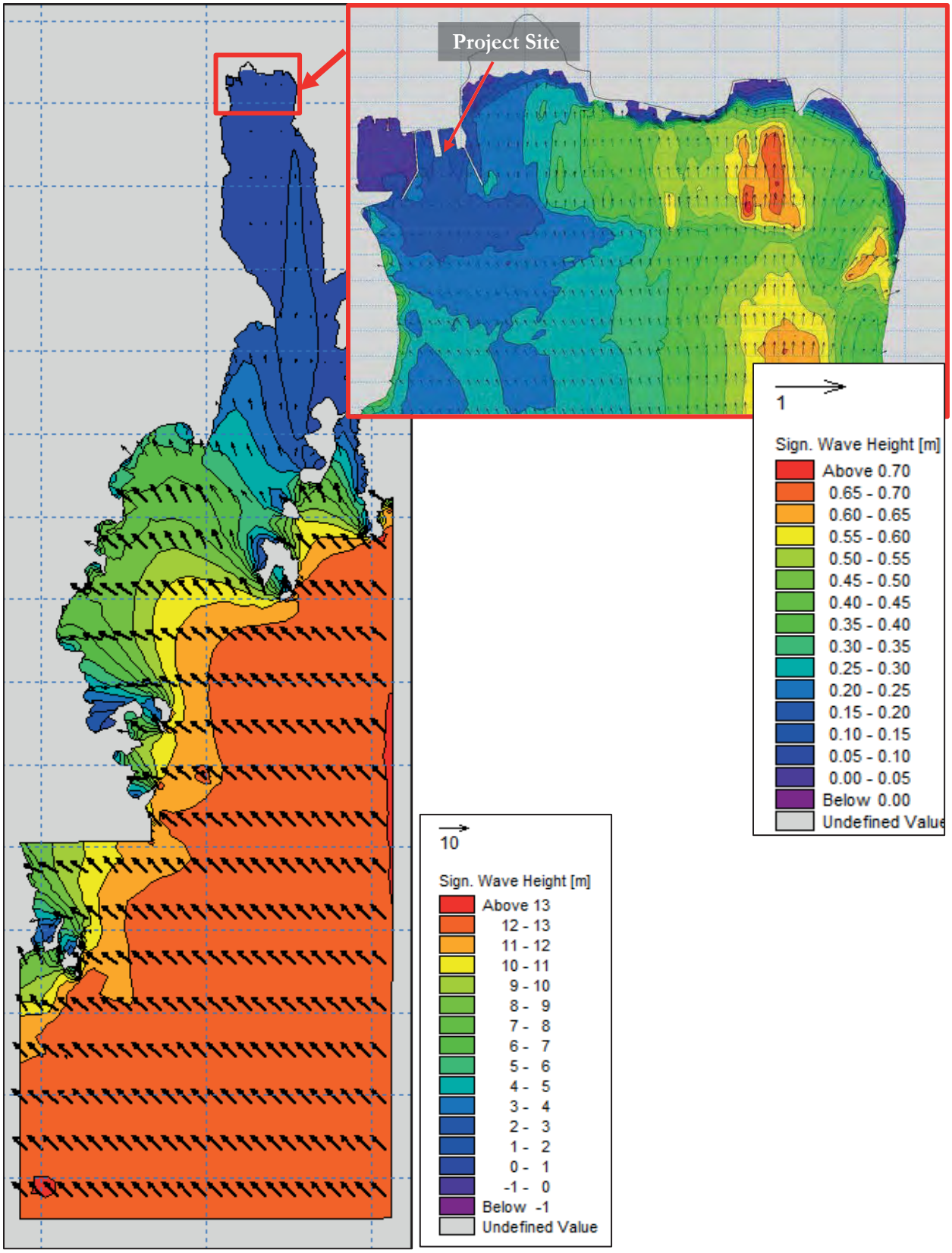


Figure 11. MIKE21 Model Run No. 2 Results. 50-yr Southeast Swell (43-foot wave).

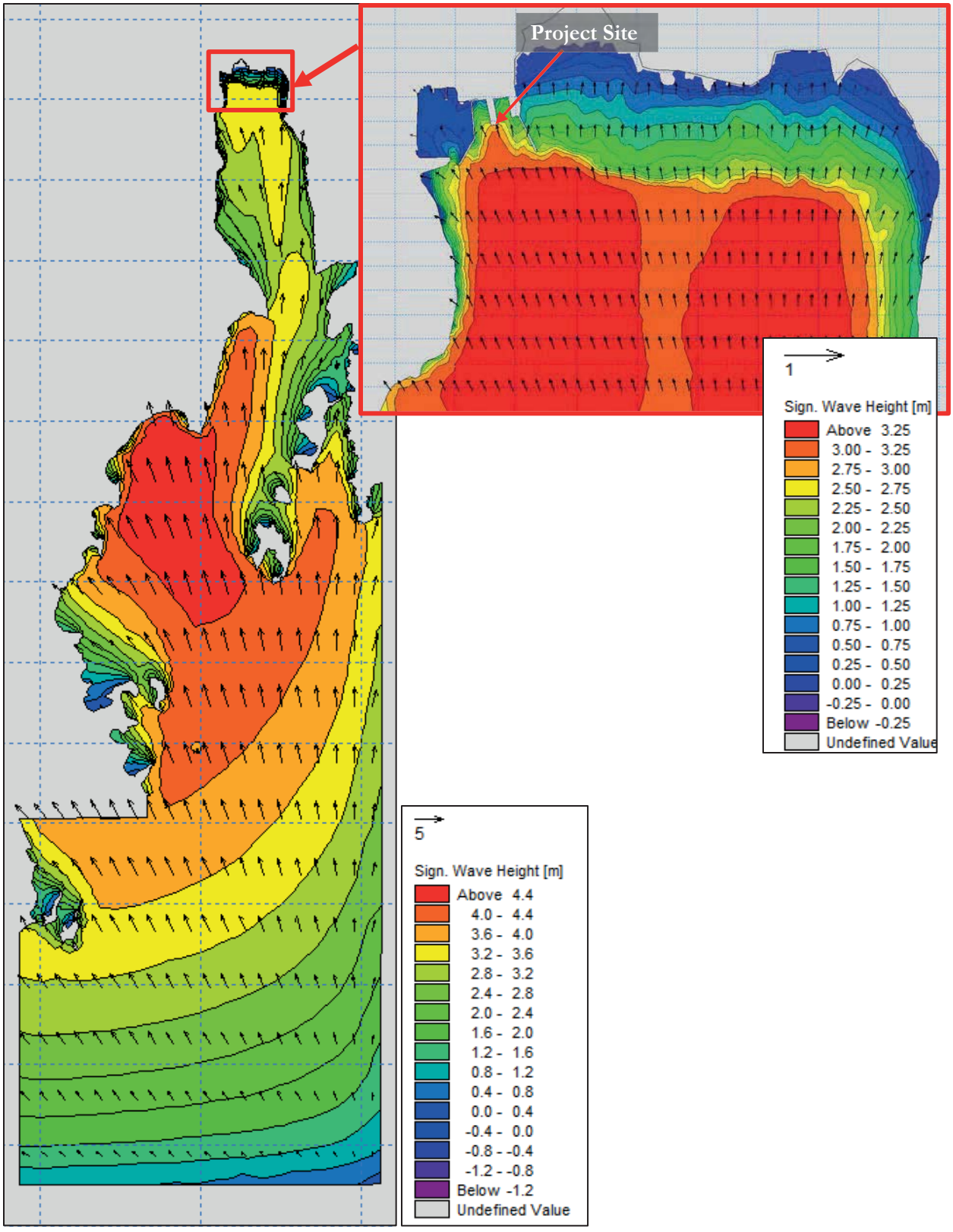


Figure 12. MIKE21 Model Run No. 3 Results. 100-yr North Wind (56 MPH).

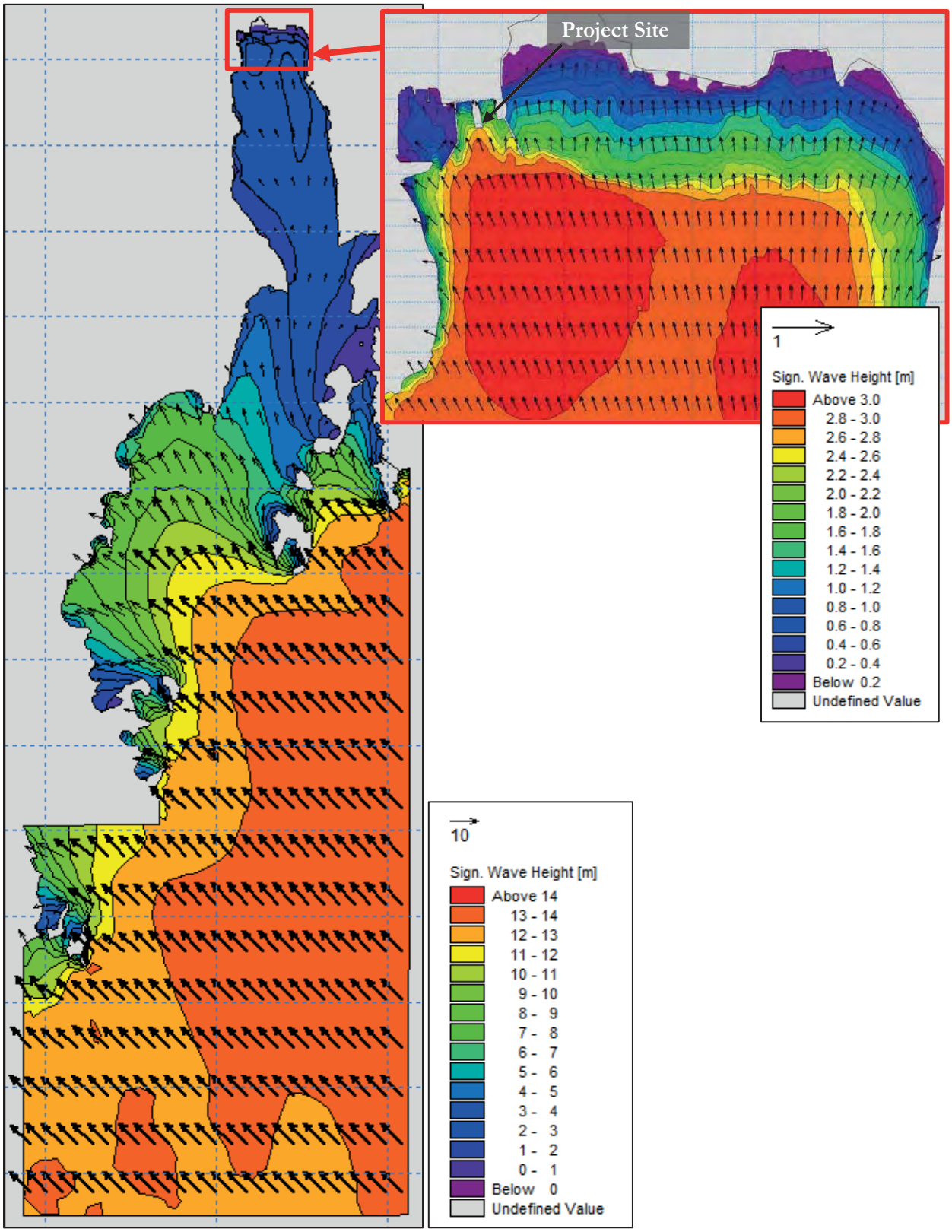


Figure 13. MIKE21 Model Run No. 4 Results. 100-yr North Wind (56 MPH) + Swell

Table 10. MIKE21 Wave Model Summary

Run #	Run Description	MIKE21 INPUT						MIKE21 OUTPUT		
		Water Level	Wind		Wave			150 from Dock		
		feet (m.) MLLW	Speed mph (m/s)	Dir. (deg.)	Height ft. (m.)	Period seconds	Dir. (deg.)	Wave Height ft. (m.)	Wave Period seconds	Wave Dir. Deg.
1	100-yr South Swell	5.6 (1.7)	-	-	46 (14)	18	180	0.7 (0.2)	18	170
2	50-yr Southeast Swell	5.6 (1.7)	-	-	43 (13)	18	135	0.7 (0.2)	17	174
3	100-yr. South-Southeast wind	5.6 (1.7)	56 (25)	157.5	-	-	-	9.2 (2.8)	7	167
4	100-yr. South-Southeast wind + Swell	5.6 (1.7)	56 (25)	157.5	43 (13)	18	135	8.9 (2.7)	6	166

A series of sensitivity tests was also run to check the influence of different parameters in the model. The results of the sensitivity tests were compared with original model runs to understand the effect of the different input parameters in the model. The model results compare reasonably well with the desktop hindcast calculations when the simulations are run with the default parameters in the MIKE21 model. These default parameters were used for the final simulations to predict waves at the project site.

5.2 CELERIS Model

The CELERIS Advent interactive wave simulation and visualization model was used to calculate and visualize wave diffraction and reflection around proposed vertical OPEN CELL™ T-Dock structures. The software solves the extended Boussinesq equations using a hybrid finite volume – finite difference method. CELERIS provides an interactive modeling platform and supports simultaneous visualization with both photorealistic and color-mapped rendering capabilities.

Three conceptual dock structures were rendered and overlaid on existing bathymetry to simulate wave diffraction, reflection, and possible wave focusing around the structure. The output waves from MIKE21 model for the locally generated waves and for the waves propagated from Gulf of Alaska to the project site were used to input along the CELERIS model boundary. Waves from two directions (south-southeast – 166 degrees; south-southwest – 186 degrees) were tested in the model. A sponge layer (absorption layer) was added at the east side of the domain to absorb all outgoing wave energy. The grid spacing 6x6 feet in both the x and y direction and a time step of 0.05 seconds were used to adequately resolve the steep bathymetry gradients and remove instabilities in the model. The initial T-Dock computational domain of 984x2014 feet with grid spacing 6x6 feet is shown in **Figure 14**. The set of 18 virtual output stations (gauges) was placed at the same location for each proposed dock structures to measure water

level fluctuation during simulation and compare results. Water level data from gauge stations were analyzed using zero-crossing MATLAB code to determine significant and maximum wave height statistics.

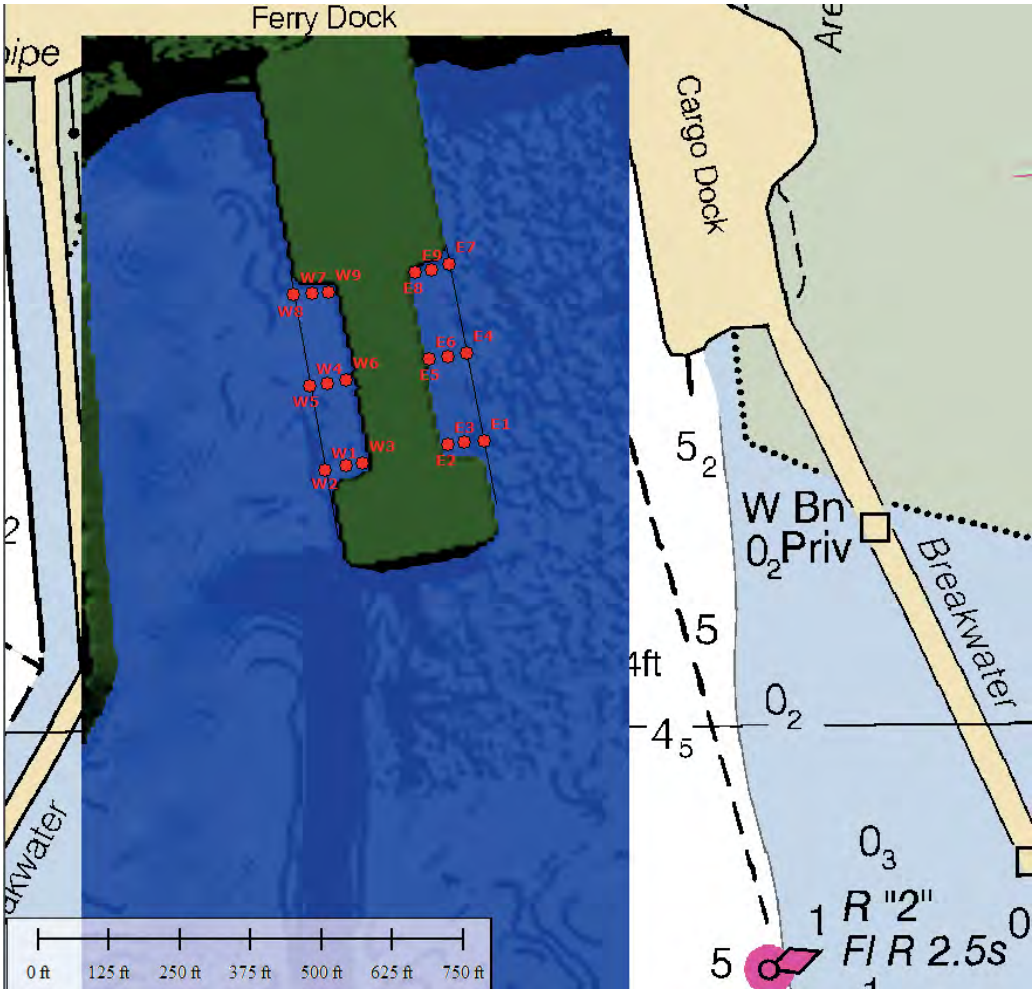


Figure 14. CELERIS model computational domain overlaid on Nautical chart. (Red dots showing 18 model output gauges.)

During initial CELERIS simulation, considerable wave focusing (standing/clapotis waves) was noticed on the northeast and northwest corners of the proposed dock around E9 and W9 gauges, due to a wave reflection. **Figure 15** shows areas of the wave focusing around the initial T-Dock. Clapotis wave is a non-breaking standing wave pattern, caused by the reflection of a traveling surface wave train from a vertical seawall. The standing wave height could be twice the height of the incoming waves at a distance of one-half wave length from the wall. When a wave train strikes a wall at an oblique angle, the reflected wave train departs at the supplementary angle causing a cross-hatched wave interference pattern known as the clapotis gaufré ("waffled clapotis"). In this situation, the individual crests formed at the intersection of the incident and reflected wave train crests move parallel to the structure.

The maximum significant wave height of 7.2 feet was recorded at the gauge W1 during initial T-Dock wave simulation for the waves from 186 degrees. **Table 11** shows significant and maximum wave height recorded at the gauges for 20 minutes of simulation.

To reduce wave reflection, potential wave focusing, and standing wave around the proposed structure, a new structure was rendered with a smaller passenger dock area at the north side and with 45 degree revetment positioned in front of the vertical surface on the windward (south) side of the structure. Placement of the riprap revetment in front of the vertical surfaces substantially reduced wave reflection and consecutive diffracted wave focusing. **Figure 16** shows a modified T-Dock model screenshot.

The third model study simulated waves diffraction around the closed cell dock with pile supported approach dock. Model screenshot is shown in **Figure 17**. **Table 11** shows wave height and wave statistics output from the CELERIS model at 18 gauge locations. The model video recordings for the each proposed concept will be provided as an attachment to this report.

Based on the CELERIS model output, a modified T-Dock with revetment provides optimal protection for the proposed floating dock, minimizing wave diffraction and wave focusing behind the structure. Average significant wave height for all gauges for a modified T-Dock was 30-40% smaller compared to the average waves output from the other alternatives. However, incident waves of 5 feet and more are still possible at some locations behind the structure. Additional numerical modeling of this concept is recommended if this alternative is selected for final design to further investigate possible reflection/diffraction effects around the structure.

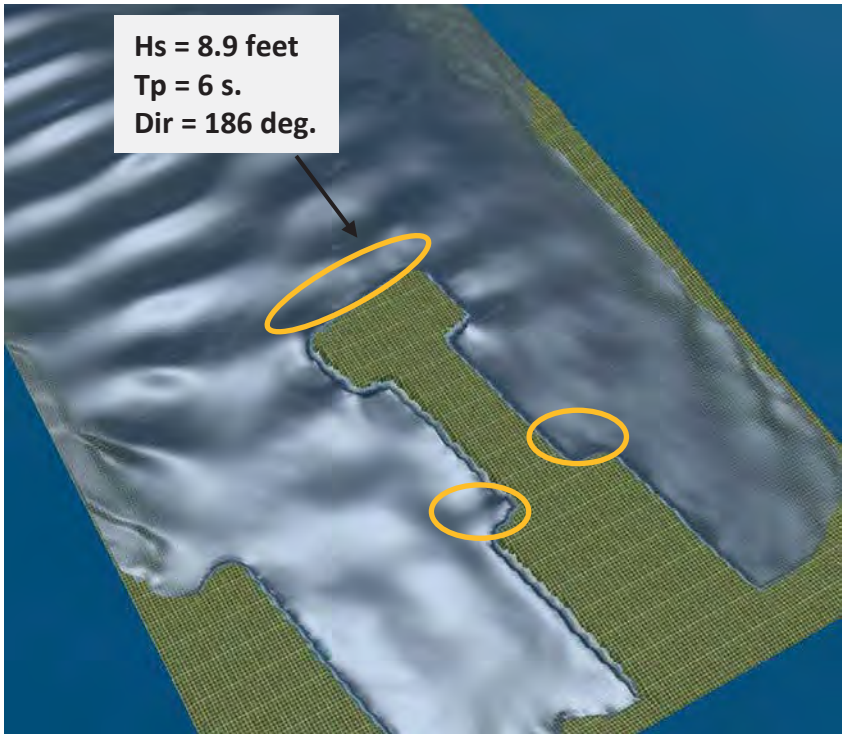


Figure 15. Initial T-Dock CELERIS wave simulation, showing areas of the wave focusing.

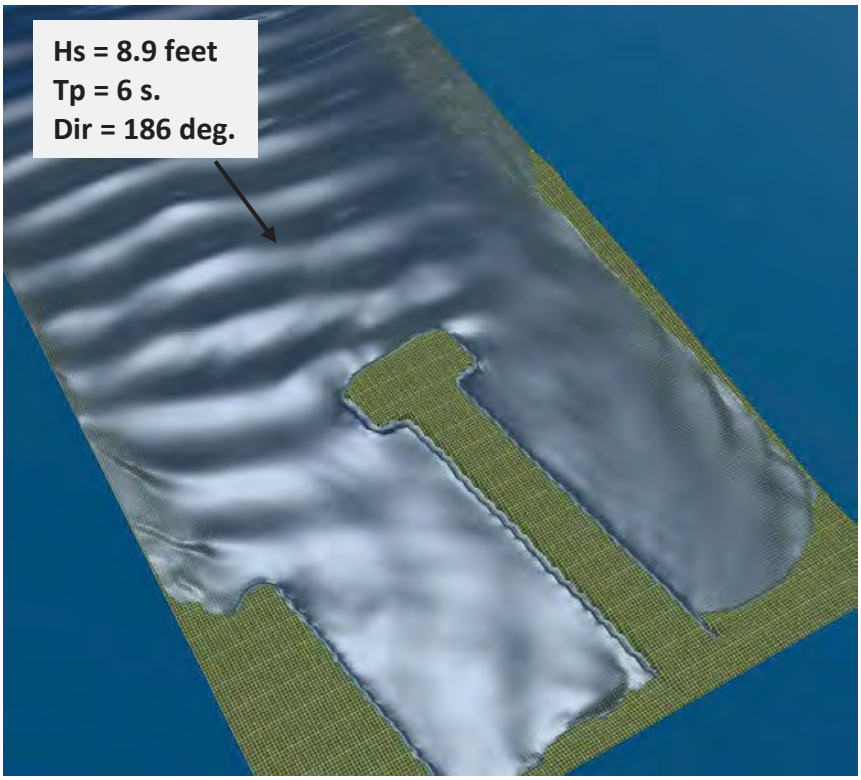


Figure 16. Modified T-Dock Concept CELERIS model simulation screenshot.

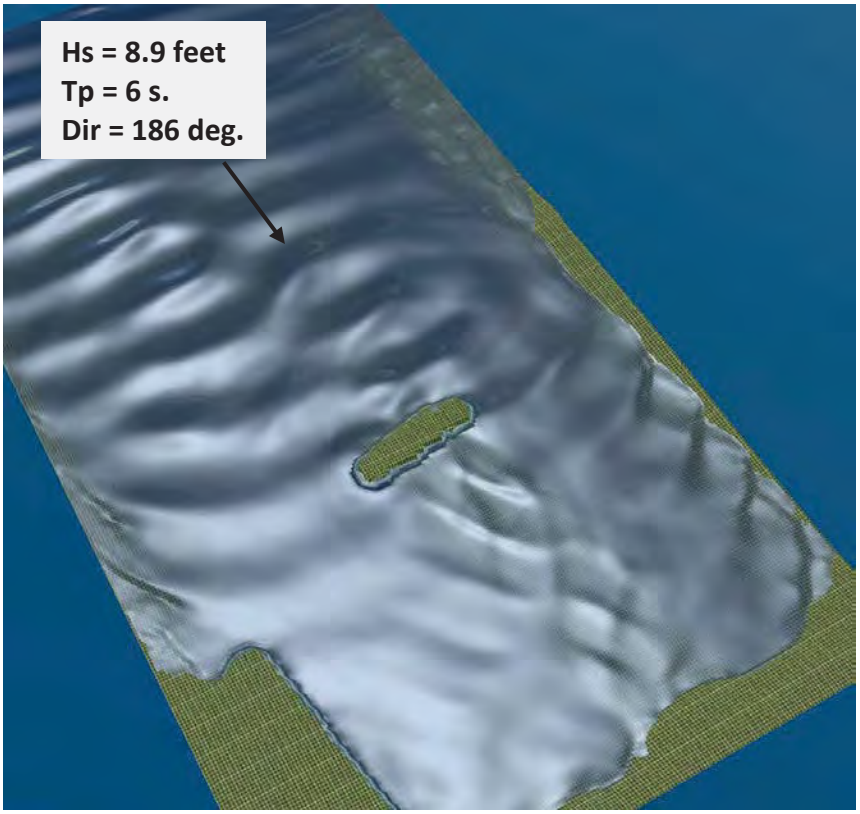


Figure 17. Closed Cell Island Concept CELERIS model simulation screenshot.

Table 11. CELERIS Model Output

Gauge #	South-southeast waves (166 deg.)			South-southwest waves (186 deg.)		
	Initial T-Dock Hs (Hmax) feet	Modified T-Dock w/Revetment Hs (Hmax) feet	OPEN CELL Island w/Revetment Hs (Hmax) feet	Initial T-Dock Hs (Hmax) feet	Modified T-Dock w/Revetment Hs (Hmax) feet	OPEN CELL Island w/Revetment Hs (Hmax) feet
E1	2.3 (3.3)	2.3 (3.0)	2.6 (3.3)	3.6 (5.9)	3.0 (4.3)	3.9 (5.2)
E2	1.6 (3.0)	1.6 (2.6)	2.6 (3.0)	2.6 (4.9)	2.3 (3.0)	3.9 (5.6)
E3	2.0 (3.6)	1.6 (2.6)	2.3 (2.6)	3.6 (5.6)	3.3 (4.9)	3.9 (5.2)
E4	2.3 (3.0)	2.6 (4.3)	1.6 (2.6)	3.3 (5.9)	2.6 (3.6)	3.0 (4.3)
E5	2.0 (2.3)	1.6 (2.3)	1.6 (2.3)	3.6 (5.6)	3.0 (4.3)	2.6 (3.9)
E6	3.0 (4.3)	2.6 (4.3)	2.0 (3.0)	5.6 (8.9)	4.9 (6.2)	3.6 (4.9)
E7	3.0 (5.9)	2.3 (3.0)	3.0 (3.6)	5.2 (7.9)	4.3 (5.6)	4.3 (3.0)
E8	2.6 (3.6)	2.0 (3.0)	3.0 (4.9)	4.3 (6.6)	3.3 (4.6)	3.0 (4.3)
E9	2.3 (3.3)	2.3 (3.6)	2.6 (3.9)	4.6 (7.2)	3.3 (4.3)	2.6 (4.3)
W1	3.9 (5.2)	3.3 (4.9)	2.6 (3.9)	7.2 (8.9)	3.3 (3.9)	4.6 (5.2)
W2	2.0 (3.0)	1.6 (2.3)	2.3 (3.9)	3.3 (4.9)	1.3 (1.6)	3.6 (5.2)
W3	3.6 (4.9)	3.0 (3.6)	2.3 (3.3)	6.6 (7.5)	3.0 (3.6)	3.9 (4.9)
W4	4.9 (7.2)	3.3 (4.6)	4.6 (5.6)	4.9 (7.5)	1.6 (2.0)	3.3 (4.6)
W5	1.6 (2.3)	1.0 (1.3)	3.9 (5.6)	2.0 (2.6)	0.7 (1.3)	4.3 (5.6)
W6	4.9 (7.5)	4.3 (5.2)	2.3 (3.9)	5.6 (7.5)	2.0 (2.6)	2.6 (4.6)
W7	3.6 (5.6)	2.0 (3.0)	4.3 (5.9)	4.6 (6.2)	1.0 (1.3)	3.3 (4.6)
W8	2.0 (3.0)	0.7 (1.3)	3.9 (5.2)	2.3 (3.3)	0.7 (1.3)	3.0 (4.6)
W9	3.9 (5.9)	2.3 (3.3)	3.6 (4.3)	5.2 (7.2)	1.3 (2.0)	3.3 (4.6)
Maximum	4.9 (7.5)	4.3 (5.2)	4.6 (5.9)	7.2 (8.9)	4.9 (6.2)	4.6 (5.6)
Average	2.9 (4.3)	2.2 (3.2)	2.8 (3.9)	4.3 (6.3)	2.5 (3.4)	3.5 (4.7)
St. Deviation	1.1 (1.6)	0.9 (1.1)	0.9 (1.1)	1.4 (1.7)	1.2 (1.5)	0.6 (0.6)
Minimum	1.6 (2.3)	0.7 (1.3)	1.6 (2.3)	2.0 (2.6)	0.7 (1.3)	2.6 (3.0)

5.3 OpenFOAM Model

The OpenFOAM numerical model was applied for this study. OpenFOAM is an open source software toolbox that was originally developed to solve a wide range of problems using Computational Fluid Dynamics (CFD). The toolbox can solve fluid dynamics problems involving compressible and incompressible flows, multiphase flows and buoyancy-driven flows for which both laminar and turbulent solvers are available.

The modeling study was done in two phases. The first phase included only the OPEN CELL structure to analyze the wave heights at the floating dock. This is similar in scope to studying the efficiency of a breakwater. The floating dock was added during the second phase of the study to analyze the motion in 6 degrees of freedom when subjected to the design wave. The simulations during the first phase was carried out in model scale (1:10) and simulations in the second phase were carried out in true scale.

The computational domain for the study is shown in **Figure 18** and **Figure 19**. The grid spacing is 0.5 m in the x and y direction, and 0.25 m in the z-direction. An input wave with a significant wave height 2.7 m (8.9 feet) and period 6.0 seconds (50-year conditions) was applied at the inlet boundary. The float was free to move in all three linear and rotational directions.

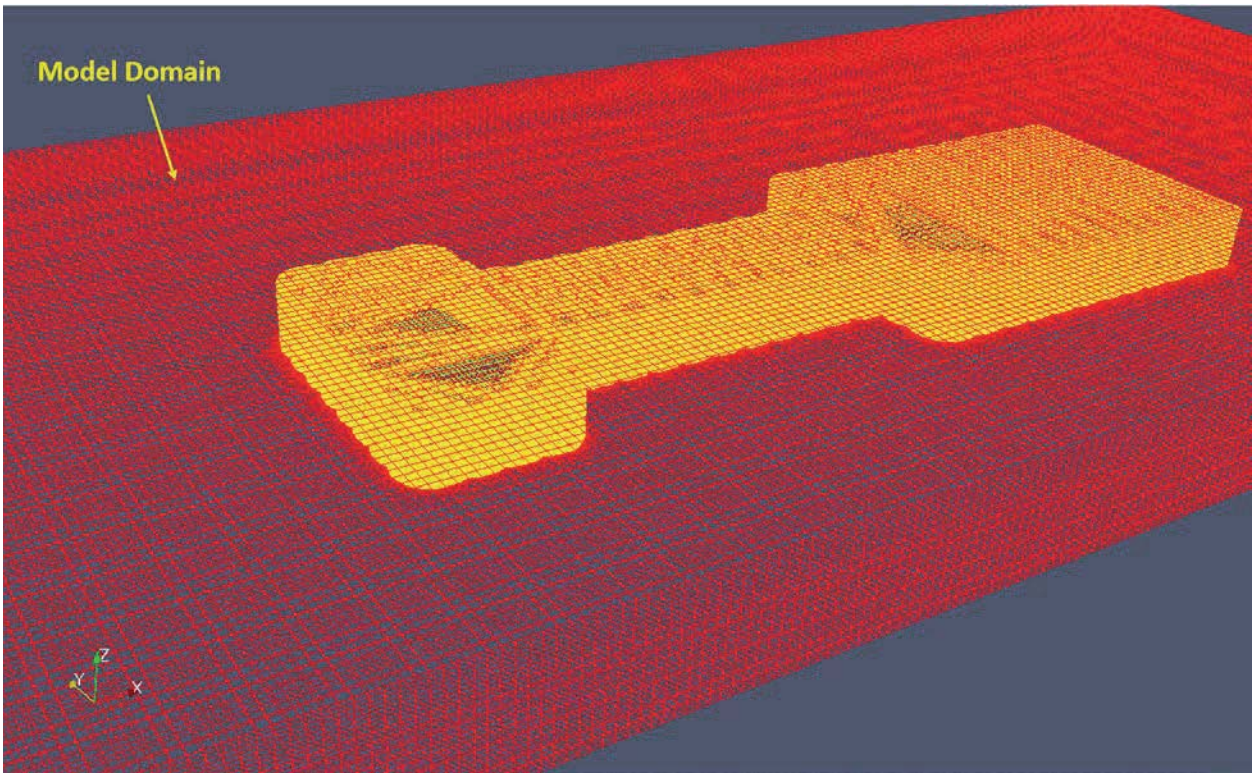


Figure 18. Numerical Model Set-up – Phase 1 – OPEN CELL

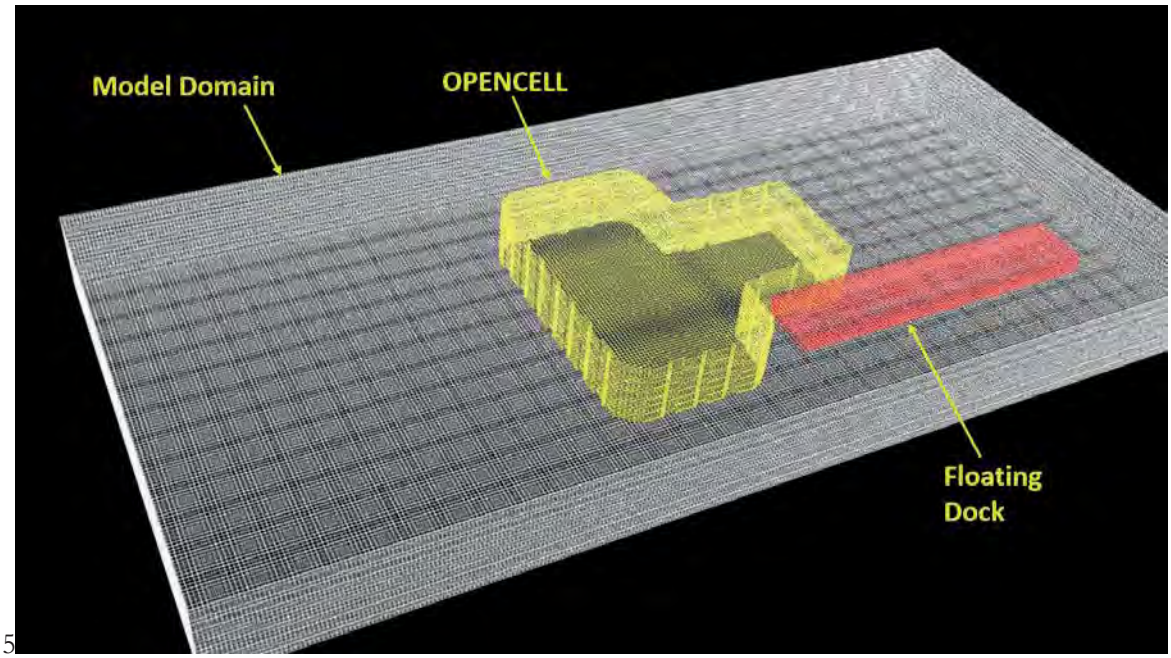


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Figure 19. Numerical Model Set-up – Phase 1 – OPEN CELL and Floating Dock

The maximum wave height output behind the OPEN CELL dock was obtained at the 9 locations shown in **Figure 20**. The maximum wave height at each location is summarized in Error! Reference source not found.. The wave heights are maximum at points W9 and W6. This is likely due to standing wave effect created by wave reflection at the face of the dock. The wave heights are significantly large compared to the CELERIS model. Note that the OpenFOAM model is a more localized model to analyze wave structure interaction and does not take in to account the effects of bathymetry, likely causing the difference in wave heights at the output locations.

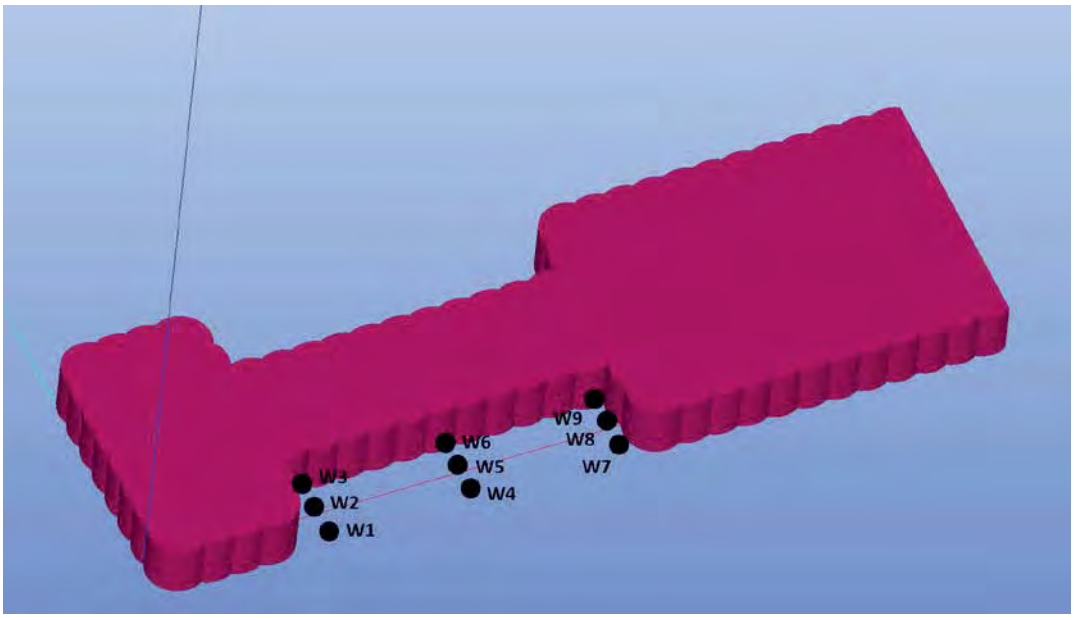

Figure 20. OpenFOAM Numerical Model - Phase 1 – Output Points

Table 12. OpenFOAM Numerical Model – Maximum Wave Height Summary (South-Southwest Wave Input - 186°)

Observation Point	Wave Height (feet) OpenFOAM Model	Wave Height (feet) CELERIS Model
W1	9.8	7.2
W2	8.5	3.3
W3	4.9	6.6
W4	8.5	4.9
W5	10.2	2.0
W6	11.5	5.6
W7	6.2	4.6
W8	10.5	2.3
W9	12.1	5.2

The surge, sway, heave, pitch and roll motion of the float is shown in **Figure 21 through Figure 26**. An example screen shot from the simulation is shown in **Figure 27**. The displacement of three points (corners) on the barge were obtained as a time series. Simple linear algebra was then applied to estimate the tilt of the barge on the x and y axis to determine the roll and pitch. The float motion is limited with a maximum pitch of 1-degree for a 50-year design event. This indicates that the OPEN CELL provides sufficient protection and float motion is unlikely to cause significant problems during operations. However, only a portion of the OPEN CELL (front face) was modeled to analyze the float motions. This was done to reduce the computation times ad to get a general idea of the motions for the dock. It is expected that the float motions may be somewhat higher due to wave reflection from the back wall when the full dock is modeled. Further analysis is recommended prior to final design.

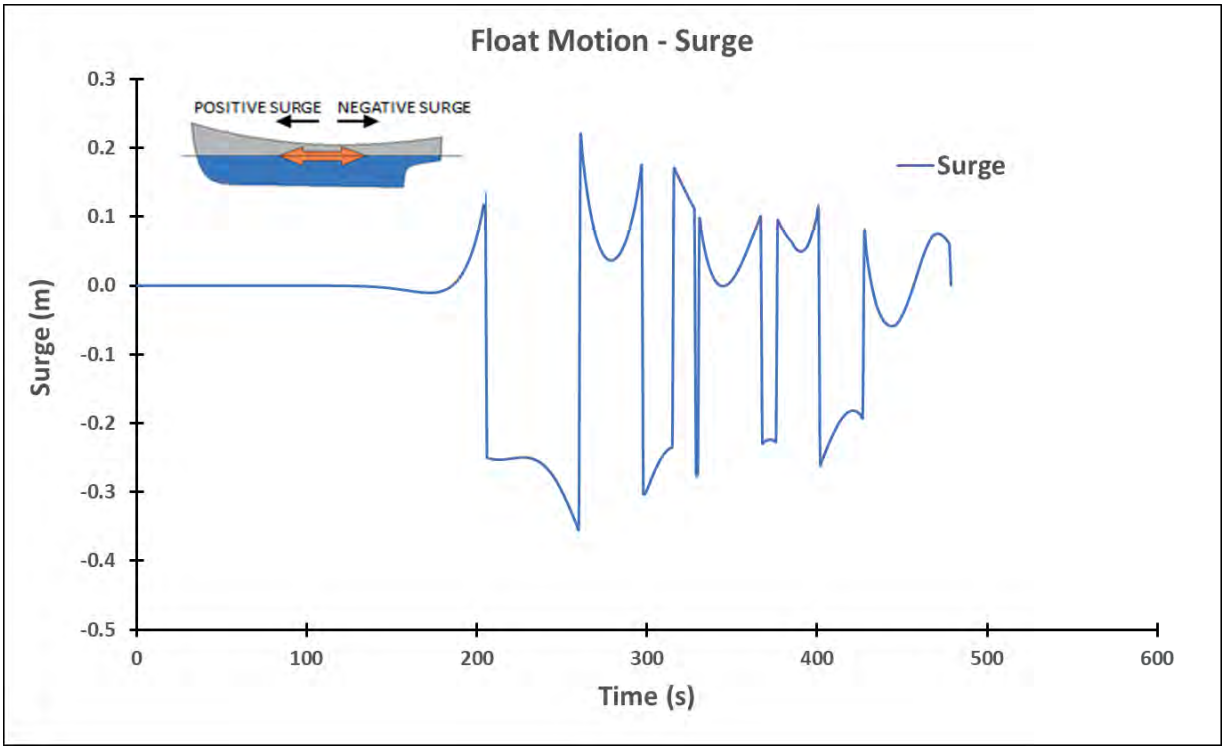

Figure 21. Seward Floating Dock – Surge (Forward-Backward)

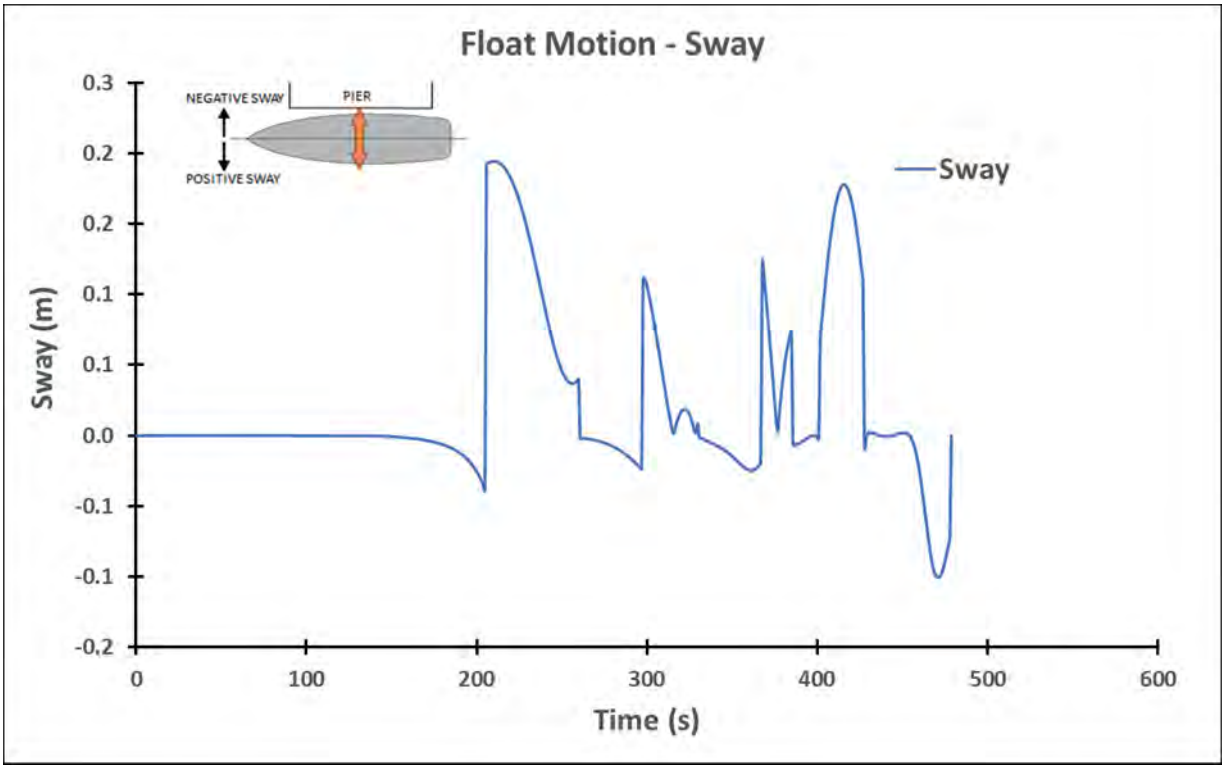

Figure 22. Seward Floating Dock – Sway (Left-Right)

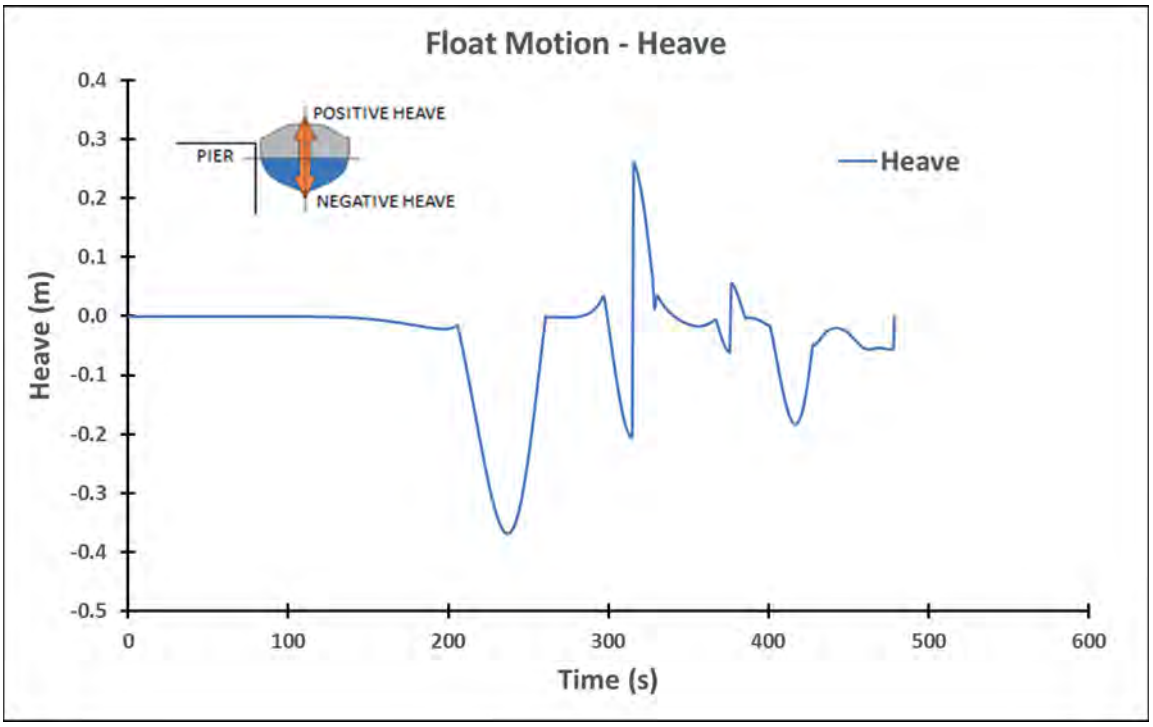

Figure 23. Seward Floating Dock – Heave (Up-Down)

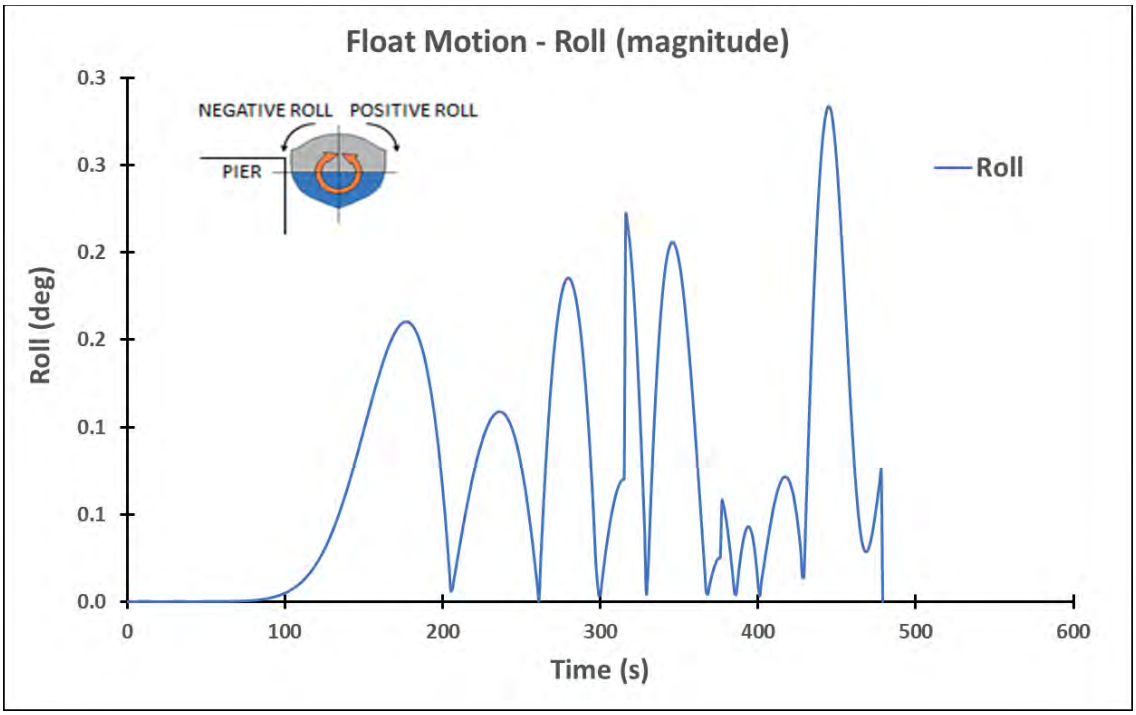

Figure 24. Seward Floating Dock – Roll (About the long axis)

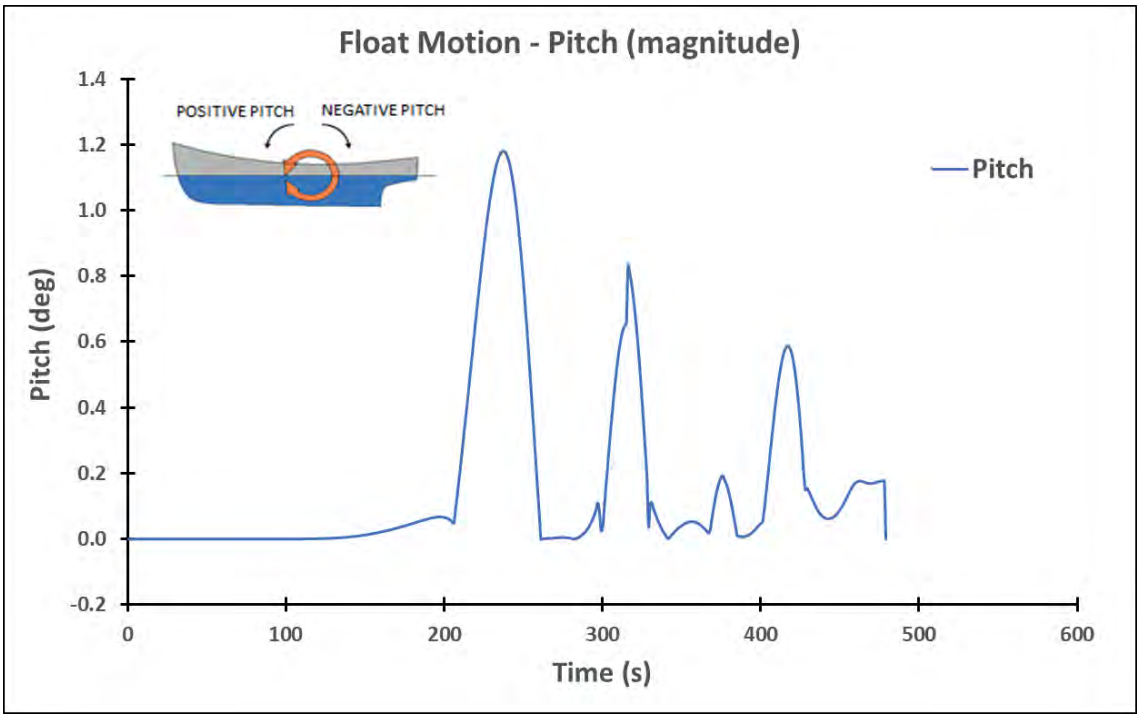

Figure 25. Seward Floating Dock – Pitch (about the transverse axis)

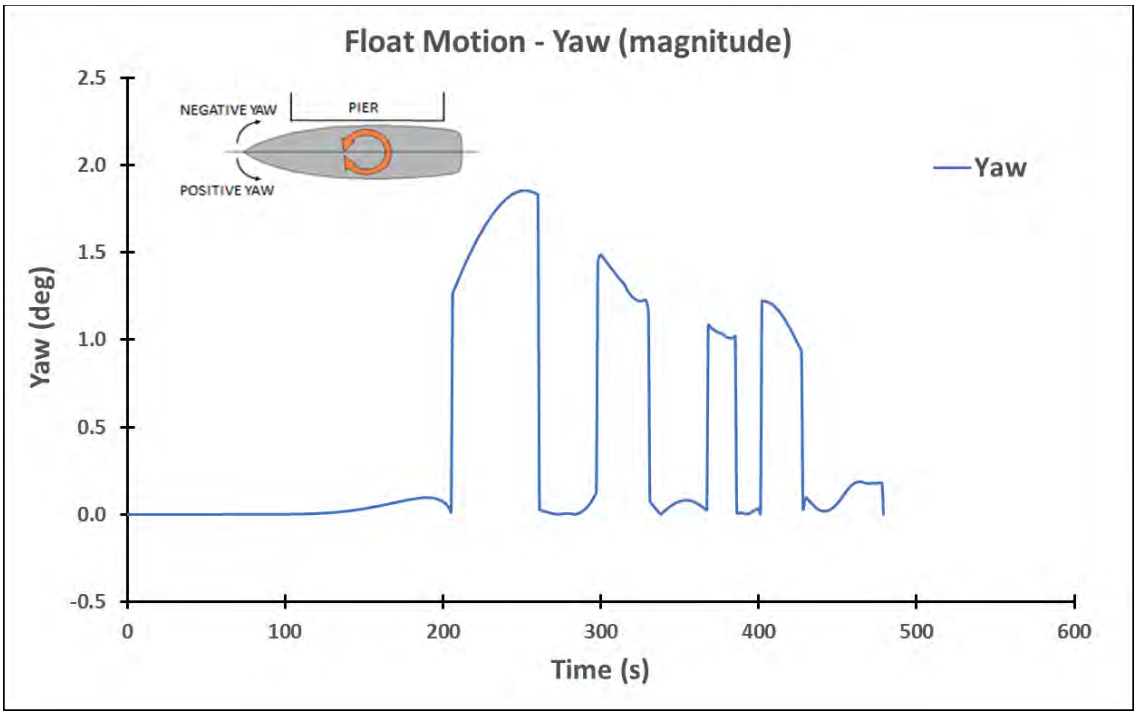

Figure 26. Seward Floating Dock – Yaw (about the vertical axis)

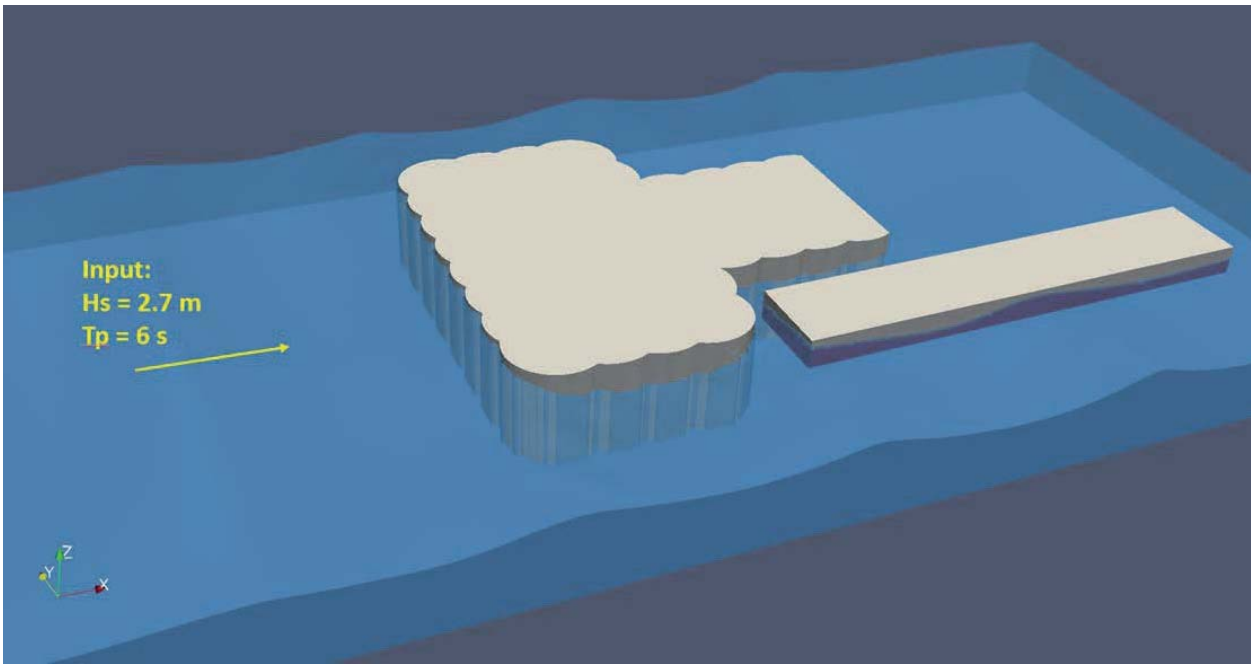

Figure 27. OpenFOAM Numerical Model – Screenshot form model simulation

6. Conclusions and Recommendations

The recommended DEC for proposed AKRR Dock Facility are summarized in Table 13. The DEC are the extreme conditions with a specific combination of tide, wind, waves, and currents that the system is to

be designed for. The current speed direction can be assumed parallel to the bathymetry contours nearshore.

Prevailing winds in Seward are from north in winter and from south in summer. The wind distribution is highly influenced by the regional topography. The 100-year return period omnidirectional wind speed is 137 MPH. The 100-year southerly winds is 89 MPH for winds during cruise season (2-minute average wind speeds). The 100-year return period wave height of 150 feet offshore from planned dock is 9.2 feet for wind waves from the south-southeast direction. The project site is semi-protected from the large wave storms approaching from the Gulf of Alaska. The largest predicted 100-year swell wave height from the south penetrating the site is 0.7 feet.

An extreme high water elevation of +16 feet above MLLW is appropriate for design.

Based on the CELERIS model output for alternative with modified T-Dock provides optimal protection for proposed floating dock. This T-Dock concept with the revetment added at the south side of the dock minimizes wave diffraction and wave focusing behind the structure. Five-foot waves are still possible at some locations behind the structure.

The OpenFOAM model was used to analyze the wave heights behind the OPEN CELL dock and the floating body motions. In general, the wave heights are significantly higher compared to wave heights predicted by the CELERIS model. This is likely due to the standing wave heights formed by the wave reflection of the face of the dock. The floating dock motions were analyzed with only the front face of the dock. Based on the analysis, the dock motions are within the general design criteria limits with a maximum pitch of 1-degree. The floating body motions need to be further analyzed with the complete OPEN CELL structure in the model domain to capture the effects of wave reflection on the floating body motion.

Numerical models were not calibrated due to the lack of measured wave data at the project site. However, the results of the model simulations are comparable to the desktop calculations and appear reasonable.

Table 13. AKRR Dock Facility - Recommended Design Environmental Conditions - 100-year Return Period Events

No.	Description	Water Level (ft, MLLW)	Current Speed (knots)	Wind		Wave		
				Speed (mph)	Dir. (deg)	Hs (ft)	Tp (s)	Dir. (deg)
1	Omnidirectional	+12	1.0	137	Omni	-	-	-
2	South-southeast Wind All Season			89	SSE	-	-	-
3	South-southeast Wind Cruise Season			56	SSE	9.2	7	SSE
4	Southern Swell			-	-	0.7	18	SSE

PND Engineers believes that the proposed project site is semi-protected from large swell waves reaching the site. A field study would also be helpful prior to final design to measure waves and currents at the project site. The measured data would be used for verifying assumptions, calibrating numerical models and refining the design with less risk.

6.1 Study Limitations

The information presented in this report is based on professional opinions derived from our analysis and interpretation of available documents and information. Our conclusions and recommendations are intended for this particular project and scope; schedule and budget limitations apply.

7. References

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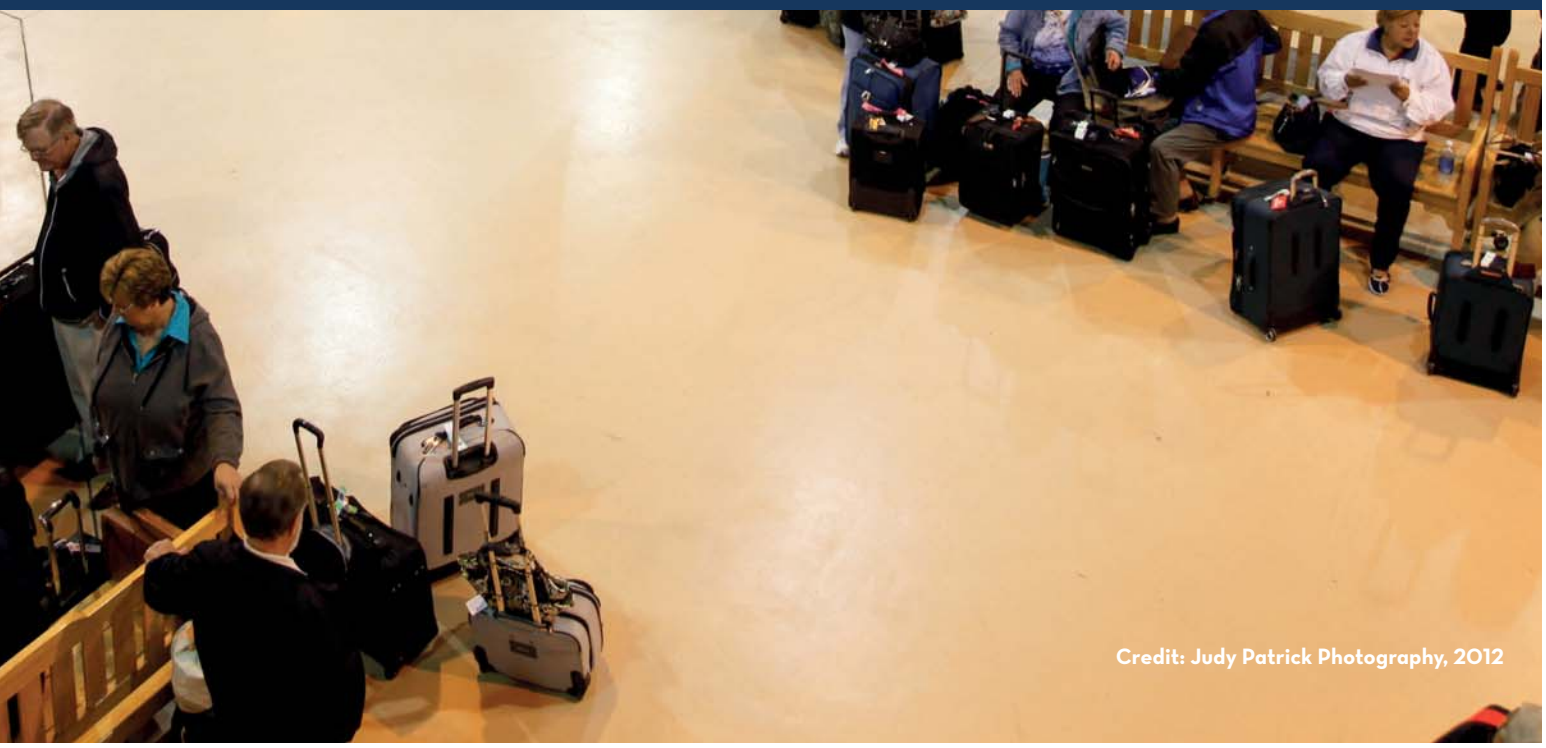
Appendix D:
Passenger Dock Options



Credit: Judy Patrick Photography, 2012

1 Seward Marine Terminal Passenger Dock Options

1.1 Option P-PD1: Full Size Sheet Pile Bulkhead Dock

Description

The new passenger dock provide for in Option P-PD1 will replace the existing dock with a full size sheet pile bulkhead dock measuring approximately 970 feet long and 200 feet wide. The heavy-duty dock will provide flexibility for rail freight activities, which can be easily accommodated by installing ties and rails as necessary. Other components include salvaging two existing mooring dolphins and installing one new mooring dolphin to provide mooring for vessels over 1,000 feet in length. The dock will be finished with a concrete surface, and fenders and bollards will line the east and west face for berthing on both sides (Figure 1):

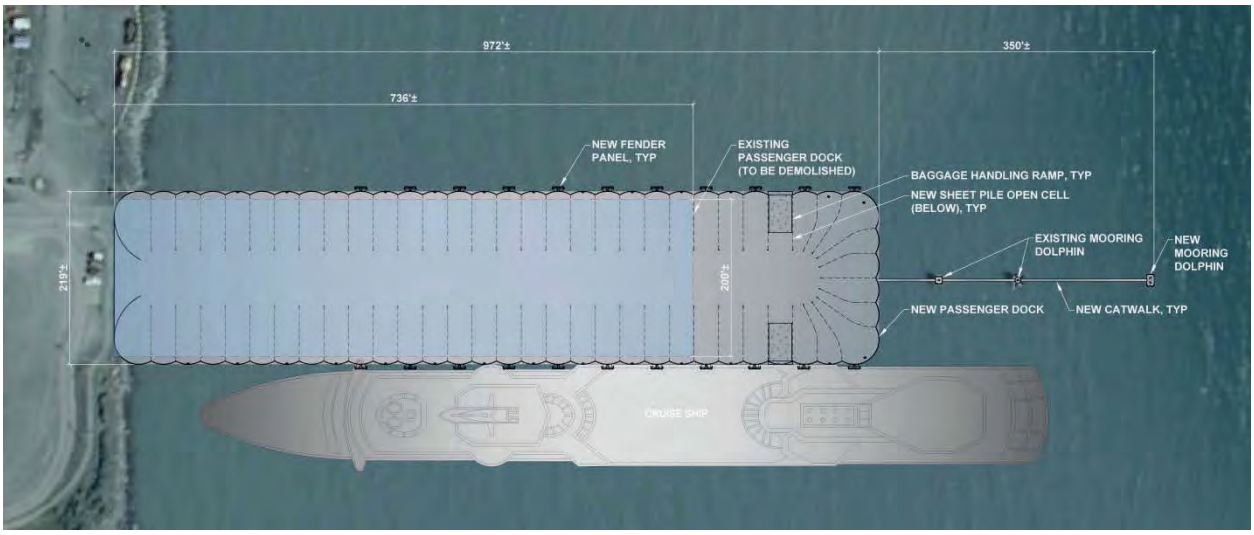


Figure 1: Full Size Sheet Pile Bulkhead Dock

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD1 are presented in Table 1, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously.

Table 1: Cost Estimate for Passenger Dock Option P-PD1

Option P-PD1: Full Size Sheet Pile Bulkhead Dock ($77.3M and 2 Years Construction Time)			
Construction Activity		**Cost**	**Duration**
• Mobilization and demobilization		$4.5M	4 months
• Demolition		$6.8M	1 month
• Sheet pile dock (includes sheet pile installation, deep compaction, layer compacted fill)		$27.1M	1 year and 6 months
• Fender system		$4.8M	2 weeks
• Dock utilities (includes water service, fuel system)		$0.4M	1 month
• Dock appurtenances (includes face beam, bullrail, mooring bollards, safety ladders)		$4.5M	5.5 months
• Dock surfacing		$6.4M	5 months
• Mooring dolphins		$0.45M	2 weeks
• Catwalks		$0.4M	1 week
• Rail tracks		$0.4M	2 weeks
• Cathodic protection (material and install)		$0.4M	3 weeks
• Engineering, contract administration, project management, permitting)		$6.6M	Throughout project
• Contingency (20%)		$14.5M	N/A
	Total	**$77.3M**	**2 Years**

1.2 Option P-PD2: Minimal Sheet Pile Bulkhead Dock

Description

Similar to Option P-PD1, Option P-PD2 will replace the existing dock with an sheet pile bulkhead dock. However, Option P-PD2 has a minimal approach, measuring approximately 970 feet long and 150 feet wide, which is approximately 50 feet narrower than the current passenger dock (Figure 2). Also similar to Option P-PD1, Option P-PD2 will be finished with a concrete surface and can also accommodate rail activities, if needed.

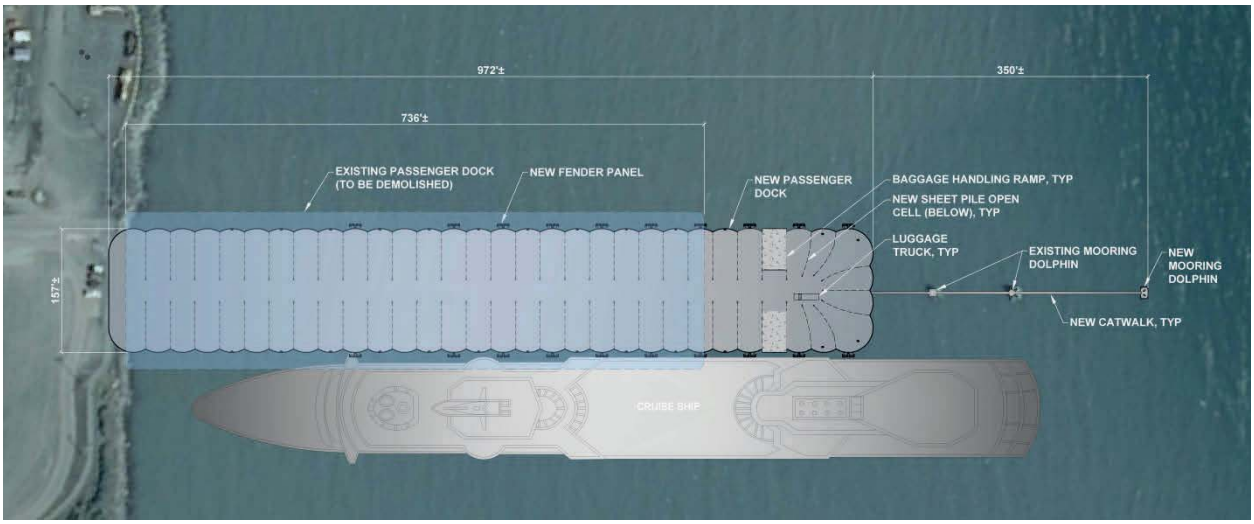


Figure 2: Option P-PD2 – Minimal Sheet Pile Bulkhead Dock

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD2 are presented in Table 2, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously.

Table 2: Cost Estimate for Passenger Dock Option P-PD2

Option P-PD2: Minimal Sheet Pile Bulkhead Dock ($65M and 2 Years Construction Time)			
Construction Activity		**Cost**	**Duration**
•	Mobilization and demobilization	$4.3M	3 months
•	Demolition	$6.8M	1 month
•	Sheet pile dock (includes sheet pile installation, deep compaction, layer compacted fill)	$22.1M	1 year 3 months
•	Fender system	$4.8M	2 weeks
•	Dock utilities (includes water service, fuel system)	$0.4M	1 month
•	Dock appurtenances (includes face bean, bullrail, mooring bollards, safety ladders)	$4.3M	5.5 months
•	Dock surfacing	$2.9M	3 months
•	Mooring dolphins	$0.45M	2 weeks
•	Catwalks	$0.4M	1 week
•	Rail tracks	$0.4M	2 weeks
•	Cathodic protection (material and install)	$0.4M	3 weeks
•	Engineering, contract administration, project management, permitting	$6.0M	Throughout project
•	Contingency (20%)	$11.7M	N/A
	Total	**$65.0M**	**2 Years**

1.3 Option P-PD3: Widened Sheet Pile Dock Retaining Existing Terminal Building and Existing Foundation Piles Reinforced

Description

Option P-PD3 is one of two options that enable ARRC to keep the existing passenger terminal building in place. This option is aligned with terminal Option P-TE2, which provides for the retention and retrofit of the terminal building. The cost of these options is separate. Similar to passenger dock Options P-PD1 and P-PD2, this option incorporates an sheet pile bulkhead dock replacement option. In order to fit the sheet pile around the existing building, the dock must be widened to approximately 280 feet. With a similar length to other options, the wider dock provides an additional 120,000 square feet of surface area relative to the existing dock. In order to keep the existing building in place, the pile foundation below that portion of the dock will be reinforced with grouted fiberglass reinforced polymer (FRP) wraps. Other components will be similar to Options P-PD1 and P-PD2, including salvaging two existing mooring dolphins and installing one new mooring dolphin to provide mooring for vessels over 1,000 feet in length. Fenders and bollards will line the east and west face for berthing on both sides of the dock.

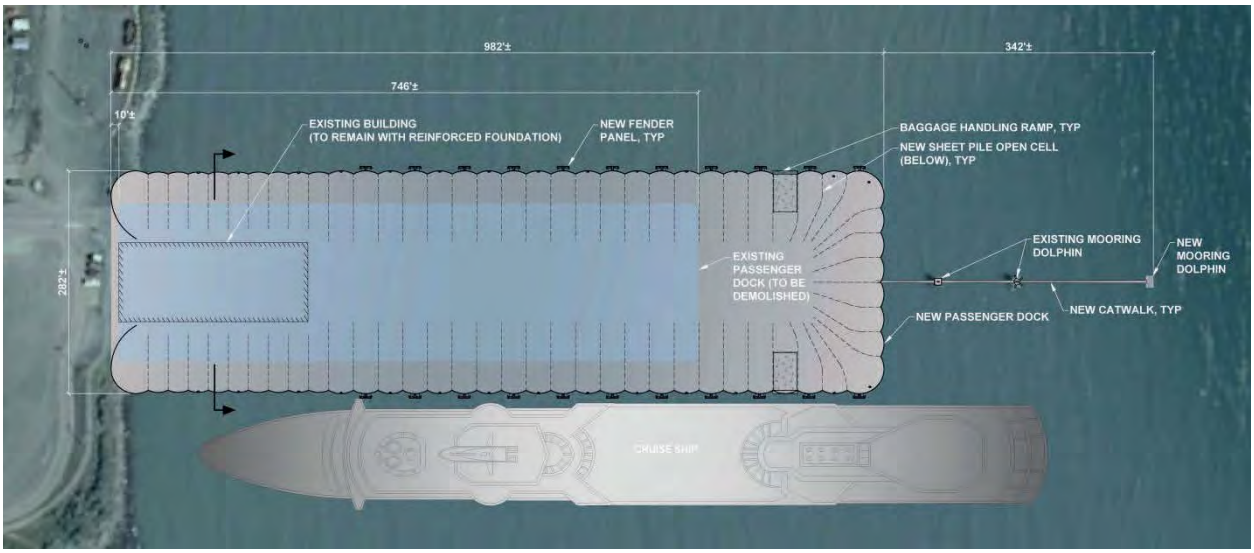


Figure 3: Option P-PD3 – Widened Sheet Pile Bulkhead Dock Retaining Existing Terminal Building and Existing Foundation Piles Reinforced

To salvage the existing terminal building, the compromised piles that support the dock must be repaired. To repair the piles, a preformed fiberglass laminate will be installed on the pile in a 5-foot section. The laminate sections will be installed and slid down the pile to the mud line until the entire pile is encased. The annulus between the laminate and the pile is then filled with epoxy grout. Once the grout is cured the full strength of the pile is returned. The repair does not require any special equipment or experience.

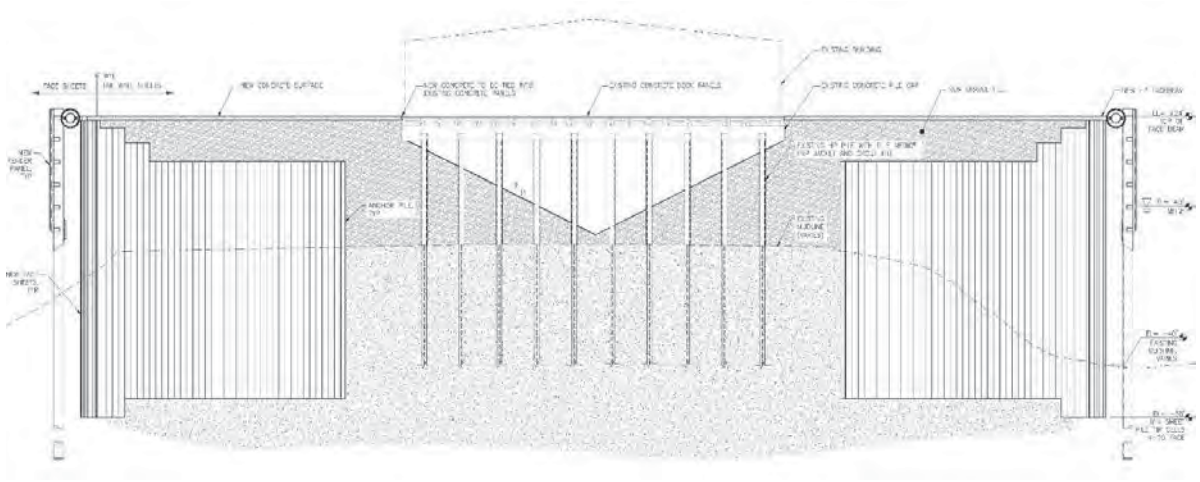


Figure 4: Option P-PD3 – Section of Sheet Pile With Existing Building Foundation Piles Reinforced

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD3 are presented in Table 3, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously. The cost estimate excludes the cost associated with salvaging and retrofitting the existing terminal building, which is covered in Open P-TE2.

Table 3: Cost Estimate for Passenger Dock Option P-PD3

Option P-PD3: Widened Sheet Pile Bulkhead Dock Retaining Existing Terminal Building and Existing Foundation Piles ($79.4M and 2 Years Construction Time)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$4.5M	4 months
• Demolition	$3.8M	1 month
• Sheet pile dock (includes sheet pile installation, deep compaction, layer compacted fill)	$28.2M	1 year, 6 months
• Salvage terminal building foundation	$4.4M	6 months
• Fender system	$4.8M	2 weeks
• Dock utilities (includes water service, fuel system)	$0.4M	1 month
• Dock appurtenances (includes face beam, bullrail, mooring bollards, safety ladders)	$4.5M	5.5 months
• Dock surfacing	$6.0M	5 months
• Mooring dolphins	$0.45M	2 weeks
• Catwalks	$0.4M	1 week
• Cathodic protection (material and install)	$0.4M	3 weeks
• Engineering, contract administration, project management, permitting	$7.0M	Throughout project
• Contingency (20%)	$14.5M	N/A
Total	**$79.4M**	**2 Years**

1.4 Option P-PD4: Minimal Pile Supported Dock Retaining Existing Terminal Building and Existing Foundation Piles Reinforced

Description

Option P-PD4 is one of two options that enable ARRC to keep the existing passenger terminal building in place. A concept layout of this option is shown in Figure 5. This option is aligned with terminal Option P-TE2, which provides for the retention and retrofit of the terminal building. The cost of these options are separate.

This option provides for a minimal pile-supported dock to be constructed. Approximately 280 feet in length by 160 feet in width of the existing dock will remain, with a reinforced foundation to ensure the existing terminal building can remain in use. The remainder of the dock would be replaced by a platform measuring approximately 400 feet in length by 120 feet in width, with access provided by a 300-foot long, 45-foot wide causeway. Four new breasting and mooring dolphins would be installed at the platform corners, with two existing and one new mooring dolphin beyond the end of the platform. Vessels of 1,000 feet in length would be able to berth at the facility, with fenders and bollards provided along the east and west faces of the platform.

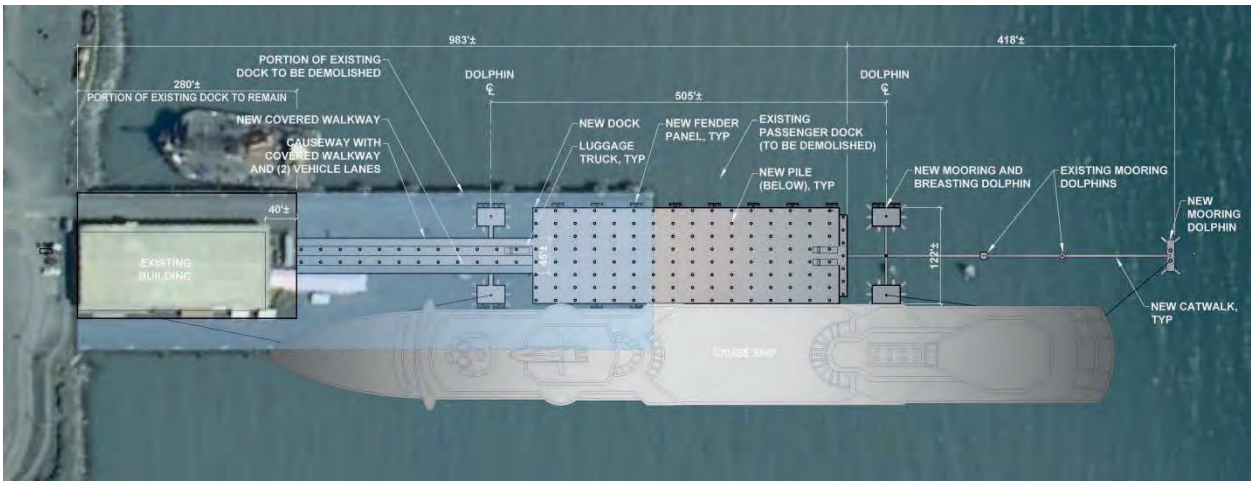


Figure 5: Option P-PD4 – Minimal Pile Supported Dock Retaining Existing Terminal Building and Existing Foundation Piles Reinforced

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD1 are presented in Table 4, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously. The cost estimate excludes the cost associated with salvaging and retrofitting the existing terminal building, which is covered in terminal Option P-TE2.

Table 4: Cost Estimate for Passenger Dock Option P-PD1

Option P-PD4: Minimal Pile Supported Dock Retaining Existing Terminal Building and Existing Foundation Piles Reinforced ($52.9M and 2 Years Construction Time)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$5.6M	2.5 months
• Demolition	$3.8M	1 month
• Salvage terminal building piles	$7.9M	1 month
• Breasting dolphins	$2.7M	1 month
• Catwalks	$0.1M	10 days
• Mooring dolphins	$1.9M	2 months
• Pile supported dock (includes pile material and install, concrete pile caps, concrete deck panels, fendering and appurtenances)	$16.1M	1 year, 3 months
• Dock utilities (includes water service, fuel system)	$0.4M	1 month
• Engineering, contract administration, project management, permitting	$4.9M	Throughout project
• Contingency (20%)	$9.5M	N/A
Total	**$52.9M**	**2 Years**

1.5 Option P-PD5: Full Size Pile Supported Dock

Description

Option P-PD5 is a 'full size' pile supported replacement dock option (Figure 6). The dock would have steel pipe piles as a foundation and a precast concrete panel deck. The option is similar to Option P-PD1 in size, being approximately 970 feet long and 200 feet wide and providing approximately 50,000 square feet of additional surface area. However, unlike the sheet pile full size option (Option P-PD1), the pile supported dock will not accommodate freight activities. The pile supported dock proposed in Option P-PD5 is HS-20 load limited, which means it can provide for buses and truck traffic only and no major freight or container handling activities. The two existing mooring dolphins will be salvaged and one new mooring dolphin would be installed to allow for mooring of vessels over 1,000 feet in length. Fenders and bollards would extend along the east and west face to provide berthing on both sides of the dock.

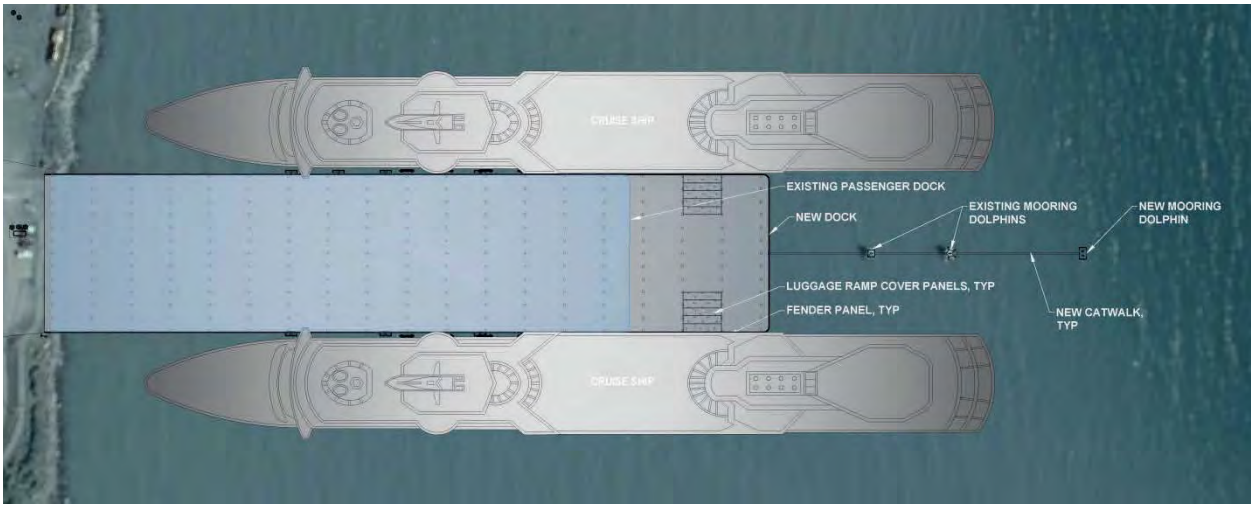


Figure 6: Full Size Pile Supported Dock

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD5 are presented in Table 5, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously.

Table 5: Cost Estimate for Passenger Dock Option P-PD5

Option P-PD5: Full Size Pile Supported Dock ($97.3M and 2 Years Construction Time)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$6.3M	3 months
• Demolition	$6.8M	1 month
• Breasting dolphins	$7.0M	1 month
• Catwalks	$0.4M	0.5 month
• Mooring dolphins	$0.5M	1.5 months
• Pile supported dock (includes pile material and install, concrete pile caps, concrete deck panels, fendering, and appurtenances)	$52.7M	1 year, 6 months
• Engineering, construction administration, project management, permitting	$7.9M	Throughout project
• Contingency (20%)	$15.7M	N/A
Total	**$97.3M**	**2 Years**

1.6 Option P-PD6: Minimal Pile Supported Dock

Description

Option P-PD6 is a minimal pile supported dock replacement option (Figure 7). This option significantly reduces the dock surface area by approximately 100,000 square feet relative to the existing dock. The platform would be approximately 400 feet long by 120 feet wide with access provided by a 475 feet long and 45 feet wide trestle. Four new breasting dolphins would be installed at the platform corners with two existing and one new mooring dolphin being located beyond the end of the platform, which would be accessed using catwalks. Vessels over 1,000 feet in length would be able to berth at the facility with fenders and bollards provided along the east and west face of the platform. Similar to Option P-PD5, the dock will not be able to be used for freight activities.

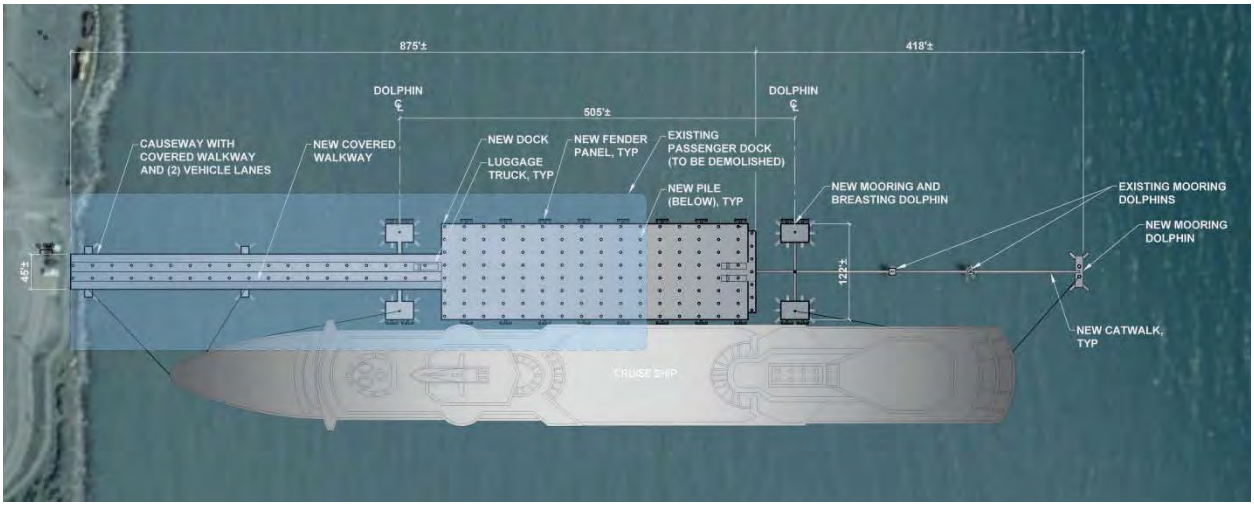


Figure 7: Option P-PD6: Minimal Pile Supported Dock

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD6 are presented in Table 6, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously.

Table 6: Cost Estimate for Passenger Dock Option P-PD6

Option P-PD6: Minimal Pile-Supported Dock ($58.1M and 2 Years Construction Time)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$5.6M	2.5 months
• Demolition	$6.8M	1 month
• Breasting dolphins	$2.7M	1 month
• Catwalks	$0.1M	10 days
• Pile supported dock (includes pile material and install, concrete pile caps, concrete deck panels, fendering and appurtenances)	$19.8M	1 year, 3 months
• Breasting/mooring dolphins	$3.3M	2.5 months
• Deck fender system	$3.0M	2 weeks
• Dock utilities (includes water service, fuel system)	$0.4M	1 month
• Engineering, contract administration, project management, permitting	$6.5M	Throughout project
• Contingency (20%)	$9.9M	N/A
Total	**$58.1M**	**2 Years**

1.7 Option P-PD7: Seward Loading Facility Dock Pile Supported Platform Expansion

Description

The Seward Loading Facility was originally designed to unload bulk material (specifically coal) from railcars, stockpile the material on ARRC used for storage, and load the material into bulk ships via a stacker-reclaimer and conveyer belt system. However, due to the downturn in the global export coal market, the facility is currently not in use and has been put into a long-term shutdown. The SLF dock has been in service for about 31 years following construction in 1984. The dock is approximately 900 feet long at 28 feet wide with a trestle and conveyer. A platform and ship loader is located at the end of the trestle/conveyor. The dock is currently only set up to handle bulk carriers.

Since the dock is not currently in use, several options have been considered to find the best alternative to use the existing dock and space. One minimal option (Phase I) is to extend the platform with a pile supported timber deck at the south end of the dock to provide berthing for cruise ships along the west side. The platform would have an approximately 630 feet berth face and be approximately 60 feet wide. Breasting dolphins and fenders would be added for adequate berthing. As part of Phase I, dredging to -35 feet MLLW would be required along the west side to provide adequate draft for cruise ships.

A more extensive option, Phase II, widens the platform and provides berthing and mooring for cruise ships along the east side of the platform. With Phase II, the overall berth face (east and west sides) would be approximately 630 feet long and approximately 120 feet wide. In addition to expanding the platform for cruise ships, the conveyor will be removed and replaced with a covered walkway to accommodate cruise ship passengers. To further accommodate passengers, an adjustable luggage platform would be built on the east and west sides to expedite the offloading process (Figure 8).

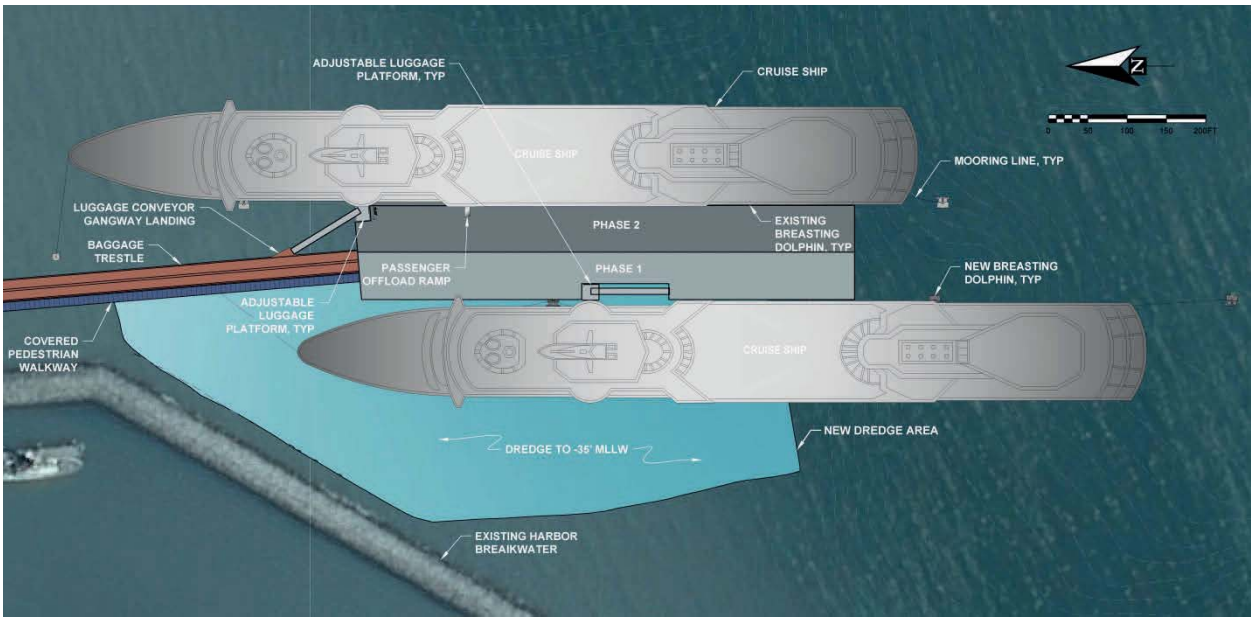


Figure 8: Option P-PD7: Seward Loading Facility Pile Supported Platform Dock Expansion

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD7, Phases I and II are presented in Tables 7 and 8, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously.

Table 7: Cost Estimate for Passenger Dock Option P-PD7 (Phase I)

Option P-PD7: SLF Pile Supported Platform Dock Expansion (Phase I) ($39.1M and 1 Year Construction Time)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$2.5M	1 month
• Demolition (includes offshore conveyor, ship loader, catwalks)	$0.9M	2 months
• Salvage and reinstall trestle superstructure	$1.5M	2 months
• Provide and install new trestle (piles, superstructure, running boards)	$15.1M	6 months
• Breasting dolphins	$1.7M	1 month
• Dock fender system	$2.6M	2 weeks
• Dock appurtenances (safety ladders, anodes, bullrail)	$0.5M	1 month
• Dock utilities (includes water service, fuel system)	$0.7M	2 months
• Engineering, construction administration, project management, permitting	$3.9M	Throughout project
• Dredging	$3.7M	2 months
• Contingency (20%)	$6.6M	N/A
Total	**$39.7M**	**1 Year**

Table 8: Cost Estimate for Passenger Dock Option P-PD7 (Phase II)

Option P-PD7: SLF Pile Supported Platform Dock Expansion (Phase II) ($20.8M and 8 Months Construction Time)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$2.5M	1 month
• Provide and install new trestle (piles, superstructure, running boards)	$9.0M	3 months
• Dock fender system	$0.9M	2 weeks
• Breasting dolphins	$1.7M	1 month
• Dock appurtenances (includes bullrail, safety ladders, anodes)	$0.4M	2 weeks
• Install utilities (includes water service, fuel system)	$0.3M	1 month
• Cathodic protection (materials and install)	$0.1M	1 week
• Engineering, construction administration, project management, permitting	$4.0M	Throughout project
• Contingency (20%)	$3.5M	N/A
Total	**$20.8M**	**8 Months**

1.8 Option P-PD8: Extend Freight Dock to Accommodate Cruise Vessels

Description

The freight dock was originally designed to relieve the combined dock that is currently used as the passenger dock and to provide separation of freight and passenger operations. The freight dock is constructed using an sheet pile bulkhead with a gravel surface and rail tracks running to the end of the dock. It has been in service for approximately 15 years and was constructed from 2000-2002. The dock currently measures approximately 600 feet in length and 200-320 feet in width and has a total surface area of approximately 130,000 square feet. The dock elevation is +20 feet MLLW in height, and it primarily services barges carrying cargo.

Option P-PD8 proposes to incorporate varying degrees of extension to the bulkhead to enable the accommodation of cruise ships. Phase I is a minimal option, extending the west facing bulkhead approximately 600 feet with approximately 120 feet of width. The minimal extension would allow for cruise ships over 1,000 feet long to dock on the west side, in addition to standard freight and cargo. A more extensive option can be provided by Phase II, which would add a bulkhead face over 600 feet long on the east side of the extension. This would make the extension over 300 feet wide. Dredging will be necessary to provide adequate draft on the east bulkhead and a sediment groin or similar should be constructed to mitigate infill from sediment migration. This would enable larger vessels to berth at the dock, and would also add approximately 200,000 square feet of additional surface area for use by cruise ships and freight activities. An aerial view of Option P-PD8 is shown in Figure 9.

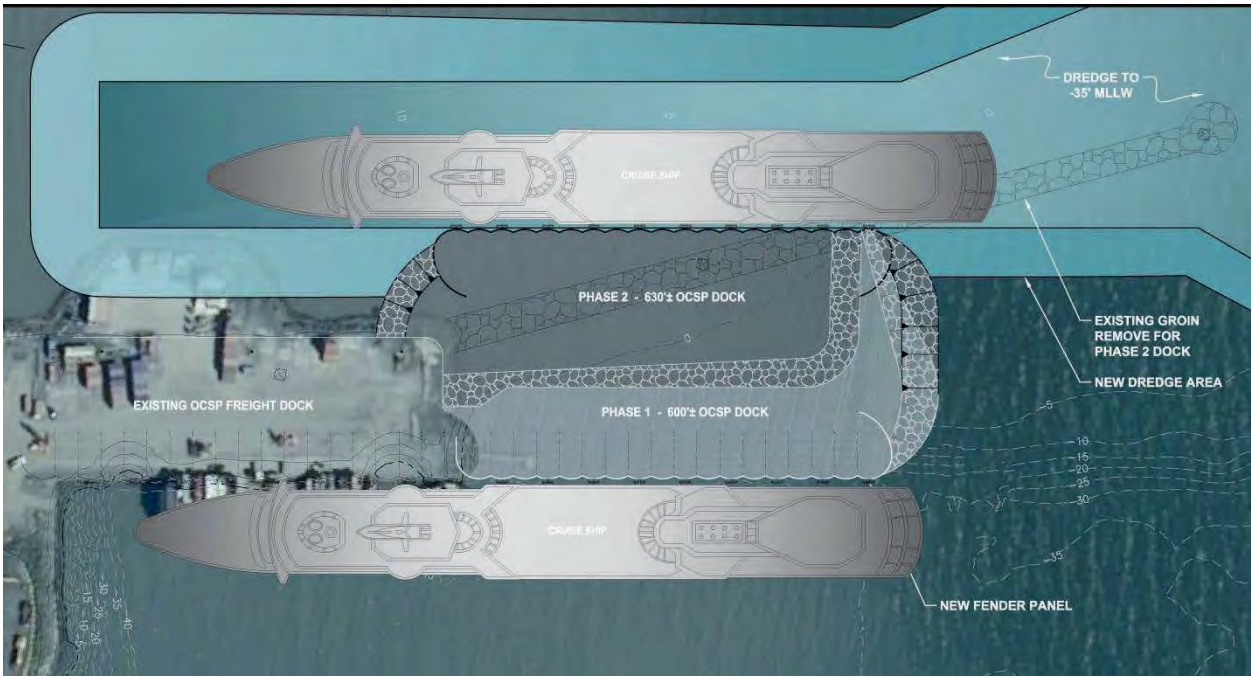


Figure 9: Option P-PD8 – Freight Dock Extension to Accommodate Cruise Ships – Phases I & II

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD8 are presented on a phased basis in Tables 9 and 10, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously.

Table 9: Cost Estimate for Passenger Dock Option P-PD8 (Phase I)

Option P-PD8: Extend Freight Dock to Accommodate Cruise Vessels ($21.3 Million, 1 Year and 3 Months to Complete) (Phase I)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$2.3M	2 months
• Salvage existing armor rock and reinstall	$0.6M	3 weeks
• Sheet pile dock construction (includes: drive sheet, cut off sheets and weld interlocks, backfill, compact below and above waterline)	$6.7M	8 months
• Install utilities (includes water service, fuel system)	$0.4M	1 month
• Dock fender system (materials and install)	$2.0M	2 weeks
• Dock appurtenances (includes: face beam, bull rail, mooring bollards, safety ladders)	$1.7M	3 months
• Cathodic protection (materials and install)	$0.3M	2 weeks
• Engineering, construction administration, project management, permitting	$3.7M	Throughout project
• Contingency (20%)	$3.8M	N/A
Total	**$21.3M**	**1 Year, 3 Months**

Table 10: Cost Estimate for Passenger Dock Option P-PD8 (Phase II)

Option P-PD8: Extend Freight Dock to Accommodate Cruise Vessels ($46.8 Million, 1 Year and 3 Months to Complete) (Phase II)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$2.3M	2 months
• Sheet pile dock construction (includes: drive sheet, cut off sheets and weld interlocks, back fill compact below and above waterline)	$7.2M	8 months
• Install utilities (includes water service, fuel system)	$0.4M	1 month
• Dock fender system (materials and install)	$2.0M	2 weeks
• Dock appurtenances (includes face beam, bull rail, mooring bollards, safety ladders)	$1.7M	3 months
• Cathodic protection (materials and install)	$0.3M	2 weeks
• Engineering, construction administration, project management, permitting	$3.7M	Throughout project
• Contingency (20%)	$3.8M	N/A
• Dredging	$23.8M	1 year, 6 months
• Sediment groin	$1.9M	1 week
Total	**$46.8M**	**1 Year, 3 Months**

1.9 Option P-PD10: Sheet Pile Dock With Floating Platforms

Description

Option P-PD10 is a sheet pile bulkhead replacement dock, with associated floating platforms. The proposed dock is approximately 914 feet long, and forms a “T” that is approximately 276 feet wide. On either side of the “T” bulkhead are floating platforms measuring 322 feet by 60 feet. The configuration allows for mooring a cruise ship on either side of the dock, while providing the floating platforms with some protection from waves. With the proposed dock extending further seaward than the current passenger dock, a new mooring dolphin would be added beyond the existing dolphins to provide adequate mooring. Additionally, a mooring breasting dolphin would be added to the shore side of the floating platforms. Figure 10 shows Option P-PD10.

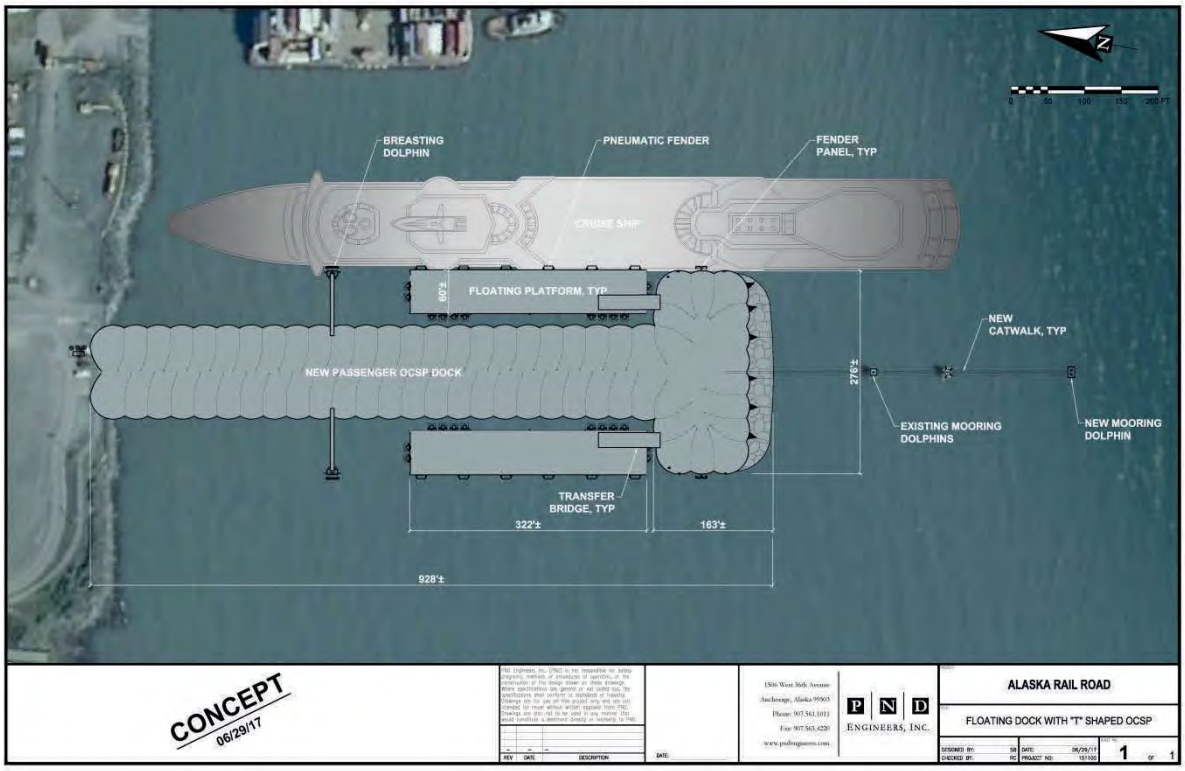


Figure 10: Option P-PD10: Sheet Pile Dock With Floating Platforms

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD10 are presented in Table 11, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously.

Table 11: Cost Estimate for Passenger Dock Option P-PD10

Option P-PD10: Sheet Pile Dock with Floating Platforms ($90.25 Million, 2 Years to Complete)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$5.0M	3 months
• Demolition	$7.0M	4 months
• Sheet pile dock	$25.1M	6 months
• Dock fender system	$430K	2 weeks
• Dock appurtenances	$4.5M	5 months
• Dock surfacing	$2.7M	4 months
• Floating platform docks	$18.4M	1 month
• Breasting dolphins	$1.5M	1 month
• Mooring dolphin	$450K	2 weeks
• Catwalks	$1.0M	1 week
• Armor rock revetment	$1.35M	2 weeks
• Cathodic protection	$800K	3 weeks
• Dock utilities	$420K	1 month
• Engineering, Contract administration, Project management, Permitting	$6.6M	Throughout project
• Contingency (20%)	$15.0M	N/A
Total	**$90.25M**	**2 Years**

1.10 Option P-PD11: Pile Supported Dock with Floating Platforms and Armor Rock Head

Description

Option P-PD11 is a combination of a pile supported dock that extends 280 feet seaward and a closed cell wall with armor rock located approximately 863 feet seaward. The 276 foot wide closed cell/armor rock barrier provides the floating platforms some protection from the waves. Shore side of the closed cells are two 322 feet by 60 feet floating platforms. Similar to other options, a new mooring dolphin would be added seaward of the existing mooring dolphins, while mooring breasting dolphins are added to the shore side of the floating platforms. These structures provide adequate breasting and mooring for large vessels. Figure 11 shows an aerial view of Option P-PD11.

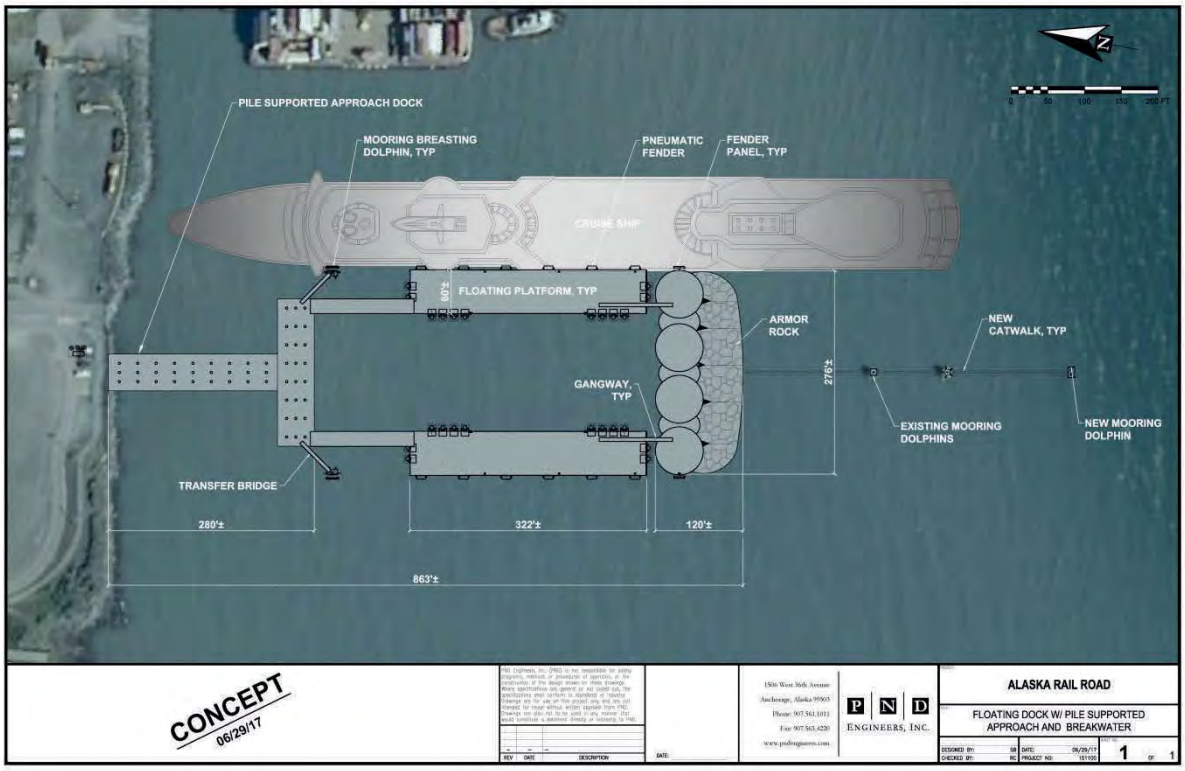


Figure 11: Option P-PD11: Pile Supported Dock with Floating Platforms and Armor Rock Head

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD11 are presented in Table 12, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously.

Table 12: Cost Estimate for Passenger Dock Option P-PD11

Option P-PD11: Pile Supported Dock with Floating Platforms and Armor Rock Head ($64.8 Million and 2 Years to Complete)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$5.65M	3 months
• Demolition	$6.8M	4 months
• Pile supported dock	$5.6M	6 months
• Sheet pile breakwater with armor rock	$8.8M	2 months
• Floating platform docks	$18.5M	1 month
• Breasting dolphins	$1.5M	1 month
• Mooring dolphin	$0.5M	2 weeks
• Catwalks	$1.0M	1 week
• Dock utilities	$420K	1 month
• Engineering, contract administration, project management, permitting	$5.2M	Throughout project
• Contingency (20%)	$10.8M	N/A
Total	**$64.8M**	**2 Years**

1.11 Option P-PD12: Open Pile Supported Dock with Floating Platforms and Sheet Pile with Armor Rock Head

1.11.1.1 Description

Option P-PD12 is very similar to Option P-PD11. The main addition between the two different design options is two additional floating platforms (four floating platforms total) shore side of the closed cells with armor rock. The closed cell/armor rock barrier is 276 feet wide and extends approximately 874 feet seaward. The pile supported dock extends approximately 280 feet seaward, with ramps extending to the floating platforms. Similar to other options, a new mooring dolphin is proposed to be added seaward of the existing mooring dolphins, while mooring breasting dolphins are added shore side of the floating platforms. These structures provide adequate breasting and mooring for large vessels.

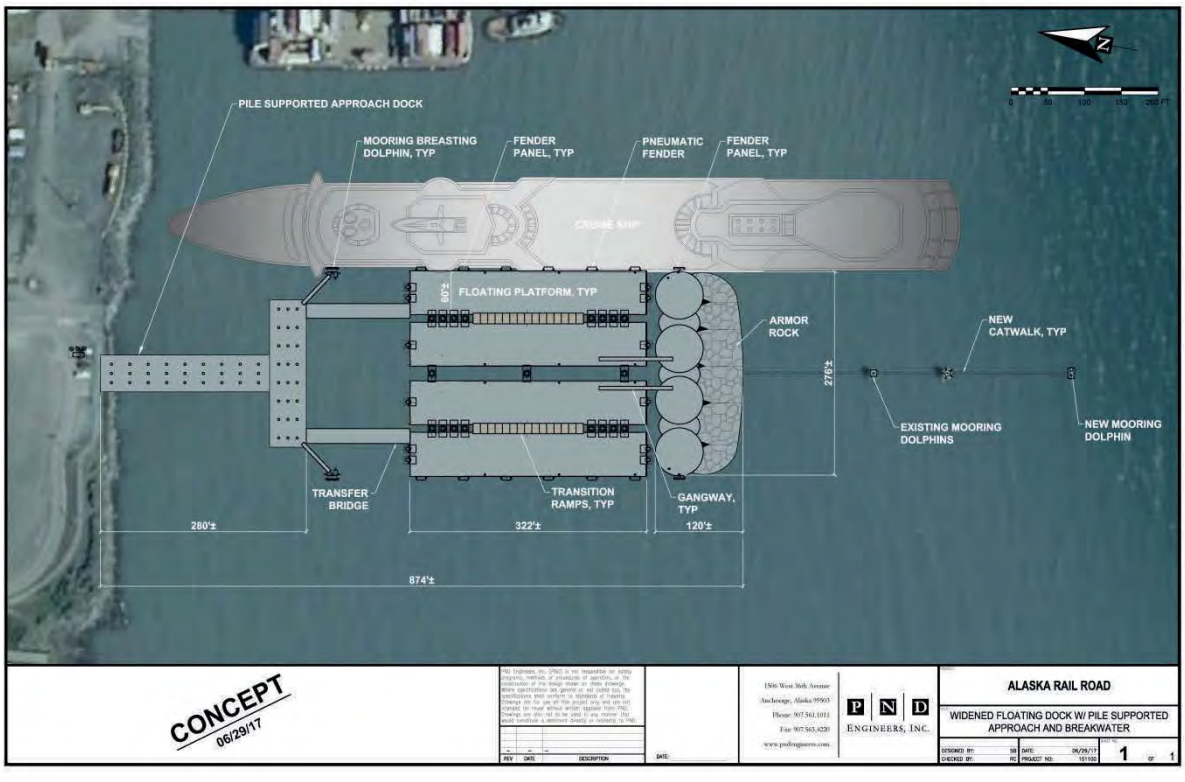


Figure 12: Option P-PD12: Open Pile Supported Dock with Floating Platforms and Sheet Pile Armor Rock Head

1.11.1.2 Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD12 are presented in Table 13, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on multiple tasks simultaneously.

Table 13: Cost Estimate for Passenger Dock Option P-PD12

Option P-PD12: Open Pile Supported Dock with Floating Platforms and Sheet Pile with Armor Rock Head ($81.3M and 2 Years to Complete)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$5.65M	3 months
• Demolition	$6.8M	4 months
• Pile supported approach dock	$5.6M	6 months
• Sheet pile breakwater with armor rock	$8.8M	2 months
• Floating platform docks	$31.8M	2 months
• Breasting dolphins	$1.5M	1 month
• Mooring dolphins	$0.5M	2 weeks
• Catwalks	$1.0M	1 week
• Dock utilities	$420K	1 month
• Engineering, Contract administration, Project management, Permitting	$5.7M	Throughout project
• Contingency (20%)	$13.5M	N/A
Total	**$81.3M**	**2 Years**

1.12 Option P-PD13: Pile Supported Dock Retaining Existing Terminal Building and Existing Foundation Piles Reinforced, with Floating Platforms

Description

Option P-PD13 utilizes 280 feet of the existing passenger dock at the shore side. This allows the existing passenger terminal building to be salvaged. To keep the existing dock functions, the existing pile foundation is reinforced. Four drive-down ramps connect the fixed platform approach to the floating portion of the dock and provide vehicle and pedestrian access. The middle of the dock is comprised of four 322-foot long by 60-foot wide floating concrete platforms, which can accommodate two vessels moored at one time (one on the east side of the dock and one on the west side of the dock). A 276-foot wide wave barrier is located south (seaward) of the floating platforms, which consists of a closed cell sheet pile retaining structure faced with armor rock on the south end to absorb and deflect incoming waves during storm events. A mooring dolphin is added seaward of the existing mooring dolphins, and additional mooring/breasting dolphins are added shoreward of the floating platforms to provide sufficient mooring capabilities for larger vessels.

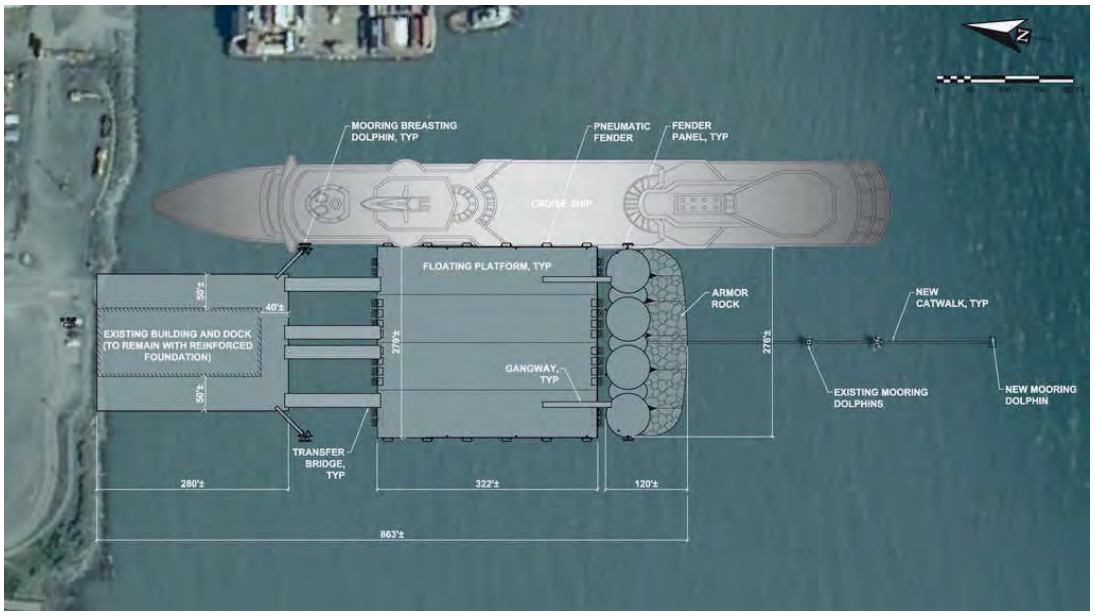


Figure IV-3.2: Option P-PD13: Option P-PD13: Pile Supported Dock Retaining Existing Terminal Building and Existing Foundation Piles Reinforced, With Floating Platforms

Cost Estimate and Schedule

Cost estimates and approximate completion timeframes for Option P-PD13 are presented in Table 14, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on separate tasks simultaneously. This cost estimate excludes the cost associated with salvaging and retrofitting the existing terminal building, which is covered in Option P-TE2.

Table 14: Cost Estimate for Passenger Dock Option P-PD13

Option P-PD13: Pile Supported Dock Retaining Existing Terminal Building and Existing Foundation Piles Reinforced, With Floating Platforms ($88.4M and Two Years to Complete)		
Construction Activity	**Cost**	**Duration**
• Mobilization and demobilization	$5.7M	3 months
• Demolition	$3.8M	4 months
• Reinforce Terminal building piles	$8.0M	6 months
• Sheet pile breakwater with armor	$8.8M	2 months
• Floating platform docks	$38.1M	1 month
• Breasting dolphins	$1.5M	1 month
• Mooring dolphins	$0.5M	2 weeks
• Catwalks	$1.0M	1 week
• Dock utilities	$0.4M	1 month
• Engineering, contract administration, project management, permitting	$5.9M	Throughout project
• Contingency (20%)	$14.7M	N/A
Total	**$88.4M**	**2 Years**

Expected Life of Facility

Rehabilitation of the piles supporting the existing dock and terminal building will strengthen and restore the long term strength of the exposed portion of the pile. Eventually though, the steel embedded in the concrete and below mudline will continue to corrode (although at a much lower rate than the exposed pile). This corrosion will eventually necessitate a more substantial and potentially cost prohibitive retrofit to ensure seismic stability of the structure. It is our assessment that the proposed repair would provide 15 years of additional useful life before additional repairs and/or replacement would be necessary.

1.13 Option P-PD14: Pile Supported Dock with Floating Platforms and Armor Rock Head

Description

Option P-PD14 incorporates a pile supported platform access that extends approximately 280 feet seaward. Four drive-down ramps connect the fixed platform approach to the floating portion of the dock, which provide vehicle and pedestrian access. The middle of the dock is comprised of four 322-foot long by 60-foot wide floating concrete platforms, which can accommodate two vessels moored at one time (one on the east side of the dock and one on the west side of the dock. A 276-foot wide wave barrier is located south (seaward) of the floating platforms, which consists of a closed cell sheet pile retaining structure faced with armor rock on the south end to absorb and deflect incoming waves during storm events. A mooring dolphin is added seaward of the existing mooring dolphins, and additional mooring/breasting dolphins are added shoreward of the floating platforms to provide sufficient mooring capabilities for larger vessels.

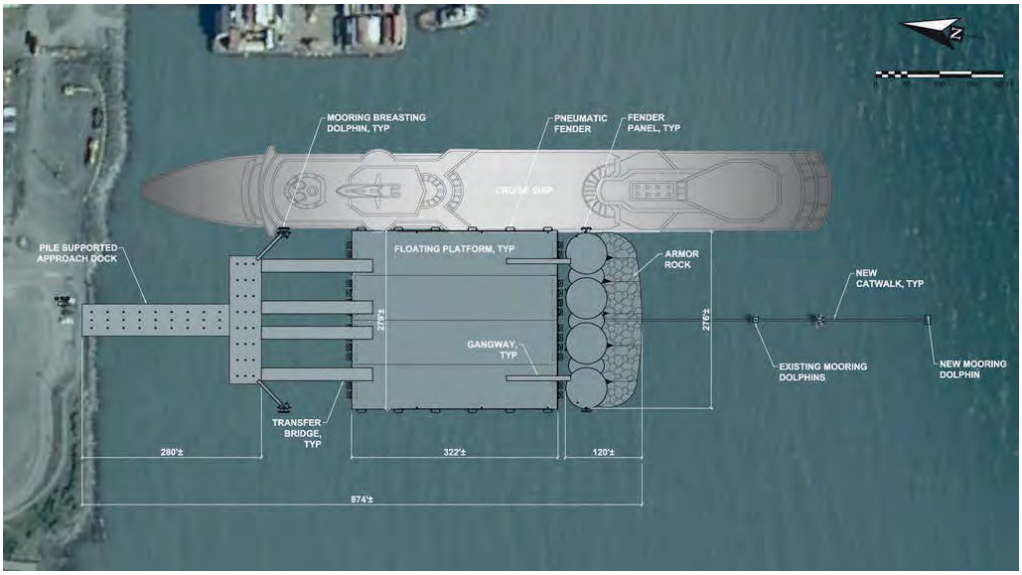


Figure IV-3.3: Option P-PD14: Pile Supported Dock With Floating Platforms

Cost Estimate and Schedule

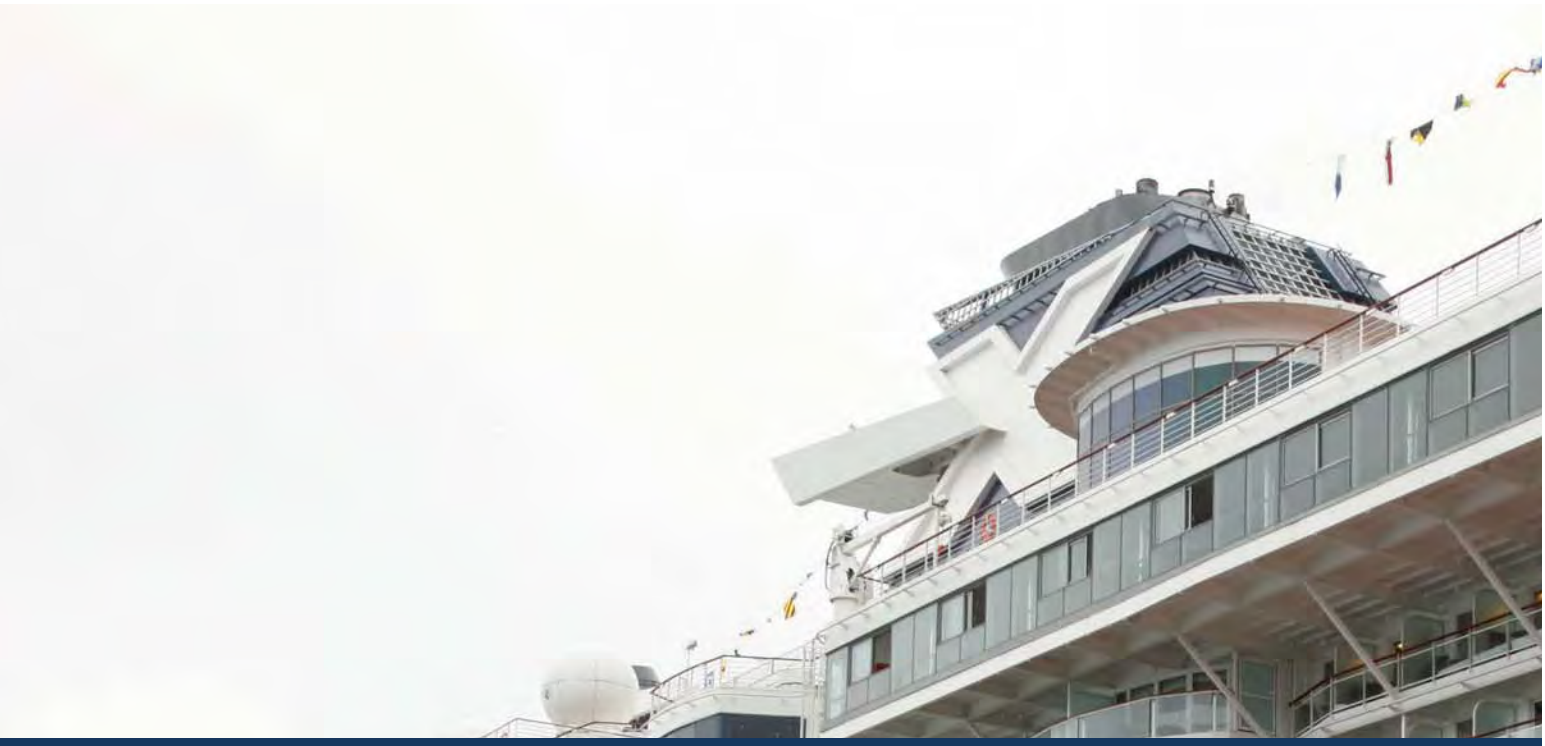
Cost estimates and approximate completion timeframes for Option P-PD13 are presented in Table 15, with major components broken out in itemized bullet points. Most activities occur concurrently, meaning that multiple crews will be working on separate tasks simultaneously.

Table 15: Cost Estimate for Passenger Dock Option P-PD14

Option P-PD14: Pile Supported Dock With Floating Platforms ($89.1M and Two Years to Complete)		
Construction Activity	**Cost**	**Duration**
• Mobilization and Demobilization	$5.6M	3 months
• Demolition	$6.8M	4 months
• Pile Supported Approach Dock	$5.6M	6 months
• Sheet Pile with Armor	$8.8M	2 months
• Floating Platform Docks	$38.1M	2 months
• Breasting Dolphins	$1.5M	1 month
• Mooring Dolphin	$0.5M	2 weeks
• Catwalks	$1.0M	1 week
• Dock Utilities	$0.5M	1 month
• Engineering, Contract Administration, Project Management, Permitting	$5.9M	Throughout project
• Contingency (20%)	$14.8M	N/A
Total	**$89.1M**	**2 Years**

Expected Life of Facility

The design life of the passenger dock is 50 years. It is expected that the dock would last at least 50 years before any significant repairs or replacement would be required.



Appendix E:
Passenger Dock Assessment

Credit: Judy Patrick Photography, 2012

Alaska Railroad Corporation

Seward Marine Terminal Passenger Dock Condition Assessment

FINAL REPORT

March 2014

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Bound Separately

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EXECUTIVE SUMMARY

This report summarizes the results of a condition survey of Alaska Railroad Corporation (ARRC) Seward Marine Terminal Passenger Dock conducted by R&M Consultants Inc. (R&M) in November 2013. The inspection utilized Waterfront, Structural, and Electrical Engineers along with commercial divers. Electrical Engineering support was provided by RSA Engineers. Commercial diving support was provided by American Marine and the dive support vessel (DSV) "Shamrock". The inspection consisted of four-days of above water facility inspection, including waterfront, structural, and electrical aspects followed by 4-days of underwater inspection of the facilities. The transit shed or terminal building was not included in the scope of work.

The intent of this work is to provide the Alaska Railroad Corporation with a condition assessment of this valuable asset along with outlining items that are in need of repairs and maintenance.

General Condition and Significant Observations

The majority of the dock is in satisfactory condition. The elements needing the most significant work include the steel piling, timber fenders, timber wales, ladders, and the cathodic protection (CP) system.

By far the element in the most serious condition is the steel piling. This includes the H piling, pipe piling and sheet pile abutment. The steel piling on this dock are in poor to critical condition with advanced stages of corrosion and significant section loss. Table ES-1 outlines the condition ratings based on percentages of section loss along with the percentage of piles tested for each category.

Table ES-1: Pile Section Loss - Percentage

Item	Section Loss	Rating	% of Piles Tested
H Piles	Greater than 30%	Critical	57%
H Piles	Between 15% and 30%	Serious	32%
H Piles	Less than 15%	Poor	11%
Pipe Pile Batters	Greater than 30%	Critical	23%
Pipe Pile Batters	Between 15% and 30%	Serious	40%
Pipe Pile Batters	Less than 15%	Poor	37%
Abutment Sheet Piling	Greater than 30%	Critical	100%

The average section loss of various piling is outlined in table ES-2.

Table ES-2: Pile Section Loss - Average

Item	Average Section Loss	Rating
H Piles	32%	Critical
Pipe Pile Batters	19%	Serious
Abutment Sheet Piling	52%	Critical

Section loss of over 50% of the original wall thickness was noted on many piling and in a few places remaining wall thickness of around ¼ inch or 0.25" was reported. This is indicative of potential imminent failure.

Corrosion was noted over the entire length of the pilings but was especially concentrated in two zones:

- The first zone was below the concrete pile cap in the splash zone at around elevation 13 to 14 feet, just above Mean Higher High Water (MHHW). This area showed a visible band of heavy pack rust and serious section loss. Averaged corrosion rates of 6 to 15 mils per year (1 mil equals 1/1000 of an inch) or greater have been noted in this zone. This area, being above the water line, is not protected by the CP system.
- The second zone was around elevation 0.0 at Mean Lower Low Water (MLLW). This area is normally under water and only exposed at minus tides. Corrosion in this lower zone is typically associated with a documented phenomenon known as "accelerated low water corrosion" (ALWC). This is generally defined as a localized and aggressive form of corrosion with documented averaged rates of section loss of 20 mils per year, or greater. This area can be protected by the CP system.

In general there was more corrosion noted on the section of the dock nearest the beach than on the offshore end. This is likely due to the increased agitation and splash of the water from waves running up and into the shallow beach areas. The CP half-cell readings taken showed inadequate protection indicating that maintenance to the cathodic protection system is required.

Based on the above outlined section loss and corrosion rates, without cathodic protection many of the piling will have complete section loss and or perforation in 5 to 10 years or less. This would result in a critical condition that may require structurally condemning the dock as unsafe. Therefore operation and maintenance of the CP system along with repairs to the piling should be considered a priority. The other items found during the inspection fall under the category of routine maintenance.

The following is a summary of the condition of the primary elements involved in the assessment:

Table ES-3: Condition Summary

ELEMENT	COMMENTS	OVERALL RATING SCORE	
Pre-Cast Concrete Deck	• Limited defects were noted	5	Satisfactory
Cast-in-Place Pile Caps	• Localized but repairable damage was noted	4	Fair
H Piling	• Two bands of corrosion were noted; one near MLLW at elevation 0.0 and one just below the pile cap in the splash zone. • Several piling were observed to have been perforated by corrosion with complete section loss in some areas.	1 2 3	57% Critical 32% Serious 11% Poor
Pipe Piling	• Two bands of corrosion were noted; one near MLLW at elevation 0.0 and one just below the pile cap in the splash zone. • Significant section loss was noted in places	1 2 3	23% Critical 40% Serious 37% Poor
Sheet Pile Abutment	• The entire sheet pile abutment is in the splash zone above the area where a CP system will be effective. • The sheet piling are heavily corroded with serious section loss.	1	100% Critical
Cathodic Protection System	• The CP system was off at time of inspection. • A functioning CP system could provide protection of submerged components but will require on-going routine maintenance.	3	Poor
Ladders	• The lower attachments were loose on some ladders and some were bowed.	3	Poor

	• The ladders pose a moderate safety issue		
Timber Fender Piling	• There are a number of missing and broken piling resulting in gaps in the timber pile fender system.	3	Poor
Timber Wale	• The wale is showing advanced deterioration and rot. There are small bushes growing in sections of it.	2	Serious
Main Fenders	• Limited defects were noted	5	Satisfactory
Dolphins	• Limited defects were noted	5	Satisfactory
Bollards	• Limited defects noted	5	Satisfactory
Timber Bullrail	• Limited defects noted	5	Satisfactory
Electrical and lighting	• Only a few minor items noted. See appendix	6	Good

Recommendations

Cathodic Protection System

The first priority is to fully inspect, repair, and operate the CP system at full capacity and efficiency and to then aggressively maintain it. The following are recommended items for the CP system:

- A full inspection of the CP system by a corrosion specialist. This will focus on items that need to be repaired for full system operation.
- Develop and execute a detailed maintenance and operation program of the CP system. This will include a schematic of the system and written operations inspection and maintenance procedures.
- ARRC staff who operate and inspect the CP system should receive National Association of Corrosion Engineers (NACE) training.

Steel Pile Repairs

The next priority recommendation is an aggressive pile rehabilitation project involving repair sleeves and jackets. This would involve cleaning the piling, installing a synthetic jacket around it (possibly including reinforcement), and pumping grout into the annulus. There are a number of commercially available products on the market for this. The jacket systems have several advantages including:

- The jacket provides a barrier to chlorides (seawater) greatly reducing the corrosion potential.
- The grout provides both a barrier and an alkaline environment that reduces corrosion potential.
- The jacket can be extended into the splash zone (above the water surface) to protect areas a CP system cannot reach.
- Reinforcing can be added to rebuild structural capacity of the piling.

The sheet pile abutment should be sand or water blasted and coated. This would slow the corrosion down. It is recommended that the remaining wall be used as one side of a form to create a reinforced concrete wall under the first pile cap. This could provide corrosion protection and allow some additional structural capacity.

Because there are approximately 1800 piling in this dock, prioritized repairs might be done in phases over a number of years. For example 300 piling could be done each year for six years. The prioritized repairs could be based on the condition of the piling, for example repairing those with a serious or critical rating, or by region, for example staring at the abutment and working

outward. Repairing all the piling in the dock would be a costly and involved process. This needs to be weighed against the ARRC's long term plans and the possibility of future dock replacement.

Timber Fenders
Broken and missing fender piling should be replaced. This includes about 35 timber piling.

Wales and Chocks
The entire wale and chock system should be replaced. The wale is a continuous horizontal timber along the edge of the dock. The timber fenders are attached to this. Chocks are the short sections of horizontal timbers between the piling. There about 1650 lineal feet of wale to be replaced.

Ladders
The ladders should be replaced with fabricated galvanized steel units. At a minimum, this should include 4 ladders on each side and 2 on the end.

Structural Capacity

The current capacity of the dock is adequate for HS 20-44 loading, for the original design forklift loads, and for 600 pounds per square foot (PSF) uniform distributed loads. These loads are in line with the current primary use of the dock which is centered on passenger services for cruise ships and light commercial use. Trains and gantry cranes should not be used without first conducting major repairs to the dock.

North Star Stevedores operates two types of large forklifts on the dock: a Taylor model TY-602L with 62,000 lb cargo capacity and a Hyster H970E with 95,000 lb cargo capacity. The calculated capacity of the dock is adequate for the Taylor unit. The Hyster unit must be limited to cargo loads less than or equal to 62,000 lbs.

While structural analysis demonstrates that, even with significant section loss due to corrosion, there is still vertical load capacity, any steel piling with 30 percent or greater section lose is at risk of failure due to eccentric loads that could result in combined bending and axial forces.

The dock does not meet current design standards for seismic performance. The original design was based on a lateral load of 10% of gravity. Modern design methods are much more complex and include loads of over 100% of gravity, or over 10 times the original design. These modern standards are likely to provide a more accurate representation and analysis of the actual forces and behaviors in an earthquake.

The maximum considered earthquake (MCE) also known as the design earthquake is a relatively rare event with an approximate 2500 year return period and a 2% chance of occurrence in 50 years. Although the statistical chances of this occurring are fairly small, it is likely that the dock will fail in the design event. It is also likely that even after comprehensive pile repair the dock will not withstand either MCE or a significant seismic event.

The three primary modes of seismic failure include: shearing of the batter piles near the deck connection, the batter piling pulling out of the soils due to large lateral loads, and loss of soil strength due to liquefaction. All three of these are possible and are likely in a large seismic event.

Additional Inspections

We recommend the following additional inspections:

1. A complete and detailed inspection of the CP system by a NACE trained technician.

2. Routine inspections that are completed at regular intervals not to exceed 1 or 2 years.
3. Repair design and construction inspections prior to each phase of rehabilitation work.

Renovation Cost Estimates

Below is a table outlining the budgetary costs for priority repair and replacement items in poor condition.

Table ES-2: Repair and Retrofit Estimates

ITEM	UNIT COST	QUANTITY	TOTAL
CP System Full Inspection	$50,000	1 EA	$50,000
CP System Maintenance	$200,000	1 EA	$200,000
Electrical Renovations	$150,000	1 EA	$150,000
Pile Jacket Materials	$300	27,000 LF	$8,100,000
Pile Jacket Installation	$2,000	1,800 EA	$3,600,000
Abutment Renovation	$250,000	1 EA	$250,000
Furnish and Install Timber Pile	$5,000	35 EA	$175,000
Furnish and Install Timber Wale	$250	1,650 LF	$412,500
Safety Ladders	$7,500	10EA	$75,000
Sub Total			**$13,012,500**
Contingency @20%			$2,602,500
Engineering and Admin @8%			$1,041,000
Construction Admin @8%			$1,041,000
Total			**$17,697,000**

Replacement Cost Estimates

The remaining service life of the existing dock could be extended by repairing piling and maintaining the CP system. However, the pile configuration cannot be made compliant with current seismic design standards, and is impractical and uneconomical from a corrosion control and prevention standpoint. Further, the dock configuration while remaining useable, is not efficient for current and anticipated use with ever longer cruise ships. Therefore major resources may be better utilized to replace as opposed to repair the existing dock.

A modern pile supported concrete deck replacement dock can be expected to cost in the range of $350 to $450 per square foot. The existing dock is approximately 147,200 square feet with an estimated replacement value of around $50 to $65 million. This does include basic lighting and electrical utilities, and fenders but does not include the building, office space, or the dolphins. Of course a replacement dock may have a different configuration than the current dock due to differing use.

A concept level phased replacement alternative is outlined in the report. This includes a pile supported concrete deck platform dock that is approximately 116 feet wide and 1,006 feet long. Two mooring dolphins to the south are shown with a catwalk system. A new two story 7,000 square foot terminal building is included. Dredging to – 42 feet design depth is included. The cost of the replacement dock and building is: phase one $34,300,000 and, phase two $25,700,000.

1.0 INTRODUCTION

The purpose of this report is to summarize the results of the inspection and condition assessment of the Alaska Railroad Corporation (ARRC) Seward Passenger Dock facility. The scope of work included:

- An above water inspection of the dock including the top portion of approximately 400 piles, the pile caps, deck, and fenders.
- An underwater inspection of approximately 400 piling
- An inspection of the electrical service on the dock.
- A simplified structural analysis of the piling to include the effects of the reduced pile wall thickness.
- A condition assessment.

The inspection consisted of four-days of above water inspection of the facilities, including waterfront, structural, and electrical aspects followed by 4-days of underwater inspection of the facilities. The above water inspection included engineers in a skiff under the dock observing the piling at several stages of the tide.

Recommendations and budgetary cost estimates are also provided.

1.1 Site Location and Description

The City of Seward is located on Resurrection Bay on the east coast of the Kenai Peninsula about 125 highway miles south of Anchorage. The Passenger Rail Dock is located at about 60º- 7,143' N, 149º- 25.681' W.

1.1.1 Climate

According to the Alaska Department of Commerce Community Database online, winter temperatures average about 17 to 30º F and summers range from 49 to 63º F. Average annual precipitation is about 66-inches of rain and 80 inches of snowfall.

1.1.2 Tides

NOAA publishes the following tidal statistics for Seward:

Highest observed water	15.69 feet
MHHW	10.62 feet
MHW	9.71 feet
MTL	5.54 feet
MSL	5.55 feet
MLW	1.38 feet
MLLW	0.0 feet
Lowest observed water	-5.00 feet

1.2 Existing Dock

The Passenger Dock (also known and the Seward Rail Dock and West Dock) is 736 feet long and 200 feet wide and is located at the end of Resurrection Bay near the town of Seward, Alaska There is a 100-foot by 260-foot building located on the north edge of the dock. The facility was designed and constructed by the US Army Corps of Engineers in the mid-1960s following the 1964 Great Alaska Earthquake. Originally it was used for intermodal cargo and had a rail extension on the dock along with a transit or cargo building. Currently, the dock is primarily used for cruise ships and passenger service. Today the rail

extensions on the dock are not used and the transit building has been converted to provide passenger service and office space. Drawings in the appendix generally illustrate the dock configuration.

The original design depth of the dock was -35 feet MLLW. Recently the berth has been deepened by dredging to -42 feet MLLW. The deeper section begins just outside the fender face and does not extend under the dock to the support piling.

The dock is supported by un-coated and un-galvanized vertical steel H-piling. There are over 1800 piles supporting the dock. Depending on location, these are either 14-BP-102 or 14-BP-89 piles. (The original thickness for a 14-BP-102 H pile is 0.704" for both the flange and web. The original thickness for a 14-BP-89 H pile is 0.616" for both the flange and web.) The 14-BP-102 piling are typically located in the outer 8 rows of piling along both the east and west faces of the dock. This section was originally designed to support trains. The 14-BP-89 pilings are typically located in the center section of the dock.

Lateral loads are resisted by 16 inch diameter by 3/8 inch or 0.375" wall thickness batter pipe piling. There are two rows of batter piling along the interior of the dock. There are a total of 63 pile bents in the dock. Bents are typically 12 feet on center with the exception of several bents near the expansion joint. This joint is between Bents 32 and 33. The pile bent spacing from Bents 31 to 34 is non-standard.

Bent 1 is the abutment and includes a sheetpile retaining wall. This was constructed of Z-27 sheets with an original wall thickness of 3/8 inch or 0.375'. There are vertical H-piling on Bent 1 as well as a row of batter pipe piling.

The deck consists of pre-cast concrete panels supported by cast in-place concrete pile caps. The elevation of the deck is approximately +24 feet. On the outside east and west edges of the dock for the first 8 rows of piling the deck includes railroad ballast (crushed rock) on top of the concrete panels to support railroad tracks. This ballast area is currently overlaid with asphalt. The center section of the deck does not include ballast. This area has an asphalt overlay directly on top of the concrete deck panels. There is a slot in the dock on the west side to accommodate a conveyor system to handle baggage for cruise ships. This is a section where the deck has been removed so that the conveyor can be lowered to reach the cargo door in the side of the vessel.

There are seven main fenders located along the east face of the dock and eight on the west face. These were installed sometime after the original construction and consist of "pin pile" units. Each pin pile unit consists of a prefabricated framework supported by two galvanized pipe piling driven into the bottom. The framework includes timber facing and pipe sleeves that slip over the pin piling. The fenders are attached to the deck of the dock with side loading cylindrical rubber energy units. There are also timber fender piling in place along the edge of the dock. These are attached to a timber wale system near deck level.

According to previous reports, significant corrosion was noted in a 1978 inspection and an impressed current cathodic protection system was installed in 1979. The ARRC has made considerable efforts to provide and maintain cathodic protection to the dock. Various repairs and upgrades to the system have been completed over the years. Currently there are several generations of impressed current anodes on the dock including at least 3 different types of anodes. These are fed by banks of rectifiers. One bank is located at the south end of the transit shed. Another bank is located near the south edge of the dock near the longitudinal centerline. There are also sacrificial anodes located along the first few bents of piling near the beach.

Previous reports outlined significant corrosion on the piling with the maximum deterioration centered around elevation +1 to -1 feet MLLW. Corrosion was also noted up to and including the splash zone above elevation +12 feet MLLW. Remaining pile wall thickness in some of these areas was reported to be less than half the original wall thickness. Significant corrosion was also noted in some of the pile splice

butt welds. Repairs were made to the piling in some areas. These include bolted pile splice plates. There are at least three distinct types of pile splice plates currently in place. These include types that are bolted into the web and types that are bolted to the flanges.

1.3 Inspection Approach

Members of the condition assessment team, including engineers specializing in the waterfront, structural, and electrical engineering as well as commercial divers traveled to Seward in November 2013 for an on-site inspection of existing facilities.

Modern inspection standards point to a three level inspection approach designed to cover the entire structure with a visual inspection and a statistically representative sampling of certain elements for a closer inspection. R&M generally performed the above and below water inspections using this three level approach. However, due to the large number of piling (over 1800) and to limit project cost, the level 1 visual inspection was limited to approximately 400 piling or about 20 percent of the total number of piles. This provided a representative sampling of the piling.

The 3 level inspection protocol is described below:

Level I
A complete visual inspection of all exposed components of the element. This typically includes visually inspecting each identified pile from the mudline to the pile cap. Marine growth is not typically removed in the Level 1 inspection. The underwater Level I inspection operation was videotaped and includes a taped dialog between the diver and the topside personnel describing the location, marine growth, and general condition of the structure. The above water Level I inspection included a low tide inspection under the dock in a skiff.

Level II
Partial marine growth removal and close up visual and photographic inspection of selected portions of approximately 10 percent of the structure. This was done in a manner designed to produce a statistically representative sample of the underwater components. Close-up photographs were taken of these areas.

Level III
Non-destructive testing (NDT) of selected portions of approximately 5 percent of the structures. This was done in a manner designed to produce a statistically representative sample. Ultrasonic thickness readings were taken to determine the remaining wall thickness of the piles. Cathodic protection (CP) half-cell readings, using a silver/silver chloride electrode (half-cell), were also taken to determine the amount of cathodic protection current at the piling.

1.3.1 Cathodic Protection Inspection

The National Association of Corrosion Engineers (NACE) publishes standards and criteria for cathodic protection. One widely used criteria for adequate CP is to maintain the structure at -0.850 volts or more negative with respect to a copper copper sulfate reference cell. Copper copper sulfate reference cells are not intended for use in seawater so it is typical to use a silver silver chloride reference cell. There is a correction factor that can be applied to correlate readings taken with a silver silver chloride cell to standards based on a copper copper sulfate cell. The correction factors vary depending on temperature, salinity, resistivity of the medium, and other factors. For the purposes of this inspection an approximate correction factor of 0.050 volts was applied so that a silver silver chloride CP readings of approximately -0.800 or more negative indicates adequate cathodic protection.

1.3.2 Ultrasonic Thickness Readings

The inspection included NDT ultrasonic thickness readings at various places throughout the facilities to monitor the remaining wall thickness of piling and other structures. A specialized underwater thickness meter was brought to the site and utilized for this purpose. An underwater ultrasonic thickness meter was

used to measure wall thickness of steel elements. This meter is specially built for underwater applications. The diver cleans an area of the steel piling, removing marine growth and corrosion deposits, and then places the transducer on the cleaned area. The meter gives a visual reading that is reported by the diver and logged by the topside personnel.

Inspecting Piling from a Skiff

The thickness readings can be compared to original wall thickness to determine section loss. It should be noted that there are tolerances for wall thickness in new material from the factory. These vary with the specification for the material but can range up to as much as plus or minus 10 percent of the nominal value.

There is little published guidance for acceptable levels of section loss. Obviously the consequences of section loss will depend on the application of the member in question. Highly loaded, highly stressed, primary structural members are less tolerant of section loss than lightly loaded, lightly stressed, secondary members. A rule of thumb that has been used previously in industry is that any member with 30% or greater section loss should be repaired or replaced. However, this depends on the application and some members may require repair or replacement prior to 30% section loss.

Silver/Silver Chloride Cathodic Protection ½ Cell

Underwater Ultrasonic Thickness Meter

1.3.3 Diving Inspection Procedures

R&M and American Marine used surface supplied commercial diving procedures to inspect the underwater portions of the facility in this report. We used the Association of Diving Contractors International (ADCI) consensus standards as a diving safe practices manual. This manual lists the minimum requirements for personnel and equipment to be used on commercial diving jobs. An underwater video camera and light was mounted on the diver's hardhat helmet for the inspection. This allowed the topside personnel to see exactly what the diver saw. Surface video display, combined with the ability to communicate with the diver, allowed project engineers to enter into a real time dialog with the diver as the inspection progressed. This dialog was taped and is a valuable resource. Underwater still photographs were also taken and selected photos are included in the report.

Surface Supplied Diving Operations with Helmet Mounted Video Camera

1.4 Rating System Description

A condition assessment rating system was chosen for the evaluation of the structures. The purpose of choosing a rating system is to provide a uniform and repeatable method to track the condition of the various structures throughout the service life of the facilities. The correct rating assignment requires professional engineering judgment in consideration of the scope of damage, severity of damage, distribution of damage, types of components affected and their structural sensitivity, and location of defect on the component relative to the point of maximum moment or shear.

The rating system used in this report generally follows that recommended by the "*Underwater Investigations Standard Practice Manual*" published by the American Society of Civil Engineers (ASCE, 2004) for routine inspections. Ratings are assigned to each structure to facilitate establishing the priority of maintenance, repair or replacement actions. Basically, a numerical scale is used for routine condition assessments and should remain associated with the structural unit until the structure is re-rated after a quantitative engineering evaluation of repairs, or on completion of the next scheduled routine inspection.

The ASCE rating system, summarized in Table 1.1, uses a scale of 1 to 6 with 6 corresponding to a structure in *good condition*, and a rating of 1 corresponding to a structure in *critical condition*. These ratings are used to describe the existing in-place structure relative to its condition when newly constructed. Our inspection uses this system and applies the ratings to individual elements.

Table 1.1: Rating System for Condition of Structures

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 load bearing 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.

Source: Underwater Investigations Standard Practice Manual (ASCE, 2004).

In addition to the above, several published inspection standards outline section loss thresholds that automatically trigger certain condition ratings regardless of any structural analysis. For example draft ASCE *Waterfront Inspection Standards* outline that any steel element with a section loss of between 15% and 30% of nominal at any point is considered to have “major damage” and any element with greater than 30% of nominal at any point is considered to have “severe damage”. This would require element ratings of “*serious*” and “*critical*” respectively.

2.0 INSPECTION RESULTS

This section summarizes the inspection results of each primary element of the Passenger Dock facility

2.1 Precast Concrete Deck

The precast concrete deck was found to be in satisfactory condition with little damage.

Deck with Asphalt Overlay

Bottom of Precast Deck Panels

Slot in Deck for Baggage Handling

Expansion Joint

2.2 Cast in Place Concrete Pile Cap

The cast in place pile cap is in fair condition with a few areas of spalling near some of the pile to cap connections. These areas are repairable. Repair would include:

- Saw cutting the concrete around the damage to expose clean surfaces of sound concrete,
- Sand blasting exposed corroded reinforcing steel
- Installing a form, and
- Applying polymer modified repair compound.

Cast-In-Place Concrete Pile Cap with Local Spalling at Pile Embed.

2.3 Steel H Piles

The steel H piles exhibit serious to critical corrosion in several zones. There is a splash zone area just above extreme high tide and a few feet below the pile cap at about elevation 13 to 14 feet. This forms a band of heavy pack rust and corrosion that is visible in most piling across the dock. This area is above the waterline and therefore not protected by the CP system. Average corrosion rates of 6 to 15 mils per year are noted in this zone. No perforated pilings were noted in this zone. However, remaining wall thicknesses of less than ¼ inch 0.25"were recorded on some piling. The average section loss of the H piling was 32% of original wall thickness. A log of the thickness readings is provided in the appendix.

There is a second zone of heavy corrosion near elevation 0.0 that is typically underwater except at minus tides. Corrosion in this lower zone is typically associated with a documented phenomenon known as "accelerated low water corrosion" (ALWC). This is generally defined as a localized and aggressive form of corrosion with documented averaged rates of section loss of 20 mils per year, or greater. ALWC is thought to be produced in part by microbiological induced corrosion (MIC) and to be exasperated by bacteria. ALWC and MIC can be treated through the use of coatings, wraps and CP systems. A more detailed description of this phenomenon can be found at the following web site:

http://www.pianc.us/workinggroups/docs_wg/marcom-wg44.pdf

Two characteristic of ALWC include a bright orange corrosion deposit and a sulfur odor. Neither one of these was noted at the time of the inspection. It is possible that the application of impressed current CP mitigated ALWC but that it had occurred at some time in the past. There is some evidence of this due to the location of the band of high section lose in the area where ALWC normally occurs.

On this project, the wall thickness of several H-piling was perforated in this zone. An active CP system will generally mitigate ALWC and MIC. According to records, the existing CP system has been performing well for a number of years. However, there is evidence that this has been intermittent and that the system has been shut down at times. Therefore it is difficult or impossible to estimate average annual corrosion rates for this zone.

Similar to the above water section, piling with significant section loss may require structural repairs in order to regain load capacity. This could be done with repair clamps or with a reinforced jacket and grout system.

The H pilings on this dock are the primary structural members to resist vertical loads. These include the dead load (self-weight) of the structure and any live loads. The original design for the dock included provisions to run rail cars onto the deck and for a gantry crane. Because these functions are no longer used, the live loads are less than the original design condition. Piling with significant section loss may require structural repairs in order to regain vertical load capacity. This could be done with repair clamps or with a reinforced jacket and grout system. Corrosion in this zone can be mitigated by coatings or by a pile encasement system.

Typical H Piling. Note corrosion in the splash zone

Corrosion of H Piling in the Splash Zone

Impact Damage to Piling at Bent 63 Row 9

Pile Repair Clamps

There was impact damage noted to the pile at Bent 63 Row 9. This pile was visibly bent. It was behind the timber fender system so it is unclear if this was from a ship or from a floating object. It is possible that a ship broke through the timber fenders and impacted the steel pile and that the broken fender piling were subsequently repaired. There were several large logs wedged in places under the dock. However these did not appear to have damaged the piling.

There were a number of bolted repair clamps in place. The majority of these were centered on heavily corroded areas of the piling near elevation 0.0 and in the first 10 bents of piling near the abutment. The repair clamps were generally steel channel sections that were bolted to the corroded areas of the piling in an attempt to rebuild the structural section of the pile. While several differing types have been used, one predominate type of channel repair measured 15 inches deep with 3-3/4 inch flanges and 3/8 inch thick webs. This would be an American Institute of Steel Construction (AISC) C 15x50 section.

Similar to the above water portion of the H-piling, in general the piling close to the beach seem to have more corrosion than the piling further offshore. This may be due to agitation and spray from the waves breaking in the shallow water.

Underwater Photo Bent 10 Pile 11

Underwater Photo Bent 10 Pile 7

Wall thicknesses were taken on a number of piling. A log of these readings is presented in the appendix. The majority of the readings were taken in the splash zone corrosion area and near elevation 0.0 in the ALWC zone by a diver. Tables 2.1 and 2.2 provide a summary of the thickness readings for the H-piling.

Table 2.1: H Pile Wall Thickness

Pile Type	Item	(Inches)
BP 14-102	Original Wall	0.704
	Average Remaining	0.479
	Minimum Remaining	0.180
BP 14-89	Original Wall	0.616
	Average Remaining	0.423
	Minimum Remaining	0.145

Table 2.2: H Pile Section Loss - Percentage

Item	% of Piles Tested	Rating
Greater than 30%	57%	Critical
Between 15% and 30%	32%	Serious
Less than 15%	11%	Poor

2.4 Steel Pipe Batter Piles

The steel pipe piling had serious corrosion in several zones. The heavy corrosion zones for the pipe piles are the same as for the H piling. The corrosion of the pipe piling, while serious, is not as acute as for the H piling. This may be due to the round shape with no corners or edges to form a starting point for corrosion. The original wall thickness of the batter piling was 3/8 inch or 0.375". Remaining wall thicknesses of less than ¼ inch or 0.25" were recorded in several places. The average section loss of the pipe piling batter was 19% of original wall. Table 2.3 and 2.4 provide a summary of the thickness readings for the batter piling.

Table 2.3: 16 Inch Diameter Batter Piling Wall Thickness

Pile Type	Item	(Inches)
16" Pipe	Original Wall	0.375
	Average Remaining	0.304
	Minimum Remaining	0.140

Table 2.4: Batter Pile Section Loss - Percentage

Item	% of Piles Tested	Rating
Greater than 30%	23%	Critical
Between 15% and 30%	40%	Serious
Less than 15%	37%	Poor

Corrosion of the pipe piling can be mitigated by applying coatings above the waterline, continued application of CP below the waterline, and or by a pile encasement system.

For this dock, the pipe piling form the primary structural members to resist lateral loads such as seismic. These piling are quite stiff compared to the plumb piling and therefore collect the majority of the lateral loads. The loss of section for the pipe piling is directly related to the loss of capacity to withstand a seismic event. Pipe piling with significant section loss may require structural repairs in order to regain load capacity. This could be done with repair clamps or with a reinforced jacket and grout system.


Cleaning and Inspecting Batter Piles

2.5 Steel Sheet Pile Abutment

The sheet pile abutment is in critical condition due to advanced corrosion. The original wall thickness was 3/8 inch or 0.375". In some places 1/8 inch or 0.125" of steel section remains, indicating possible imminent failure of that element. The average section loss of steel measured at the abutment was 52% of original wall. The entire exterior section of the sheet pile wall is in the splash zone and is encased in very thick laminations of pack rust. The abutment wall is generally above the water line and not protected by the CP system. Table 2.5 provides a summary of the thickness readings for the abutment.

Table 2.5: Sheet Pile Wall Thickness

Pile Type	Item	(Inches)
PZ-27	Original Wall	0.375
	Average Remaining	0.178
	Minimum Remaining	0.125

The abutment includes the steel sheets, and a concrete pile cap supported by vertical H piling and a row of pipe pile batters. The H piling and pipe piling in this area also have very heavy laminations of pack rust and advanced stages of corrosion. The north wall of the transit building is above the abutment.

The abutment wall is relatively short and stiff with retained earth on the upland side. The pipe pile batters at Bent 1 add to the overall stiffness of this wall. Because of this relative stiffness, the abutment will collect a significant amount of lateral load in a seismic event. This coupled with the advanced corrosion and section loss means that the abutment is at a high risk of failure under seismic loads. Failure of the abutment would likely result is loss of upland fill into the waterway and, possibly, a partial collapse of the transit building north wall.

The sheet pile abutment should be sand or water blasted and coated. This would slow the corrosion. It is recommended that the remaining wall be used as one side of a form to create a reinforced concrete wall under the first pile cap. This could provide some corrosion protection and provide some additional structural capacity.

Sheet Pile Interlock at Abutment

2.6 Cathodic Protection System

The cathodic protection system is in poor condition. The CP system was turned off at the main breakers at the time of the inspection. ARRC facilities maintenance personnel turned the system back on part way through the inspection. Due to the lengthy time required for polarization (several days or weeks), the effects of turning the system on were not evident in the readings.

Zinc and aluminum alloy sacrificial anodes (the most common types used in seawater) typically have a potential in seawater of between -1.000 and -1.100 volts with respect to a silver silver chloride half-cell. Impressed current anodes typically have potentials set to values in the -1.5 volt range or more positive. (Higher voltages can damage coatings.) It is common to have CP readings approaching these values when the reference cell is held close to an anode. It is also common for the readings to drop off with distance from the anode. CP readings more positive than -0.800 volts generally indicate inadequate cathodic protection. Bare steel with no CP system will often have potentials less than -0.700 volts. This indicates active corrosion.

Corrosion typically progresses in stages based on the age of the structure and condition of the CP system. Without CP, galvanizing typically lasts 15 to 20 years in seawater. As it nears the end of its service life, patches of bare steel will become exposed, typically covered with light red colored surface rust. In the absence of coatings or galvanic or impressed current protection, bare steel will first form a layer of red oxide (rust) and then will start to develop a black oxide layer under the surface layer. The black oxide can be associated with loss of section of the steel and with advanced corrosion. Fully active corrosion of bare steel will typically exhibit a hard crusty exterior layer of reddish brown corrosion deposits with thick chalky black oxide underneath. Each of these layers may be over ¼ inch or 0.25” thick and may come off in small sheets. When the corrosion deposits of this type are removed there will typically be shinny bare steel underneath with pitting and measurable section loss.

On this project, cathodic protection half-cell readings (CP readings) were taken at numerous piles. None of the CP readings showed adequate protection. The majority of the readings were in the -0.5 to -0.6 volt range indicating active corrosion. These readings are listed in the table in the appendix. Thick laminations of corrosion deposits as described above were found. Some of these were over ¼ inch thick and over 6 inches in diameter.

There are a number of impressed current rectifiers on the dock. There are four abandoned oil cooled rectifiers located just south of the transit building in fenced enclosures. These are rectifiers number 2, 3,

5, and 7. These were evidentially part of an early CP system that has been replaced. The majority of the oil has been drained from these and they are disconnected from the power sources and anodes. The abandoned oil cooled rectifiers should be removed from the site and properly disposed of.

There are four (4) functional air cooled rectifiers in the same fenced enclosures near the south end of the transit building (see drawings in the appendix) including rectifiers number 1, 4, 6, and 8. These convert 480 Volt 3 phase current to DC current for the anodes on the north end of the dock. Once the main breakers were turned on, these four rectifiers appeared to be functional and operating.

There are five (5) air cooled rectifiers at the south end of the dock including units number 9 through 13. These are similar to the air cooled rectifiers near the transit building and convert 480 Volt 3 phase current to DC current for the anodes on the south end of the dock. Once the main breakers were turned on, three of these rectifiers appeared to be functional and operating. Unit number 11 was missing an output wire and was off at the internal breaker. Unit number 9 was off at the internal breaker for unknown reasons.

Table 2.6: Cathodic Protection Rectifiers

NUMBER	LOCATION DESCRIPTION	CONDITION
1	Near Building, West Side, Air Cooled	Functional
2	Near Building, West Side, Oil Cooled	Abandoned
3	Near Building, West Side, Oil Cooled	Abandoned
4	Near Building, West Side, Air Cooled	Functional
5	Near Building, East Side, Oil Cooled	Abandoned
6	Near Building, East Side, Air Cooled	Functional
7	Near Building, East Side, Oil Cooled	Abandoned
8	Near Building, East Side, Air Cooled	Functional
9	South End of Dock, Air Cooled	Unit Breaker off
10	South End of Dock, Air Cooled	Unit Breaker off Missing output wire
11	South End of Dock, Air Cooled	Functional
12	South End of Dock, Air Cooled	Functional
13	South End of Dock, Air Cooled	Functional

Note: the term “functional” refers only to the rectifier unit and not necessarily to the CP system it is intended to operate.

CP Rectifiers South End of Dock

CP Rectifiers Near Building

Typical Air Cooled Rectifier

Rectifier Name Plate

CP Breaker Panel in Terminal Building

Abandoned Oil Cooled Rectifiers

The DC power from the rectifiers is routed to moisture resistant junction boxes under the dock and from there distributed to pile mounted impressed current anodes. No drawings or schematics were uncovered for this system. There is a catwalk system under the dock co-located with the cable and conduit runs for the CP system. Impressed current anodes are installed at approximately every fourth pile bent and were observed on Bents 16, 20, 24, 28, 33, 37, 41, 45, 49, 53, 57, 61, and 63. At each anode bent there were anodes on approximately every other H piling and no anodes were found on pipe piling.

There are several generations of anodes and a number of abandoned anodes and wires under the dock and a number of melted and loose wires were observed. There were a number of open junction boxes observed. Except for some obvious cases, for example melted wires, it is difficult to differentiate abandoned components from active ones. It is recommended that abandoned elements of the CP system be removed and properly disposed of. This will aid in future maintenance and inspection.

Some piling exhibited white colored calcareous deposits which is a good indication of a functioning CP system.

CP Junction Box Under Dock

Melted Anode Wires Under Dock

Catwalk and Electrical Conduit Under Dock

Sacrificial Anodes Near Abutment

2.6.1 Sacrificial Anodes

From bents 1 to 15 there are sacrificial anodes welded to the piling. Many of these are partially to mostly consumed and should be replaced. The CP readings on this section of the dock are generally below minimum levels for good cathodic protection.

2.6.2 CP Maintenance and Inspection History

ARRC facilities and maintenance staff reported that they routinely inspect the CP system and record the output voltage and amperage readings from the rectifiers. They also perform an annual survey of the dock and take 1/2 cell readings from a skiff. The most recent ½ cell survey was done in May of 2013 and showed some areas of the dock receiving cathodic protection but large areas that had readings below minimum acceptable levels. These staff members were trained by an ARRC engineer who no longer works there. They do not have formal training in cathodic protection systems and are not equipped to provide maintenance to the components.

We recovered historical inspection reports from Norton Corrosion for the years 1996, 1998, 2000 and 2004. These are included in the appendix of this report. Inspection such as this by trained personnel is generally desirable. The various reports outline the condition of the system over time and items that have been or are in need of maintenance and replacement. It is interesting to note that there are a number of recorded instances of breakers being off and or rectifiers being down, indicating that CP has been intermittent to the dock.

Due to the advanced corrosion and section loss observed on the pilings it is recommend that the CP system be completely inspected by trained professionals and that an aggressive maintenance system be implemented. ARRC personnel involved in the maintenance and inspection of the CP system should undergo NACE training.

2.7 Ladders

The ladders were in poor condition. There are synthetic ladders at several locations around the dock. These seem to be industrial portable building trades extension units and not specifically designed for use on a dock. The lower attachment braces for many of these have become detached and the ladders are bowed in places. Fabricated galvanized steel ladders are more typically found on docks.

Typical ladder. Note supports detached from pile on left.

2.8 Timber Fender Piling

The timber fender piling are in poor condition. There are a number of broken or missing timber fender piling, about 35 total. This results in several gaps in the secondary fender system. These are not the primary fenders but do provide some protection for smaller vessels using the dock.

Fender Piles at End of Dock

Missing and Broken Fender Piles

2.9 Timber Wale

The timber wale was in serious condition. The majority of the timber wale system should be replaced. The system includes about 1650 linear feet of continuous horizontal timber wale and shorter timber chocks between timber fender piling. The timbers are deteriorated and detached in some places. There is grass and small bushes growing on them in places. There are utilities including water and electrical lines running down the dock on top of the wale. Replacement of the wale and chock system needs to consider these lines.

Timber Wale

2.10 Main Fenders

The main fenders are in satisfactory condition. The main fenders are serviceable and no serious issues were noted. Minor wear was noted on the timber facing. No anodes were noted on the pin piles. It is recommended that sacrificial anodes be attached to the steel framework of the fenders and to the pin piles.

Main Fender at East Side of Dock

Main Fender SW Corner of Dock

2.11 Dolphins

The dolphins are in satisfactory condition. The dolphins are serviceable and no serious issues were noted. A couple of small dents on the piling were noted, possibly from vessel impact. These do not affect the function of the dolphin. There were no anodes on the dolphin piling. The galvanizing was still intact above and below water. It is recommended that sacrificial anodes be attached to the dolphin piling.

Dolphin

Small Dent in Dolphin Pile

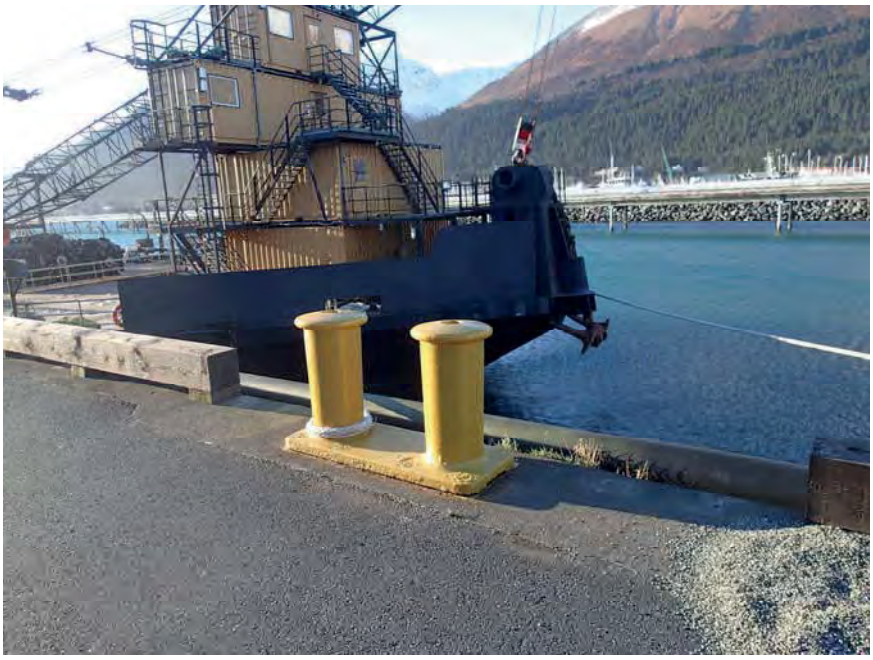
Thickness readings were taken on some of the dolphin piling. Serious section loss was not noted. Table 2.5 provides a summary of the thickness readings.

Table 2.7: Dolphin Pile Wall Thickness

16” Diameter Piles	Item	(Inches)
	Original Wall	0.50
	Average Remaining	0.486
	Minimum Remaining	0.470

2.12 Bollards

The bollards are in satisfactory condition. No damage was noted. The bollards had been recently painted.



Bollard

2.13 Bullrails

The bullrails are in satisfactory condition. No damage was noted. The timber bullrails have recently been replaced.

Bullrail

2.14 Electrical and Lighting

The electrical and lighting system is in generally good condition. The electrical and lighting system is summarized in a separate report contained in the appendix. It was in generally good condition with the

exception of a few items. Several components of the CP system appear to have been abandoned in place and should be removed.

2.15 Condition Assessment Summary

Table 2.8 below provides a summary of the overall condition assessment at each facility, including a rating score for each structure in accordance with the rating system described in Section 1.4. In general, the lowest rating score of 1 = *Critical* condition and the highest score of 6 = *Good* condition.

Table 2.8: Condition Summary

ELEMENT	COMMENTS	OVERALL RATING SCORE	
Pre-Cast Concrete Deck	• Limited defects were noted	5	Satisfactory
Cast-in-Place Pile Caps	• Localized but repairable damage was noted	4	Fair
H Piling	• Two bands of corrosion were noted; one near MLLW at elevation 0.0 and one just below the pile cap in the splash zone. • Several piling were observed to have been perforated by corrosion with complete section loss in some areas.	1 2 3	57% Critical 32% Serious 11% Poor
Pipe Piling	• Two bands of corrosion were noted; one near MLLW at elevation 0.0 and one just below the pile cap in the splash zone. • Significant section loss was noted in places	1 2 3	23% Critical 40% Serious 37% Poor
Sheet Pile Abutment	• The entire sheet pile abutment is in the splash zone above the area where a CP system will be effective. • The sheet piling are heavily corroded with serious section loss.	1	100% Critical
Cathodic Protection System	• The CP system was off at time of inspection. • A functioning CP system could provide protection of submerged components but will require on-going routine maintenance.	3	Poor
Ladders	• The lower attachments were loose on some ladders and some were bowed. • The ladders pose a moderate safety issue	3	Poor
Timber Fender Piling	• There are a number of missing and broken piling resulting in gaps in the timber pile fender system.	3	Poor
Timber Wale	• The wale is showing advanced deterioration and rot. There are small bushes growing in sections of it.	2	Serious
Main Fenders	• Limited defects were noted	5	Satisfactory
Dolphins	• Limited defects were noted	5	Satisfactory
Bollards	• Limited defects noted	5	Satisfactory
Timber Bullrail	• Limited defects noted	5	Satisfactory
Electrical and lighting	• Only a few minor items noted. See appendix	6	Good

3.0 STRUCTURAL ANALYSIS

Simplified structural analysis was performed to estimate the current live load and seismic capacity. This included comparing the original design criteria to current use and to modern design standards while taking into account the section loss of the piling due to corrosion. Detailed calculations are included in the appendix.

3.1 Vertical Load Capacity

3.1.1 Original Vertical Load Capacity

The original design drawings for the dock list the following under Structural Notes on drawing Q-5-1-56:

Crane Load
50 K ea. wheel, 4 wheels per truck, wheels spaced at 2'-8", 3'-4" and 2'-8"

Rail Car Load
Coopers E 50

Forklift
35K ea. tire. Dual 18 x 25 tires inflated to 70 PSI tread 9'-0"

Truck Load
H-20-S16

Uniform Live Load
600 lbs per square foot

Vertical Impact Load
Slabs designed for 20% crane and railroad wheel impact 15% fork lift and truck wheel impact. Pile cap designed for 10% crane wheel impact 10% railroad wheel impact and 155 fork lift and truck wheel impact. Vertical impact loads are not applied to piling.

Ship Impact
The kinetic energy of a 25,000 ton ship with a velocity of 1.0 FPS striking the bullrail at an angle of 10 degrees.

Seismic Forces
10% of the combined total of the dead load and ½ the uniform live load on the storage area applied laterally in any direction in the plane of the deck

Design Load on the Piling
65 tons compression, 35 tons withdrawal, with 1/3 increase for earthquake.

Concrete
4000 PSI compressive Strength at 28 days

Reinforcing Steel
Intermediate grade Fs = 20,000 PSI bar laps and embedment to be 36 diameters unless noted

For the outer sections of the dock, the crane wheel load and the rail car axle loads are the most significant loads in the original design criteria. Of course, the dock does not see these loads because there is no gantry crane and the rail cars are no longer brought onto the dock.

The Cooper E Series loading is defined below in Figure 3.1.

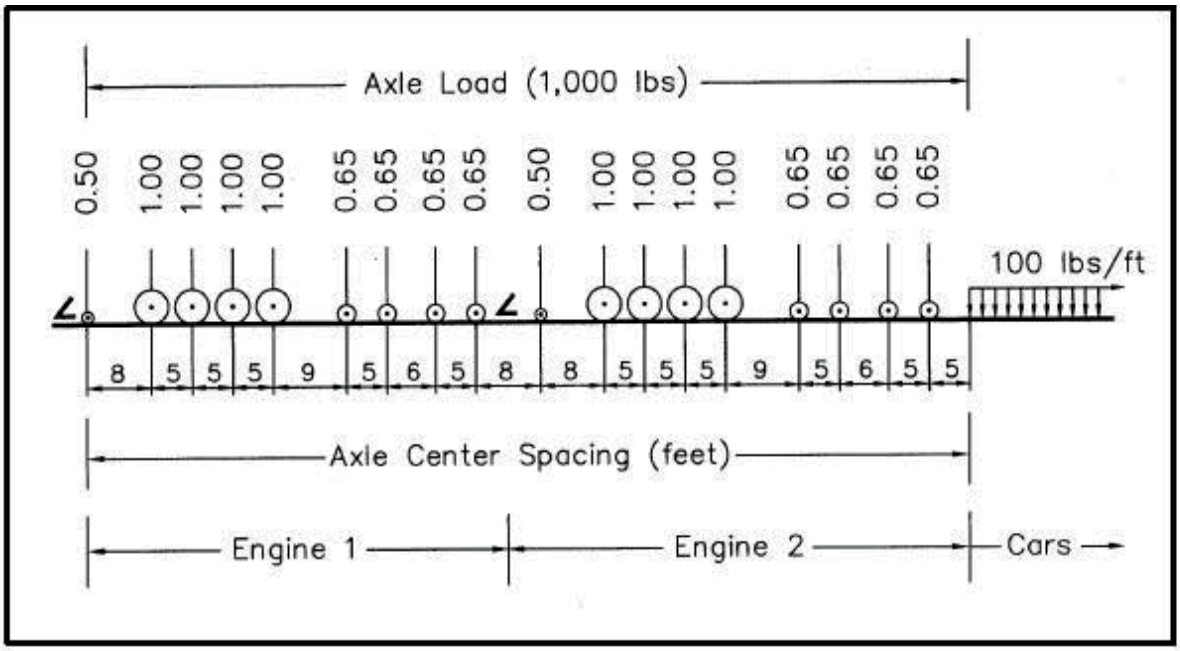


Figure 3.1: Cooper E Series Unit Loading

The values shown in Figure 3.1 are in units of 1000 lb axle loads. For E50 loading each unit increment is multiplied by 50. For example the 1.00 axle loads at 5' on center become 50,000 lb axle loads under Cooper E50 loading. Standard gage is 4'-8.5", which is the effective width of each axle.

The BP-102 H piling are generally placed under the crane and rail car loading areas and are spaced at 12 feet on center longitudinally down the dock (along with the pile caps and bents) and at 6 feet on center transversely across the dock (in each pile cap or bent).

Moving down a notch in the hierarchy, the next most significant loads from the original design criteria are the fork lift, H20-S16 vehicle, and the 600 PSF distributed live loads. These loads are not confined to the outer sections of the dock and can act at any point including the center section of the dock supported by the slightly smaller BP-89 H piling.

The listed forklift tire loads are for a moderately large sized unit.

The H20 – S16 designation was replaced by AASHTO in the 1960s with the HS-20 designation. This means a truck with semi-trailer. A modern HS20-44 truck load distribution is shown in Figure 3.2.

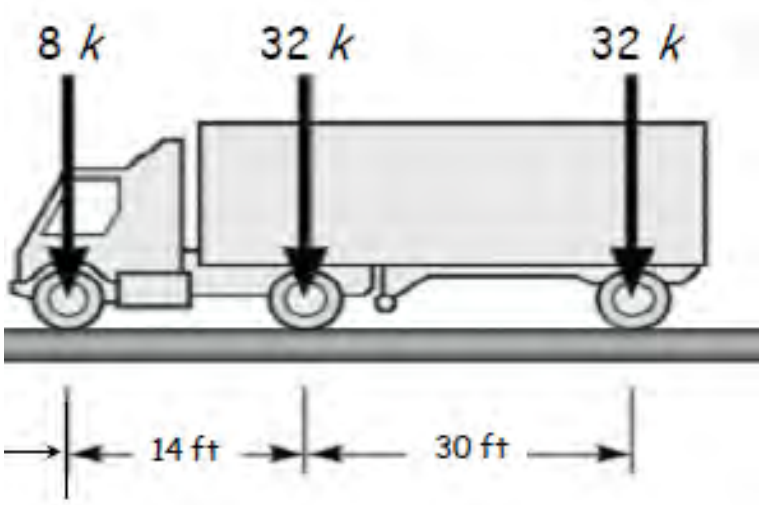


Figure 3.2: HS-20-44 Truck

600 PSF is a fairly robust industrial dock design loading criteria. For reference a single loaded shipping container can be expected to exert around 200 PSF. Therefore it is possible to stack loaded containers on a 600 PSF dock. 200 PSF is generally adequate for pedestrian use and the upper end of modern container dock design criteria is around 1000 PSF.

The original capacity of the dock is controlled to a large extent by the capacity of the piling. Table 3.1 below summarizes section properties of these piling prior to any section loss.

Table 3.1: Pile Original Section Properties

SECTION	WEB OR FLANGE OR WALL THICKNESS	X-X			Y-Y		
	(in)	Ix (in^4)	Sx (in^3)	Rx (in)	Iy (in^4)	Sy (in^3)	Ry (in)
BP 14 x 102	0.704	1055.1	150.4	5.93	379.6	51.3	3.56
BP 14 x 89	0.616	909.1	131.2	5.89	326.2	44.4	3.53
16” Pipe	0.375	562	70.3	5.53			
PZ27	0.375	276.3	45.3				

The column capacity of the piling is a function of the section properties (the radius of gyration and the gross section area), the end restraint conditions (K), and of the un-braced length (L). We used a K of 0.75 to account for a moment connection at the top and fixity at the bottom. L included the length of the pile from the mud line to the pile cap plus10 feet penetration to achieve fixity. Using these values we calculated the original live load capacity of the piling based on pile length / depth of water as outlined in Table 3.2.

Table 3.2: H Pile Original Live Load Capacity

SECTION	WATER DEPTH (FEET FROM MLLW)	LIVE LOAD CAPACITY (TON)
BP 14 x 102	-35	67.89
BP 14 x 102	-25	104.69
BP 14 x 102	-15	152.83
BP 14 x 102	-5	203.58
BP 14 x 102	+5	250.23
BP 14 x 89	-35	60.89
BP 14 x 89	-25	92.39
BP 14 x 89	-15	134.54
BP 14 x 89	-5	179.04
BP 14 x 89	+5	220.14

Based on the above, the original dock was a robust, highly redundant structure, adequately designed for fairly significant cargo and equipment loads.

3.1.2 Current Vertical Load Capacity

The reduced section of the H piling due to corrosion can effect whether the pile is considered compact, non-compact, or slender. If the pile is compact then the full axial load can be applied without modification. If it is non-compact then localized bulking may occur and a reduced allowable load is used. If the pile is slender it is generally deemed not fit for purpose and a different section or larger pile is suggested. The American Institute of Steel Construction (AISC) publishes design standards that outline means to calculate the capacity of piling for various lengths and conditions including modifiers for non-compact sections. A summary of the compact section analysis is shown in the table below.

Table 3.3: H Pile Compact Section Analysis

Section	Condition	Remaining Wall Thickness	Compact State
BP 102	Original	0.707”	Compact
BP 102	1/3 section loss	0.470”	Compact
BP 102	Average section loss	0.479”	Compact
BP 102	½ section loss	0.352”	Non- Compact
BP 102	Max section loss	0.180”	Slender
BP 89	Original	0.616”	Compact
BP 89	1/3 section loss	0.410”	Non-Compact
BP 89	Average section loss	0.423”	Non-Compact
BP 89	½ section loss	0.308”	Non Compact
BP 89	Max section loss	0.145”	Slender

Section loss varied widely in the splash zone. For simplicity we assumed an approximate reduced wall thickness by using 1/3 of the original section loss (2/3 remaining wall thickness) for the H piling. Note that these are the approximate average values found from the inspection results. Using these values we calculated the section properties and remaining live load capacities as outlined in tables 3.4 and 3.5.

While analysis shows that the pilings still have significant load capacity there are several factors that are of concern. First, section loss estimates are based on a partial inspection. It is possible that more serious corrosion would be uncovered with additional inspections. Second, the remaining live load capacity is based on pure axial loads and is not combined with any bending forces. Actual bending forces are likely due to small eccentricities. These could be caused by non-uniform section loss or eccentric loads. The radius of gyration section property that governs axial capacity is not sensitive to wall thickness. However the moment of inertia and section modulus are quite sensitive to the member wall thickness. These later two section properties govern the bending capacity. This points to a condition where a small eccentricity in the loads or a small lateral load combined with the axial loads could cause a pile with reduced wall thickness to fail.

Table 3.4: H Pile Revised Section Properties for Splash Zone

SECTION	WEB AND FLANGE THICKNESS	X-X			Y-Y		
	(in)	Ix (in^4)	Sx (in^3)	Rx (in)	Iy (in^4)	Sy (in^3)	Ry (in)
BP 14 x 102	0.470	727.15	103.64	5.93	253.23	34.257	3.56
BP 14 x 89	0.410	620.54	89.569	5.89	216.96	89.569	3.53

Table 3.5: H Pile 1/3 Section Loss Live Load Capacity

SECTION	WATER DEPTH (FEET FROM MLLW)	LIVE LOAD CAPACITY (TON)
BP 14 x 102	-35	38.19
BP 14 x 102	-25	62.84
BP 14 x 102	-15	94.98
BP 14 x 102	-5	128.88
BP 14 x 102	+5	159.98
BP 14 x 89	-35	36.09
BP 14 x 89	-25	57.14
BP 14 x 89	-15	83.09
BP 14 x 89	-5	110.14
BP 14 x 89	+5	134.69

Note that section loss of 30% is generally considered severe damage and triggers a critical condition rating. That said these piling, even in a corroded state, still have significant load capacity.

Section loss varied widely in the ALWC zone near elevation 0.0. For simplicity we assumed an approximate reduced wall thickness by using 1/2 of the original section loss for the H piling in this zone. Using these values we calculated the below outlined section properties and remaining live load capacities.

Similar to the above for the splash zone, piling with 50% section loss can be considered to have severe damage and a critical condition rating.

Table 3.6: Pile Revised Section Properties for ALWC Zone

SECTION	WEB AND FLANGE THICKNESS	X-X			Y-Y		
	(in)	Ix (in^4)	Sx (in^3)	Rx (in)	Iy (in^4)	Sy (in^3)	Ry (in)
BP 14 x 102	0.352	556.50	79.3	5.93	189.62	25.62	3.56
BP 14 x 89	0.308	475.05	68.569	5.89	162.96	22.178	3.53

Table 3.7: H Pile 1/2 Section Loss Live Load Capacity

SECTION	WATER DEPTH (FEET FROM MLLW)	LIVE LOAD CAPACITY (TON)
BP 14 x 102	-35	23.42
BP 14 x 102	-25	40.89
BP 14 x 102	-15	60.98
BP 14 x 102	-5	81.38
BP 14 x 102	+5	99.63
BP 14 x 89	-35	23.40
BP 14 x 89	-25	38.54
BP 14 x 89	-15	55.99
BP 14 x 89	-5	73.69
BP 14 x 89	+5	89.49

The above outlined pile capacities can be compared to the original capacity to get a sense of the overall condition of the piles.

In general, as long as the pilings have no more than 30% section loss, there is still adequate section for supporting HS-20-44 vehicle loading, the original design forklift load, and 600 PSF uniform deck live loads. However, this does not negate the condition rating of "critical" nor does it negate the recommendation for repairs. Pilings with section loss greater than 30% remain at increased risk of failure.

3.2 Current Forklift Use and Limitations

North Star Stevedores operates two types of large forklifts on the dock: a Taylor model TY-602L with 62,000 lb cargo capacity and a Hyster H970E with 95,000 lb cargo capacity. The calculated capacity of the dock is adequate for the Taylor unit. The Hyster unit must be limited to cargo loads less than or equal to 62,000 lbs.

Table 3.8: Forklift Live Load Capacity

FORKLIFT	RATED CARGO CAPACITY LB	ALLOWABLE CARGO LIFTING LB
Hyster H970E	95,000	62,000
Taylor TY-602L	62,000	62,000

3.3 Effects of Berth Deepening

As mentioned previously the original design depth of the berth was -35 feet MLLW. Recently the berth has been dredged to -42 feet MLLW. The dredge line is just outside the fender face. While the support pilings are not in the dredge prism, they are adjacent to it and in close proximity. This has the potential to affect the structural capacity of the piling. It is difficult to calculate the exact effect of this without precise data as to the location of the edge of the dredge prism. That said if the piling were placed in -42 feet of water, as opposed to -35 feet of water, there would be an approximate 20% reduction in the pile column capacity with an increase in un-braced length of 7 feet. Also, the piling are only embed about 35 feet. If 7 feet of soil were removed around the piling it would reduce the embed depth by about 20%. This would remove some of the soil support and further reduce the pie capacity. Finally the divers reported a small "cliff" outside the fender face where the dredging produced vertical wall about 7 feet high. It is likely that soils from under the dock will slough into this area and that the slopes will eventually find an equilibrium position with a flatter angle. If a large mass of soil sloughs off at once it could put lateral loads on the piling on the edge of the dock.

3.4 Seismic

There are two sections of the dock separated by an expansion joint between bents 32 and 33 (see drawings in the appendix). Each of these sections will behave like independent structures in a seismic event. In general the outer or more southerly section of the dock from Bent 33 to 63 is in deeper water and has no building on it. Therefore it has lighter dead loads and longer piling. Because of this the fundamental period of this section of the dock will be longer and it will see less seismic force than the landward section of the dock. The landward section of the dock has shorter piling and is therefore stiffer and has a shorter period. It also contains the abutment and the building. Therefore the landward section of the dock from Bents 1 to 32 will see higher seismic loads.

The ARRC Passenger Dock consists of both short and longer period piling. The batter pilings form a triangular braced frame and are by nature stiff with a relatively short fundamental period. The vertical pilings are by nature more flexible with a longer period. Therefore it can be expected that the batter piling will be the primary lateral load resisting element.

The California State Lands Commission created a widely cited set of design and evaluation criteria called "Marine Oil Terminal Engineering and Maintenance Standards" or MOTEMS. These have been officially adopted by the State of California and are applicable to marine oil terminals in that state's waters. While not legally applicable in Alaska, the methods and science behind the standards are helpful in understanding the expected behavior of a wide range of waterfront facilities. MOTEMS describes the seismic performance of a batter pile dock as follows:

> *"Wharves or piers with ordinary batter piles typically have a very stiff response when subjected to lateral loads in the direction of the batter. The structure often maintains most of its initial stiffness all the way to failure of the first row of batter piles."*

MOTEMS goes on to outline that the batter piles most likely will fail under a significant seismic event and:

> "*When the row of batter piles fail in tension or shear, stored energy will be released. The structure will therefore experience a lateral displacement demand following the non-ductile pile failures. If the structure can respond to this displacement demand without exceeding other structural limitations, it may be assumed that the structure is stable and will start to respond to further shaking with a much longer period and corresponding lower seismic demands. The wharf structure may therefore be able to sustain larger seismic demands following the loss of the batter piles than before the loss of pile capacity, because of a much softer seismic response*."

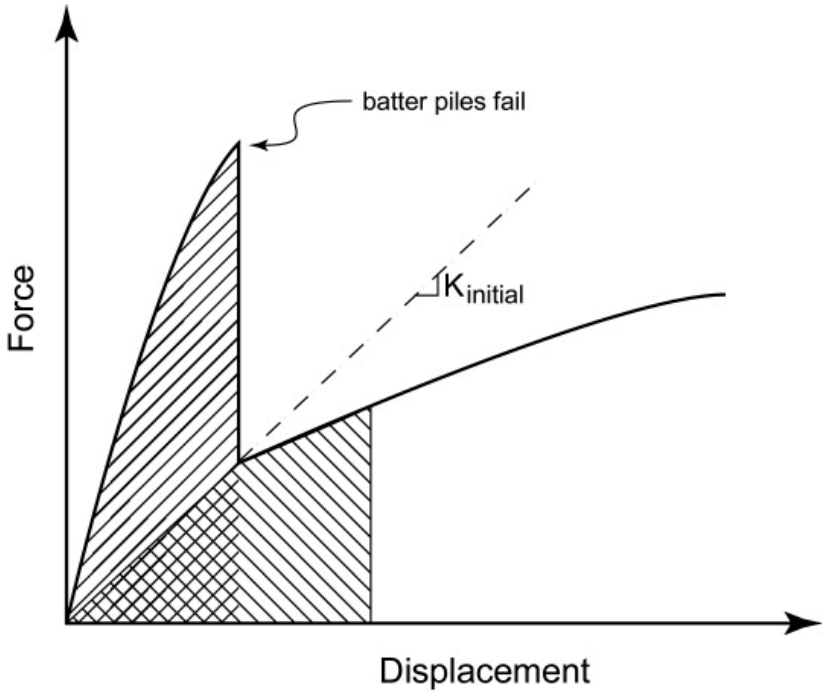


Figure 3.3: Push Over Curve for Batter Pile Dock

Figure 3.3 shows this graphically. Initially there is a large force (Y axis) corresponding to a relatively small displacement (X axis). This is due to the stiff batter piling resisting the initial accelerations from the earthquake. The graph shows the marked drop in force once the batter piling fail. At this point in time the remaining vertical pilings take the load at a longer period. It is likely that the Passenger Dock facility would have a seismic response similar to this.

3.4.1 Original Design Seismic Load Capacity

As mentioned previously, the original drawings list the seismic design forces as:

> "*10% of the combined total of the dead load and ½ the uniform live load on the storage area applied laterally in any direction in the plane of the deck.*"

The uniform live load is listed as 600 pounds per square foot. 300 PSF of this is to be included in the seismic design load.

Using approximate methods an evaluation of the dock to resist the original design seismic forces was performed. The dead load in the ballast area of the dock (under the rail systems) is about 592 lbs per square foot and the dead load in the deck area is about 285 lbs per square foot (not including the self-weight of the piling). An estimated additional 20 lbs per square foot was added to the building area.

Using these values, and the listed design criteria, an approximate lateral load of 21,000 lbs per batter pile was calculated. This load could be reasonably resisted by the batter piling even in their current reduced condition.

3.4.2 Current Seismic Load Capacity

Much has changed in seismic design criteria and methodology since the 1960s when this dock was designed and built. In general the required design forces have increased significantly and the design methods have become much more complex.

In contrast to using 10% of the weight of the structure for seismic (0.10 G), current ASCE standards outline a design earthquake of 2/3 the maximum considered event (MCE) based on spectral response criteria. The MCE has a 2% probability of occurrence in 50 years and an approximate return period of 2500 years. The design standards require collapse prevention at this event but do not require that the structure be usable or even repairable following it.

Modern methods of calculating this design earthquake includes a large number of modifiers based on location, site soils conditions, the importance and occupancy of the structure, the fundamental period of the structure, and other factors. The spectral response is based on the idea that stiffer shorter period structures behave differently than softer longer period structures. That is, the forces depend on the stiffness and period of the structure.

Table 3.9 outlines current design data for Seward using mapped values from the USGS web site and 2/3 MCE and for site classification D.

Table 3.9: Current Adjusted Mapped Spectral Response 2/3 MCE

Item	Description	Period	Spectral Acceleration
SDs	Short period spectral response, Site Class D	0.2	1.19
SD1	1 second period spectral response, Site Class D	1.0	0.665

Note that the current short period adjusted design acceleration (1.19) is nearly 12 times greater than the original design value (0.10).

Approximate methods were used to compute the batter pile stiffness and fundamental period. The landward section on the dock from Bents 1 to 32 was found to have a period of around 0.3 seconds or less. The offshore section of the dock between bents 33 and 63 was found to have a period of around 0.5 seconds. For simplicity we used the values of SDs and SD1 in Table 3.7 for these two sections of the dock. In contrast, the H pile periods were generally over 2 seconds in the Y axis direction.

Using the above we calculated approximate lateral seismic loads for the batter piling as follows:

- Bent 0 to 32: 250,000 lbs/ batter pile
- Bent 33 to 63: 140,000 lbs/ batter pile

MOTEMS outlines that two primary modes of failure for a batter pile supported dock include shear and pile pull out. The shear capacity of a like new 16” x 3/8” wall pipe pile is approximately 398,000 lbs. The shear capacity of a 16” x ¼” wall pipe pile is approximately 267,000 lbs. This later value is close to the average remaining wall thickness currently in place due to section loss. So, for the reduced section batters, the approximate forces are about 6% less than the estimated shear capacity for the landward section of the dock. Given the approximate nature of the analysis, this can be considered nearly equal to or in danger of a shear failure.

In addition to shear, such a large seismic load on a batter pile group results in large axial and tension forces in some of the piles. These are in the range of 700,000 lbs or about 350 tons. The original design capacity of the piling in withdrawal is 35 tons or about $1/10^{th}$ of the estimated load. Even if the pile had enough shear capacity, these axial forces would pull the pile out of the ground.

3.4.3 Liquefaction Potential

The original design criteria are silent on the subject of soil liquefaction. However, there is strong evidence that the site is subject to this condition. The site is an alluvial fan from nearby rivers and has a documented history of liquefaction in seismic from the 1964 event. Saturated sandy material is at high risk for liquefaction. Modern design standards require that this be considered. Preliminary design done recently on concepts for the nearby Freight Dock expansion show piling with embedment's of over 70 feet, in part due to liquefaction potential. These are far greater than the existing dock's 35 to 45 feet of embedment. It is likely that the relatively short existing pilings are embedded in the zone of soils that are subject to this condition. Based on this there is a significant risk of damage to this dock due to liquefaction in a seismic event.

4.0 RECOMMENDATIONS

4.1 General

Structural problems or safety hazards were identified during the condition assessment. Facilities with a rating of 1 or 2 are considered critical or serious and are a high priority for repair or replacement, followed by those with a rating of 3 which should be repaired with moderate urgency. Facilities with a rating of 4 have items that are recommended for repair, but are the lowest priority. Facilities rated 5 or 6 do not have obvious structural or safety repairs required; however, those facilities with a rating of 5 had some deterioration and moderate defects observed and these items should be monitored on a regular basis.

4.2 Priority Repairs

Cathodic Protection System
As mentioned above, there is the potential for loss of structural capacity of the piling due to corrosion. Without cathodic protection this could happen in 5 to 10 years or less. Based on this, the first priority is to inspect, repair, and operate the CP system at full capacity and efficiency and to then aggressively maintain it. The following is recommended:

- A full inspection of the CP system by a corrosion specialist. This will focus on items that need to be repaired for full system operation.
- Develop and execute a detailed maintenance and operation program of the CP system. This will include a schematic of the system and written operations, inspection, and maintenance procedures.
- ARRC staff who operate and inspect the CP system should receive National Association of Corrosion Engineers (NACE) training.

Steel Pile Repairs
The next priority recommendation is a fairly aggressive pile rehabilitation project involving repair sleeves and jackets. This would involve cleaning the piling, installing a synthetic jacket around it (possibly including reinforcement), and pumping grout into the annulus. There are a number of commercially available products on the market for this. See appendix for some information on this. The jacket systems have several advantages including:

- The jacket provides a barrier to chlorides (seawater) greatly reducing the corrosion potential.
- The grout provides both a barrier and an alkaline environment that reduces corrosion potential.
- The jacket can be extended into the splash zone (above the water surface) to protect areas a CP system cannot reach.
- Reinforcing can be added to rebuild structural capacity of the piling.

Because there are approximately 1800 piling in this dock, repairs might be done in phases over a number of years. For example 300 piling could be done each year for six years.

Sheet Pile Repairs
As mentioned previously the sheet pile abutment has serious section loss. Portions of this wall are near failure based on very thin remaining wall thickness. The wall is generally in the splash zone and above the area where the CP system could offer protection. The sheet pile abutment should be sand or water blasted and coated. This would slow the corrosion. It is recommended that the remaining wall be used as

one side of a form to create a reinforced concrete wall under the first pile cap. This could provide corrosion protection and provide some additional structural capacity.

Timber Fenders
Broken and missing fender piling should be replaced. This includes about 35 timber piling.

Wales and Chocks
The entire wale and chock system should be replaced. The wale is a continuous horizontal timber along the edge of the dock. The timber fenders are attached to this. Chocks are the short sections of horizontal timbers between the piling. There about 1650 lineal feet of wale to be replaced.

Ladders
The ladders should be replaced with fabricated galvanized steel units. This should include four ladders on each side and two on the end.
Table 4.1 outlines estimated costs for the major maintenance and repair items. It is based on typical costs for similar items done on other recent projects.

Table 4.1: Repair and Retrofit Estimates

ITEM	UNIT COST	QUANTITY	TOTAL
CP System Full Inspection	$50,000	1 EA	$50,000
CP System Maintenance	$200,000	1 EA	$200,000
Electrical Renovations	$150,000	1 EA	$150,000
Pile Jacket Materials	$300	27,000 LF	$8,100,000
Pile Jacket Installation	$2,000	1,800 EA	$3,600,000
Abutment Renovation	$250,000	1 EA	$250,000
Furnish and Install Timber Pile	$5,000	35 EA	$175,000
Furnish and Install Timber Wale	$250	1,650 LF	$412,500
Safety Ladders	$7,500	10EA	$75,000
Sub Total			**$13,012,500**
Contingency @20%			$2,602,500
Engineering and Admin @8%			$1,041,000
Construction Admin @8%			$1,041,000
Total			**$17,697,000**

4.3 Service Life

The design life of a typical pier is 50 years. This facility is approaching the end of that life span. In many ways design service life of a dock is analogous to the service life of a vehicle. The older a vehicle gets, and the more miles it has on it, the more maintenance can be expected. At some point in the life of a vehicle, major and expensive maintenance can be expected. This may include required replacement of the engine and drive train.

It is theoretically possible to keep a dock in operation indefinitely. The ARRC has been repairing and strengthening specific piles and maintaining the impressed current CP system for over 20 years. The remaining life could be extended further by continuing this approach. The question becomes the level of service provided versus ongoing maintenance costs. This facility requires major maintenance of the piling, CP system, and other items to continue to function.

In terms of level of service, the pile configuration is out dated and cannot be made compliant with current seismic design standards. Further, the functionality of the dock for its current use should be considered. This facility was originally designed and built as an intermodal rail dock. The primary use of the dock is now centered on passenger services and cruise ships. While cargo operations are still possible, the on dock rails and transit building are no longer used for this. Therefore these items may be considered functionally obsolete, at least for their originally intended purpose.

Based on the above the ARRC should consider the costs of major maintenance versus replacement costs and desired level of service.

4.4 Replacement Option

The ARRC may plan for major capital expenditures in terms of a replacement dock. A concept level drawing of a new dock, tailored to the passenger cruise ship industry, is shown in the appendix. This includes a pile supported concrete deck platform dock designed to modern standards. Two mooring dolphins to the south are shown with a catwalk system. A new terminal building is included. This dock has the following features:

- It is longer and narrower than the existing dock. The new dock is shown to be nominally 1,006’ long and 116’ feet wide. This is long enough to provide berthing for nearly the entire side of a typical cruise ship and wide enough for turning around tour buses.
- The berths will be dredged to -42 feet MLLW.
- Two mooring dolphins are shown, one at 100’ and one at 200’ from the offshore end of the dock. These are connected via a catwalk.
- A two story 7000 square foot terminal building is shown on the shoreward end of the dock. This has preliminary dimensions of 50’ x 115’ in plan view. The building would provide for passenger services on the ground floor and office space on the second floor.
- The building is situated to provide a gate / secure access point to the dock similar to the existing terminal building.
- A 33’ wide access lane is provided on each side of the building for vehicular traffic.
- Four each dock slots are provided to aid in all-tide baggage handling.
- Fenders are provided at 60’ on center down each side of the dock.
- Utilities include lighting, electrical, and potable water for the vessels.
- Cathodic protection is provided by sacrificial anodes attached to each pile and fender panel.
- The dock would be supported on galvanized steel pipe piling and would include a concrete deck.
- The load capacity of the dock would be sufficient for cruise ship and light cargo operations. Pile bents are 40 feet on center and the channel section deck panels are utilized.

Concept level cost estimates are shown in table 4.2 and 4.3. These should be used to provide the general magnitude of a replacement dock and terminal building. A more detailed study could provide more refinements to the concept and a higher level of confidence in the estimated costs. If heavy cargo capacity is required a multipurpose dock could be built. The load capacity of the concept dock could be increased by decreasing the pile bent spacing from 40 feet on center to 20 feet on center and using higher capacity concrete deck panels.

Table 4.2: Concept Level Dock Replacement Phase One Estimate

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	EXTENDED PRICE
Dock (116' x 375')	1	LS	$ 18,870,000	$1,8870,000
Dredging (78,000 CY)	1	LS	$ 2,340,000	$2,340,000
Shore Protection	1	LS	$ 810,000	$810,000
Terminal Building (7000 SF)	1	LS	$ 3,500,00	$3,500,000
CONSTRUCTION TOTAL				**$25,520,000**
Engineering and Construction Admin			12%	$3,062,400
Estimate Contingency			20%	$5,716,480
PROJECT TOTAL				**$ 34,300,000**

Table 4.3: Concept Level Dock Replacement Phase Two Estimate

DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	EXTENDED PRICE
Dock (116' x 631')	1	LS	$ 17,269,400	$17,269,400
Dredging (40,000 CY)	1	LS	$ 1,200,000	$1,200,000
Dolphins (2 each)	1	LS	$ 620,00	$620,00
CONSTRUCTION TOTAL				**$19,089,400**
Engineering and Construction Admin			12%	$2,290,728
Estimate Contingency			20%	$4,276,026
PROJECT TOTAL				**$25,700,000**

4.5 Additional Inspections

This inspection should be followed by routine inspections that are completed at regular intervals. Because some of the members in this dock are in advanced stages of deterioration, the frequency of inspections should be increased with the overall goal of preventing an unanticipated structural failure. ASCE recommends various inspection intervals depending on the condition of the element and on the environment. For steel piling in seawater with no CP and in serious condition they recommend annual inspections. For bridges the State of Alaska uses a maximum 2 year interval for routine above water inspections. Based on these examples and on the condition of the dock, annual inspections are recommended. If the CP system is repaired and maintained the interval between recommended inspections could be relaxed to once every two years. Additional inspection should be conducted following any accident or event that could potentially cause damage to the structures.

As mentioned previously we recommend a detailed inspection focused on the CP system. This should be conducted by a NACE trained technician. A schematic of the system should be produced and the inspection should be followed by repairs and maintenance.

Repairs to the piling and other items should be preceded with a project specific field inspection of the items and elements involved in the repair.

4.6 Additional Analysis

The ARRC may consider additional analysis as follows:

Seismic: Approximate methods were used to estimate the seismic performance of the dock. This analysis outlined that the dock is at significant risk for damage or failure in a seismic event. Additional and more detailed analysis may help to better outline the expected performance in a range of events. This would include creating a structural model of the entire dock and subjecting it to various events with differing return periods. In addition the soils at the site could be analyzed for liquefaction potential. These could help the ARRC better understand the seismic risk.

Special Load Cases: If the dock is used for heavy loads, for example cargo lifted from a vessel with a crane, additional analysis should be completed for that specific equipment and load case.

APPENDICES BOUND SEPARATELY

Appendix A -	**Inspection Drawings, Plan and Sections**
Appendix B -	**Cathodic Protection ½ Cell Readings**
Appendix C -	**Ultrasonic Thickness Readings**
Appendix D -	**Electrical and lighting Inspection Report**
Appendix E -	**Structural Calculations**
Appendix F-	**Concept Replacement Plan**
Appendix G -	**Dive Reports**
Appendix H -	**Pile Jacket Vendor Data**
Appendix I -	**Historical Corrosion Inspection Reports**
Appendix J -	**Selected Original Design Drawings**

Appendix F:
Railroad Terminal Option

Credit: Judy Patrick Photography, 2012

Alaska Railroad

Seward Marine Terminal Expansion

Photo from Pixabay

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August 25, 2017

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CONTENTS

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Terminal Artwork

Terminal Artwork

Executive Summary

This report is a Concept Design report for replacement of the Alaska Railroad (ARRC) cruise ship terminal in Seward, Alaska. It provides a status of the work to date and includes next steps. Concept Design is viewed as 10% of a typical building design effort, thus the project is in the very early stages of design.

Replacement of the facility is primarily driven by the condition of the existing passenger dock that it sits upon, which is near the end of its useful life. The building does not have an independent foundation system, so if the dock is completely removed, the terminal will require replacement. While dismantling and moving or renovating the existing Terminal was explored, these options were not pursued due to lack of long-term savings and those options did not significantly extend the life of the facility. Therefore, the primary focus of the design effort to date has been for a new, replacement facility.

The existing Dale R. Lindsey Railroad Intermodal Terminal (Terminal) is a 26,555sf staging facility built in 1964 and used by approximately 184,745 cruise ship passengers in 2016. Annually, Seward receives approximately 65 cruise ships between mid-May to mid-September. Cruise passenger numbers have steadily climbed over the last several years and ship capacity is increasing, thus the building must be designed to accommodate more passengers than the current facility. Between September and May the Terminal is lightly used for various community events, with its primary usage occurring May to September.

Concept design efforts led to a design solution which replaces the terminal in a manner similar to its current function, but also incorporates passenger train operations that currently take place at the Seward Depot. The existing Depot is located roughly .6 miles down Port Avenue toward the tourist activities of Seward and includes roughly 1,700 sf of enclosed space in three buildings and has an 800sf luggage tent on site as well.

Informed by site observations, design charrettes and other investigations, an approximately 43,000sf building is proposed, sited on land adjacent to the new dock. The western portion is exclusively cruise ship operations and the east side contains shared services, including port operations, and passenger train service operations. Detailed descriptions of the proposed design are provided as well as floor plans and preliminary massing models.

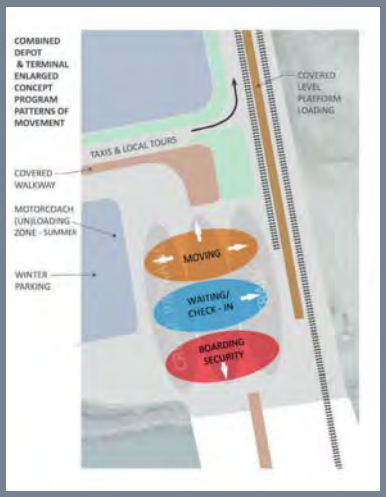
Design floor plans and concepts were presented to cruise line, stevedore and other stakeholders in late September 2016. Design options and budgets, including a division of space between users and associated costs, was presented to ARRC executives and leadership in early October 2016. Project estimates for 2021 occupancy is $27M for the building and site work, excluding train rail, and $35M when including canopies and other pedestrian coverings on site. Terminal design efforts are dependent on which dock replacement option is selected as well as finalization of what functions the building will serve and an associated construction budget. First steps in the next phase of design, 35% or Schematic Design, will be to form a design committee who will assist, inform and direct the Design Team on these decisions in order to move the design forward.

Dates	Design Effort Timeline
November 12, 2015 November 16, 2015	• Whittier terminal and dock site visit • Seward on-site observations, as-builting and user input
January 26, 2016	• Charrette to determine what functions the new terminal would serve
March 30, 2016	• Workshop for overall master planning effort
May 2, 2016 May 20, 2016	• Depot feasibility Charrette, determining if it could be renovated to meet the needs • Seward on-site observations and user interviews
June 5, 2016 June 30, 2016	• Seward on-Site observations and user interviews • Downtown Anchorage on-site observations, as-builting and user interviews
July 1, 2016 July 8, 2016	• Bill Sheffield Depot at Anchorage Airport onsite observations and user interviews • Downtown Anchorage on-site observations, as-builting and user interviews • Executive presentation on dock, terminal and depot options
August 2, 2016 August 8, 2016 August 24, 216	• Fairbanks Train Depot onsite observations, as-builting and user interviews • Dock and Terminal Design Charrette #1 • Whittier terminal on-site observations and user interviews
September 9, 2016 September 13, 2016 September 21, 2016 September 30, 2016	• Dock and Terminal Design charrette #2, Dock and Terminal Design Charrette #1 • Dock and Terminal Design charrette #3 with Southeast Stevedores • Seward on-site observations and user interviews • Dock and Terminal Design Charrette #4 with cruise lines and others
October 5, 2016 October 10, 2016	• Presentation of Dock and Terminal options with budgets to Railroad leadership • Seward public meeting held in Terminal, site observations
May 9, 2017	• Seward public meeting held in Terminal

Public Presentation in Seward

Space Planning Charette

Design Workshop



Early Circulation Diagram

Design Committee and Resources

Design input was provided by multiple people from both the Alaska Railroad and from cruise ship and related industry personnel. Key railroad personnel are listed below who participated in design charrettes, on-site tours and interviews:

ARRC:

Brian Lindamood: Director, Capital Projects

Christy Terry: Seward Port Manager

Doug Reagan: Port Security Manager

John Simmons: Guest Services Manager

Paul Farnsworth: Director, Facilities

David Greenhalg: Director, Strategic Market Initiatives

Non-Railroad Stakeholders:

Holland America Princess

Norwegian Cruise lines

Southeast Stevedoring

Longshore and Warehouse Union local 200 unit 60

Premiere Tours

Neptune Security

Major Marine Tours

While many other stakeholders provided input for the overall masterplan, the above noted entities provided valuable and significant input that informed the Terminal design.

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Inside Terminal Looking Torward Land Side

Existing Terminal Sitting on Passenger Dock

Existing Facilities and Conditions

Full descriptions of the terminal and depot can be found in the Factsheets appendix of the master plan, but brief descriptions are provided below.

Terminal

The existing Dale R. Lindsey Terminal serves embarking and debarking cruise passengers as they transfer between the ship, the Cruise (Grandview) Train, motor coaches, local tours, car rentals, taxis, walk toward or from tourist services, etc. Passenger services and accommodations are provided at the Terminal including luggage handling, coffee shop, restrooms, and vending machines.

Community use of the Terminal in the off-season is a significant asset to Seward as it is the only facility that holds more than 350 people within one space. Events range from resident walking and archery classes, ocean side training events, meetings and conferences to weekend-long community events attended by 3,000+ people.

Through the design process, it was determined the highest priority project was to replace or renovate the terminal due to the remaining life of the supporting piles. It is estimated the dock will need replacement or significant structural repairs before the 2020 to 2022 time period, thus so will the terminal.

Passengers Loading the Train

Existing Terminal & Cruise Ship

Depot

The Depot, or “Summer Depot” serves passengers of the daily-scheduled Coastal Classic train, which travels between Anchorage and Seward and carries up to 550 passengers, from mid-May to mid-September. This single-story building has a waiting area, storage room, small mechanical room, a single restroom, and a reception/ticketing counter area with storage. Depot site services include local tourist information, restrooms, luggage handling, train operations storage, and train shore power. Connections to the City of Seward, local tours, restaurants, attractions, hotels, and cruise ships are available. Use is seasonal, operating mid-May to mid-September, with the Coastal Classic arriving daily at 11:05 a.m. and departing at 6:00 p.m. Constructed between 1997 and 2015, it has had light use during that time, thus, the buildings are in good condition and could be repurposed.

Passengers Unloading Coastal Classic

Winter Event in Terminal

Depot, Restrooms and Coastal Classic

Depot facility and site deficiencies include; trespassing across train tracks, loitering in summer, vandalism in winter, vehicular congestion and crowding, insufficient parking, mixing pedestrians and vehicles on site, absence of use and revenue in winter, undersized, distance from Terminal for passengers transferring between the two sites while pulling luggage, lack of gift shop and passenger amenities, industrial setting, indirect public transportation between Depot and Terminal.

The Depot's primary positive attribute at its current location is access to the Seward Small Boat Harbor which is directly across Port Avenue to the south and its tours, shops, restaurants and other amenities that serve tourists.

Early Programming Decisions

Several options were analyzed as to what the new Terminal should contain and whether or not it should be combined with the depot. Options explored and the direction on how to proceed with each one is described below.

1. Renovating the terminal in place with potential additions –Renovating and adding onto the existing terminal, repairing the piles directly under it and building a new dock around it was explored, but was abandoned due to cost and the need for major repairs in approximately 15 years.

2. Replace Terminal in-kind without the Depot– This option is still available, but not the recommended approach as described within this section.

3. Terminal with event center features – The current Terminal operates as an events center within the spaces provided and does not have specific design accommodations for operation as an events center. This same approach is taken with the proposed Terminal where it can be used for events, but is designed for its primary functions of cruise ship terminal and railroad depot. Events can be held in the facility with the spaces and layout available.

Inside the Depot

Renovating or Replacing the Depot Option

Development of an expanded or new Depot on the existing site faces many challenges. First, building expansion is limited to two directions, north or south, due to the narrow E-W site width. The western edge is set by the train tracks which would be cost prohibitive and technically challenging to move, and the property that borders the eastern edge is not owned by the Railroad. The circulation corridor between the Depot and the edge of site is already congested and appears unsafe as it is narrow and is the only circulation path for both pedestrians and all non-train vehicles using the site.

Expansion to the south or north is possible, but the building width would be limited to the current roughly 30' building width or it would further narrow north to south circulation. Adding on to, or replacing the Depot with a new, larger facility, would require additional parking and there is already traffic congestion and shortage of parking. While the safety and congestion lasts only a brief time, roughly 30 minutes after the Coastal Classics 11:05 am daily arrival, adding parking or restricting vehicular maneuvering space on an already tight site would be counterproductive.

Depot Unloading Site Circulation

Adding on to or replacing the Depot would be considered a major renovation, thus would require Level Platform Loading (LPL) train access. As a commuter train service, Alaska Railroad is required to provide LPL on any new or major renovation projects of their depots or train terminals after February 1, 2012 per federal law 49 CFR 37 and 38. There is a freight service exception, but it most likely does not apply to the Depot. LPL is a significant piece of infrastructure that moves passengers inside a building, exterior stairs and ramps are not allowed, up roughly 52" to train floor level, with accessible ramps and stairs. This requirement adds approximately 1,350sf of interior square footage. The existing Depot and Bathroom building combined are about 1,300sf, but require an additional 1,000sf per occupant load. Combined with the LPL square footage requirements, the overall building would be roughly 3,700sf, almost three times larger than current facilities. To increase the building to this size on a site that already has the safety, circulation and parking issues noted above, would be an exceptionally challenging project.

Level Platform Loading at Airport Depot

To compound this issue, LPL requirements also adds site infrastructure. The LPL platform is required to extend the entire length of accessible car loading. Because essentially all Coastal Classic cars are accessible, the platform would be roughly 1,300' long and roughly 8' wide. Fitting this platform on the existing Depot site will further tighten and restrict rebuilding development options. Rough Order of Magnitude (ROM) costs for 2019 construction estimated the LPL platform for the combined Depot and Terminal, which is of similar design, at $2.8M and a canopy at $3.6M, totaling $6.4M. While there are exceptions to not providing LPL, the approval process for that path is drawn out and the intent seems clear the goal is to provide level platform loading wherever physically possible. Therefore, design efforts proceeded as if it is required, to pursue, or not, an exception is at ARRC's discretion. It is recommended an additional 6-8 months be allotted in the design schedule if this is pursued.

This above analysis assumes ARRC's land holdings and Right of Way remains as they currently exist. However, there is a roughly 1 acre piece of property between the Depot property and Leier Road. Acquiring this lot would almost double the Depot site at its most restricted widths, which would completely change redevelopment opportunities. It is advised ARRC consult an architectural design firm before securing the property, but from a preliminary assessment, securing this property would be required if the Depot is to be expanded or renovated at its current location.

Zone 8 graphic of the existing parameters on the Depot Site.

Pedestrians at Port Ave. No Pedestrian Sign

Depot Site Congestion

Combining the Depot and Terminal Decision

Three key issues led to the decision to combine these two facilities. First, the depot building and site are undersized and increasing the building size as needed exacerbates the site constraints as previously explained. Two, Level Platform Loading (LPL) would be required at both a renovated or replaced Depot and new Terminal. LPL requires significant interior square footage, space on the site and capital investment of potentially $12M investment for just the LPL at two sites, not including the additional square footage in each building. Third, passengers currently walk between the train depot and the cruise ship terminal in the industrial area along heavily traveled Port Avenue which is considered unsafe, inconvenient and divides winter security and operations costs between two facilities. Therefore, the proposed terminal combines the two functions. It is believed that combining the facilities will improve and enhance passenger service and experience.

Level Platform Loading Example

Proposed Facility Design

Once it was decided the recommended approach was to combine the Terminal and Depot on land adjacent to the current Passenger Dock and Terminal location, site design, programming, floor plan and facility design efforts moved forward. The design described in this report was developed in coordination with Dock Option P-PD1. If an alternate dock option is pursued, the building design will need to be modified to accommodate the passenger dock location, configuration and other factors as developed in future design phases.

Site design

Site design efforts include site design, access and circulation on land and around the building, but also require coordination and design in conjunction with the activities on the adjacent dock. A major factor in the terminal site design is how many coaches will be staged and loading on land, versus how many will be able to load on the dock during morning debarking operations.

Coaches Staged on Passenger Dock

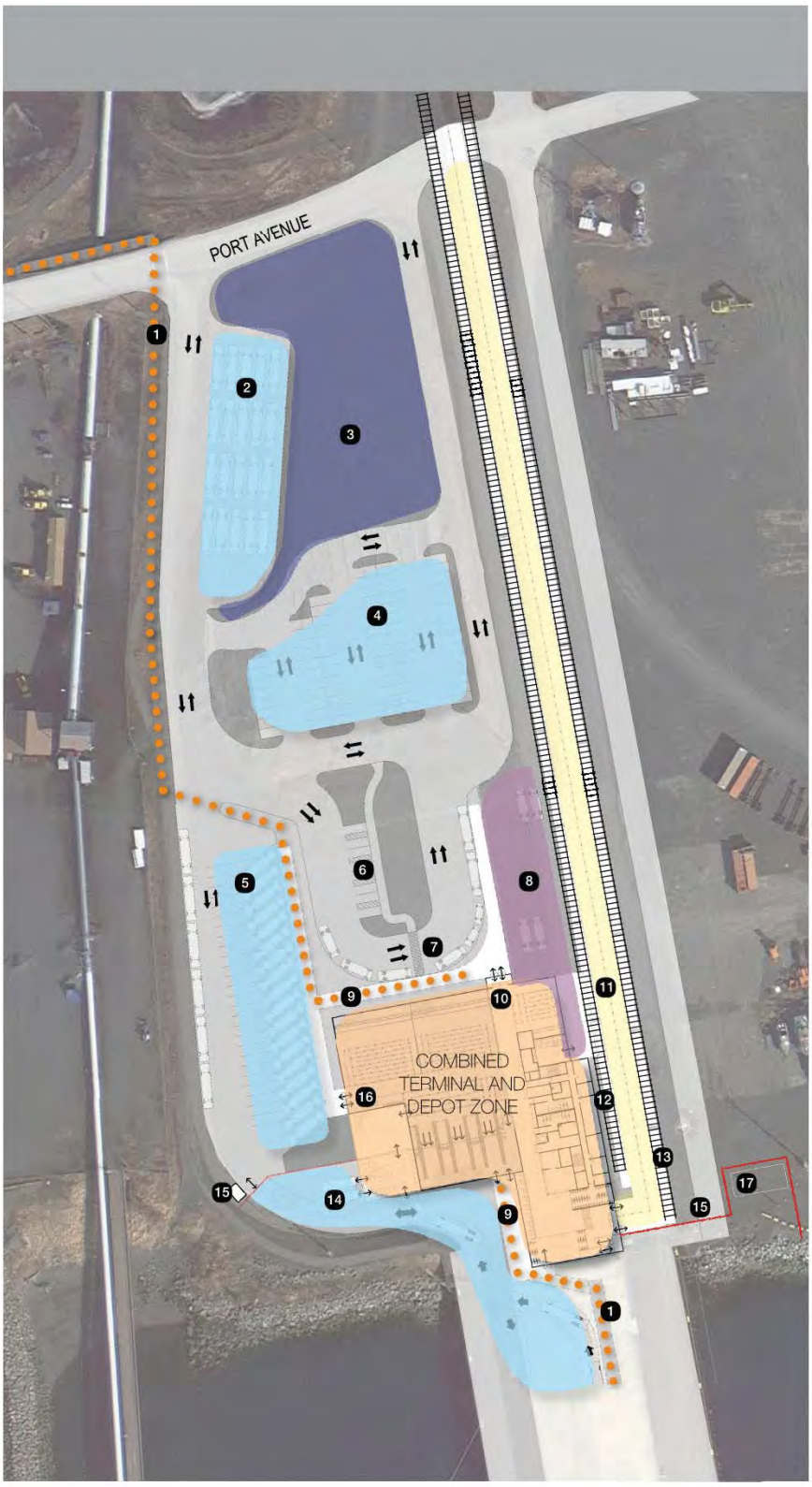
General Site Organization

See Concept Site Plan below.

Concept Site Plan

SITE KEY:

1. PEDESTRIAN PATH
2. COACH STAGING
3. LEASABLE AREA
4. STAFF AND PUBLIC PARKING
5. CRUISE TRAFFIC LOADING
6. ACCESSIBLE PARKING
7. TRAIN TRAFFIC LOADING
8. ARRC LUGGAGE OPERATIONS
9. COVERED WALKWAY
10. NORTH ENTRY
11. SHARED COVERED LEVEL PLATFORM BOARDING
12. COASTAL CLASSIC TRAIN
13. GRAND VIEW (CRUISE TRAIN
14. CRUISE LUGGAGE OPERATIONS
15. SECURITY GATE
16. WEST ENTRY
17. LONGSHORE-MEN TRAILER



NORTH

September 19, 2016

Loading Coaches at Terminal

Non-Coach Transportation

Independent Travelers Leaving Terminal

General Site Configuration

The northwest corner of the site is the primary passenger vehicular and pedestrian entrance point off Port Avenue. A loop road from this point goes to the Terminal and loops back through to exit onto Port Avenue in the northeast corner. This loop primarily serves taxis, vans, and smaller vehicles who pick up and drop off passengers. Tour companies with a small fleet of coaches, one to two, are planned to use the outer edges, NW or NE, inside of this loop, adjacent to covered walkways. North of this loop is personal vehicle parking and land available for development of passenger services such as rental cars, tour connections and the like abuts Port Avenue. On the west side of the site is cruise line coach staging, circulation, loading and unloading as well as access to the dock if the selected dock option allows. The far southwest area of the site is on the secure side of the security fence and is used for cruise luggage operations and is the primary vehicle entrance to the secure dock. Train servicing and building service vehicles will enter the site primarily from the northeast entrance for direct access to the service area on the Northeast corner of the building. Train access and circulation is from the northeast and extends the entire landside eastern length of the site. Ship access is from the south along the passenger dock.

Vehicular Circulation

There is an abundant number of vehicles, and vehicle types, that circulate on, to and from the site, roughly 65 to 100 permitted vehicles. Parking areas and the site is used heavily on cruise ship days and better, safer and more efficient traffic control and movement is desired for the future site. The site needs to have enough area to accommodate, and when appropriate, separate different streams and types of traffic, including cruise ship passenger motor coaches, taxi cabs, local tour company shuttles, hotel shuttles, personal vehicle parking for employees, other personal vehicles used for dropping off and picking up visitors, railroad luggage trucks, cruise ship luggage trucks, cruise ship luggage carts/fork-lifts, cruise ship maintenance and servicing vehicles, railroad maintenance and servicing vehicles.

Motor coaches operating on the west side of the site that transport cruise passengers require a large parking area not just to accommodate their length but also for their turning radius. It was noted in stakeholder meetings that it is important for these coaches to be located as close to the terminal as possible, and for a covered walkway to be provided to improve passenger experience during inclement weather. Stakeholder meetings revealed the preference for the cruise line motor coach traffic to be separated from the other vehicular traffic on land. This helps place the motor coaches closer to the entrance for the cruise ship check-in area, while also allowing them direct access to a secure check point and guarded gate for dock access if the selected dock option allows.

While there are not many cabs within the City of Seward, they are one of the ways that passengers are dropped off and picked up from the site, along with other local tour company shuttles and hotel shuttles. This traffic type tends to run in intervals depending on the demand, so it was determined that a pull through loading zone adjacent to a sidewalk with covered pedestrian access near the north Terminal entrance

Coastal Classic Passengers


Passengers Walking on Dock


Current Accessible Loading

was the best way for this traffic to unload people in a safe and efficient manner. The pull through loop also negates the need for additional square footage required to provide turning space for each of these vehicles.

Train Circulation

Two trains utilize the Terminal site, the Coastal Classic and the Grandview, or Cruise, Train. The Grandview Train is a private charter train used by cruise line companies exclusively for their passengers. Passengers cannot independently schedule trips on this train. The Coastal Classic currently arrives at the Depot close to the Small Boat Harbor in Seward, but its service is recommended to be relocated to the new Terminal as described previously. Tickets on the Coastal Classic train are available for purchase by the public. Both trains use the Level Platform Loading platform at the east side of the site, with the Coastal Classic on the west side of the platform and the Grandview on the east side. Scheduled service for both trains is provided later in the report.

Pedestrian Circulation

There are four primary paths of pedestrian circulation on the site. The first travels from the cruise ships down the gangway, across the dock and into the terminal. All stakeholders expressed a strong desire to provide protection from the elements for these pedestrians and reduce this walking distance. Because the current terminal sits on the dock and the new terminal will sit on land adjacent to an assumed much longer dock, the length of travel for these pedestrians will be increased in the new facility. Design solutions to shorten this distance should be part of coordinated design efforts with the selected dock and subsequent Terminal floor plan. Assistance such as golf carts or something similar as seen in large airports should be explored as needed. Included in the current design concept is a tent-like structure that runs the length of travel on the dock and protects pedestrians as they transition into the Terminal. Not only will this structure protect passengers from the windy and rainy elements, but with enclosed or restricted access from the sides, it will help keep passengers away from dock equipment and contained within a visually and physically separate space.

Pedestrian vehicular loading occurs through the north building exit to load into coaches, taxis, vans and the like, with very few personal vehicles using this area. The west entrance is for cruise package coach use only. Pedestrian access to the north parking lot and accessible parking is through the north exit of the terminal along a designated, well-lite and marked pathway.

Pedestrian train loading is the third pedestrian path of travel and it occurs only through the southeast entrance of the facility where there is access to the Level Platform Loading (LPL). Loading of all passengers must occur on the platform, as those who need the LPL cannot be segregated by use of a separate means of access from other passengers per 49 CFR 37 and 38. Passengers make the vertical transition, roughly 52”, from the finished floor level of the terminal on the inside of the terminal, enter/exit to the interior or exterior of the building at platform level and enter/exit the trains at the seating level of the train.

The fourth and final primary pedestrian circulation path is from the NW corner of the terminal and site, serving those passengers who walk to and from the small boat harbor or other areas of Seward. This path is partially covered by a canopy in the coach and loading area. The path continues along the western edge of the site, crosses Port Avenue and travels along the north side of Port Avenue to and from town.

Luggage Vans Loading on Dock

Independent Travelers and their Luggage inside the Terminal

Longshoremen Place Luggage in Terminal

Independent Luggage Bins

Luggage Handling and Circulation:

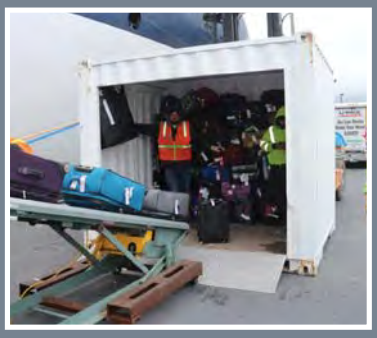
Luggage is handled on site for three separate types of passengers; cruise package passengers, independent passengers and train passengers. Services for each group is handled differently and luggage handling operations are a primary driver of the site and floor plan configurations.

Cruise package passenger's luggage moves through the site via a luggage truck whether the passengers arrives from the ship, a hotel or if they are traveling on the Cruise (Grandview) train. Their luggage transport needs are taken care of for them except for their carry-on items. Cruise package passenger's luggage is unloaded from the ship in the morning into luggage vans and transported to their hotels or other destinations as coordinated with the cruise lines via their tour package deals. For evening embark, cruise package luggage arrives in Seward on luggage vans, goes into the secured area at the southwest corner of the site and is either screened at this corner of the building or on the dock and is then loaded into the ship.

Independent traveler's luggage is handled differently, and these travelers could be traveling on the Coastal Classic, by rental vehicle or in some manner other than with a cruise package group, thus there are several ways their luggage is handled. For morning ship debarking, independent traveler's luggage is unloaded from the ship, and moved into the west side of the Terminal by longshoremen for passenger pick-up. Delineating what areas inside the terminal are limited to luggage movement only by longshoremen versus where other service providers can provide assistance is an important design decision to be clarified in the next phase of design, as it impacts customer service and experience.

Luggage of independent travelers who arrive on the morning Coastal Classic is handled in two ways dependent on luggage handling operations of the cruise line they will be loading onto that evening. The first is accomplished by some cruise lines tagging these travelers luggage at Anchorage and loading it onto luggage vans for transport to Seward. This luggage is then handled on site the same as that of package cruise passenger's luggage. If Independent Traveler's luggage is not tagged in Anchorage for the above noted service, they need to pick it up at the northeast corner of the building where Coastal Classic train luggage is handled. Passengers would then transport it to

Moving Luggage Bins from Dock



Screening Luggage on Dock

Coastal Classic Luggage Operations

cruise line luggage bins located on the west side of the site for luggage check-in to the cruise ship. During Concept Design, both the cruise lines and the Railroad wanted to avoid this scenario and intend to tag, in Anchorage, Independent Traveler's luggage who use the Coastal Classic for transport to Seward.

A second way Independent Traveler's luggage is handled during evening embark is by checking it in at the luggage bins described above. When these bins are available during the day for drop-off depends on which cruise line is operating the ported ship, as they pay for Stevedore and Longshoremen services whenever the luggage bins are available. Some have longer hours of availability and others have shorter service hours. Not all cruise lines have the bins available as early as 11:00 when the Coastal Classic arrives. Accommodations for these passenger's luggage needs to be considered as the design develops further. All Independent Travelers, not matter how they arrive on site, check-in their luggage at these bins prior to entering the terminal area for cruise line check-in, security screening and loading onto the ship. Once one of the bins is full, it is transported via forklift into the secure dock area for screening and loading onto the cruise ship.

Coastal Classic train passenger luggage is defined as those passengers who are not associated with a cruise ship on any leg of their trip, they are solely train passengers. Luggage handling is relatively simple as it is unloaded from the train luggage cars during morning arrival, and moved directly into the northeast corner of the building through the luggage handling garage. It is then picked up by the passengers. Evening luggage drop-off is similar where luggage is checked in when the passenger checks in for the Coastal Classic trip to Anchorage. Luggage is sorted and handled in the luggage garage and loaded into train luggage cars using forklifts and luggage carts.

Parking

There are few personal vehicles used on site for passenger pick-up and drop-off, but employees, vendors and others working on the dock, trains and within the Terminal require parking. Such parking is planned for the far north parking area while personal vehicles used for passenger pick-up and drop off, as well as accessible parking, is planned for the southern parking lot areas.

In the off-season (September to May) when the terminal is used for special events or for daily use by Port staff and office lease holders, the cruise line motor coach parking and staging areas along the west side of the site can be utilized as additional parking of personal vehicles. Dependent on the style of dock selected, maintaining off-season freight traffic access to the dock along this side of the site may be required.

Vehicle Barriers and Landscaping

Guard Shack and Gate

Utility Corridor by Tracks

Site Grading, Landscaping and dust control

The existing site is relatively flat with a very minimal slope toward Resurrection Bay. Wind is an issue, so landscape and site finish materials that control dust should be utilized. Seward experiences heavy, persistent, and wind-driven rain, thus requiring site amenities to be appropriately designed. Landscaping was requested to be easily maintained and require a minimal annual investment as this budget item is not typically funded and human resources are not available for such maintenance.

Site Security:

Site security requirements include access control, fencing, lighting and video surveillance to comply with U.S. Coast Guard and U.S. Department of Homeland Security requirements. Barriers to protect pedestrian sidewalks and entrances into the building should be provided protection from vehicular penetration.

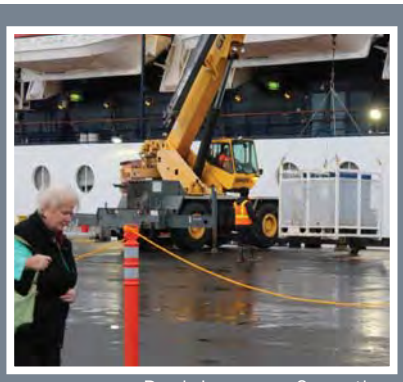
Site lighting and pedestrian pathway lighting is needed for safe use during early morning and evening use in the shoulder season and for winter use of the site.

Site Utilities:

To the northeast of the building site, on the east side of the rail tracks, there is an underground utility corridor that includes telephone, grid power and sewer. The sewer and telephone utilities cross under the tracks within 200 to 300 feet of the existing building. It is assumed that telecommunication lines also follow this northeast utility corridor from the tower and communications shacks located in the southeast corner of the intersection of Port Avenue and the exit driveway loop that serves Terminal traffic. City water lines enter below grade at the northwest corner of the existing building and travel along the entire west length of the building within the dock structure. Fiber optics are on site and available for the future Terminal. There is no piped natural gas, thus fuel oil is provided on site in a tank as further described in the mechanical systems section of this report.

Special site features

A visual fence or something similar that screens the Coastal Classic luggage handling operations is planned near the north building entrance, extending along the covered sidewalk at this location.



Dock Luggage Operations

Ship Servicing

Entering Terminal from Dock

Pedestrian Tent on Dock

Dock

Dock Security

Access onto the dock is controlled both inside the building and through guarded security gates controlled as required by the US Coast Guards 33 CFR Maritime Security. Only permitted vehicles can drive onto the dock. The proposed primary access point is at the southwest corner of the site, where the security guard shack is located. Access is also provided at the southeast corner of the site between the Level Platform Loading platform and the Longshoremen trailer. This secondary entry point is required for emergency vehicle access and to manage heavy traffic loads on the dock. The location and configuration of these checkpoints, as well as the types of vehicles allowed on the dock is dependent on which dock option is selected for construction.

Dock Circulation

Five types of vehicles or pedestrians could be circulating on the dock, dependent on which dock option is selected. Four circulation types will occur independent of what dock option is selected, these are luggage loading/unloading operations, luggage transport vehicles, ship servicing vehicles and pedestrian passengers. Heavy equipment operates on the dock to unload/load luggage. The amount or type of equipment used is dependent on the style of dock provided, floating or fixed, whether luggage conveyance slots are provided, etc. Luggage transport vehicles are also required to have access to the dock, as are ship servicing vehicles. Passenger circulation is described in the pedestrian circulation section above.

The type of vehicle that may or may not be allowed on the dock, dependent on which dock option is selected, are cruise package motor coaches. Note that Independent Travelers will be required to walk across the dock to the Terminal, no matter which dock option is chosen. Whether cruise package coaches load on the dock or not, greatly impacts the overall site design as not loading coaches on the dock, greatly increases the number of coaches required to load on land. It also increases the number of passengers who walk across the dock and through the Terminal during morning debark. Cruise ship and tour operators greatly value loading passengers directly from the ship to coaches on the dock for the following reasons: reduced passenger walking distance, improved organization and direction of passengers, better utilization of tight Terminal space, and reduction of the number of areas and processes passengers must traverse, thus reducing the number of lost or

Fresh Water Service

Gangway Placement on Dock

Luggage Equipment on Dock

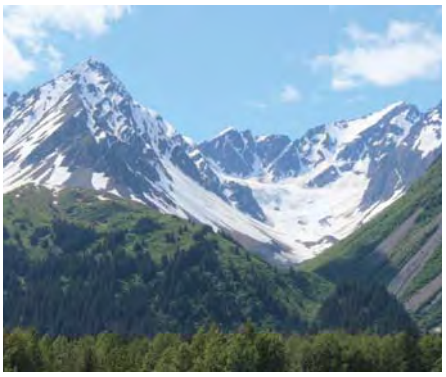
confused passengers. Loading the coaches in this manner allows the cruise package coordinators to more easily separate passengers going to different locations as they don't intermingle with non-cruise package passengers as they walk through the Terminal, thus separating from their group.

Safely separating and coordinating the crossing of paths of these five types of vehicles and passengers who circulate on the dock is a key design opportunity on how the dock, land site and Terminal building function together for the safe and efficient circulation on the Passenger Dock and Terminal site. Resolving this aspect of the design shortly after a dock option is selected will guide the design direction for further design work on the land site and within the Terminal.

Dock Utilities

Hotel services proposed for cruise ships, as further refined during future design, are below.

+ Integral fuel lines to service ships versus fuel trucks on the dock was requested, others preferred this service to be delivered by truck.
+ Repair, maintenance and resupply services available for hire as needed.
+ Cruise ships would like, in order of priority: fresh water, fuel, shore power on both sides of the dock, and possibly oily waste disposal.
+ Barges would like, in order of preference: fresh water, fuel, shore power on both sides of the dock, oily waste and sewage removal.
+ Both cruise and barge crews requested Wi-Fi services.
+ Water distribution through permanent pipes versus portable hoses.
+ Permanent, hard, data lines connecting the ship's computers to Terminal check-in computers
+ A compatible electrical connection between ships and the dock when generators go out.



Mountain View from Seward

Code Summary

Authority Having Jurisdiction: State of Alaska Fire Marshal

Use: Passenger terminal for cruise and railroad passengers.

Occupancy Classification: Assembly, Group A-3

Type of Construction: Type V-B

Sprinklers: fully sprinklered with NFPA 13 system

Full code analysis for location of emergency exits, fire separations and barriers, final bathroom count and other factors to be completed at next stage of design.

Building Program

Initial building design efforts include creating a program for the facility. The program is an inventory of the spaces, including their quantity and sizes, to be included. Originated from as-built conditions of the existing Terminal and Depot, the program was modified and refined throughout the design process. The final programming document is shown in Table 1 below.

TABLE 1

SQUARE FOOTAGE and ROM Costs

*** Square footages are +/- 15% due to wall thickness and rounding**

October 5, 2016

	Existing SF	Proposed Concept Plan	Added Spaces (SF) Change between existing and new	Year Round square footage	Pavilion (Cruise) Square footage		Notes
Existing All-Year Building Space							
Terminal 1st Floor Open Space	21,227						
Terminal 1st Floor Enclosed Area	2,638						
Terminal 2nd Floor	2,690						
Existing Terminal Subtotal	**26,555**						
New All-Year Building Space							
Depot Waiting and Check-in Space	580	3,515	2,935	3,515			Larger Check-in desks, Queuing and waiting areas
ARRC Ticketing Office	144	275	131	275			
ARRC Luggage Garage	0	859	859	859			currently outdoors
Depot Public Restrooms	380	0	0	0			Combined with Terminal Restrooms
Train Servicing Supplies	232	275	43	275			
ARRC Storage Rooms	0	245	245	245			(2) rooms, (1) Adjacent Waiting, (1) Adjacent Gen.
Gift Shop w/Storage	0	744	744	744			none existing
ARRC Subtotal	1,336	5,913	4,957	5,913	0		
Primary Cruise Check-in	4,382	4,420	38		4,420		
Secondary Cruise Check-in	0	4,420	4,420		4,420		Secondary cruise space
Increased Security line	6,203	7,873	1,670		7,873		
Med Hold	330	330	0		330		
Cruise Storage	317	365	48	365			First Floor, 2 rooms
Cruise Offices	1,171	1,173	2	1,173			Second Floor, (7) Offices
Cruise Subtotal	12,403	18,581	6,178	1,538	17,043		
Vendor Restroom & Tour Kiosks	734	851	117	851			(8) kiosks
Vendor Restroom & Tour Kiosks Subtotal	734	851	117	851	0		
Concierge/Information Desk	0	150	150		150		none existing
Terminal Public Restrooms	437	800	363	800			
Family and Staff Restrooms	50	179	129	179			(1) existing in Depot
Storage Room	0	312	312	312			
Janitor Room	29	207	178	207			(1) downstairs, (1) upstairs
Espresso Stand with Storage	100	428	328	428			Storage space added, larger coffee stand
Port Offices	371	395	24	395			Second Floor, (2) Offices
Staff Showers	0	108	108	108			none existing in building, (2) new upstairs
Break Room	0	357	357	357			existing is shared with conference area
Conference Room	93	345	252	345			with kitchenette
Mechanical, Electrical and Data Spaces	931	1,614	683	1,614			
Elevator	0	150	150	150			
Indoor LPL ADA ramp, stairs, elevated floor	0	1,351	1,351	1,351			
Walls & Circulation Space	11,787	11,479	-308	8,934	2,545		
Port Subtotal	13,798	17,875	4,077	17,875	2,695		1st and 2nd Floor SqFt
	Existing SF	**Proposed (SF)**	**Change (+/-)**	**Year Round**	**Pavilion**		**Notes**
Total Square Footage	**27,891**	**43,220**	**15,329**	**26,177**	**19,738**		**43,220**

ARRC
CRUISE
VENDORS
PORT

Coffee Kiosk in Terminal

Cruise Ships at Passenger Dock in Seward

Who the Building Serves

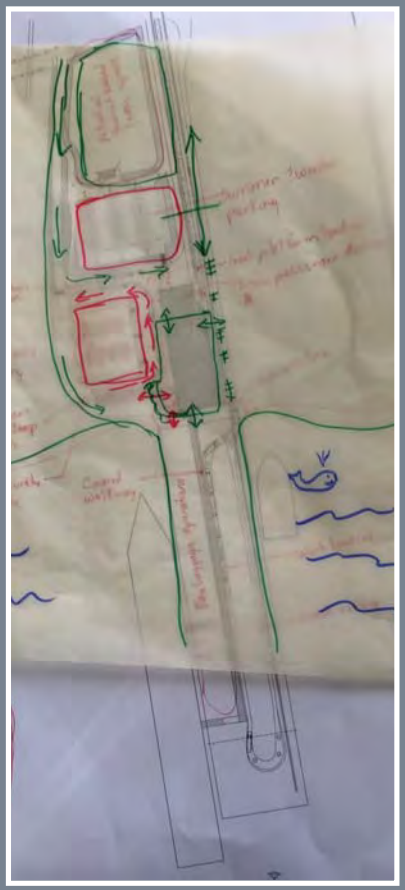
The Terminal will serve four primary functions: Alaska Railroad functions for passenger train service, cruise ship operations, vendor space and shared support spaces. Primary user groups include:

Tour Kiosk

Railroad Only Passengers	*Independent Passengers*
Those arriving and/or departing Seward via the Coastal Classic and using local light vehicle or pedestrian means of transport in Seward.	Those passengers who arrive on one mode of transportation and depart on another form which they have independently arranged, not on a cruise package
Cruise Package Passengers Those arriving/departing from the south into Seward via a cruise ship and leaving/arriving Seward to the north either on a chartered coach or Grandview Train. May or may not be touring in Seward, but if doing so they are on a package tour and traveling in large coaches.	*Others* •Vendors; tours, hotels, shuttles, coffee cart •Contractors; Neptune Security, Southeast Stevedores, Longshoremen, etc. •ARRC staff and employees; Port and Train staff •Cruise logistics companies (HAP and Premiere)

Train Passengers Loading

Passengers Waiting for Check-In Inside the Existing Terminal



An Early Site Plan

Passengers Walking South Through Terminal to Security

Occupant Load:

Currently, the largest cruise ship docking in Seward holds 3,000 people and most ships hold under 2,000. Many small ships berthing in Seward hold under 1,000 people. 4,000-person ships are expected within the next 5-10 years and future ships that could use the facility over its 30-year plus life are expected to hold 5,000 plus paying passengers, with large crews up to 2,000 additional people. On most cruise season days, there is only one ship, but accommodating double, large ship days was a critical design criteria for the new Terminal.

During the busiest Terminal period, 4:00pm to 6:30pm, roughly 1,300 to 1,400 people need to check in and move through security. These numbers vary per cruise line, but the entire ship load of people is normally never in the Terminal at one time. This is because passengers are arriving via different forms of transport from different locations at different times. To further reduce congestion and wait times, the land-side operations companies stagger arrivals through constant communication with the coaches, the cruise train and other entities who deliver large numbers of embarking passengers to the Terminal.

During active periods of cruise debark and embark, there can be roughly 50 non-passenger people working in security, cruise operations, railroad operations, as vendors, as well as visitors and others. In addition, there can be 30 to 40 Stevedore's, longshoremen, vendors and cruise operations people on the dock.

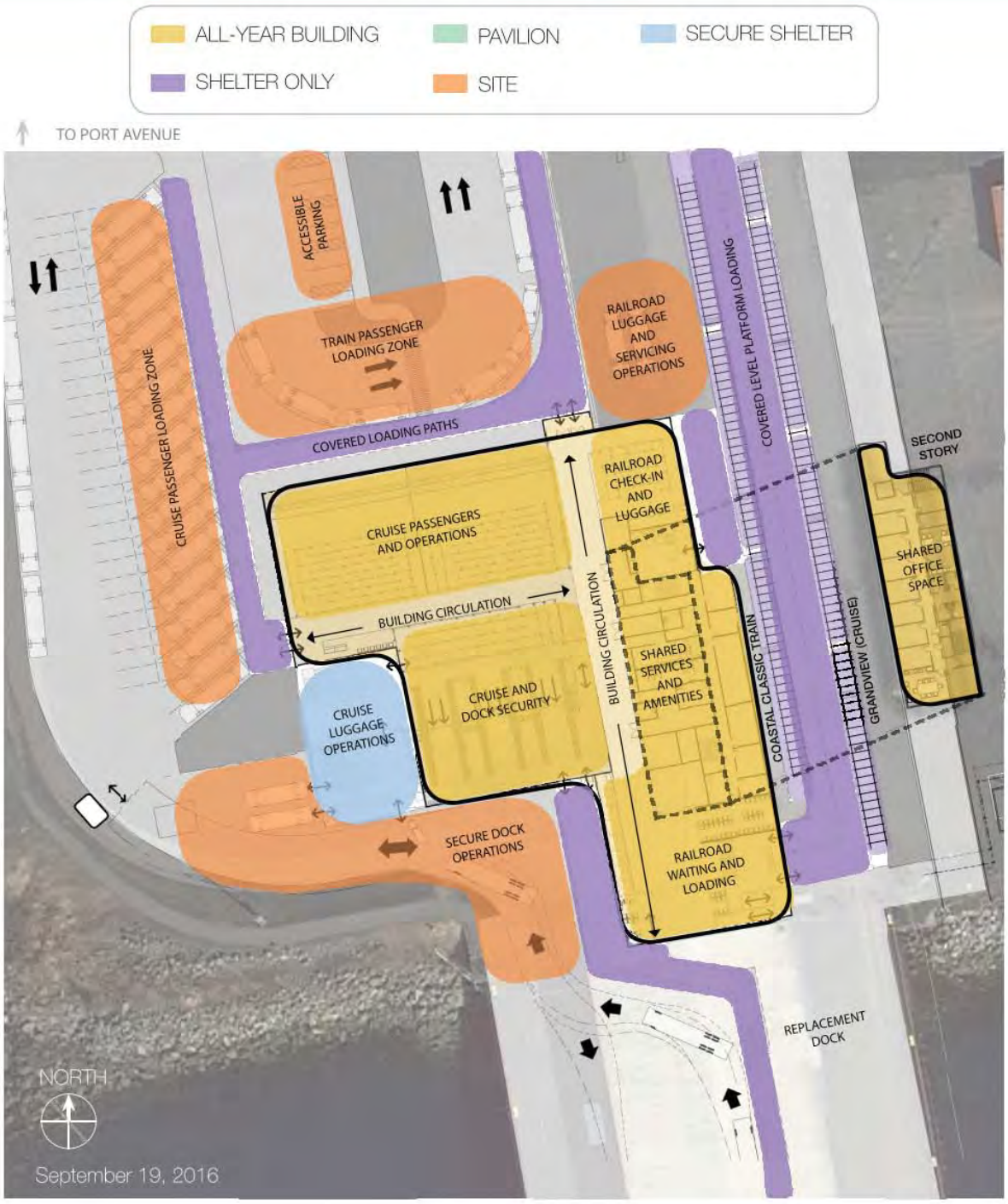
Other than special events, which primarily occur on the weekends, the typical winter weekday occupant count in the Terminal is under 10 people. Special events can be 1000+ people at one time.

Building Organization and Circulation:

The program and occupant information provided above was developed into the Concept level floor plan and exterior design through site visits, charrettes with the Design committee, one-on-one design sessions with various users and other activities highlighted in the Design Effort Timeline.

Seven primary functional zones were developed in the proposed floor plan as shown in the All-Season Option on the next page.

All-Season Option



Sketching on the Concept Design

Design Workshop Process

Public Presentation in Terminal

Divided into west and east portions by a primary corridor that runs north to south, the west side is exclusively cruise operations and the east side houses railroad and port operations, and shared passenger services. This arrangement locates all services and functions that remain operational throughout the year on the east side. It also isolates the large, open areas of the cruise and security operations, allowing them to be built and operated in several manners without changing the floor plan as further explained below.

The eastern side of the floor plan is further broken down into three distinct zones. In the NE corner of the building is the Railroad check-in and luggage handling areas used during the summer season, but available as a small gathering or meeting space in the winter. Spaces are provided to service and clean the Coastal Classic as well.

The central area on the east side consolidates all small, enclosed spaces and contains shared services such as mechanical and electrical systems, restrooms, port and leased storage,and leased offices on the second level. It includes passenger amenities such as a coffee shop and an Alaska Railroad gift shop located where all cruise and train passengers will pass by. Locating the offices on the second floor is strategic as it provides areas to observe operations across the site and within the building. This is needed by office occupants whom are typically in supervisory or management roles. Some office holders and the Port Manager need to observe activities to the east on the freight dock and others need to observe the Passenger dock, train loading, cruise check-in or security line operations. Many office holders need to observe in multiple directions, so observation points that can be accessed by anyone on the second floor are provided in all four directions. The south one is located within the conference room as it will not have consistent occupancy and will most likely not be occupied during busy times. The north observation point can be in the north stair tower or the fan room, dependent on fire ratings, and as the plan is further developed. Two showers are provided on this level for office occupants and management level building users. Dock workers and longshoremen restrooms showers are located on the first level.

The southeast area of the floor plan includes access to the Level Platform Loading that runs the length of the eastern edge of the site. This space includes seated waiting for approximately 77 passengers. Future design efforts are to try and increase this to 100 seats. Depending on how the space is designed, the raised platform area could be used as a stage area for events with the waiting area as a dance floor or audience seating. This location provides easy and direct access from the dock for Cruise (Grandview) Train passengers during early morning train loading. It also provides seating for independent cruise passengers who have left the ship and have longer wait times and can enjoy the view and a cup of coffee. Because most cruise ships prefer to berth on the west side of the dock, the view from this waiting area is expected to be exceptional, as it looks across Resurrection Bay toward the mountains

Hikers in Seward

Kayakers in Resurrection Bay

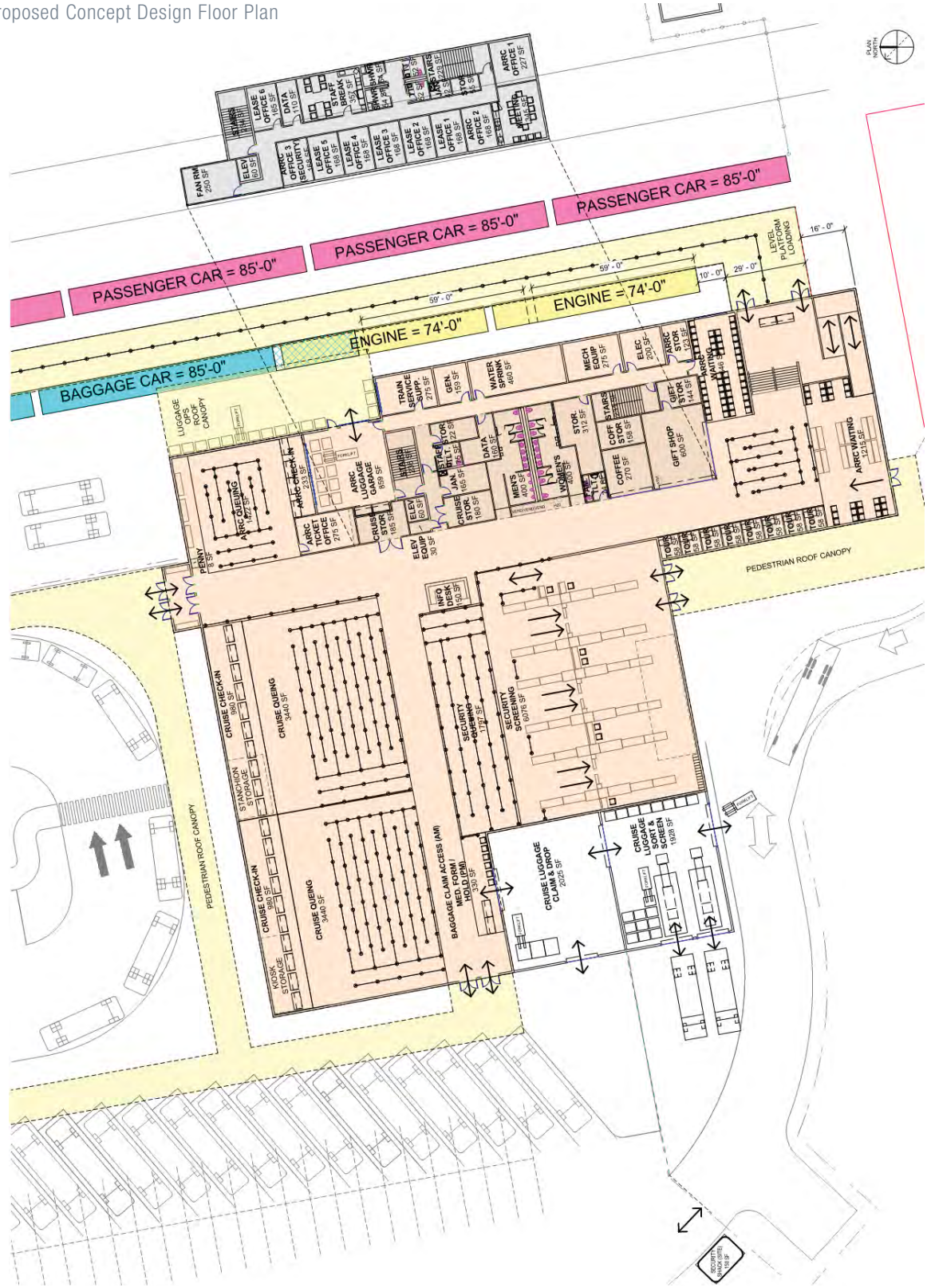
to the east. A waiting area in the north part of the Terminal where passengers waiting for transport can see arriving taxis and buses should also be established. Chairs along the north wall of the Cruise check-in area, dependent on relocating the circulation path to this area as noted below, would be a good location.

Whale in Resurrection Bay

The western side of the floor plan also has three primary areas of functionality, all associated with cruise operations. Cruise passenger queuing and check-in is located at the NW area of the building and an east to west pathway is located between the cruise ship check-in spaces and the security screening operations. A small, moveable, tourist information kiosks is located near the main N-S corridor. In the far Southwest corner of the plan, both interior and exterior, covered and secure and not secured, spaces are provided for cruise luggage handling and screening. This space, in conjunction with the adjacent security area can be used by cruise ships during the summer season and others during off season for heated, unheated and secured storage. Overhead doors and sufficient roof height allow forklift access to quickly and efficiently move pallets of materials.

As the floor plan indicates, other than the central area on the east side of the building, spaces are primarily open and can be modified throughout the day or season for various modes of operation. This is currently done with portable check-in podiums, security equipment, furniture and stanchions to direct traffic flow. Security equipment generally stays in place during summer and is consolidated and moved aside in the winter.

Proposed Concept Design Floor Plan



All-Year & Shelter Only Example

All-Season Example

Pavilion Example

Alaskanesque Architecture

Seasonality of Floor Plan

The floor plan was designed dividing cruise and railroad/port operations as shown and designed for several reasons.

1. The west or cruise side, contains a significant amount of square footage that is lightly used outside of the summer season. By isolating this space, it can be built and tempered differently than the east side which is used all year.

2. The west side may have a different capital funding source, thus isolating it physically provides more control to the funders as to seasonality of the structure, level of finish, operations, etc. Options for types of construction of this side is explored more below.

3. The north to south corridor that separates east and west starts to identify areas of operation and control when the facility is fully occupied in the summer. This also helps separate cruise and train passengers, which was strongly desired.

4. All building functions that contain water or systems that cannot be allowed to freeze, if the sprinkler system is designed accordingly, are isolated on the east side and are below the port and leased office space that functions all year. Thus, this two story space can be isolated for environmental controls.

5. The floor plan arrangement is an initial step at setting up the zones for ventilation, heating, lighting and other building systems so that spaces not used in the winter can be kept either at a lower temperature with minimal lights and ventilation or no environmental control.

The east side of the facility is anticipated to be constructed in what was termed an All-season approach as defined below. But as previously noted, the style of construction for the west side is yet to be determined. Depending on the funding and the needs and desires of the funding and managing entity(ies), it could be constructed and operated in several manners. Styles of construction considered include:

1. All-Season or All-year: This building type is constructed and designed for year-long operation of environmental control systems and impacts building systems such as foundation, thermal envelope, heating, ventilation, sprinklers, lighting etc.By providing thermal barriers between the east and west side, or atleast around the two story central area on the east side, the west side of the facility can be normally be kept at a minimal temperature during the winter, but the temperature can be increased for event occupancy.

2. Pavilion: The intent of this construction type is to provide potential savings in both capital and operating expenses by constructing it for summer operation only. This means providing heat, lighting and dry sprinkler systems in the summer that are specifically designed for this condition. In winter months, this side of the building would be allowed to go cold and remain unoccupied in the winter months. It is not insulated or intended to be heated, even temporarily, during the winter months. A thermal barrier, not currently shown in plans, would be needed to separate the east and west sides of the building for this option to function correctly.

Shelter Only Example

3. Shelter only: This style of construction is only feasible for spaces used for luggage handling, canopies, etc. as it is not enclosed enough for heating and ventilation. It can be lit and may require dry sprinkler heads depending on size and location. This style of construction is not feasible for the west or cruise side of the Terminal due to the shoulder seasons that the Terminal is used within. Cruise ships arrive as early as mid-May and as late as mid-September where temperatures are cool enough to require heating. This is particularly true for Seward's cool, rainy climate, early morning debarking and for cruise line staff who spend long periods of time within the Terminal.

Choosing a style of construction for the west side is a fundamental decision that must be made early in the next stages of design. Pavilion style facilities are cost prohibitive to heat and are not designed to be heated year-round. All-Season facilities that are allowed to go cold will experience foundation, condensation, mold and other material integrity problems. One or the other solution must be chosen. The safer, more flexible and long-term solution is to construct the entire facility for all year use. However, this is a more expensive option for both capital construction and operations.

Independent Luggage Laydown

Passengers Embarking Through Security

Cruise Check-In Passengers without Luggage

Terminal Sizing

When the proposed design was presented to stakeholder groups outside of the Railroad, there was significant concern the west side of the facility was not large enough to handle double ship days and the projected growth of ship landings at Seward. Additional analysis was conducted to determine if adequate space was provided. On the next page is a diagram that overlays the existing Terminal floor plan over the proposed Concept Design Terminal floor plan.

The diagram shows that while the square footage totals are similar between the two, the configuration of the plan determines the functionality of the space.

In the existing terminal, there is not enough space in the east/west direction to set-up two cruise queuing and check-in lines as needed on double cruise ship days. There is also not enough space in the north to south direction as it is restricted by the enclosed space of the bathrooms and second level to the north and the security line to the south.

The proposed floor plan provides enough space to have two cruise queuing and check-in set-ups side by side. On single cruise days, set-up can be spread out and more space allotted for both queuing and check-in.

Another concern raised was there was not enough space to lay down the luggage for a double cruise ship day. Per the Existing versus Designed diagram on the next page, the current terminal utilizes roughly 3,100sf for luggage pick-up by independent travelers. The east side of the current terminal, labeled as “Cruise Check-in Queuing 3,360sf”, just below the “15,992sf” text, is not currently used for luggage laydown, primarily due to the north-south path of travel used by passengers while the luggage is being put in place during morning debark. This space is also not available for luggage laydown in part because the stanchions used in the ques remain in place at all times in Seward. In the Whittier cruise Terminal, the queuing stanchions are put in place after luggage has been either picked up by passengers or moved to the side, double using the space dependent on the time of day. It is anticipated that an operation mode similar to what is used in Whittier would be implemented in the new Seward Terminal as there is no major circulation path that separates the two cruise operations zones. Under this mode of operation, the proposed floor plan offers 6,880sf for morning luggage laydown area which doubles as cruise queuing starting midday.

As an additional means of confirming the cruise operations side of the facility is correctly sized, an analysis was conducted utilizing the “level of service” approach. This approach looks at several aspects of space allocation per person including assigning a range of square feet per passenger based on the assumption that morning debarking independent passengers would be travelling with one to two bags per person and potentially luggage carts. Afternoon embarking passengers should not have their luggage with them as explained in the luggage handling section, thus they would only have carry ons during queuing and check-in. Therefore, a smaller square footage requirement applies to these interior queuing and check-in spaces.

1 TERMINAL SQUARE FOOTAGE COMPARISONS:
EXISTING SEWARD TERMINAL AND CONCEPT TERMINAL OVERLAY PLAN

10/03/2016

The second aspect of this analysis is based on the use of the Level of Service (LOS) C space allocations recommended by the International Airport Traffic Association (IATA) Airport Development Reference Manual, in which they note “The prevailing practice at North American airports for many years has been to develop facilities to provide at least IATA LOS C. This study indicates that passengers are largely satisfied with the space available to them at the airports studied. Additionally, the prevalent use of the LOS C design criteria appears to be financially acceptable to project sponsors.” LOS C is typically recommended as a design objective for the design hour because it denotes good service at a reasonable cost. This level of service provides a mid-level square footage assignment for various areas such as check-in/queue areas, waiting and circulation areas and baggage claim areas. Also provided in this reference manual are recommended sizes for kiosk depth and width, active check in zone depth and width, and passenger queue depths. This method assumes that people can stand and wait in line for short periods of time in spaces smaller than they would normally want to be in for longer periods of time. It also takes into account that long lines can spill over into adjacent areas temporarily during peak times. Based on this performed analysis, the proposed west side of the Terminal floor plan is adequately sized and slightly generous on a per person basis.

In addition to the various analysis noted above, opportunities to expand the west side of the proposed terminal were explored and are shown on Potential Additions Diagram shown on the next page. The proposed Concept Design Floor plan includes 19,738sf on the west side, intended to function for double ship days, with potential increases or future expansions of 2,858sf for a total of 22,596sf. As shown on the diagram in the upper right hand corner, the Whittier Terminal’s single cruise ship square footage is 14,276sf. Confirmation of adequate square footage and functionality will be revised and reconciled with the construction budget in the next phases of design.

2 POTENTIAL TERMINAL SQUARE FOOTAGE ADDITIONS

10/03/2016

Passengers Walking Along Port Avenue

Grandview Cruise Train at Terminal

Passengers Loading the Coaches

Daily Operations:

Seward primarily operates as a Turn Port, meaning ships unload one set of passengers and reload another set of passengers generally on the same day. It is occasionally used, under five times a year, as a Port of Call where passengers get off the ship, tour the local area for the day and then return to the departing ship that evening.

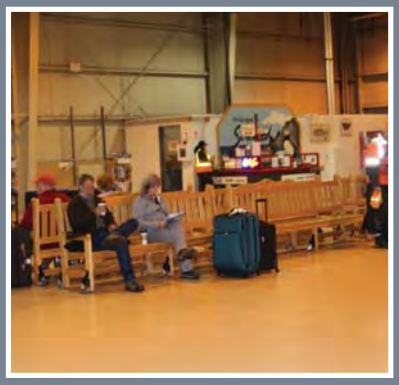
All times are approximate and vary per cruise company.

4:00am to 6:00am	Ship docks, is secured and luggage unloading and other service operations begin
5:00am to 5:30am	Cruise Train pulls from Roundhouse to Terminal
6:00 am	Passengers begin to debark
6:30 am	Cruise Train passengers debark ship and begin to load onto train
7:00am	Cruise train leaves for Anchorage
11:00am to 11:30am	Ship debarking is normally complete, typically taking 4.5 to 5.5 hours.
11:00am to 11:30am	Coastal Classic Train arrives at Terminal and unloads through Terminal
11:30 to 7:30	Ship embarking begins and ends
5:15 to 5:30	Cruise Train arrives with passengers going through Terminal and security
5:30pm	Coastal Classic boarding begins
6:00pm	Coastal Classic departs for Anchorage
8:30pm to 9:00pm	Ship leaves Port

The busiest period inside the Terminal will be between 4:00pm to 6:30pm when the Cruise Train arrives with roughly 300 to 400 people between 5:15pm and 5:30pm in the same general time frame that multiple motor coaches arrive from various Alaska Railbelt locations. The train check-in, waiting and loading areas will be very busy as well during that time with Coastal Classic passengers waiting to load and depart at 6:00pm. Other than the time period of Grandview (Cruise) train arrival at roughly 5:30 and Coastal Classic departure at 6:00pm, train, cruise and other operations are isolated from one another through the use of different spaces within the building and/or different times of use.

It is during this timeframe that both cruise and train passengers will spend the longest periods of time within the Terminal. During morning unloading of both the ship and the Coastal Classic, passengers disburse and move onto their next event or mode of transportation relatively quickly. Evening check-in and security screening for the cruise ship is typically kept to under 30 minutes. Although passengers can check-in and wait to load the Coastal Classic beginning between 4:30pm and 5:00pm, many check-in and load the train with less than 30 minutes spent in the terminal, unless the weather is inclement.

Local Kiosk



Passengers Waiting for Transport.

Wind and Rain on Deck

Weekly Schedule

Weekly berthings:	Sunday and Friday
Biweekly berthings:	Monday, Wednesday and Thursday
Tuesday –	Perhaps one ship per year
Saturdays –	No berthings in 2014, 2015, or 2016

The above schedule provides a general look at the weekly berthings with more frequent and consistent ship docking between early June and mid-August and a less consistent schedule in the beginning and end of the cruise season. In 2016 there were three double ship days, with the cruise lines, Port Manager and others putting high priority on the need for the new Terminal to accommodate more of these events in the future.

During final design presentations and conversations, a list of suggestions or requests for plan changes was generated for further analysis and potential modification. These starting points for future plan development are provided below:

1. Move the east to west pathway on the cruise (west) side of the building to be along the north wall so that passengers enter at the north and flow through queuing and check-in directly to security. The current plan allows train passengers or others to interrupt the circulation of cruise passengers who have just checked in and are proceeding to security. The backdrop behind the cruise check-in podiums may be cumbersome in this scenario, so an alternate is to have the podiums back-up against the west or east walls/boundaries of the cruise operations area with the queuing space split down the middle. This configuration would be like what exists on the east side of the current terminal and would be mirrored to the west side. The main entry on the west side would move north with the pathway, locating it at the northwest corner of the facility.

2. Move the eight vendor kiosks currently located in the SW area of the north to south hall, across from the train waiting and access area, to the north wall of the Cruise side. Located on the eastern side of this wall, just to the west of the north entrance, this move resolves several issues. First, it gets the queues for these services out of the traffic pattern from the train and ship passengers as they move north through the Terminal and out of the facility. Second, it uses space during the morning debarking time, 6:00 to roughly 11:30, that is not used or lightly used. During the morning hours this space is only used for independent luggage laydown, with the majority of the bags being laid down on the west end of the cruise ship operations area.

3. Confirm if ARRC Port Manager and Assistant offices are separate or combined on the second level. Current Port Manager requested they be combined, other suggested they be separated.

4. The need or desire for a covered luggage sorting and screening area currently located on the far southwest corner of the plan needs to be finalized. Some cruise line operators requested it to help keep luggage dry, others wanted to only handle the luggage once continuing to screen luggage on the dock as is currently done. During Concept Design security personnel indicated screening on the dock was acceptable to

the Coast Guard. Final inclusion of this area will be resolved in next design phases.

5. One design concern of the proposed floor plan was that Grandview (Cruise) train passengers would enter the building at the far southeast corner and then travel north to get into line for security screening. There was concern that significant cruise line personnel would be required to keep track of all of the passengers, moving them along to their destinations. Access to the Level Platform Loading (LPL) facility is pushed as far south as possible due to the length of the Coastal Classic and it blocking Port Avenue between its arrival at 11:00am and its departure at 6:00pm. ARRC operations did not want to pull it north to clear Port Avenue during the day. LPL access within the building is driven by what happens with Port Avenue and how the dock is accessed around the building. The Coastal Classic needs to be on the west side of the LPL for luggage operations from this train. If LPL access can move north within the building, floor plan adjustments could be made to ease the above noted concern. Conversely, separate security screening or another solution will need to be explored in the next design phase.

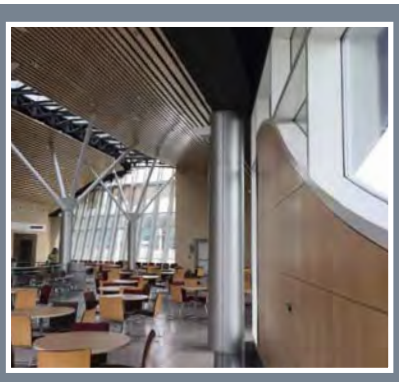
6. A staff toilet is provided for Longshoremen and others on the first floor in the central area on the east side of the floor plan. There are currently no restrooms available on the freight dock and 24/7/365 access to restrooms and showers was requested. If these services are to be provided in the Terminal, a shower should be added for their use, and a confirmed access path of its users established. The toilet and shower combination, or separate facilities, may need to be located closer to this access point, which is most likely from the south closest to the Longshoremen traier. Additional staff restrooms maybe warranted in this area for vendors, cruise and train operations staff.

7. A drive through staging area for package cruise coaches at the northwest corner of the site was requested for ease of use. When a dock configuration is selected and the number of coaches to be loaded on land versus on dock is determined, this feature can be worked into the revised site plan.

Interior Construction Character and Level of Finish

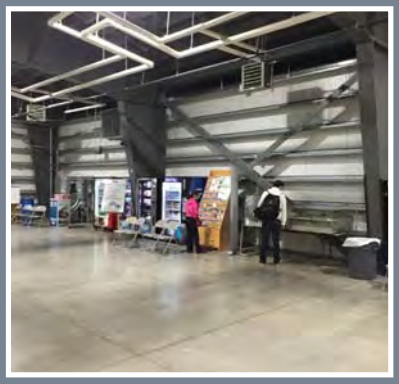
For cruise ship passengers, the Seward Terminal could be their first step or last step on Alaska soil, or the final leg of their journey, it is a gateway for tourists to Alaska. Stakeholders familiar with the current facility and the Whittier Terminal, requested an updated, less-industrial and more welcoming feel for the new Terminal. Artwork, color schemes and information maps, etc. should have an Alaskan character.

The facility has heavy summer traffic that includes wet, silty soils being tracked through and people with luggage, baggage carts, carted goods and other traffic that could damage walls and floors. Winter traffic also brings moisture into the building and could include forklift and material storage, as well as materials being moved in and out for various events. Interior materials and finishes should be durable, easily cleaned and long lasting. Examples of similar Alaskan buildings are provided on the next page.



Airport Depot Level of Finish

Fairbanks Depot Level of Finish



Whittier Terminal Level of Finish

Emergency Requirements

The facility is the designated emergency shelter in case of a cruise ship related disaster, or ship-wide illness. A review of these requirements was performed during Concept Design and a preliminary assessment indicates the floor plan as shown can meet these requirements. Requirements for use in this capacity should be incorporated into future floor plan development including the storage of water, blankets, etc. as required.

The Terminal is not a shelter facility for the City of Seward's emergency planning. The site of the passenger dock, Port Avenue and the Small Boat Harbor was destroyed or heavily damaged in the tsunami following the Good Friday earthquake on April 5, 1964. Emergency routes away from the docks and terminal are part of the city's emergency evacuation plans. Site and circulation access within and away from the site will need to be coordinated with the City's emergency planning department during design.

Security Requirements

The building itself is not secured during normal hours of operation, however, access to the dock through the Terminal and on site is controlled under the requirements of 33 CFR Maritime Security. Additional security information is provided in the electrical section below, and as shown and described on the floor plans found in earlier sections of the report.

Building Systems

Structural

The foundation system will be informed by a geotechnical investigation to occur during the early stages of Schematic Design once a structural Engineer of Record is on board. What system is used will be dependent on that report and whether the west or cruise side of the building will be All-Season construction or Pavilion style.

Likewise, the structural system used for exterior wall and roof support will be dependent on the above noted information. It is anticipated to be of steel construction, due to the desire for an open, daylight façade, meaning sheer stresses will be handled by steel framing versus solid wall assemblies. Separation of the building sides, east and west, at the foundation line, exterior assembly, and up through the roof, will require careful detailing if the two sides of the building are designed to experience significant temperature differentials between them.

Design criteria to consider are wind, earthquake, and Tsunami potential. The facility is not an essential facility, but can hold large numbers of people within it at any one time.

Exterior Envelope:

A building's exterior envelope consisting of walls, roof, windows and doors, creates the thermal and weather barrier that protects occupants from outside cold and weather. The State of Alaska Building Safety Department does not typically include energy efficiency requirements in their adopted building codes. However, as a

minimum, the envelope will need to be designed to any applicable energy efficiency standards that may be required by funders. More importantly, envelope assemblies should be designed to be of long-term protection of ARRC's financial assets as determined through energy modeling and Life Cycle Cost Analysis. Arctic vestibules should be provided to retain temperature controlled air inside the building. Canopies are needed wherever pedestrians will be traveling or waiting outside of the building due to heavy rain. Wind protection is also needed due to wind-driven rain. Sand and silt from the adjacent river basin and freight dock area is driven by wind across the site. The Seward, waterfront environment is harsh on buildings and materials and assemblies must be designed and carefully detailed for wind-driven rain that includes corrosive salt water spray. Landscaped areas under roof eaves should be provided with materials that are designed for the erosion of heavy rainfall and to prevent water splashing up and on to the base of the exterior walls.

Mechanical and Electrical spaces are kept to the northeast corner of the terminal, for service access without circulation through the building being required. This area is also somewhat "back of house" due to train luggage handling and servicing of the Coastal Classic.

Mechanical

General System types:

Heating

While electric baseboard is used in some facilities within the Railroad Port area, fuel oil boilers with hydronic distribution systems typically cost less to operate in Alaska, except for communities where electricity is generated through hydro dams. Seward's power is only partially provided by hydro dam production. An underground fuel storage (UST) was requested for the boiler's fuel oil to be located off the NE corner near Railroad luggage operations.

Ventilation

Ventilation system and capacity will be provided as required for Assembly occupancy and provided with heat recovery and scheduled to operate in an energy efficient manner.

Sprinklers

Terminal will be fully sprinklered with a NFPA 13 system. Dependent on the style of construction used on the west or cruise side of the facility, an interior dry sprinkler system may be required for that side. A dry system will also likely be needed for canopies and covered luggage handling areas in the NE and SW corners of the structure.

Controls

An automated building controls system should be included to control and monitor the building systems to help reduce energy use and operate the building in a scheduled and efficient manner. Such a system can also record building operations which can be used for energy use management and building maintenance and operations.

Electrical Train Storepower

Electrical

Site Power

Shore power for both the Coastal Classic and Grandview (cruise) trains is required. Each train is to have its own shore power unit, located at the southern-most end of the Level Platform Loading platform. As this area is adjacent to the train waiting area, it is between waiting passengers and the view of the mountains and Resurrection Bay. Due to this and all passengers needing to pass by it to load and unload the trains, careful design and detailing of screening to reduce visual impact is needed.

Grid power for large cruise ships is not provided as the grid does not have the capacity to serve such ships. However, power is available to these ships for communications during debark and embark operations. Additionally, power is available for a fee for small cruise and non-cruise vessel use for Maintenance and Repair so that moving a portable generator into place is not required for each occurrence.

Grid transformer and service upgrades may be required as determined when a full design team of engineers is secured for the next phases of design.

Generators

There is a back-up generator at the south end of the existing Terminal that powers dock security gates, x-ray machines and security lights. It is not an emergency generator. The intent of the generator is to allow cruise ships to load and leave port even when the grid power is out. However, the current generator is not properly sized for this as it cannot run the cruise line's computers to check-in passengers. A compatible connection between this generator and the ship's check-in computers is also a current barrier. Generator power is required in the new Terminal to serve the purposes described above, and as modified through future design efforts.

Communications

Modern communications systems are required throughout the proposed facility to include; wifi, visual and audio public announcement systems, including on site and dock, and updated office technology. Security, Railroad Passenger services and cruise operations personnel all requested programmable, LED, electronic signage for better communicate with passengers. Effective, well designed signage for wayfinding, security and other purposes will be required throughout the building and site.

Lighting and Controls

The building should have daylight, occupancy and other energy saving lighting controls and use LED lights for both interior and exterior applications wherever possible. Lighting coverage is critical on the dock and site due to use outside of daylight hours and the mixing of several modes of transportation with pedestrians. Emergency lighting to be provided as required by building code and dock and site security requirements.

Access and Security Control

As noted above, security clearance is needed both inside the building and outside for access to the dock. Cameras are needed for the dock, the site and inside the building.

A surveillance system is required and such requirements will be developed through future design development.

Exterior Architectural Character and Envelope

During each design charrette, the exterior massing and character of the building was further refined. In Design Charrette #1, exterior images of buildings that had a wide range of styles and shapes was shared to garner likes and dislikes from the design review committee. Images below include were viewed favorably by the Design Committee.

Examples of Pavilion style construction that were viewed favorably are below.

Priorities for the exterior design included:

+ Having an Alaskan feel or vernacular
+ Similar in style to other Alaskan Railroad Depots
+ An aesthetically pleasing and prominent entrance
+ Human scaled, not a looming, tall, warehouse
+ An iconic feature that was unique to the building and the Alaska Railroad
+ Windows to highlight the views of Resurrection Bay, Seward and surrounding mountains
+ Daylighting
+ An open feel that allowed passengers to see what was outside the building, such as train, coaches, or ship, to assist in orientation and wayfinding.

Through this feedback and that received on interim design solutions, three massing options were developed as shown below.

Option A Landside View:

Option A Dockside View:

Option B Landslide View:

Option B Dockside View:

Option C Landside View:

Option C Dockside View:

In final design charrettes and presentations, Option B was well liked with participants noting that a clock or stain glassed image of a train could be placed in the round window at each of the entrances located on the four sides of the building. It was suggested that each entrance window could have its own unique design, delineating it from the others and assisting in identifying the area of the building whether it be the cruise side, train side or a more Alaskan or Seward design at the dock entryway.

Energy Efficiency Levels and Standards and Renewable Energy Opportunities:
ARRC has indicated they would like the facility to be designed to LEED Silver standards. Whether project documents will be submitted and approved through the US Green Building Council for official certification or not will be decided in future design phases. This decision will also be impacted by the potential funding entities and programs. Federal funding typically requires LEED Silver or two Green Globes on the Green Globe Initiative certification program.

Both ARRC and the Seward community are very enthusiastic about seeking alternative energy sources to heat and/or power the future Terminal. This is primarily driven by the successful use of seawater heat pumps at the Alaska Sealife Center in downtown Seward. This center is a large employer and driver of the local economy and tourist industry, and the benefits of the pumps have been widely shared. For several years, the city of Seward has also been exploring groundwater wells that capture seawater heat during tide changes. Future design phases should plan to actively pursue and explore these and other alternate, potential heating resources, particularly with environmental permitting and construction for the dock as a key part of the overall construction project. These costs and permitting timelines are already required and provide an opportunity to install pipes, pumps and other necessary items in and/or around the dock to harvest the warm, compared to air temperature, seawater. An analysis of how the existing terminal uses energy and energy modeling should be employed to determine if electrical or heating costs will be the larger cost for future operations and then renewable opportunities that provide the highest cost service in a less costly manner, either heat or power, should be explored.

Construction Budget

Throughout the design process, it was emphasized that construction operational costs should be kept low to keep user fees down. Cruise line and tourist activities are key drivers of both the Seward and Alaskan economies with passengers that arrive in Seward providing economic impact throughout Alaska as they travel north and throughout the state. This direction, paired with the lack of activity and subsequent decrease in revenue during the winter season, requires careful capital budgeting and operational management planning. Utilizing the facility for off-season, or even days with no cruise ships, special events should be revisited during the next phases of design.

A Rough Order of Magnitude Construction budget was created from design information available in fall 2016. The estimate was not a line item or detailed estimate, but rather a cost per square foot per type of construction applied to the relevent square footages within the design. Dollars are escalated to 2019, with construction completion anticipated for 2021, and have a 20% estimator's contingency. This construction cost was developed into a Project Budget to include design, permitting, project management, furniture, fixtures and equipment, site survey, geotechnical investigation, project contingency, and other project overhead costs. It does not include environmental permitting.

ROM Project Costs	*Category*
$14.2M	All-Season space, east side of building
$7.2M	Pavilion style or west side of the building
$5.7M	Level Platform Loading base and Site work, not including dock, Port Avenue or train track work
$8M	Level Platform canopy, covered walkways (landside), Covered walkways (on dock), Covered Cruise luggage operations
$35.2M	Overall Project ROM Costs for part All-Season and part Pavilion style building
$348 to $235	Cost per square foot range between All-Season and Pavilion style construction

Assuming there are not significant design changes from what is shown within this Concept Design Report, it is recommended that a line item estimate be provided in the earliest stages of design, before it progresses much further. This is to ensure alignment between the proposed construction budget and the budget information above.

Completion Timeframes

Timelines for funding, design, permitting and construction, will be established through coordination with dock construction, phasing and necessary temporary facilities when a preferred dock option is chosen and a phasing strategy is established. Information below provides a schedule in general terms for use in developing the project specific design and production schedules.

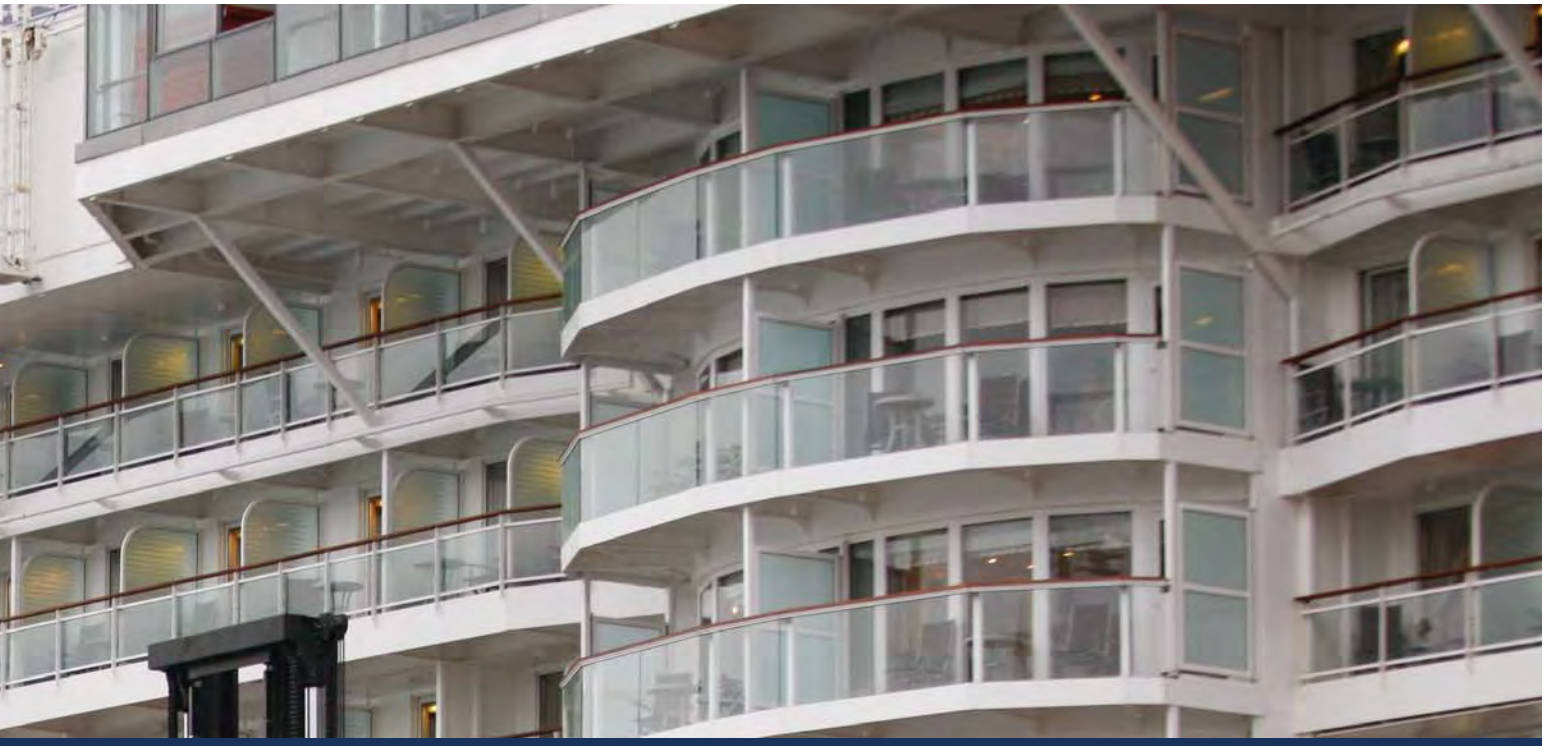
Time Allowance	*Phase Name*	*Description*
Three to Four months	Design Team onboarding	This includes writing the Request for Proposals (RFP) over one to two months, issuing the RFP and having it "on the streets" for three weeks, firm interviews, fee negotiations and contract signing.
One year minimum to 18 months	Design	Includes confirmation or modifications to Programming and Concept Design efforts through the following design phases: Schematic Design (35%), Design Development (65%), 95% Construction Documents, and Bid or Construction Document.
Unknown	Environmental Permitting	Please refer to other sections of the Master Plan for time allowances and requirements for this effort. This process can take several years and can cause significant delays if not properly scheduled. Understanding what is required and the length of time required is critical for overall project success.
Three to Four months	Plan review and Permitting	Due to budget constraints, the State of Alaska has reduced their Plan Review offices causing a significant increase in plan review time. Considered a large project by Alaska standards, the longer than normal time allowance should be provided for the Terminal project. While early consultation helps with review comments, projects are processed in the order received. This time frame can overlap with bidding.
Two months	Biding	Normally occurring after the completion of construction documents in traditional Design-Bid-Build Bidding, bidding is typically scheduled to occur between December and February. Two months includes a month to advertise and one month to negotiate and sign the contract. If an alternate delivery method such as Construction Manager/General Contractor (GC/GC) or Contractor at Risk(CAR) or similar is used, this should be decided early in the next phases of design, or prior to issuing the RFP for professional architectural and engineering services. GC/CM or similar approaches typically brings the construction contractor onboard between 35% and 65% design, but the same amount of time should be allowed for this type of bidding and contracting process.

Two Years Plus	Construction	It is assumed temporary facilities and construction phasing will be required because the cruise operations must continue operating during construction. Of course, this is dependent on which dock option is selected, but between seasonal limitations, the adjoining dock construction and the need for operations to continue, the schedule should allow a minimum of two years for construction. Construction timing is dependent on the seasonal barge schedule even though Seward is an ice-free port. This dependence comes from the lack of train service, only once a week in the winter, and difficult winter truck service between Anchorage and Seward. Anchorage is the main port for roughly 98% of the goods that enter Alaska.

Expected Building Life

The current Terminal has served since 1964, 53 years, and if it wasn't for the piles underneath it deteriorating, it could continue to function in its capacity for 5-10 years before a major renovation would be required. Likewise, the new Terminal will be a long-term investment and asset for its owners. The building should be designed for a life expectancy of 40-45 plus years, with a major renovation to occur at year 25, which should extend the life for approximately 15-20 additional years.

End of Concept Design Report.



Appendix G:
Facility Fact Sheets

Credit: Judy Patrick Photography, 2012

DEPOT

Factsheet

DESCRIPTION

The Depot, or “Summer Depot” as it is sometimes called, provides accommodations for 59,426 (2015) passengers using the daily-scheduled Coastal Classic train from mid-May to mid-September. Coastal Classic travels between Anchorage and Seward with more passengers riding Southbound (from Anchorage) than northbound. This single-story building has a waiting area, storage room, small mechanical room, a single restroom, and a reception/ticketing counter area with storage. Tourist pamphlets, brochures, and other information, are available at the Depot. Rail passengers can make transportation connections to the City of Seward, local tours, restaurants, attractions, hotels, and cruise ships from the Depot. Access to the Depot and parking is by a one-way drive that enters northeast of the Depot from Leirer Road and exits south to Port Avenue.

Additional restrooms are provided in a small, separate structure north of the Depot. Luggage handling occurs in a steel-framed tent located north of the Restroom Building. A small Storage Shed is located at the far north end of the Depot site and a shore power connection is provided for parked trains at the south end.

In general, the Depot and adjacent outbuildings are in good condition and are well-kept.

General Information

- Construction Date: Depot 1997, Restroom Building 2005 or 2010, Storage Shed October 2015 and Shore power in 2010.
- Years in Service: Roughly 19 for Depot, 16 for Restrooms and 1 for Storage Shed and Shore power.

- Structure Type: Depot and Restroom Building are assumed wood-frame on concrete masonry unit (CMU) foundation with crawlspace, modified gabled hip roof. Storage Shed is CMU construction.

Primary Features

Both the Depot and Restroom Building are raised construction, approximately 12 inches above adjacent grade, and are equipped with ramp and stair access that appear to meet current Americans with Disabilities Act (ADA) requirements. The one-storey structures have modified hip roofs, punched window openings in the Depot, and horizontal wood siding. The hipped roofs drain on all sides of the building, thus ensuring the downspouts are functioning properly is critical to keeping people who are accessing or waiting near the buildings dry. The large overhangs have been noted as valuable for protecting waiting passengers from rain.

OPERATIONAL DETAILS

- The facilities are seasonal, operating mid-May to mid-September. Currently, the Coastal Classic train arrives in Seward daily at 11:05 a.m. and departs for Anchorage at 6:00 p.m.
- The passenger Depot is one terminus of the Seward railroad line.
- The heaviest period of use within the buildings is between 5:00 p.m. and 6:00 p.m. after passengers have checked in for the return trip to Anchorage.

LIST OF APPLICABLE REPORTS AND STUDIES

- 12/31/2010 Seward Depot Improvement – file located on project SharePoint site (https://sewardmarinesp.akrr.com/sites/SewardMarineTerminal/SitePages/Home.aspx).

DEFICIENCIES AND AREAS OF CONCERN

Issues Identified by ARRC Staff

- The facility is closed mid-September to early-May and vandalism has occurred during the closure.
- During summer months, the luggage tent has provided cover for unwanted visitors to hang out.
- Traffic around Depot is noted as “a mess” and “horrible”. Some factors that contribute to this description are some drivers do not realize it is one-way circulation and enter off Port Avenue which is exit only. Another issue is the lack of a designated unloading/loading area for tour vans and motor coaches, so they stop in the circulation driveway. There is insufficient parking. Pedestrians walk to the south or the east, and there is not a designated walking path so they cross the site in any direction. Finally, the driveway cut to access Port Avenue is very wide making it more difficult for pedestrians to cross to the designated crosswalk on Port Avenue or to access the sidewalk on the north side of Port Avenue which goes to the Terminal.
- The facility is minimally heated and maintained without generating income for the majority of the year.
- It was suggested to move the Depot closer to the Passenger Terminal or to combine them.
- Insufficient space to accommodate passengers, keeping them dry and warm, between 5:00 p.m. check-in and 6:00 p.m. boarding was noted. The railroad has accommodated this by allowing passengers to begin loading at 5:00 p.m.
- Luggage handling for “Independent” travelers who are connecting to cruise ships and have their luggage with them drag their luggage down Port Avenue to the Terminal due to either unclear or lack of vehicular transport.
- Request for larger overhangs for people to get out of the rain.

- New federal accessibility regulations require at-grade access to trains which is not currently provided. Providing this feature would only apply to major renovations or new construction.
- Railroad Passenger Services would like to make the Depot about 10 times larger, with a gift shop, a public announcement system, and with baggage and check-in located closer together. They also suggested separating railroad baggage forklift and passengers for safety. Passenger Services would like electronic signage both inside and outside of the building, in addition to signage directing traffic from the Seward Highway to the site entrance from Leirer Road.
- Movement of passengers from the Depot can be delayed after the morning train arrival when multiple types of transportation are simultaneously attempting to load passengers and luggage.

Issues Identified by External Stakeholders

- Maneuvering of various modes of transportation and support services are pinched between the tracks, buildings and Leirer Road. Several suggestions or comments were made to improved traffic control included stripping, designated loading zones, more parking and clear pedestrian paths.
- The industrial buildings and area to the east were noted as a detractor to the beauty of arriving in Seward. Murals and beautification were suggested.
- Free Wi-Fi, technological modernization, drinks, food, light entertainment, and area to hang-out were suggested.
- The location of the Depot to the tourist oriented area by the small boat harbor is important to the community and local tour operators.
- Distance and lack of transportation to terminal is a problem, as is scenery along Port Avenue.
- Tour coordinators for cruise ships like to hold Coastal Classic people at Depot so they can control how many arrive at Terminal and need to check-in etc. all at once, but there is not space to hold people at the Depot.
- It was suggested that baggage handling protocols conducted in Anchorage during the morning loading of the Coastal Classic could help alleviate the baggage issues in Seward.
- Currently a free shuttle is operated by the City of Seward, but only travels one direction going from the Depot to the downtown Seward area and ending at the terminal. For those passengers who have their luggage with them, the Independents, this causes them to ride a school bus for roughly 1 hour with all of their luggage in tow, so they often choose to instead pull their luggage the roughly 0.6 miles from the Depot to the Terminal so they can check into their cruise and load onto the ship.

ENGINEERING DATA/CODE & CONDITIONS SURVEY

GENERAL INFORMATION	
Building Name/Location:	Depot, Restroom Building and Storage Shed
Purpose of Facility:	Coastal Classic embark and disembark, luggage handling
Supervising Department:	
Services Provided:	Water, wastewater, electrical heat and power
Date of Construction:	1997 for Depot, Restroom Building in 2010, 2015 for Storage Shed
Date of Renovation:	No renovations have occurred
General Condition:	Good
Land Ownership:	ARRC
Lot Size:	
Building Size:	1,155 sf with 527 sf of overhangs

SITE	
Outbuildings - Types	Restroom Building and Storage Shed
Outbuildings – Sizes	Restroom: 637 sf, Storage: 216 sf
Outbuildings - Uses	See names
UTILITIES	
Water Source	City water
Waste Water	City sewer
Electric Service Utility	City grid
Fuel Type & Storage Size	none
Heating System	Electric baseboard heat in Depot and electrical Cabinet Unit Heaters in Restroom Building. Storage Shed is unheated.
Building Controls System	Non-programmable thermostats
Security	Cameras in Depot waiting lobby
Survey Data provided by	Bettisworth North – Dena Strait and Emmanuel Daskalos
On-Site Space Use Audit	Bettisworth North – Dena Strait and Emmanuel Daskalos
FIRE & LIFE SAFETY	
Smoke/Heat/CO Detection	None present
Program Compliance	
Building Type Compliance	
Entry/Exit	ADA - compliant except at Storage Shed
Restrooms	Depot has one unisex ADA-compliant restroom (if storage lockers were moved out) and the Restroom Building has three stalls per sex with two sinks in each restroom.
Other	
FACILITY CONDITION	
Exterior Wall Finish	Depot and Restroom building both have horizontal painted wood siding in good condition
Exterior Entrance	Depot has two pairs of double doors, in good condition. Restroom Building has one exterior door each for men's and women's restrooms, in good condition
Interior Wall Finish	Depot has paint on gypsum wallboard in good condition, Restrooms have fiberglass reinforced plastic (FRP) in good condition.
Interior Floor Finish	Depot has vinyl composite tile (VCT) throughout and Restroom Building has sheet vinyl.
Interior Ceiling Finish	Depot has finished wood. Restrooms have painted gypsum wallboard (GWB).
Interior Casework	Wood at Depot Check-in Counter and plastic laminate (PLAM) at Restroom Building.
Windows	Double panes with operable sections at Depot.
APPLIANCES	
Commercial	
Residential	Depot has 20 gallon electric hot water heater, small refrigerator and microwave. Restroom Building has on-demand hot water heaters.
LIGHTING & ELECTRICAL	
Service	120V/208
Emergency Power - Uninterruptible Power Supply (UPS)	None
MECHANICAL	
Ventilation	Exhaust fan in bathrooms of Depot and Restroom building. Operable windows in Depot.

Controls	Non-programmable thermostats
GROWTH & CONSTRAINTS	
Site	Yes
Building	
Code	There is likely a distance setback between the buildings to eliminate the need to rate the exterior walls.
ENERGY CONSERVATION	
Energy Forms	Electricity
GENERAL COMMENTS	

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JESSE LEE MAIN

Factsheet

DESCRIPTION

The Jesse Lee Main was originally constructed during 1914 beginning at Milepost 0.0, near the current Alaska SeaLife Center, as the mainline of the Alaska Railroad. The first part of the track was destroyed by the tsunami that followed the 1964 Good Friday earthquake, and was not rebuilt. This section of the mainline currently begins at Milepost 1.6, just north of Port Avenue, and extends to Milepost 3.0 at Airport Road. The Jesse Lee Main is currently used for turning trains and passenger unloading and loading for the Coastal Classic passenger train which operates from May to September. The mainline then continues north to Anchorage and Fairbanks.

RELATED FACTSHEETS

- The Jesse Lee Main is located within Seward **Depot** and ROW
- The **Depot** directly supports passenger service on the Jesse Lee Main
- The **Roundhouse** is located within the Railyard and is traversed by Roundhouse Tracks #1, #2, and #3

OPERATIONAL DETAILS

- Length: Approximately 7,400 feet, from end of track to Airport Road
- Standard gauge
- Grade is nearly zero for southern 4,700 feet. Grade is 0.29 percent ascending to the north for the northern 2,600 feet
- Mostly tangent track. The initial 1,300 feet is a 2°00’ curve.
- Track is within Yard Limits of Seward and non-signaled.
- Speed Limit is 20 mph for passenger and freight trains.
- At-grade crossings:
    - Milepost 2.24 – Aspen Lane, wood tie crossing
    - Milepost 2.97 – Airport Road, concrete crossing panels
    - Shoreside Petroleum spur – crossing panels

Aspen Road At-Grade Crossing

Airport Road At-Grade Crossing

Shoreside Petroleum Spur At-Grade Crossing

ENGINEERING DATA

- Rail is jointed 115 pound/yard (lb/yd) rolled in the mid 1950’s
- Wood ties, nominal dimensions 7 inches x 9 inches x 8.5 feet
- Turnouts to other tracks:
    - Milepost 2.23: #9, left hand, 16.5 foot switch points, RBM frog, to Shoreside Track
    - Milepost 2.26: #9, right hand, 16.5 foot switch points, RBM frog, to Wye Track
    - Milepost 2.76: #9, left hand, 16.5 foot switch points, RBM frog, to Upper #8 Track
    - Milepost 2.99: #9, left hand, 16.5 foot switch points, RBM frog, to Upper #6 Track

LIST OF APPLICABLE DRAWINGS

- Alaska Railroad Corporation, Track Chart, April 2015
- Alaska Railroad Corporation, Track centerline CADD Drawings

FEATURES

- Shoreside Petroleum Spur:

- Length: Approximately 1,200 feet, from clearance point near Leirer Road to end of track.
- Previously used for offloading fuel from rail to onsite storage tanks. Spill containment panels installed for approximately 450 track feet.
- Locked out since the shutdown of the Flint Hills Refinery in 2014.
- Future plans to add fuel loading capability as early as 2017.

DEFICIENCIES AND AREAS OF CONCERN

- The proximity of the mainline to the Seward Highway causes queueing challenges for vehicles entering the highway; there is limited space between the highway shoulder and the track for vehicles to queue without blocking the track. This is especially challenging for HAZMAT freight vehicles and others which are required to stop before crossing the track. This issue is exacerbated at the Seward Highway and Airport Road intersection, where the highway bridge to the north limits the line of sight for turning south onto the highway from Airport Road.
- Challenges external to the Seward Reserve for accessing Seward by rail include 3 percent mountain grades, greater rail distance from the Interior compared to other Alaskan ports, clearance limitations through bridges and tunnels, and delays/maintenance due to avalanches and icing.
- Operational inefficiencies to the Seward Reserve include one-way revenue. Currently, a dead-head train is required to support a revenue train.

Shoreside Petroleum Spur, Containment Pans

- Tie condition has deteriorated throughout much of the Railyard and a significant portion of ties are nearing end of life. There is no capital program for tie replacement; only essential maintenance replacement is being conducted.
- When a cruise ship is in port and the Costal Classic train is occupying the track adjacent to the Depot, ship crew members will often climb between cars to gain access to the Seward Highway.

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SEWARD LOADING FACILITY

Factsheet

DESCRIPTION

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, Alaska for shipment worldwide. The facility was constructed on property leased from the Alaska Railroad Corporation (ARRC) to Suneel Alaska Corporation. In 2003, ownership of the Seward Loading Facility was transferred to the ARRC.

The SLF consists of a conveyor, vehicle access and stationary ship loader. 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. Coal has been the primary bulk material shipped to international markets.

However, due to the diminishing demand for coal, the facility was taken out of service and currently serves as a temporary mooring location for vessels awaiting berth at the Passenger or Freight Docks. While both the superstructure and substructure are in good condition with minor corrosion present, significant maintenance will likely be required to bring the conveyor and loader back into full operation. Should the SLF be decommissioned, the facility could serve as long-term storage for barges or for medium to large vessels. The large uplands area interfaces directly with the existing industrial and commercial property which could be a strategic location for cruise ship infrastructure and potentially serve as an alternate Passenger Dock with modifications.

General Information

- Construction Date: 1984
- Years in Service: 31 years
- Structure Type: Pile-supported trestle with conveyor
- Length: 1,700 feet
- Area: 33.91 acres
- Stockpile Capacity: 130,000 tons
- Dock Elevation: +24 Mean Lower Low Water (MLLW)

Primary Features

- Railcar dump and transfer conveyor facility
- Stacker-reclaimer to collect and transfer bulk material from stockpile to trestle with conveyor
- Conveyor connected to stationary ship loader for discharging bulk material to bulk ship operated by control building
- Dolphin berth
- Facility connects directly to rail by a single track spur extending to the railcar dump
- Port Avenue crosses the conveyor by bridge

OPERATIONAL DETAILS

- Annual throughput capacity: 1.65 million tons
- Unit train unloading: 2,750 tons per hour
- Rail mounted stacker-reclaimer:
    - Stacking capacity: 2,750 to 3,300 tons per hour
    - Reclaiming capacity: 770 to 1,100 tons per hour
- Average loading time: 5-6 days to load 77,000 tons

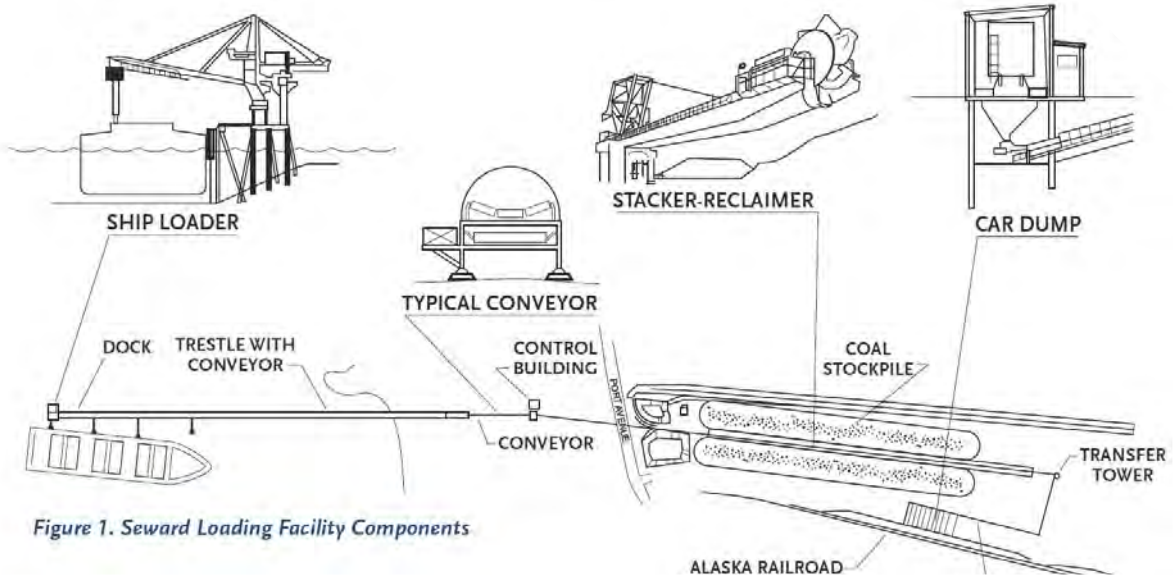


Figure 1. Seward Loading Facility Components

ENGINEERING DATA

- Berthing Load:

44,000-ton cruise ship approaching dock at 0.3 ft/sec. Assume ship's quarter point shall contact fender at 10° from parallel to dock face. Maximum docking energy to each fender is 250 kip-feet

- Mooring Load:
    - Dock Face: 100 kips any direction
    - Mooring Dolphin and Bollard: 400 kips in any seaward direction at a 30° maximum incline from horizontal

- Design Vessel:
    - Cargo Ship:
        - Length =853 feet
        - Beam = 129 feet
        - Tonnage = 136,933 LT (Displacement)

- Design Seismic Acceleration:
    - OLE (Operating Level Event): 0.2G

- Design Significant Wave Height: 6.0 feet (Spectral period: 5.0 sec)
- Wind Data:
    - 110 mph Exposure "D" (UBC), except for mooring loads
    - Mooring Conditions:
        - 80 mph in North-South direction October through April
        - 50 mph in North-South direction May through September
    - 32 mph in East-West direction year round

- Tidal Data:
    - Extreme High Water: 15.7 feet
    - Mean Higher High Water: 10.6 feet
    - Mean High Water: 9.7 feet
    - Mean Tide Level: 5.5 feet
    - Mean Low Water: 1.4 feet
    - Mean Lower Low Water: 0.0 feet
    - Extreme Low Water: -5.0 feet

LIST OF APPLICABLE DRAWINGS

- North-South X-Sections (83077 Handling Facility X-Sections 2.pdf)
- Boring and Test Pit Locations (83077 Handling Facility X-Sections.pdf)

LIST OF APPLICABLE REPORTS AND STUDIES

- Soils Investigation: Seward Coal Loading Facility 1983 (83056 Design Criteria for Seward Coal port.pdf)
- Ultimate Pile Capacities (83056 Load Facility Dolphin Data Anlysis.pdf)

- Wind Rose Chart (83056 Seward Wind Rose 1985.pdf)
- 93077 Coal Handling Facility Project Description.pdf
- Report of Geotechnical Investigation: Seward Coal Handling Facility (83077 Handling Facility Geo Report.pdf)
- Pile, Log and Driving Record (83077 Pile, Log and Driving Record.pdf)
- Inspections report following Phase II-B (88088 Coal Port Underwater Inspection Report.pdf)
- Evaluation of Seward Coal Terminal Docking and Mooring Structures (95063 Evaluation of Coal Terminal Docking and Mooring Structures.pdf)

RECENT IMPROVEMENTS

- 2009:
    - Installed additional dust control spray bars along conveyor belts and stacker-reclaimer.
    - Sealed several openings throughout the dust control system.
    - Winterized necessary components of the dust control system to include frost-free valve and spray bars as well as insulation for the water pump house, water lines, and heating lines.
    - Replaced the ship loader transfer chute to minimize incidental spillage and breakdown time.
    - Added scrapers and wipers to the ship loader belts.
    - Installed drip pans beneath the conveyor belt that extends above Resurrection Bay connecting the ship loader to the stockpile yard.

DEFICIENCIES AND AREAS OF CONCERN

Issues Identified by ARRC Staff

- The dock meets existing needs and is believed to be adequate to accommodate any anticipated growth in demand.
- Significant maintenance will be required to bring the loader back into service.
- Potential to decommission the facility due to escalating maintenance costs and diminishing demand for coal. Decision to be made May 2016.

Issues Identified by External Stakeholders

- The dock is high and narrow and has limited vehicle access.
- Larger ships can interfere with cruise ship access to the Passenger Dock.

SEWARD LOADING FACILITY BUILDINGS

Factsheet

DESCRIPTION

The Seward Loading Facility (SLF), currently leased to Aurora Energy Services, LLC (Aurora), a subsidiary of Usibelli Coal Mine, Inc., includes three buildings located within a secure yard in the SLF Uplands area: an office building, a break room modular, and a maintenance shop. These buildings provide operational and administrative space for the leaseholder. An Unloading Shelter that covers coal railcars while they are unloading is located north in the uplands. The conveyance and unloading portions of the SLF are described in the **SLF Uplands** Factsheet.

The office building is in fair condition, however because it is wood and residential grade construction, it is near the end of its useful life and is due for major renovation. It appears there have been no remodel or renovation efforts in the facility since original construction. There is water damage to the south wall which faces the water front. Degradation can be seen on the exterior siding via peeling paint and interior damage can be seen on damaged gypsum wall board, wood window sills and adjacent stair flooring. It is assumed lack of flashing at windows due to the T-111 siding is the cause and there is potential for dry rot of structural members in this wall. If the wall has been wet, as it appears it has been, the insulation has reduced R-value.

The maintenance shop is in poor condition and has reached the end of its useful life. The integral vapor retarder that is attached to the roof and wall batt insulation is torn, punctured and degraded throughout. On-site Aurora personnel said the structure was dismantled and moved to the site in the mid to late 1980s after or near the same time to when the office building was constructed. Many of the timbers appear to be hand-hewn and there is no steel bracketing at post to beam or other connections that tie structural members together. There is no diagonal bracing for wind and seismic loads. The SE corner column of the building is roughly half to potentially 2/3 of the way rotted through due to an ongoing roof leak. The building's ability to remain structurally sound during a large wind or seismic event is questionable.

The break room modular is in good condition as it is relatively new, having been added to the site within the last 3 to 5 years. Finishes and bathroom areas inside are heavily used with industrial type of workers using the facility. Due to the temporary nature of the structure and finishes combined with the heavy use, it will likely need to be renovated within the next 10 years.

The unloading shelter condition is fair in the occupied areas and good in the open to air portions. The majority of this structure is an open-air shelter with enclosed controls areas on the west or conveyance side of the facility. Enclosed areas were not open for observation, but their condition is reported as fair by ARRC.

General information

- Construction Date: Floor Plans are dated December 1983, ground breaking was July 1984, and assumed completion is 1985.
- Years in Service: 31
- Structure Type:
- Office building: wood studs with T-111 sheathed shear walls and siding, stem wall foundation with concrete slab-on-grade, and gabled roof with metal cladding.
- Maintenance shop: timber frame with batt insulation and plywood siding, concrete slab-on-grade, batt insulated metal-clad gabled roof.
- Break room modular: wood framed trailer with flat plywood siding and battens. Asphalt shingle roof. New within last 3 to 5 years.
- Unloading shelter: steel framed, with corrugated fiberglass reinforced siding and metal corrugated roofing.

Primary Features

- Buildings within the secured yard are bordered to the east by the conveyance and measuring tower where the coal is elevated, distributed in the tower back to grade level and then enters a gradually rising portion of the conveyor to the ship loading area. The unloading shelter is to the north of the Uplands and is the starting point of the coal distribution system on the Seward Railroad Reserve.

OPERATIONAL DETAILS

Office Building

- The upper room is the control station for the SLF conveyance and loading systems
- The lower level is an office area with:
    - four workstations;
    - shower/bath facility;
    - large electrical room that serves the controls/distribution; and
    - typical office level of storage.
- There are two small connexes off the south side of the building with unknown contents.
- Most safety features focus on the high voltage electrical service that operates the conveyor.
- On-site information was provided by Rocky Elhard with Aurora who has been at location for 9 years.
- There are currently three occupants in the SLF permit area which includes both Uplands and Marine Zones.
- Last year, the occupant count was 7 and there was a high of 22 approximately 3 or more years ago.

Maintenance Shop

- Overhead door and man door
- 20-foot conex at south end of structure with roof covering interstitial space and top of conex
- A small Bobcat is parked inside
- Significant storage space as well as various work benches and welding area

Break Room Modular

- Contains a small kitchenette with break room area
- Has stacked washer and dryer and two restrooms, one with a shower
- Houses handheld radios and base
- Stores safety clothing and file cabinets

LIST OF APPLICABLE DRAWINGS

- Floor plans and exterior elevations from 1983 Construction Documents are located in 2nd floor of Office Building. Photos of plans are included at the end of this document.

DEFICIENCIES AND AREAS OF CONCERN

Issues Identified by ARRC Staff

- Concern over high electrical costs despite little operational activity has been noted. This is understandable with all of the buildings using electricity for all or some portion of their heating needs as well as the age and energy inefficiency design of the structures.

Issues Identified by External Stakeholders

- The structural degradation of the corner post of the maintenance shop, which is described above, was pointed out by on-site Aurora staff.
- Aurora on-site staff also noted that during high winds and rains, water leaks through the south wall at window openings. Damage caused by this leakage is noted in more detail above.

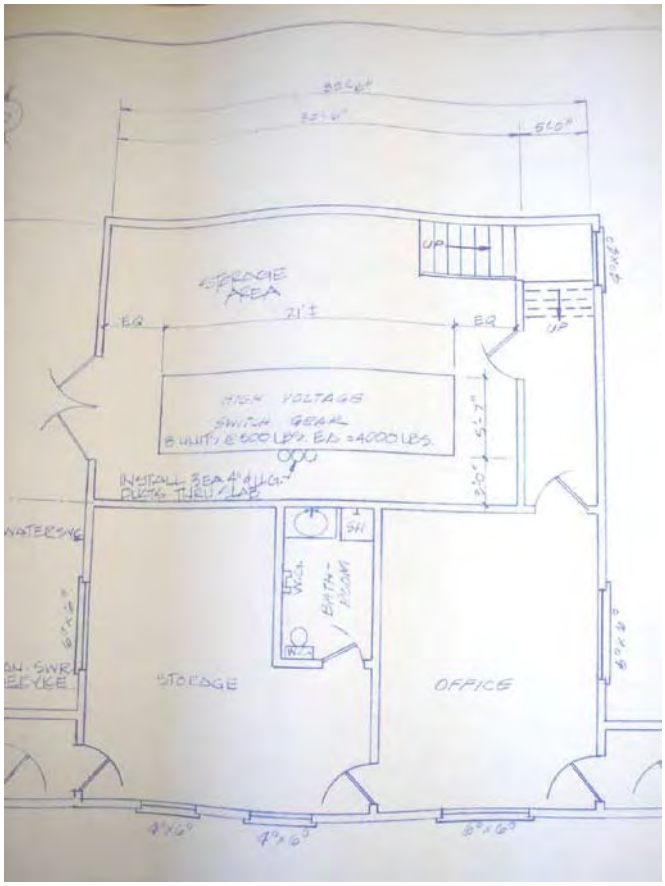
ENGINEERING DATA/CODE & CONDITIONS SURVEY

GENERAL INFORMATION	
Building Name/Location:	SLF Office
Purpose of Facility:	Office space for lease holder/permit
Supervising Department:	
Services Provided:	Grid Power, city sewer and water, propane and electrical heat
Date of Construction:	1984 to 1985
Date of Renovation:	Appears to not have been renovated
General Condition:	Fair
Land Ownership:	ARRC
Lot Size:	

Building Size:	2,200 sf
SITE	
Outbuildings - Types	Break room modular unit and Maintenance Shop
Outbuildings – Sizes	Shop = 1,740 sf, Modular = 605 sf (11 feet x 55 feet)
Outbuildings - Uses	See names
UTILITIES	
Water Source	City water to office building and break room modular only.
Waste Water	City sewer is at office building and break room modular only.
Electric Service Utility	City grid to all three structures.
Fuel Type & Storage Size	Break room modular has a 1000 gallon propane tank.
Heating System	Office building is on electric baseboard and cabinet unit heat, break room modular uses electric baseboard in restrooms and propane forced air furnace heater in one portion of the building and assumed propane hot water generation. Maintenance shop has electrical cabinet unit heater distribution. ARRC and Aurora currently share the electrical bill.
Building Controls System	Thermostats, not programmable.
Security	Fence protects dock area to water line. Security is in compliance with U.S. Coast Guard Maritime Security (MARSEC) requirements and there are security cameras on the southeast corner of conveyance tower.
Survey Data provided by	Bettisworth North: Dena Strait and Emmanuel Daskalos
On-Site Space Use Audit	Bettisworth North: Dena Strait and Emmanuel Daskalos
FIRE & LIFE SAFETY	
Smoke/Heat/CO Detection	None
Program Compliance	
Building Type Compliance	
Entry/Exit	Americans with Disabilities Act (ADA) non-compliant throughout site
Restrooms	Unisex, non-ADA compliant
Other	
FACILITY CONDITION	
Exterior Wall Finish	Painted T-111 siding
Exterior Entrance	2 Arctic vestibules, Non-ADA compliant
Interior Wall Finish	Painted gypsum wallboard (GWB)
Interior Floor Finish	12 inch vinyl composite tile (VCT)
Interior Ceiling Finish	Painted gypsum wallboard (GWB)
Interior Casework	None
Windows	Wood (WD) double pane originals
APPLIANCES	
Commercial	none
Residential	50-gallon hot water heater in office building, small refrigerator, stacked washer and dryer and 50-gallon hot water heater in break room modular, microwave in both

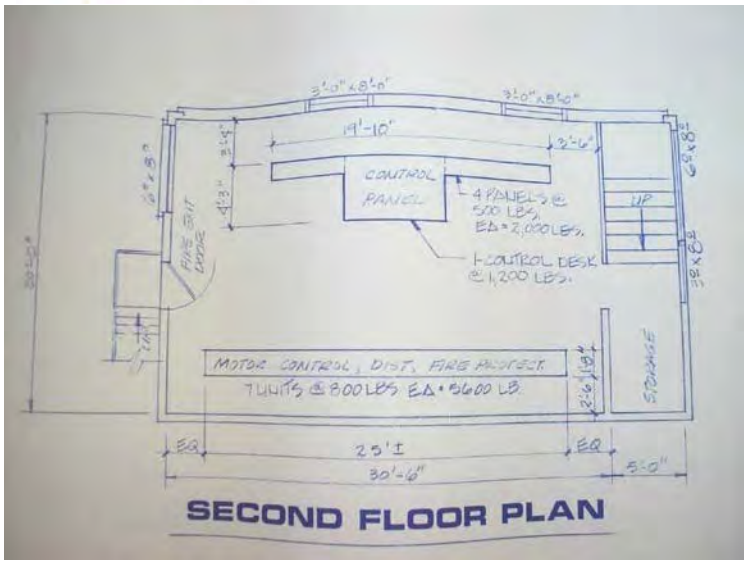
LIGHTING & ELECTRICAL	
Service	12,800 volt
Emergency Power/UPS	
MECHANICAL	
Ventilation	Toilet exhaust in office building and break room modular and exhaust at welding station in maintenance shop.
Controls	None
GROWTH & CONSTRAINTS	
Site	None
Building	Office building and maintenance shop need repair before they can be added on to or repurposed.
Code	Upgrades likely required if major renovation
ENERGY CONSERVATION	
Energy Forms	Propane and electricity.
GENERAL COMMENTS	

FLOOR PLANS



First Floor Plan

Source: Onsite drawing set.



Second Floor Plan

Source: Onsite drawing set.

UPLANDS

SEWARD LOADING FACILITY UPLAND AREA

Factsheet

DESCRIPTION

This upland area covers about 30 acres surrounding the Seward Loading Facility (SLF); it contains the facility buildings and conveyer and is used to stockpile bulk materials such as coal and gravel prior to loading. Bulk materials are unloaded from railcars and placed in stockpiles prior to being loaded into bulk ships through the stacker-reclaimer and conveyor belt system. This area is bordered to the north by the Leirer Road Property, and extends south to Resurrection Bay and the Seward Small Boat Harbor. Port Avenue crosses over the conveyer by bridge. The SLF, SLF Buildings, and Railyard Factsheets contain additional details.

LIST OF APPLICABLE DRAWINGS

Refer to the **Seward Loading Facility** and **Seward Loading Facility Buildings** factsheets for applicable drawings.

LIST OF APPLICABLE REPORTS AND STUDIES

- Seward Freight Dock Expansion Jurisdictional Determination Report and Wetland Functional Assessment (HDR, August 2013)
- Seward Freight Dock Expansion Environmental Assessment (April 2014)
- Air Quality Observations and Recommendations for the Seward Coal Loading Facility (HMH Consulting, March 2007)
- Seward PM10 Air Monitoring Program January 2011 to May 2012 Final Report (DEC, January 24 2013)

ENVIRONMENTAL INFORMATION

Two ponds are present north of Port Avenue and persistent emergent wetlands and a stream are present along the west side of the area.

PLANNED IMPROVEMENTS

There are currently no planned improvements to the loading facility upland area.

DEFICIENCIES AND AREAS OF CONCERN

- There is potential for impacts from coal and petroleum based products.
- Site drainage and trespassing have been identified as areas of concern.
- There is a public perception that fugitive dust from coal handling activities has a negative impact on air quality in the surrounding area. Air quality studies have been inconclusive regarding the impact of fugitive dust on air quality.

PASSENGER DOCK

Factsheet

DESCRIPTION

The Seward Passenger Dock was constructed in 1965 after the original dock, located near the present day Alaska SeaLife Center, was destroyed by the 1964 Good Friday Earthquake. The Seward Passenger Dock served as a multi-use dock servicing cargo vessels, cruise ships, and the Alaska Marine Highway System passengers until the construction of the Seward Freight Dock in 2001. While a majority of the current freight operations moved to the Seward Freight Dock, the Seward Passenger Dock continues to provide support and moorage space for freight vessels during the off season.

The foundation has experienced significant corrosion which has limited the remaining useful service life and increased weight restrictions. As a result, the single rail spur extending to the end of the dock is no longer in service. The current fendering system is in relatively good condition although there is minor damage present on the timbers of the corner fenders. The dock surface is worn but in generally good condition.

General Information

- Construction Date: 1965
- Years in Service: Entering 51st year
- Structure Type: Pile-Supported Pier with Concrete Deck
- Length: 736 feet
- Width: 200 feet
- Area: 147,200 square feet
- Dock Elevation: 24 feet relative to Mean Lower Low Water (MLLW)

Primary Features

- Pile-supported dock with concrete deck and asphalt-wearing surface
- Capable of mooring two vessels at one time
- Dock equipped with 7 ship fenders, 3 barge fenders, and 12 mooring bollards
- 12 mooring bollards and 2 mooring dolphins at 300 feet and 400 feet from the end of dock
- Dock supports the Alaska Railroad Corporation (ARRC) Seward Intermodal Terminal facility located on the north end of the pier and was rehabilitated to accommodate passenger operations

OPERATIONAL DETAILS

- In 2015, the Seward Passenger Dock serviced 11 separate cruise ships in 64 visits
- Cruise ships ranged from 338 feet to 965 feet in length
- A total of 176,100 passengers embarked/disembarked in Seward; an average of 1375 passengers per vessel each way
- During the off season, this dock is used as a supplemental freight dock and provides moorage for vessels

ENGINEERING DATA

- Design Vessel:
  - Cruise Ship: Crown Princess

    Length = 804 feet
    Beam = 106 feet
    Tonnage = 70,000 GT
- Largest Current Vessel:
  - Cruise Ship: Radiance of the Sea

    Length = 962 feet
    Beam = 131 feet
    Tonnage = 90,090 LT
- Design Seismic Acceleration:
  - Design Ground Acceleration:
    - Equivalent Lateral Force: 0.1g x (DL+0.5LL)
- Design Significant Wave Height: 7.8 feet (Spectral period: 5.5 seconds)
- Wind Data:
  - 110 mph Exposure “D” (UBC), except for mooring loads
  - Mooring Condition:
    - 80 mph in North-South direction October thru April
    - 50 mph in North-South direction May thru September
    - 32 mph in East-West direction year round
- Tidal Data:
  - Extreme High Water: 14.9 feet
  - Mean Higher High Water: 10.5 feet
  - Mean High Water: 9.6 feet
  - Mean Tide Level: 5.4 feet

- Mean Low Water: 1.3 feet
- Mean Lower Low Water: 0.0 feet
- Extreme Low Water: -4.8 feet

LIST OF APPLICABLE REPORTS AND STUDIES

- Geotechnical Investigations – Methods and Findings (1999, PND)
- Seward Port Feasibility Study Final Report (97012 Seward Port Feasibility Study.pdf)
- An Investigation of Shoaling and Coastal Processes Occurring at the Alaska Railroad Corporation Dock, Seward, Alaska (1994, Coastal Processes Report)
- Alaska Railroad Corporation Seward Terminal Reserve Dock Facilities Mater Plan, (2014, ARRC Seward Master Plan)
- ARRC Seward West Dock Condition Assessment (March 2014, R&M Consultants, Inc.)

RECENT IMPROVEMENTS

- 1980: Submerged pile splices were re-welded.
- 1980: Pile reinforcement work
- 1995 to present: Periodic pile reinforcement work
- To 2010: Annual timber fender pile replacement
- 2001: Connection to City of Seward sewer service, new Terminal concrete flooring and miscellaneous mechanical and electrical upgrades.
- Early 2000's: Reinforced corroding piles and coated existing piles above mean tide elevation; re-welded submerged pile splices; replaced timber fender piles, bull rail and fender camels; reconstructed the expansion joint between dock segments; conducted structural/seismic upgrades (steel frame bracing, dock piling repair, catwalk replacement/extension); replaced cathodic protection system rectifiers and anodes, and added sacrificial sack anodes near shore
- 2003-2005: West Dock parking areas were paved and added a circular asphalt roadway. A passenger train platform was built, along with a new pathway, to connect to the City of Seward sidewalk along Port Avenue. Installed a video surveillance system, security lighting and battery backup lighting.
- 2013: Expanded parking lot and repaved baggage drop-off. Installed 630 feet of steel panel security fence on either side of Passenger Dock. Erected card-reader controlled gates on either side of the Terminal building which was also equipped with security cameras and wireless card-reader connectivity.
- 2015: Current short term (5 to 7 years) cathodic protection repairs completed
- 2016: Pile repair currently underway
- 2016: Timber fender pile replacement

DEFICIENCIES AND AREAS OF CONCERN

Issues Identified by ARRC Staff

- The Dock is near the end of it's useable service life. Structural deterioration has led to reduced load capacity preventing use of existing railcar facility on dock.
- The current berthing configuration is insufficient to accommodate the largest cruise ships accessing the site.
- The Dock is currently too short to accommodate gangway ramps for larger vessels.

- Due to Homeland Security requirements, the Dock cannot accommodate freight vessel operations during the cruise ship season. The reduced load capacity also prevents the dock from being suitable for freight storage or heavy crane operations.
- Requests have been made for additional shore power connection to service cruise ships when docked.
- Covered walkways were requested to protect passengers from the wind and rain as they walk to their next destination.

Issues Identified by External Stakeholders

- The dock is too high for optimum passenger and/or freight access.
- The foundation for this dock is not ideal; the small piles with a large surface area are prone to corrosion, especially in marine environments.
- Would like hotel services on the dock (power, water, etc).
- The dock provides a long expanse of uncovered area, which is not preferred by passengers walking long distances and exposed to the weather.
- The fixed position of the luggage slot dictates where boats moor and the location does not work for many ships.
- Covered walkways for passengers were consistently requested by entities responsible for passenger's needs and safety.

PASSENGER DOCK TRACKS

Factsheet

DESCRIPTION

The Passenger Dock Tracks, originally constructed in 1966, are used for loading and unloading chartered cruise ship passenger trains, and occasionally for loading and unloading freight from rail cars. Passenger Dock Tracks #1 and #2 are continuations of Tracks #6 and #7, respectively. These parallel tracks run between the Railyard and the Seward Passenger Dock on Resurrection Bay. The portion of Passenger Dock Track #1 that extends onto the Passenger Dock is permanently out of service due to weight restrictions on the aging dock.

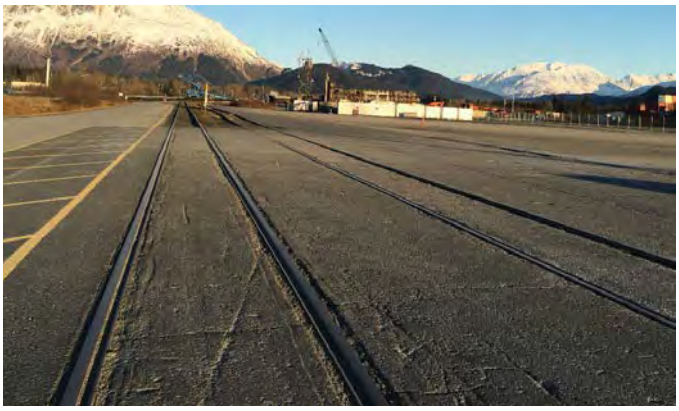
RELATED FACTSHEETS

- The Passenger Dock Tracks are located within **Former Materials Storage Area** and **Passenger Terminal Traffic Management Area**
- The Passenger Dock Tracks #1 and #2 are continuations of Tracks #6 and #7, respectively, located within the **Railyard**
- The Passenger Dock Tracks service the Seward **Passenger Dock** and **Terminal**
- The ends of the Freight Dock Tracks extend out onto the Seward **Freight Dock**

OPERATIONAL DETAILS

Passenger Dock Tracks, Port Avenue At-Grade Crossing

- Standard gauge rail
- Grade 0.0 percent
- Tangent track
- Track is within limits of Seward Yard and non-signaled
- Speed Limit:10 mph
- Useable track lengths for operational purposes by clearance point or accessibility:
  - Passenger Dock #1: 860 feet
  - Passenger Dock #2: 860 feet
- At-grade crossings:
  - Port Avenue, wood tie crossing
  - About 400 feet at the south end of Passenger Dock Tracks #1 and #2 has been paved with asphalt



ENGINEERING DATA

- Rail is jointed 115 pound/yard (lb/yd), mostly rolled mid-1950s with some mid-1960s
- Wood ties, nominal dimensions 7 inches x 9 inches x 8.5 feet

LIST OF APPLICABLE DRAWINGS

- Alaska Railroad Corporation, Track Chart, April 2015
- Alaska Railroad Corporation, Track centerline CADD Drawings

DEFICIENCIES AND AREAS OF CONCERN

- At-grade crossing at Port Avenue is in poor condition and has a high grade differential over a short distance. This creates problems for fork lifts, trucks, and other equipment.
- Tracks on the Seward Passenger Dock are no longer used due to weight limitations on the dock. This limits the length of track available for passenger trains, which can block the Port Avenue crossing. Currently chartered cruise trains are built to ensure that they do not overhang Port Avenue, which limits the numbers of passengers that can be accommodated. Adding more cars to the chartered cruise trains will result in blocking the Port Avenue crossing when trains are loaded/unloaded.
- The location of the Passenger Dock Tracks at the end of the Railyard, combined with the limited length of available track in the Railyard, occasionally results in freight trains being pushed toward passenger trains which is not ideal.

TERMINAL

Factsheet

DESCRIPTION

The Dale R. Lindsey Railroad Intermodal Terminal (Terminal) is a 26,555 square foot, steel-framed, rectangular building located on the Seward Passenger Dock. Wall assembly consists of insulated metal panel curtain wall hung on the upper three quarters and poured concrete stem wall at the lower quarter of the wall. Roof assembly is a low pitched gable with corrugated metal roofing over insulated panels. The main entrance faces north toward the uplands zone, and debarking cruise passenger access is on the south end. There are three overhead doors and several man doors on the east façade. The west façade has one overhead door and one man door. Two stories of office space are framed in with wood and steel in the northeast corner. The remainder two-storey tall space is divided into open storage, mechanical and circulation areas.

Outbuildings consist of a free standing guard shack located near the northeast corner of the Terminal, which is a wooden, modular unit in good condition, likely less than 5 years old. It controls access to the passenger dock.

The Terminal or Intermodal Facility, is a staging facility for approximately 184,745 cruise ship passenger (2016), up from 176,050 in 2015, which was an increase from 135,000 (2014). The passengers embark and disembark from the cruise ships and move through the Terminal or utilize only the dock as explained further below. Annually, Seward receives approximately 65 cruise ships between mid-May to mid-September. At other times of the year the Terminal is lightly used for various events described in more detail below. Leased office space is typically leased all year, but only occupied in the summer with the exception of two offices other than the Railroad spaces. Several leased storage areas exist that are used all year. The Alaska Railroad Corporation (ARRC) occupies two offices on the Second Floor all year.

Between 2001 to 2004, the facility was connected to city sewer and the useable floor plan was increased by partially covering an existing depressed railroad track area. Improvements also included seismic/structural upgrades, concrete floor poured over radiant heat tubing, new lighting, replacement of some doors and windows, exterior lighting replacement, security fence additions, and mechanical and electrical systems were replaced and upgraded. The in-floor heating system appears to have been placed over dock decking that is not insulated which causes the system to use more energy than would be required if the floor assembly below was insulated.

Between 2004 to 2005, railroad tracks were removed from the west side of the Seward Passenger Dock and the facility received upgrades including security checkpoints, aesthetics, and better passenger and baggage transfer accommodations. Passenger Dock project for fixing cathodic protection on the steel piles was completed in fall 2016. Office upgrades were completed in Winter 2015-2016 and included new paint and office furniture.

The facility is generally in average condition with relatively recent upgrades. Dock activities are very industrial as are some winter time uses of the interior spaces. Considering these types of uses, the building is in average condition.

General information

- Construction Date: 1966
- Years in Service: 49
- Structure Type: steel frame with foundation tied to dock structure

Primary Features

Currently, the building is being used for a different purpose than what it was originally designed for: an unheated warehouse for dock operations. While the renovations and modifications have certainly made it functional as a passenger Terminal, some features of the original use and construction remain, such as the industrial appearance with no windows.

The Terminal is the only cruise passenger facility in Alaska with a foundation on a marine dock. Unfortunately, the location has resulted in a projected early demolition of the building due to the structural integrity of the dock itself which only has approximately seven years of service life remaining. Therefore, the Terminal must be demolished so the dock can be replaced.

Site Information

The parking lot north of the building was paved between 2003 and 2005. In 2014, the parking and traffic pattern was reconfigured through restriping existing parking as well as adding more paving. It accommodates roughly 65 to 100 different permitted vehicles, including five local taxi companies. A one-way, circular drive-way through the site connects at two points along Port Avenue. The parking area and site is used heavily every Monday and Friday morning requiring the Port Manager to direct traffic for better control and traffic movement.

Site lighting is provided throughout the parking lot and driveways as well as on the exterior of the building. Between 2004 and 2005, site security upgrades were made including fencing, lighting and video surveillance to comply with U.S. Coast Guard and U.S. Department of Homeland Security requirements. Concrete planters protect the north entry doors from vehicular penetration. Train tracks for the Cruise Train run north and south along the eastern or exit loop of the Terminal parking lot.

RELATED FACT SHEETS

- The Dale R. Lindsey Terminal is located in Zone 10: **Seward Passenger Dock**.
- The **Passenger Dock Tracks** #1 and #2 extend out onto the **Passenger Dock**, adjacent to the **Terminal.**

OPERATIONAL DETAILS

Pedestrian traffic controls, signage, barriers and other moveable components are adjusted for several operational modes within the main Terminal area. These items vary depending on the cruise line, operating entity and direction of passenger travel. Components include a coffee cart, Chamber of Commerce display, car rental and information kiosks, tour operator tables and displays, benches, areas for luggage, security screening, Railroad check-in kiosks, cruise line check-in podiums, etc.

A covered, rectangular tent is located outside of the south doors to cover passengers as they walk between the ships and Terminal. Some buses, up to nine at a time, come onto the dock and load passengers directly from ship to bus. Other buses are loaded in the parking lot outside the Terminal, which requires passengers to walk directly through the Terminal and then load onto a bus. Loading the buses in this manner allows the cruise package coordinators to separate passengers going to different locations. Cruise ship and tour operators value loading passengers directly from the ship to the bus on the dock for the following reasons: reduced walking distance, improved organization and direction of passengers, utilization of tight Terminal space, and reduction of the number of areas and processes passengers must traverse, thus reducing the number of lost passengers. In the past, passengers were also able to load directly from the ship to the Cruise Train, but due to the reduced structural integrity of the dock, the train can no longer drive onto the dock. Train passengers must instead walk through the Terminal to waiting trains off the northeast corner of the building. Independent travelers walk across the dock, through the terminal, and then to their own destinations.

Luggage handling is very different for package passengers versus independent travelers. Package passengers have all of their luggage needs taken care with the exception of their carry-on. Their checked luggage handling and security needs are taken care of from when they leave their overnight accommodations until they arrive at their next night's accommodations, whether that is on the ship or at a hotel. They do not touch their luggage between one hotel or ship room and the next. Independent travelers, by contrast place their luggage into a bin in the parking lot of the Terminal upon arrival. It is then taken care of by the longshoreman, processed and put on the ship. When the bin is available during the day depends on the cruise line, as they hire the Stevedores to run dock operations for them. When independent travelers arrive in Seward via ship, their checked baggage is unloaded by longshoreman, whom are hired by the stevedores, and then placed inside the Terminal. Because the longshoreman have or have claimed luggage jurisdiction within the Terminal, only the passengers can carry or pull their luggage through the Terminal, no one can assist them other than longshoreman.

The shared bathrooms and break room are located on the second floor near a small conference area with a folding table and chairs. This conference space is open to the main Terminal area and is not on the separate office heat loop. During the winter months, the offices are kept at typical office tempertures, while the main terminal space, thus the conference table area, is kept much cooler.

Cruise Passengers as well as cruise ships themselves are serviced at the Terminal. Hotel services of water, fuel, internet and power are available to docked ships. Additional repair, maintenance and resupply services are available for hire as needed.

Community use of the Terminal in the off-season was noted as a community asset in many stakeholder meetings, particularly by Seward residents. It seems to be a very important space to the community with it noted as being the only space large enough to hold 350 or more people within one space. The Alaska SeaLife Center in downtown Seward can hold roughly 1,300 people spread throughout the facility. The largest event currently being held each year in the Terminal is the Music Festival, attended by 3,000 people over three days. In addition, the Terminal is used during the off season for various trainings, emergency preparedness exercises and other events that require them to be directly by the water. Off-season uses include:

- archery classes - one to two nights a week during November and January through March
- weddings and wedding receptions
- a kid's carnival
- a music and arts festival - end of September

- water safety training, which requires direct access to the water
- Alyeska Pipeline Services Company/SERVS - oil spill response training which requires direct access to the water
- Combat Fishing events
- a state-wide fire conference
- a Holiday Fair
- mural painting
- a Halloween carnival
- a New Year's Eve Party
- marine training
- various non-profit day-long meetings and banquets
- Military vessel rest, relaxation, and repair Port of Calls with garbage and waste offloading

Daily Schedule

The Cruise Train pulls from Roundhouse to Terminal between 5:00am and 5:30am. Passenger debarking (unloading a ship into Seward) usually takes 4.5 to 5.5 hours, roughly 6:00am to 11:00 or 11:30am. The Cruise Train leaves Seward headed north to Anchorage at 7:00am. Embarking (loading a ship to leave Seward) stretches over about 8 hours, roughly 11:30am to 7:30pm. The busiest period inside the Terminal is 4:00pm to 6:30pm when the Cruise Train arrives with roughly 300 to 400 people between 5:15pm and 5:30pm at the same general time frame as multiple motor coaches coming from various Alaska Railbelt locations arrive. The ship needs to be loaded by roughly 7:30pm or 8:30pm, depending on carrier, and pulls out roughly 1 hour after loading is completed.

The most time a passenger spends in the Terminal is during embarking a ship when they need to check-in and also go through security. Due to cruise line policies, both processes are kept under 30 minutes each for a worst case scenario processing time of roughly one hour. On site observations timed most emabarking passengers in the terminal under 30 minutes total. During debarking, passengers are moved along to their destinations quickly, directly and as efficiently as possible. Thus most debarking passengers spend less than 15 minutes in the Terminal, while those on cruise company's bus tour packages typically don't enter the Terminal at all, but rather load directly from ship to bus on the dock.

Weekly Schedule

Sunday = Holland America large cruise ship day, every week all summer in 2014 and 2015.

Monday = Premier Tours -Norwegian large cruise ship day, occurred every other week in 2014 and 2015.

Tuesday = one small ship entire 2015 cruise season, no Tuesday ships in 2014.

Wednesday = Premier Tour's client, typically Regent, small ship day, every other week in 2014 and 2015.

Thursday = Premier tour's client, typically SilverSea, small ship day, roughly every other week in 2014 and 2015.

Friday = Premier Tour's client, typically either Celebrity or Royal Carribean, large cruise ship day, every week all summer in 2014 and 2015.

Saturday = no ships typically, but Holland America Princess (HAP) preparing for Sunday ship.

2016 Cruise schedule looks very much like those for 2014 and 2015. In 2016, there were three "double ship days" on July 28th and 29th, and August 16th.

In general, Seward is a Turn Port, meaning ships unload one set of passengers and reload another set of passengers generally on the same day. The only other Turn Port in Alaska is in Whittier. Seward is

occasionally used, under five times a year, as a Port of Call where passengers get off the ship, tour the local area for the day and then return to the departing ship that evening.

Building Occupant Load

Currently, the largest cruise ship docking in Seward holds 3,000 people and most ships hold under 2,000. Many small ships hold under 1,000 people. During the busiest Terminal period, 4:00pm to 6:30pm, roughly 1,300 to 1,400 people need to check in and move through security. These numbers vary per cruise line, but in general, the entire ship load of people is not in the Terminal at one time. This is because passengers are arriving via different forms of transport from different locations at different times. To further reduce congestion and wait times, the land-side operations companies stagger arrivals through constant communication with the busses, the cruise train and other entities who deliver large numbers of embarking passengers to the Terminal.

During active periods of cruise debark and embark, there can be roughly 50 nonpassenger people working in security, cruise operations, railroad operations, as vendors, as well as visitors and others. In addition, there can be 30 to 40 Stevedore's, longshoremen, vendors and cruise operations people on the dock.

Other than special events, which primarily occur on the weekends, the typical winter weekday occupant count in the Terminal is under 10 people. Special events can be 1000+ people at one time.

ENGINEERING DATA

The fuel oil tank for the boiler is located off the northeast corner of the Terminal adjacent to the guard shack and internal boiler/mechanical room. Tank size is 1,350 gallons and the area is enclosed by a secure, 6' tall wood fence.

City water lines enter below grade at the northwest corner of the building and travel along the entire west length in a below floor line utilidor. A north and south pit provide access to controls, pipe joints, valves, control panels and other areas that require maintenance and operations access. None of this below grade mechanical utilidor is insulated from the exterior and requires heat trace its entire length.

To the northeast of the facility, there is an underground utility corridor to the east of the railroad tracks including telephone, electricity and sewer. The sewer and telephone utilities cross under the tracks within 200 to 300 feet of the building. It is assumed that telecommunication lines also follow the northeast utility corridor from the tower and communications shacks located in the southeast corner of the intersection of Port Avenue and the exit driveway loop that serves Terminal traffic.

There is an emergency generator at the south end of the Terminal that powers dock security gates, x-ray machines and security lights. The intent of the generator is to allow cruise ships to load and leave port even when the city power is out. However, the current generator is not properly sized for this as it cannot run the cruise line's computers to check-in passengers. At the NW corner of the dock there is back-up power for use by small cruise and non-cruise vessel use for Maintenance and Repair so that a generator is not required. There is currently no train shorepower at the terminal or passenger dock, which requires the trains to run off their own power when loading and unloading passengers.

LIST OF APPLICABLE DRAWINGS

- Multiple mechanical and electrical engineering drawings from 2001 Phase I Transit Building Passenger Upgrades – Files located on SharePoint project site
- Multiple mechanical and electrical engineering drawings from 2002 Seward Transit Building Passenger Upgrades - Phase II projects. – files located on SharePoint project site

LIST OF APPLICABLE REPORTS AND STUDIES

- 01/05/2012 Seward East & West Dock Investments 2-page doc from ARRC – files located on SharePoint project site
- Seward Terminal Reserve Dock Facilities Masterplan Updated 2014– files located on SharePoint project site

IDENTIFIED DEFICIENCIES AND AREAS OF CONCERN

Issues Identified by ARRC Staff:

Passenger Services:

- Would like the train to be able to go onto the dock which would reduce walking distances.
- Want covered walkways from ship gangplanks to Terminal and entire length of travel.
- Requested master planning efforts to consider elderly passengers in the design such as providing shuttle carts for rides as needed.
- Railroad Passenger Services would also like to have better flow from the ships, through the Terminal and to the trains if the train is not on the dock. They would also like a waiting area capable of seating 50 people.
- While City Shuttle provides free transportation and is generally viewed in a positive manner, there are concerns that the school bus utilized for this service has a high first step, narrow aisles, and absence of space for luggage. A van, similar to airport shuttles, would be better.

Economic:

- Combine the Depot and Terminal into a single entity.
- Concerned with lack of activity and subsequent decrease in revenue during the winter season.
- Cautioned against a design that would increase the fees paid by the cruise ships; they want to ensure the cruise ships continue to return to Seward.

Engineering:

- A 2013 assessment of the Seward Passenger Dock found significant corrosion and deterioration of the structural supports which also support the Terminal. The Seward Passenger Dock is characterized as being at the end of its service life and must be reconstructed. As the Terminal is located on the Seward Passenger Dock, there is also a need to construct a new Terminal facility. With recent maintenance and repair work, the remaining life of the Seward Passenger Dock is projected to be 7 years from 2015.
- An alternative, less costly heat source is desired for the Terminal.
- Suggested integral fuel lines to service ships instead of fuel trucks on the Seward Passenger Dock. Other Railroad personnel preferred fuel delivered by truck.
- TV monitors in Terminal are too small, too high and have never worked. Suggested finding a way to repurpose them.
- Provide updated technology in the office space.
- Upgrade to LED lights
- Railroad Passenger Services would like programmable LED signs in order to provide updated messages to passengers.

Issues Identified by External Stakeholders:

Passenger Services:

- Gangways of the larger, anticipated ships land further away from land and the Terminal which increase the walking distance required to reach the Terminal. If possible, keep walking distances to a minimum.
- Provide wind and rain protection at all passenger locations outside of the building. A continuous, covered walkway is desired from the ship to the train or shuttle service.
- Premier Tours values being able to transport cruise passengers directly from ships to motor coaches or buses on the Seward Passenger Dock.
- Provide more seating for guests inside the Terminal.
- Suggested free Wi-Fi in Terminal.
- Requested the addition of a lounge and waiting area after check-in and security. However, one cruise operator said that since they provide passengers with access to their rooms, food, drinks and all other amenities on their awaiting ship, passengers would not use this feature.

Operations:

- Improve safety by separating passenger and forklift operations, including ship service and luggage traffic. Many suggested elevating a covered passage for passengers, with the main dock surface reserved for service traffic. An alternative is to place luggage circulation below the main dock level and keep passengers above on the main dock level.
- Concern that two ships consumes the entire Terminal capacity during check in (embark).
- The cruise ship companies highly value the ability to load passengers on to the Cruise Train which reduces their need for motor coaches. They need direct connection to railroad in order to efficiently move a ship load of passengers. They do not have enough motor coaches to handle the load.
- Concern about “turning”, or unloading and loading, a 5,000 person ship in current Terminal.
- Would like a covered area to sort luggage before it goes onto the ship.
- Would like permanent check-in podiums for cruise lines and for the railroad. Cruise lines would like a total of 10 podiums for 20 cruise ship agents, two of which should be accessible, and one table for customer service.
- Need a place to securely store luggage between the time independent passengers may arrive at the Terminal and when they are able to embark onto the ship. Longshoremen service of independent baggage handling is not open all day, and is not coordinated with the arrival of the Coastal Classic, which carries arriving independent passengers.
- Luggage handling for independent travelers is a concern for drop-off, pick-up and transport between the Depot and the Terminal. Some cruise lines are more aware of this issue than others and have made adjustments to relieve the problems. These adjustments including tagging independent bags when loading the Anchorage Coastal Classic to be taken to the Terminal via a luggage truck and providing luggage pick-up at the Depot and transport to the Terminal for any bags missed.
- Luggage control and handling for independent travelers is handled differently than for the package passengers. Longshoreman have jurisdiction for luggage inside the Terminal so when a disembarking independent’s luggage is set down inside the Terminal at the southern end of the building, the passenger is the only person who can move it outside or to the north end of the Terminal. Local tour operators who are there to pick up their guests just coming off ships cannot go into the Terminal and assist with luggage. Tour operators are concerned that guests may wonder why their tour operator or accommodations host is not helping with their luggage. Passengers tend to be older and the Terminal itself is 150 feet long so it is quite a distance to carry or roll one’s luggage. Longshoreman contend that local operators could pay for their services to perform luggage handling inside the Terminal and are choosing not to. ARRC Seward

Terminal Tariff ARR 600-A Item 190 states "….stevedoring services include, but are not limited to…..loading/unloading cargo or baggage to/from rail cars or trucks or other means of land conveyance to/from the Terminal facility….." Luggage handling inside the Terminal seems to be a grey area.

- Hotel services are desired on the dock. Cruise ships would like, in order of priority: fresh water, fuel, shore power on both sides of the dock, and possibly oily waste disposal. Barges would like, in order of preference: fresh water, fuel, shore power, oily waste and sewage removal. It was noted that cruise and barge crews would appreciate the addition of Wi-Fi services.
- Would like to be able to use electronic screens for video feeds and information updates. Also could use that to direct waiting passengers to next available agent by numbering the check-in podiums.
- Freight customers would like to stage freight inside the facility during the off-season.
- Agencies servicing cruise ships value the ability to store materials and goods inside while waiting to load ships. Current overhead doors allow them to quickly and efficiently move materials inside with a forklift.
- There was a suggestion for a VIP lounge with check-in capability and a separate security screening.

Aesthetics:

- The current décor and murals were noted as outdated.
- Need pleasing aesthetics at the main entrance.
- Would like the Terminal to look less industrial and feel more welcoming.

Economics:

- Need to keep Terminal rates competitive so that they won't lose ships to Anchorage or Whittier.

Engineering:

- An under floor inspection found no insulation under the in-slab heat. Areas below the main floor level, such as mechanical pits and bathrooms, seem to have no thermal barrier from the exterior other than the structure itself.
- The building has four heating zones, or areas that can be heated to different temperatures, which allows management to reduce the heat in the main, largest area of the Terminal during the off season. However, there appears to be no thermal insulation separating the walls of the zones, thus heat easily transfers between the zones somewhat defeating the purpose of the zones.
- Need better water supply system for ships and barges. Currently, fire hoses are used and damaged due to vehicle traffic over them.
- Dock users have requested power capabilities on both sides of dock.
- Data lines are not permanent and are draped, dragged, etc. for each ship docking. They would like a permanent, hard data line connecting the ship's computers to the check-in computers inside Terminal.
- Currently, there is not a compatible electrical connection between ships and the dock when generators go out.
- Freight Dock workers requested the addition of showers and bathrooms inside the Terminal that they could access 24/7. While there are currently bathrooms in the Terminal, they apparently do not have 24/7 access to them.
- Some stakeholders suggested locating the replacement Terminal off the dock, while others requested that it be placed further out on to the dock than the current facility.

Other:

- Per cruise ship operator stakeholder engagement they "make do" with existing facilities.

- Request for better technology, kiosks, business advertisements
- Passengers don't seem to realize the Anchorage airport is 2.5 hours away and they don't have transportation, plans or time to get there.

CODE & CONDITIONS SURVEY

GENERAL INFORMATION	
Building Name/Location:	Seward Intermodal Facility or Terminal
Purpose of Facility:	Embarking and debarking of passengers and connection to Cruise Train, motor coaches, local tours, car rentals, taxis, etc. Plus luggage handling.
Supervising Department:	
Services Provided:	Fuel oil heat, city grid power, city water and sewer, fiber optics
Date of Construction:	1966 original and 2001-2002 major renovation
Date of Renovation:	2001-2005
General Condition:	Average – industrial in nature
Land Ownership:	ARRC
Lot Size:	
Building Size:	26,555sf
SITE	
Outbuildings - Types	Various connexes to south on dock, longshoremen trailer on dock, guard shack bldg. at NE corner
Outbuildings – Sizes	Various
Outbuildings - Uses	See names
UTILITIES	
Water Source	City water
Waste Water	City sewer
Electric Service Utility	City grid
Fuel Type & Storage Size	Fuel oil w/ tank
Heating System	Hydronic baseboard in office areas, radiant floor in Main space of First Floor.
Building Controls System	Honeywell
Security	Cameras through-out
Survey Data provided by	Bettisworth North – Dena Strait and Emmanuel Daskalos
On-Site Space Use Audit	Bettisworth North – Dena Strait and Emmanuel Daskalos
FIRE & LIFE SAFETY	
Smoke/Heat/CO Detection	NFPR 13 Sprinklers, alarm notifications, Fire Alarm Control Panel, multiple fire extinguishers
Program Compliance	
Building Type Compliance	
Entry/Exit	An automatic door may be required for one of the entry doors. Functions on 2nd floor are not duplicated on main floor. No Americans with Disability Act (ADA) compliant access between floors.
Restrooms	Single Men & Women's upstairs and multi-stall Men &Women's downstairs. Downstairs are ADA compliant.
Other	
FACILITY CONDITION	

Exterior Wall Finish	Concrete lower wall (52” AFF) w/ insulated metal panels (IMP) upper: decent to average condition
Exterior Entrance	Multiple double doors w/ paint damage
Interior Wall Finish	Main Area: exposed IMPs, painted concrete lower wall Office areas: painted gypsum wallboard (GWB). Some wear and tear, more so in offices.
Interior Floor Finish	Painted concrete at Main Area, vinyl composite tile (VCT) at office areas & bathrooms, exposed concrete at remainder
Interior Ceiling Finish	Open To Structure (OTS) in mechanical/electrical and Main Area, Acoustic Ceiling Tile (ACT) in office areas and bathrooms
Interior Casework	Solid surface in bathrooms in good condition
Windows	Double pane w/ operable sections on 2nd level, fair condition
APPLIANCES	
Commercial	Three vending machines on 1st floor
Residential	Various microwaves and coffee makers in break rooms upstairs and single office space downstairs.
LIGHTING & ELECTRICAL	
Service	
Emergency Power/UPS	Yes, Generator. It does not have a tank so would need a fuel truck brought in to maintain extended operation.
MECHANICAL	
Ventilation	There is no building wide ventilation system, the only exhaust fans are in bathrooms, operable windows are only on second floor and one in downstairs office.
Controls	
GROWTH & CONSTRAINTS	
Site	Yes
Building	Yes due to Dock foundation
Code	
ENERGY CONSERVATION	
Energy Forms	Fuel oil, grid power and generator power
GENERAL COMMENTS	
Several things can be done to save energy in the Terminal while waiting for the construction of the replacement building. Replacement of weather stripping at operable doors, including overhead doors, will help alleviate cold drafts. The water pipes in the pit along the west side of the building have heat trace and also insulation that has been removed due to repairs and maintenance work. Confirming the heat trace is only operating at temperatures above freezing, typically set at 45 degrees or above, will save electricity. Reinstalling the pipe insulation will also help the heat trace be more effective and thus less energy intensive. Existing boilers appear to be the originals installed when the in-floor heating system was installed in 2001. Boilers typically have a 20 year life meaning the boilers have roughly 5 years remaining to their anticipated service life. Because the dock has 7 remaining years, it is recommended the boilers be checked and serviced as scheduled to ensure they last the remaining life of the Terminal. Installing Vend Misers, http://www.vendingmiserstore.com, on the vending machines or turning them off September to May will save electricity.	

ARRC Seward Terminal Existing Space Utilization

	Ex Qty	Ex Size	Ex Net	Operational Function
Public Areas (Main Floor)				
Public Access & Multi-use Space	1	21,114	21,114	Supports passengers (in-coming/out-going), information distribution, access point to restrooms. Various areas are off-limits (screened off) to the public for equipment storage. Space used for off-season events.
Public Restrooms	2	220	440	Accessible, 3 WC for Women, 2 Lav & 1 UR
Subtotal Public Areas			**21,554**	
Leased, Railroad, and Support Areas (Main Floor)				
Storage	2	290	580	Storage for various items and maintenance equipment
Leased office space	1	337	337	Leased office area
Depressed Water Supply & Fire Sprinkler pits	2	265	530	Depressed slab area with access to water mains and fire sprinkler risers, some seasonal storage too
Generator Enclosure	1	64	64	12' x 9' modular generator enclosure
Mechanical Room	1	325	325	Combination Electrical and Boiler room
Subtotal non-public areas			**1,836**	
Leased and Railroad Areas (Second Floor)				
Storage	1	81	81	Space for misc. storage items
Electrical & Mech Controls	1	220	220	Electrical panels, data rack, and boiler pump controls
Sitting/Conference	1	93	93	Space for 9+ chairs and large conference table
Tenant Restrooms	2	37	74	Non-ADA, 1 WC, 1 Lav, 1 UR in men
ARRC Office Spaces	2	180	360	Office space for facility admins
Tenant Office Spaces	7	160	1,120	Office space for cruise and transportation companies' support staff
Subtotal Second Floor Areas			**1,948**	
Total Interior Building S.F			**25,338**	

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UPLANDS

PASSENGER TERMINAL TRAFFIC MANAGEMENT AREA

Factsheet

DESCRIPTION

The passenger terminal traffic management area covers 5 acres that is used primarily as a staging area for the Seward Passenger Dock. Paved parking and staging areas are located north of Dale R. Lindsey Terminal (Terminal) at the head of the Seward Passenger Dock. It is used for loading and unloading passengers and luggage from buses and trains after they enter or exit the terminal during the cruise season from April through September. Tour companies store vehicles in the lot overnight. During winter the area may also be used as temporary laydown area for freight. A circular asphalt road provides access to the area from Port Avenue. A path located on the western side of the area provides pedestrian access between the Terminal and Port Avenue.

OPERATIONS

The following companies have entry and transportation permits covering the Depot and Terminal. Additionally, Anchorage taxi services occasionally pick up and drop off passengers without permits.

Company	Service	Company	Service
Aurora Limousine	To & from Anchorage	Alaskan Splendor	To & from Anchorage
Luxury Limousine	To & from Anchorage	Shuttleman	To & from Anchorage
AK Adventure	To & from Anchorage	Go Purple Shuttle	To & from Anchorage
BAC Transportation	To & from Anchorage	Fish Seward AK dba Alaska Shuttle Service	To & from Anchorage
Solar Wind, LLC dba Anchorage Tours and Transfers	To & from Anchorage	PJ's Taxi	Taxi
Tim Melican - Magic Bus	To & from Anchorage	Mike's Taxi	Taxi
AIE	To & from Anchorage	Seward Taxi & Tours	Taxi
A Alaska Cruise Transfer & Tours	To & from Anchorage	Resurrection Taxi	Taxi
Salmon Berry Tours	To & from Anchorage	Greg's Taxi	Taxi
AirLink Services	To & from Anchorage	Ididaride Tours	Tour
Aries Tours	To & from Anchorage	Exit Glacier Guides	Tour
AK Latin Tours	To & from Anchorage	CIRI Kenai Fjords Tours	Tour
Alaska Toby Motorcoach	To & from Anchorage	Kenai Fjords Tours	Tour
Unique Bus Charters	To & from Anchorage	Major Marine	Tour
Tour Designs North, LLC	To & from Anchorage	Adventure Sixty North	Tour
907 Tours, LLC	To & from Anchorage	Two Dogs	Freight
Alaska Independent Coad Tours	To & from Anchorage	First Student	Free shuttle
Northern Exposure Shuttle, LLC	To & from Anchorage	AK Christian Ministry to Seafarers	Crew shuttle
AlaskaShuttles.com	To & from Anchorage	CIRI Seward Wingsong	Hotel shuttle
John Hall's Alaska	To & from Anchorage	BW Hotel Edgewater	Hotel shuttle
Orion Limousine Service	To & from Anchorage	Breeze Inn	Hotel shuttle
Alaskan Tour Guides, Inc.	To & from Anchorage	Hertz	Rental cars

LIST OF APPLICABLE DRAWINGS

- Seward Terminal Reserve Freight Dock Security Fence (March 20, 2014)
- Proposed Seward Bus Routing PX Dock Area (February 2014)
- Cruise Ship Terminal Upland Traffic – Paving, Striping and Sign Plan Option 7 (February 7, 2013)

DEFICIENCIES AND AREAS OF CONCERN

Cruise Trains block access to the freight dock and laydown area while they are being loaded.

UPLANDS

FORMER MATERIAL STORAGE AREA

Factsheet

DESCRIPTION

The former material storage area is a 5 acre gravel lot located next to the Passenger Terminal parking lot. It is used for staging buses in the summer and for temporary laydown space for freight in the winter. This area has been earmarked for future development associated with the Seward Passenger Dock and tourism.

The granular material stored at this site was recently removed for construction of the Area 1 through 3 Storage Pad. The circular asphalt road running along the east and west sides of the area was constructed and a path was added to connect the Passenger Terminal to the Port Avenue sidewalk between 2003 and 2005.

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FREIGHT DOCK

Factsheet

DESCRIPTION

The Seward Freight Dock was constructed in 2001 to relieve the aging Seward Passenger Dock and separate freight and passenger operations. The dock is used primarily for freight operations and has moved an average of 33,000 tons of freight annually between 2003 and 2014. The most significant venders utilizing the facility include Samson Tug and Barge, Alaska Logistics, Crowley Marine Services, SeaTac Marine Services and Shoreside Petroleum. The current facility services barges, container ships, break bulk, fishing and military vessels.

The Seward Freight Dock consists of compacted gravel fill supported on the west face by a sheet pile bulkhead and on the east side with a riprap armored embankment. The west face of the Seward Freight Dock provides seven, heavy duty pin pile fenders and nine mooring bollards. One mooring dolphin with an additional mooring bollard is provided at the south end of the Seward Freight Dock. The facility is connected directly to rail through two sets of rail extending to the south end of the dock. A security gate surrounds the facility and is monitored by active security detail and video surveillance. The dock is closed off to passengers and is only accessible by heavy truck, forklifts and cranes. Vehicles access the dock via Port Avenue, crossing the tracks to the Seward Highway.

The current facility is in good condition with little to no damage and minor corrosion.

Primary Features

- West face of the Dock is equipped with 7 heavy duty pin pile fenders and nine mooring bollards.
- South end equipped with one mooring dolphin and an additional mooring bollard.
- Front roll on/roll off area.
- There are keys available in the removable bullrail.
- Facility connected directly to rail through two sets of rail extending to the south end of the dock.

- A security gate surrounds the facility and is monitored by active security detail and video surveillance. The dock is closed off to passengers and is only accessible by heavy truck, forklifts and cranes.
- Vehicles access the dock via Port Avenue, crossing the tracks to the Seward Highway.

General information

- Construction Date: 2001
- Years in Service: 15 years
- Structure Type: Gravel fill bulkhead
- Length: 620 feet
- Width: 200 feet to 320 feet
- Approximate Area: 145,000 square feet
- Approximate Usable Freight Laydown Area: 75,000 square feet
- Dock Elevation: 20 feet Mean Lower Low Water (MLLW)

OPERATIONAL DETAILS

- Primary Vessel Utilization: 100 feet by 400 feet barge and associated tug
- Secondary Vessels: Various conventional freight vessels, research vessels, government vessels and other medium to large size vessels.

ENGINEERING DATA

- Maximum Live Load:
  - Uniform: 1,000 psf
  - Concentrated Load: Cooper E-80 on two tracks at the face
- Berthing Load: 44,000-ton cruise ship approaching dock at 0.5 feet per second. Assume ship's quarter point shall contact fender at 10 degrees from parallel to dock face. Maximum docking energy to each fender is 250 kip-ft
- Mooring Load:
  - Dock Face: 100 kips any direction
  - Mooring Dolphin and Bollard: 200 kips in any seaward direction at a 30° maximum incline from horizontal
- Design Vessels:
  - Cargo Ship: Length = 656 feet; Beam = 85 feet; Tonnage = 40,800 LT (Displacement)
  - Cruise Ship: Length = 856 feet; Beam = 106 feet; Tonnage = 44,000 LT (Displacement)
- Design Seismic Acceleration:
  - Design horizontal open cell response acceleration:
    - OLE (Operating Level Event): 0.13G
    - CLE (Contingency Level Event): 0.19G

- Design Significant Wave Height: 6.8 feet (Spectral period: 5.3 second)
- Wind Data:
  - 110 mph Exposure “D” (UBC), except for mooring loads
  - Mooring Condition:
    - 80 mph in North- South direction October thru April
    - 50 mph in North- South direction May thru September
    - 32 mph in East- West direction year round
- Tidal Data:
  - Extreme High Water: 15.7 feet
  - Mean Higher High Water: 10.6 feet
  - Mean High Water: 9.7 feet
  - Mean Tide Level: 5.5 feet
  - Mean Low Water: 1.4 feet
  - Mean Lower Low Water: 0.0 feet
  - Extreme Low Water: -5.0 feet

LIST OF APPLICABLE DRAWINGS

- Alaska Railroad Corporation New Seward Railroad Dock (2000, PND)
- North Dredging and Armor Alaska Railroad Dock
- Map, Sections, and Seismic Profiles of Seward and Vicinity, Alaska (Seward Seismic Line Profiles.pdf)

LIST OF APPLICABLE REPORTS AND STUDIES

- Geotechnical Investigations – Methods and Findings (1999, PND)
- New Seward ARRC Railroad Dock and Freight Terminal-Liquefaction Susceptibility Evaluation (2000, Dickinson)
- An Investigation of Shoaling and Coastal Processes Occurring at the Alaska Railroad Corporation Dock, Seward, Alaska (1994, Coastal Processes Report)

RECENT IMPROVEMENTS/IMPROVEMENTS UNDERWAY

- 2005: Video surveillance installed.
- 2007: Partially widened to 320 feet through placement of fill to the east of the existing dock.
- 2010: Basin dredged to increase maximum vessel draft.
- 2011: 8-foot chain link fence installed. Three 30-foot roller entry control gates control dock access.
- 2013: Pan-tilt-zoom (PTZ) cameras installed to monitor the terminal area and moored vessels. Two of the entry control gates installed.

PLANNED IMPROVEMENTS

- Addition of a 7,000 square foot concrete slab, electrical power and water service on the South end of the dock to accommodate fish unloading operations. Project completion expected in June 2016.

DEFICIENCIES AND AREAS OF CONCERN

Issues Identified by ARRC Staff

- Dock is currently too short to accommodate the larger barges and/or multiple barges. The current berthing configuration limits the ability for multiple barges to access simultaneously.
- Dock is currently too narrow to accommodate roll-on/roll-off ramps for larger vessels.
- Secure cargo storage and staging space is severely limited.
- Barge basin has been accumulating sediment from the shifting of the Resurrection River, requiring barge services to move to the Freight Dock berth.
- The key location in the removable bullrail allows only one barge at a time and will need to be reconfigured if the dock is expanded to facilitate simultaneous use.

Issues Identified by External Stakeholders

- The offset between the existing ladders and vessels is unsafe. The ladders are regularly damaged by vessel impact due to their current location. The preferred ladder configuration is in the center of the fender, similar to Passenger Dock fenders.
- A longer dock will allow more than one barge to offload simultaneously.
- A wider dock will allow freight to be staged from multiple barges before being transported by truck or rail.
- A notch for a ramp in the dock will allow smaller barges to access the dock for roll on-roll off operations at all tide levels.
- Fenders are too large for most barge operations. The standoff distance from the dock makes pass-pass operations and direct load to rail difficult.
- Gravel working surface requires maintenance of the tracks before rail use and becomes problematic during heavy rain.
- The current front roll-on/roll-off access is difficult to use during low tides and vessels are not easily secured.

FREIGHT DOCK TRACKS

Factsheet

DESCRIPTION

Two sets of railway tracks diverge from Track #1 south of Port Avenue and extend south onto the Seward Freight Dock. The approximately 1,500 foot-long Freight Dock Tracks were construction on the Seward Freight Dock in 2000 to 2002 to load and unload container freight from ships, from ground level, or by ramp onto and off of flat cars. The 2014 Dock Facilities Master Plan includes lengthening the existing dock and extending Freight Dock Tracks #1 and #2 by 400 feet. Freight Dock Track #2 is equipped with a 100-foot long side loading ramp. After loading flat cars proceed to Track #1 north of Port Avenue for outbound inspection.

RELATED FACTSHEETS

- The Freight Dock Tracks diverge from the ladder track at the north end of the **Railyard**.
- The Freight Dock Tracks are located within **Roundhouse Yard, Permit Area North of Port Ave**, and **Permit Area South of Port Avenue**.
- The ends of the Freight Dock Tracks extend out onto the **Seward Freight Dock**

OPERATIONAL DETAILS

- Standard gauge tracks
- Grade 0.0 percent
- Mostly tangent track. There are three curves on Track #1, the lead to the Freight Dock Tracks
- Track is within Railyard Limits of Seward and non-signaled.
- Speed Limit: 10 miles per hour (mph)
- Useable Track lengths for operational purposes by clearance point or accessibility:
  - Track #1: 3,100 feet
  - Freight Dock Track #1: 1,650 feet
  - Freight Dock Track # 2: 1,400 feet
  - Side Ramp: 100 foot-long loading area with 45 foot transition ramps and 8 percent slopes at both ends
- At-grade crossings:
  - North end of Track #1 and unnamed access road, wood tie crossing
  - Middle of Track #1 and unnamed access road, wood tie crossing
  - Port Avenue, wood tie crossing
  - Freight Dock Tracks #1 and #2, unnamed crossing north of Freight Dock, wood tie crossings

ENGINEERING DATA

- Rail is jointed, 115 pounds/, mostly rolled mid-1950s with some mid-1960s
- Wood ties, nominal dimensions 7 inches x 9 inches x 8.5 feet
- Turnouts:
  - #7 turnout from the Railyard ladder at the north end of Track #1
  - #9 turnout from Track # 1 to Freight Dock Tracks #1 and #2, north of the Seward Freight Dock

LIST OF APPLICABLE DRAWINGS

- Alaska Railroad Corporation, Track Chart, April 2015
- Alaska Railroad Corporation, Track centerline CADD Drawings

Side Loading Ramp Along Freight Dock Track No. 2

Side Loading Ramp Along Freight Dock Track No. 2

Wood Tie At-Grade Crossing North of Freight Dock

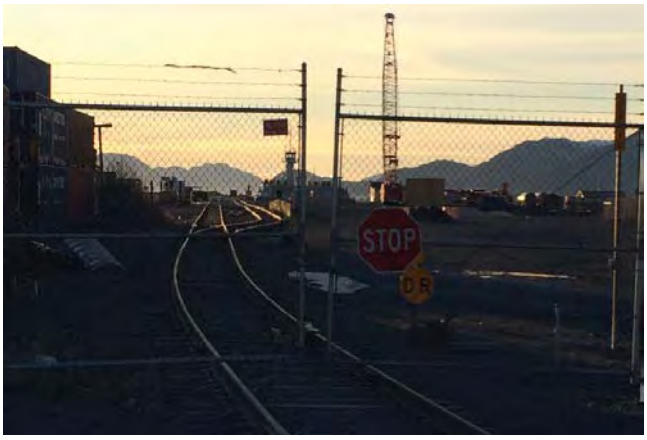
Wood Tie At-Grade Crossing at Port Avenue

DEFICIENCIES AND AREAS OF CONCERN

- Trespassers in Railyard, illegal access to coastal wetlands for bird-watching.
- Tie condition has deteriorated throughout much of the Railyard and a significant portion of ties are nearing end of life. There is no capital program for tie replacement; only essential maintenance replacement is being conducted.
- At-grade crossing at Port Avenue is in poor condition and creates problems for fork lifts and other equipment.

Leased Laydown Area Adjacent to Track No. 1

- Gravel surfacing on freight dock has a high fines content which causes track movement due to the freeze-thaw cycle. The gravel surfacing also requires cleanout of blocked flangeways with track maintenance equipment whenever tracks are used.
- Location of Freight Dock Tracks next to the dock face works for unloading pipeline from ships, but cranes or machinery required for handling of other types of freight prevents flat cars from being loaded while on these tracks.
- The at-grade crossings south of Port Avenue prevent long strings of cars from being positioned and loaded/unloaded close to the dock which results in inefficiencies for freight handling and requires frequent repositioning and switching. Waiting for crews to perform frequent switching leads to additional delays.
- The limited length of double track and location of turnouts limits lengths of trains that can be spotted and worked.
- Areas permitted for laydown next to the northern half of the Freight Dock Tracks prevents use of this half of the Freight Dock Tracks for loading/unloading.
- Weight restrictions for tracks on Seward Freight Dock creates limitations on the type of freight that can be loaded and unloaded there.



Security Gate North of Freight Dock Tracks

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UPLANDS

PERMIT AREA SOUTH OF PORT AVENUE

Factsheet

DESCRIPTION

The permit area south of Port Avenue is an 18 acre area that is used for laydown of goods prior to loading for shipment from the Seward Freight dock, or transport by truck or train from Seward. It is located south of Port Avenue extending to the base of the Seward Freight Dock. This area is bordered on the east and south by water and is fenced on the north and west borders. Two 30-foot wide automatic gates, one at the west fence and one at the north fence, and a 30 foot cantilever gate at the north fence control access to the Seward Freight Dock. Pan-tilt-zoom (PTZ) security cameras monitor the terminal area and moored vessels.

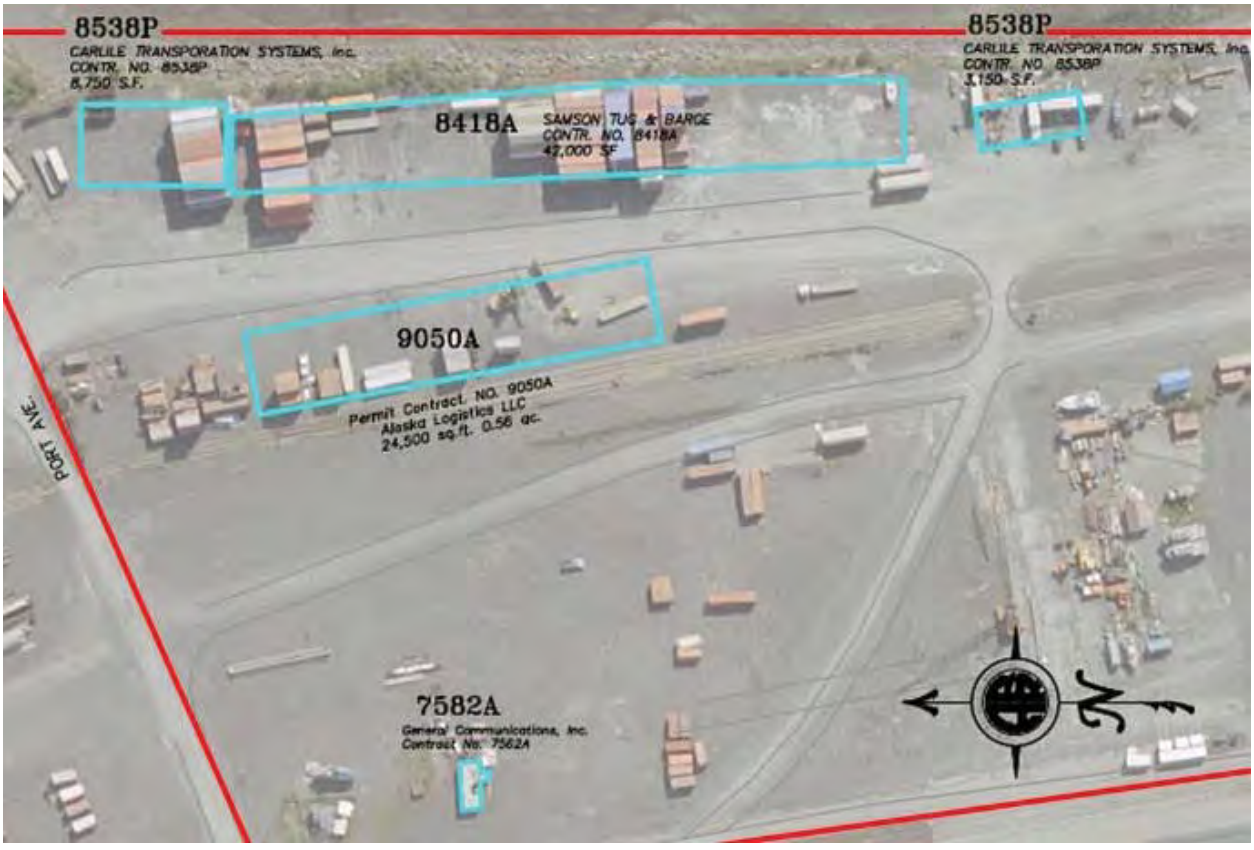
Primary Features

- Security fence
- Double track that transitions to single track at the northern end of the uplands area
- Communications building

OPERATIONAL DETAILS

Parcels

Parcel	Area (acres)	Permit Holder
7582A	*Communications building*	General Communications, Inc.
8418A	0.96	Samson Tug & Barge
8538P	0.27	Carlile Transportation Systems, Inc.
9050A	0.56	Alaska Logistics LLC
Total Permit Area	**1.80**	
Total Permit Area	**17.59**	



LIST OF APPLICABLE DRAWINGS

- Seward Terminal Reserve Freight Dock Security Fence (March 20, 2014)

LIST OF APPLICABLE REPORTS AND STUDIES

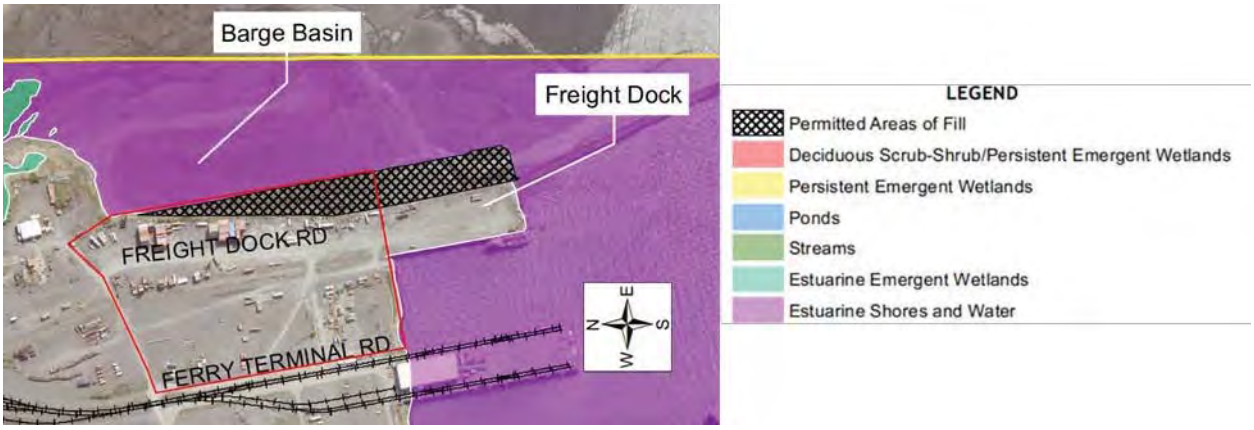
- Seward Freight Dock Expansion Jurisdictional Determination Report and Wetland Functional Assessment (HDR, August 2013)

- Seward Freight Dock Expansion Environmental Assessment (April 2014)
- Seward Freight Dock Expansion Cultural Resources Report (HDR, December 2013)

PLANNED IMPROVEMENTS

Seward Freight Dock Expansion

The Seward Freight Dock Expansion will include the placement of fill to the east of the existing uplands area south of Port Avenue, expanding the available area for laydown.



DEFICIENCIES AND AREAS OF CONCERN

Distributed utilities are not present in this area and there is insufficient office space. Current lighting is not bright enough for laydown work during the winter.

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UPLANDS

PERMIT AREA NORTH OF PORT AVENUE

Factsheet

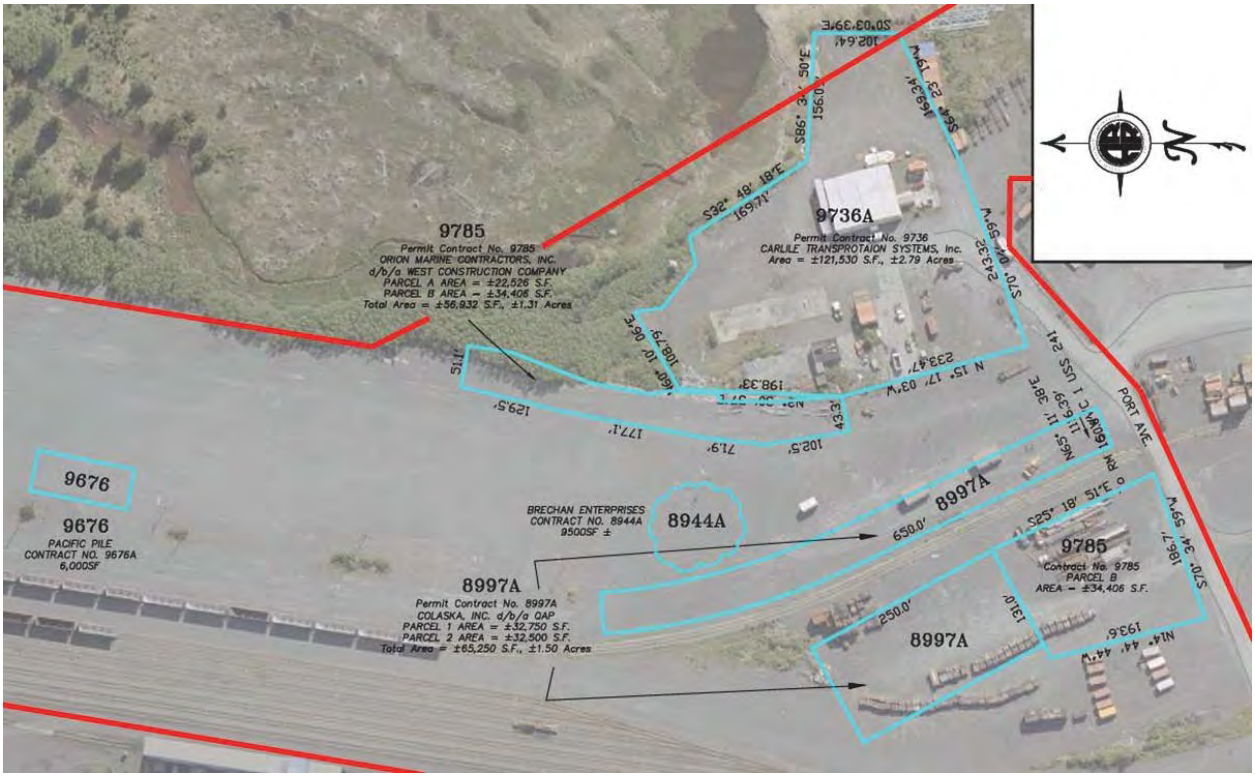
DESCRIPTION

The permit area north of Port Avenue is divided into two parcels; the largest is located north of the Seward Freight Dock and has upland areas that are currently leased or are available for lease for laydown of goods prior to loading for vessel shipment from the Seward Freight Dock, or transport by truck or train from Seward. This parcel includes the Freight Building, well house and the barge basin haul-out area. The area around the Freight Building has been used for marine maintenance activities by Catalyst Marine and Alaska Logistics. This area is currently also used for pipe laydown. The Freight Building Factsheet contains additional details. The second parcel was the site of the former Coal Pond. The Coal Pond was filled in 2014 to create additional lease land, which is now being marketed as 'Leirer Road Property'. A Telecommunications Facility tower may be constructed at the site and discussions have been held with other local tenants, including Catalyst Marine and Raibow, but no firm commitments have been entered into. Improvements will be considered on an as-needed basis, depending on future tenant needs.

OPERATIONAL DETAILS

The following permit-holders have special land use permits in the permit area.

Parcel	Area (acres)	Permit Holder
8944A	0.22	Brechan Enterprises
8997A	1.50	Colaska, Inc. (QAP)
9676	0.14	Pacific Pile
9688 *(Barge Uplands)*	0.50	Vitus Marine, LLC
9736A *(Freight Building)*	2.79	Carlile Construction
9785A	0.52	Orion Marine Contractors, Inc.
9785B	0.79	Orion Marine Contractors, Inc.
Total Permit Area	**6.46**	
Total Area	**33.07**	



LIST OF APPLICABLE DRAWINGS

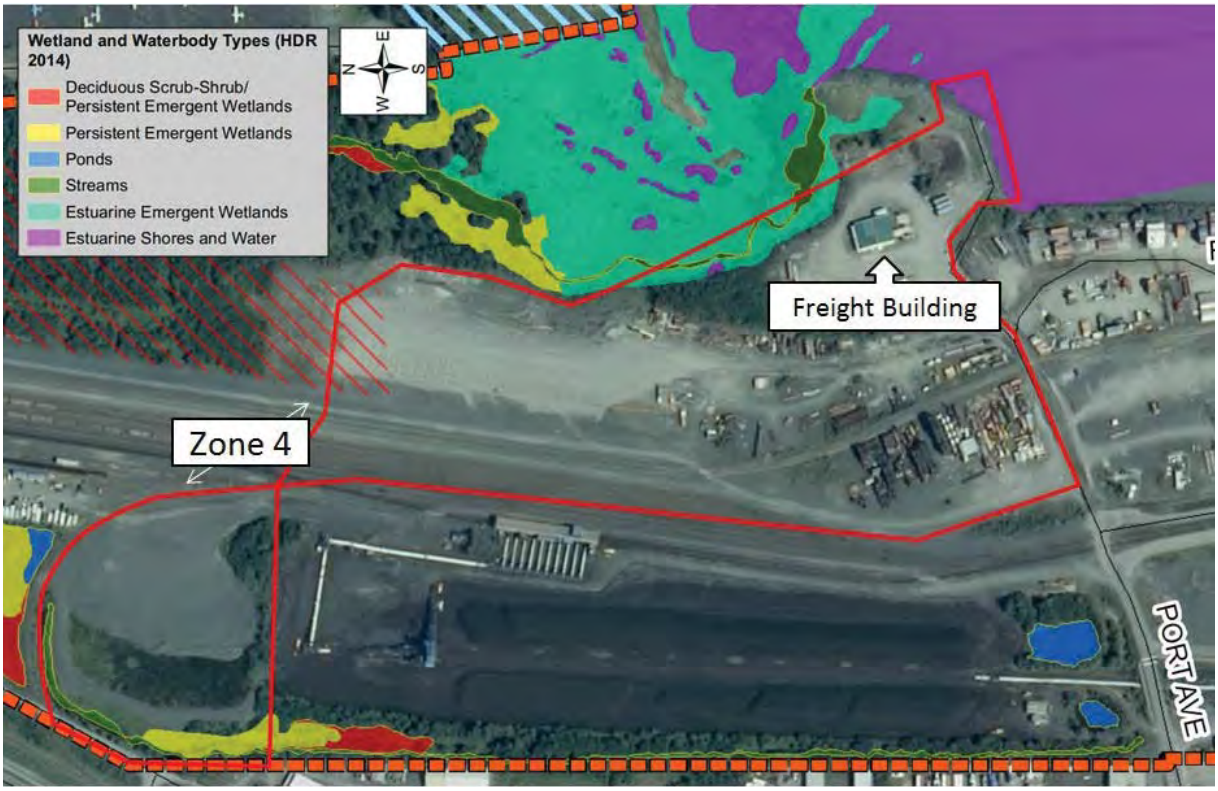
- Seward Terminal Reserve Special Land Use Permits North of Port Ave. (April 3, 2014)

LIST OF APPLICABLE REPORTS AND STUDIES

- Seward Freight Dock Expansion Jurisdictional Determination Report and Wetland Functional Assessment (HDR, August 2013)
- Seward Freight Dock Expansion Environmental Assessment (April 2014)

ENVIRONMENTAL INFORMATION

Wetlands and waterbodies are present along the eastern edge of the Freight Building parcel and along the western and northern edges of the Leirer Road Property parcel.



PLANNED IMPROVEMENTS

Barge basin dredging is planned in association with the freight dock extension and expansion project. See the Freight Dock Fact Sheet for more details.

Refer to the Seward Loading Facility Factsheet regarding any additional plans it may have.

DEFICIENCIES AND AREAS OF CONCERN

Utilities are not distributed throughout the area, with grid power being the only distributed system to the Freight Building, and there is insufficient office space. Current lighting is not bright enough for laydown work during the winter.

The area has insufficient security. Trespassers commonly cross the area to watch birds in natural areas to the east and northeast and have started bonfires near the Freight Building.

The at-grade railroad crossing on Port Avenue is confusing and has inadequate signage.

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FREIGHT BUILDING

Factsheet

DESCRIPTION

The Freight Building is a 4,000 to 5,000 sf warehouse and heavy equipment maintenance structure with four offices, storage, a break room and restroom. Permit-holding on this property comes with ± 2.79 acres of uplands yard space. The permit yard includes a driveway that goes around the entire building. This permit area is bordered on the east by wetlands, waterfront to the south and uplands/wetlands to the north and uplands to the west.

Outbuildings include a partially insulated, plywood framed well house to the west and a septic field to the east. There are two semi-trailers that act as storage units located at the north end of the building. A portable toilet is located off the southeast corner for use by non-Carlile permit holders operating in the uplands area.

It is currently leased to Carlile, an intermodal shipping company. The Freight Building is a leasing asset for the Railroad that is typically leased to permit holders operating out of the port and uplands area that benefit from the proximity to barge, railroad and truck freight traffic.

The building is in good condition for its industrial type of use. Flooding was reported during early stakeholder engagements, and this appears to be limited to the well house, as there are no signs of flood damage in the building. There are some areas of dented and damaged siding near the overhead doors where the insulation is exposed.

General information

- Construction Date: potentially 1970's to 1980's
- Years in Service: 36 to 46

- Structure Type: Steel-framed structure with a slab-on-grade floor and the walls and roof are insulated with batt insulation held between the exterior cladding and horizontal purlins. The building is clad in metal siding and roofing.

Primary Features

- Two drive-through, west to east, maintenance bays for heavy equipment, three offices, breakroom, restroom, storage, and arctic entry.
- A recent interior remodel, completed within the last 5 years, refurbished the offices, entry, bathroom, and breakroom spaces.
- Exterior metal siding has also been painted in the last 5 years.

OPERATIONAL DETAILS

- Space is administrative and operations headquarters for Carlile's Seward operations.
- A short semi and snow plow were parked in the building in mid-November 2015. Minimal maintenance and servicing equipment and supplies were located in the shop portion.
- Space is non-traditional office space, with a use schedule that varies by season and barge schedule. Currently an employee drives to Seward daily from Anchorage to work out of the facility.
- The facility was visited in mid-November 2015 and had very little activity. It appears there are more people in the building and more activity during the summer months.

LIST OF APPLICABLE DRAWINGS

- None

LIST OF APPLICABLE REPORTS AND STUDIES

- RFI 14 Response ID 14 898800 Henderlong PH1 Report All (Hazmat report) located on project SharePoint site.
- RFI 13 Response 20120801 Carlile Lease located on project SharePoint site.

DEFICIENCIES AND AREAS OF CONCERN

Issues Identified by ARRC Staff

- ARRC wants the building to remain viable to provide support for marine activities.
- There have been freezing problems with the wellhouse which was insulated about two years ago, current freezing issues were not noted although the insulation is not continuous.

Issues Identified by External Stakeholders

- There is a need for restrooms for all leaseholders on the south end of the uplands who operate near this building.
- Catalyst Marine would like to have a large, self funded shop where the Freight Building is located as it is in a strategic location for them. They noted a long-term or 99 year lease would incentivize them to construct their own shop.

- It was suggested by users of the freight dock to have showers, bathrooms etc. available twenty-four/seven for these workers in the general vicinity of the Freight Building, Terminal or secured area of the freight yard. Modifications or a small addition to the Freight Building may be one avenue to fulfill this need.
- The well house, roughly 5 feet by 8 feet, is not well constructed or insulated and has reportedly had issues with freezing up. Site drainage appears to drain into the building from the north causing further degradation, freezing and other issues.

ENGINEERING DATA/CODE & CONDITIONS SURVEY

GENERAL INFORMATION	
Building Name/Location:	Freight/Carlile/Henderlong Building
Purpose of Facility:	Offices, storage, & maintenance for lease holder/permit holder
Supervising Department:	
Services Provided:	Fuel oil heat, lights/electricity, water, well water and site septic
Date of Construction:	Estimated to be 1970's to 1980's, but unconfirmed
Date of Renovation:	Last 5 years
General Condition:	Good for industrial type of use
Land Ownership:	ARRC
Lot Size:	2.79 acres
Building Size:	Approx. 4,100 sf main building plus 270sf arctic vestibule with storage.
SITE	
Outbuildings - Types	Well house, two semi trailers (storage), port-a-potty
Outbuildings – Sizes	Approx, 5' x 8' well house and standard 30'L trailers
Outbuildings - Uses	See names
UTILITIES	
Water Source	Well water
Waste Water	Septic tank and field
Electric Service Utility	
Fuel Type & Storage Size	Fuel oil w/ 5'-4" x 7' tank, assumed 1,000 gallons
Heating System	Unit heater in shop space, elect. baseboard in bathroom & offices, unheated storage area at south end of entry vestibule (6'-10"x8'-9" inside dimensions)
Building Controls System	None
Security	4 cameras (total) focused on office area
Survey Data provided by	Bettisworth North; Dena Strait
On-Site Space Use Audit	2 bay, drive-through maintenance shop with third bay without overhead door access, 1 rest room that is not Americans with Disability Act (ADA) compliant, 4offices, open storage above finished spaces and near arctic entry.
FIRE & LIFE SAFETY	
Smoke/Heat/CO Detection	None, 4 fire extinguishers in shop
Program Compliance	
Building Type Compliance	
Entry/Exit	Not ADA compliant
Restrooms	1 unisex, not ADA compliant
Other	
FACILITY CONDITION	
Exterior Wall Finish	Corrugated metal in fair condition, recently painted, some damage at OverHead Doors (OHDs)
Exterior Entrance	Poor, no sidewalk

Interior Wall Finish	Vapor retarder over batt insulation, painted plywood at shop, Painted gypsum wallboard (GWB) remainder
Interior Floor Finish	Painted concrete at shop, painted plywood at loft, carpet in 2 offices, Vinyl Composite Tiles (VCT) in other, painted concrete at entry
Interior Ceiling Finish	Shop & loft: exposed insulation and steel beams, office: painted gypsum wallboard (GWB)
Interior Casework	Wood with plastic laminate counters
Windows	3 (total) double pane sliders
APPLIANCES	
Commercial	
Residential	1 each refrigerator and microwave
LIGHTING & ELECTRICAL	
Service	
Emergency Power/UPS	
MECHANICAL	
Ventilation	Only bathroom vent on switch
Controls	None
GROWTH & CONSTRAINTS	
Site	Minimal expansion opportunity to east due to septic field, Resurrection River and turning space needed for large equipment.
Building	None
Code	
ENERGY CONSERVATION	
Energy Forms	Fuel oil, electric baseboard, T-8 lights, incandescents
GENERAL COMMENTS	

UPLANDS

AREA 1 - 3 STORAGE PAD

Factsheet

DESCRIPTION

The Area 1 through 3 Storage Pad is currently vacant land that has been earmarked for future lease or permit-holding. This area is bordered on the east by Airport Road and on the west by a seven track yard. The Area 1 through 3 Storage Pad project is currently developing the area into a storage pad. Vegetation clearing is complete and fill placement began in 2015. Areas 1 through 3 have been earmarked for potential future use as a storage pad for liquefied natural gas (LNG) pipeline. Overhead electrical and communication lines cross the northern end of the area. Gate-controlled road access to Airport Road is available along the railway right-of-way but is not developed for commercial vehicle traffic. Wetlands along the east side of roundhouse yard and storage pad are avoided by the footprint of the storage pad.

General Information

- Construction Date: 2015 to 2016, ongoing
- Structure Type: Vacant lot, under development into gravel storage pad
- Area Under Development: 10.9 acres

ENVIRONMENTAL INFORMATION

Soil stability and geotechnical surveys have not been completed. A cultural resource survey and wetland delineation were completed for the Seward Freight Dock Expansion project. Wetland delineation and hydrologic data were used to develop the Area 1-3 Storage Pad Stormwater Pollution Prevention Plan (SWPPP).

LIST OF APPLICABLE DRAWINGS

- Area 1-3 Storage Pad (Final 08/15/2014)
- Area 1-3 Storage Pad Wetland Delineation and SWPPP drawings

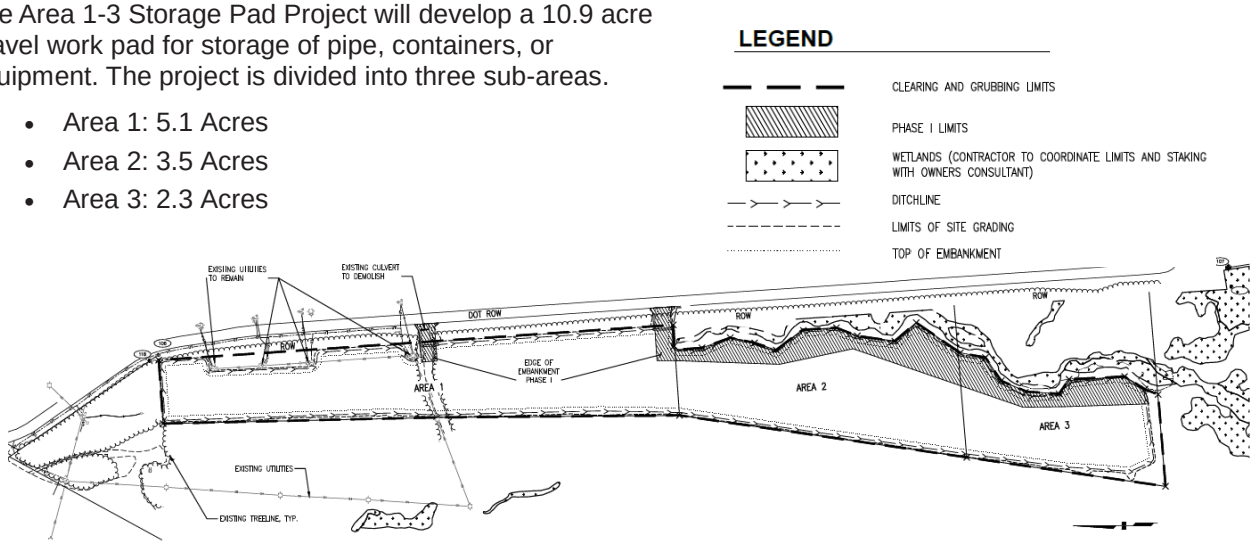
LIST OF APPLICABLE REPORTS AND STUDIES

- Seward Freight Dock Expansion Jurisdictional Determination Report and Wetland Functional Assessment (HDR, August 2013)
- Seward Freight Dock Expansion Environmental Assessment (April 2014)
- Seward Freight Dock Expansion Cultural Resources Report (HDR, December 2013)
- Area 1-3 Storage Pad SWPPP

PLANNED IMPROVEMENTS/IMPROVEMENTS UNDERWAY

The Area 1-3 Storage Pad Project will develop a 10.9 acre gravel work pad for storage of pipe, containers, or equipment. The project is divided into three sub-areas.

- Area 1: 5.1 Acres
- Area 2: 3.5 Acres
- Area 3: 2.3 Acres



Development of the Area 1 through 3 Storage Pad is divided into two phases. Phase 1 is underway and included 10.9 acres of vegetation clearing. Metco Inc. placed granular fill that had been previously stored next to the passenger terminal parking area and provided 1,800 cubic yards of additional fill in the fall of 2015. The remainder of Phase 1 will include the construction of an embankment along the eastern edge of the fill to create a buffer for the wetlands in Area 2 and Area 3 and construction of two access roads into Area 1 to provide access from Airport Road. Phase 2 will consist of additional fill placement, compaction, and leveling in Areas 1 through 3.

DEFICIENCIES AND AREAS OF CONCERN

The lot is currently undeveloped and requires filling and compaction prior to leasing.

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RAILYARD

Factsheet

DESCRIPTION

The Railyard consists of railway tracks between the Jesse Lee Main at the Airport Road grade crossing and Track #1 to the Freight Dock on Resurrection Bay. Features of the Railyard include a Wye connection to the Jesse Lee Main, three Roundhouse tracks, a coal bunker track, and a seven track yard connecting to three upper lead tracks. The Alaska Railroad Corporation (ARRC) uses the Railyard for:

- Receiving freight trains from the north
- Departing freight trains to the north
- Sorting freight cars for delivery to local customers
- Storing empty railway cars and equipment until needed
- Rail car inspection and repair
- Unloading coal
- Turning trains via the wye
- Accessing the Passenger Dock Tracks

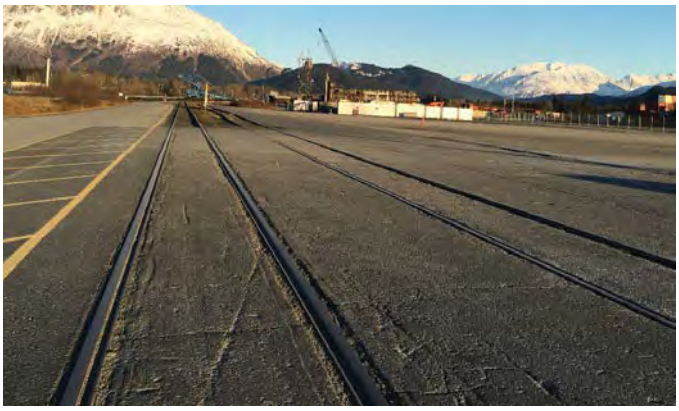
RELATED FACTSHEETS

- The Railyard is located within the **Roundhouse yard** and **Permit Area North of Port Avenue**
- Portions of the coal bunker track are located within area **Loading Facility Surrounding Area**
- The coal bunker track is an integral component of the **Seward Loading Facility**
- The **Roundhouse** is located within the Railyard and is traversed by Roundhouse Tracks #1, #2, and #3

OPERATIONAL DETAILS

- Standard gauge rail
- Grade 0.0 percent
- Tangent track
- Track is within limits of Seward Yard and non-signaled
- Speed Limit:10 mph
- Useable track lengths for operational purposes by clearance point or accessibility:
  - Passenger Dock #1: 860 feet
  - Passenger Dock #2: 860 feet
- At-grade crossings:
  - Port Avenue, wood tie crossing
  - About 400 feet at the south end of Passenger Dock Tracks #1 and #2 has been paved with asphalt

Passenger Dock Tracks, Port Avenue At-Grade Crossing



Passenger Dock Tracks #1 and #2, Asphalt Paving, Southern 400 feet

ENGINEERING DATA

- Rail is jointed 115 pound/yard (lb/yd), mostly rolled mid-1950s with some mid-1960s
- Wood ties, nominal dimensions 7 inches x 9 inches x 8.5 feet

LIST OF APPLICABLE DRAWINGS

- Alaska Railroad Corporation, Track Chart, April 2015
- Alaska Railroad Corporation, Track centerline CADD Drawings

DEFICIENCIES AND AREAS OF CONCERN

- At-grade crossing at Port Avenue is in poor condition and has a high grade differential over a short distance. This creates problems for fork lifts, trucks, and other equipment.
- Tracks on the Seward Passenger Dock are no longer used due to weight limitations on the dock. This limits the length of track available for passenger trains, which can block the Port Avenue crossing. Currently chartered cruise trains are built to ensure that they do not overhang Port Avenue, which limits the numbers of passengers that can be accommodated. Adding more cars to the chartered cruise trains will result in blocking the Port Avenue crossing when trains are loaded/unloaded.
- The location of the Passenger Dock Tracks at the end of the Railyard, combined with the limited length of available track in the Railyard, occasionally results in freight trains being pushed toward passenger trains which is not ideal.

ROUNDHOUSE

Factsheet

DESCRIPTION

The 10,161 square foot steel-framed building has a poured concrete slab-on-grade and batt insulation on the inside of corrugated reinforced fiberglass siding and corrugated metal roofing assemblies.

This facility is the maintenance, repair, and cleaning shop for locomotives and rail cars and provides covered, heated storage for yard maintenance equipment. In the winter months, one operator remains on site to perform snow removal and other maintenance activities on an as-needed basis. A D9 grader and loader are kept in the Roundhouse for this purpose.

Adjacent site space is used to park permitted personal RVs of ARRC employees.

Two modular units are located to the south of the Roundhouse: one is a safety office/break room and one is a shower and laundry facility for RV campers and personnel working out of the Roundhouse.

For the heavy industrial use of these buildings, they are in good condition. The vapor retarder on the inside of the Roundhouse's wall insulation is not punctured or torn, but is fragile and does puncture easily. The modular shower/laundry and office/break room buildings are in fair condition as they are relatively new. In general the facilities are performing their duties in their current condition, but renovation work for bathrooms, Maintenance of Way office and break room areas inside the Roundhouse would be beneficial. Future improvements needed for Positive Train Control (PTC), are still being determined.

General Information

- Construction Date: 1968, Renovated in 2001
- Years in Service: 48 years
- Structure Type: steel-framed with concrete slab-on-grade & assumed concrete footing foundation.

Primary Features

- There are three lines of track that go through the building with large overhead doors at the north and south ends so trains can pull in, be serviced, and pull through.
- A small, wood framed-in area contains the office, bathroom, storage and mechanical room..

RELATED FACT SHEETS

- The Roundhouse is located within the **Roundhouse Yard**
- The Roundhouse is located within the **Railyard** and is traversed by Roundhouse Tracks #1, #2, and #3

OPERATIONAL DETAILS

- Seasonal maintenance & cleaning facility for ARRC's engines and rail cars
- Some storage for heavy equipment (grader & loader)
- Acts as snow removal operations center and storage facility in winter and is used for maintenance activities in summer.
- There are several water storage tanks on the west side of the building that were previously used for washing trains, but are now unused.
- Waste water from train washing is currently loaded into tank cars and deposited off site, leaving the under floor drain areas under the west track unused.

LIST OF APPLICABLE DRAWINGS

- Multiple mechanical and electrical engineering drawings from 2001 mechanical and electrical upgrade – located within SharePoint project files.

DEFICIENCIES AND AREAS OF CONCERN

Issues Identified by ARRC Staff

- Currently the Roundhouse is sufficient to work on the number of trains requiring service in both the summer and winter because in the summer they can be left outside while they wait to be serviced or after being serviced. If there are more trains that require maintenance in the winter, there will not be enough space to work on them because they cannot be left outside as they would freeze-up.
- A Section or bunkhouse was considered as potentially more cost effective than renting hotels for non-RV employees. This was explored and deemed not cost effective, thus not pursued further.
- The septic field is subpar, located in a saturated area,

Issues Identified by External Stakeholders

- None noted. The Roundhouse is currently used exclusively by the Railroad although in the past railcars that are owned/leased by tour companies have been serviced and cleaned in the building.

ENGINEERING DATA/CODE & CONDITIONS SURVEY

GENERAL INFORMATION	
Building Name/Location:	Roundhouse
Purpose of Facility:	Maintain and service rail engines and cars
Supervising Department:	Maintenance of Way
Services Provided:	Engine and Yard maintenance, Snow removal equip.
Date of Construction:	1968
Date of Renovation:	Drawings exist for the 2001 renovations, but the boilers have been changed out and the boiler room enclosed since the 2001 renovation.
General Condition:	Fair
Land Ownership:	ARRC
Lot Size:	
Building Size:	10,161 sf
SITE	
Outbuildings - Types	(2) Modular buildings
Outbuildings – Sizes	512 sf (32'x16') each
Outbuildings - Uses	Safety office/breakroom, showers and laundry
UTILITIES	
Water Source	City water
Waste Water	Onsite septic system piped from middle of west façade length to drain field that goes to north from end of the line near the pole mounted transformer. Waste water from both modulars drain into this septic system as well.
Electric Service Utility	City grid
Fuel Type & Storage Size	Fuel oil tank (1,250 gallon), at Roundhouse, large propane tank for modulars
Heating System	Roundhouse: cabinet unit heaters with glycol heating coils, Modular: furnace w/ forced air (below floor)
Building Controls System	
Security	TWIC Card reader at Roundhouse door. None on modulars.
Survey Data provided by	Dena Strait, Bettisworth North
On-Site Space Use Audit	Dena Strait, Bettisworth North
FIRE & LIFE SAFETY	
Smoke/Heat/CO Detection	
Program Compliance	
Building Type Compliance	
Sprinklers	Yes
Entry/Exit	Non-ADA-compliant
Restrooms	1 unisex non-ADA in Roundhouse and 3 shower/toilet/sink combo in modular.
Other	
FACILITY CONDITION	
Exterior Wall Finish	Corrugated reinforced fiberglass siding on metal girts – Fair
Exterior Entrance	6 OHD doors (RR access), 4 man doors - fair
Interior Wall Finish	Exposed VB on batt insulation – fair condition

Interior Floor Finish	Sealed concrete - fair
Interior Ceiling Finish	Open to structure
Interior Casework	Site built shelving and storage areas of various cabinets and chain linked fenced areas
Windows	In overhead doors of Roundhouse and on long sides of Modulars
APPLIANCES	
Commercial	
Residential	Main bldg: (2) refrigerators Modular: washer, dryer, refrigerator, microwave integral to hood, stove with oven, dishwasher, deep soak laundry sink
LIGHTING & ELECTRICAL	
Service	
Emergency Power/UPS	None
MECHANICAL	
Ventilation	Exhaust fan in bathrooms for both Roundhouse and Modular
Controls	
GROWTH & CONSTRAINTS	
Site	Yard tracks are to east so cannot expand in that direction unless they move
Building	Could grow to north, south or west.
Code	
ENERGY CONSERVATION	
Energy Forms	Grid electricity, fuel oil, propane.
GENERAL COMMENTS	

UPLANDS

ROUNDHOUSE YARD

Factsheet

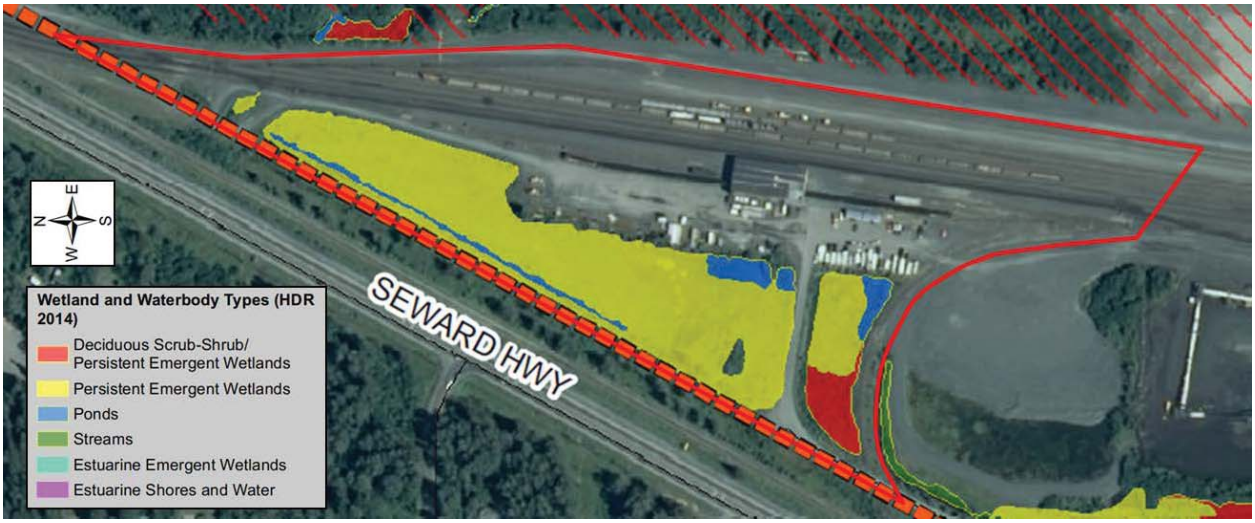
DESCRIPTION

The roundhouse yard covers 20 acres including the Roundhouse Yard, the northern half of the 7-track yard, adjacent Track #1, the Wye (triangular track junction), and wetlands west of the roundhouse. The gravel Roundhouse Yard west of the Roundhouse tracks is used to store and maintain equipment. The Roundhouse Yard to the south is also used to accommodate eligible active Alaska Railroad (ARRC) employees who may use this area as a campsite by obtaining a permit and adhering to the ARRC camping policy, which became effective June 1, 2005. Employees may stay in a “tent, camper, or recreation vehicle, designed for such a purpose, during off-duty hours while working at a remote location or away from the home terminal.” A modular shower/laundry facility and safety office/breakroom facility are available for campers and Roundhouse staff. The Roundhouse Factsheet includes a list of buildings and uses, and the Railyard fact sheet includes a description of the tracks.

Primary Features

- Roundhouse
  - Septic drain field to west of facility backing onto wetlands
  - Modular safety office and breakroom
  - Modular shower and laundry facility
  - 3 Roundhouse tracks
  - 7-track yard
  - Wye Track
  - Upper Track#1
  - Seward Highway access road via Leirer Road
  - Wetlands
    - Persistent emergent wetlands
    - Ponds
    - Streams

HDR completed a wetlands delineation of the wetlands area within the roundhouse yard in 2014 as part of the Seward Freight Dock Expansion Project. Persistent emergent wetlands and ponds are present along the western edge of the area.



LIST OF APPLICABLE DRAWINGS

See the Roundhouse and Railyard Factsheets for a list of applicable drawings

LIST OF APPLICABLE REPORTS AND STUDIES

- Seward Freight Dock Expansion Jurisdictional Determination Report and Wetland Functional Assessment (HDR, August 2013)
- Seward Freight Dock Expansion Environmental Assessment (April 2014)

DEFICIENCIES AND AREAS OF CONCERN

- The site lacks communication utilities, so the primary form of communication is two-way radio.
- Trespassing
- Site drainage is an area of concern.
- Refer to the **Roundhouse** and **Railyard** Factsheets for applicable deficiencies and areas of concern.

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