PORT of ALASKA

2000 Anchorage Port Road
Anchorage, Alaska 99501
907-343-6200
PortOfAlaska@Muni.org
**PortOfAlaska.com**

Ms. Amanda Heath
U.S. Army Corps of Engineers
Regulatory Division
CEPOA-RD-S
Post Office Box 6898
JBER, Alaska 99506-0898

February 5, 2018

Subject: Port of Alaska Modernization Program
- Petroleum and Cement Terminal Project Revised Application POA-2003-502-M11, Knik Arm
- Modification to Test Pile Program Permit POA-2003-502, Knik Arm
- Use of Nationwide Permit 6, Survey Activities

Dear Ms. Heath,

The Port of Alaska (POA) is continuing to advance the Port of Alaska Modernization Program (PAMP), including the Petroleum and Cement Terminal (PCT) Project. This correspondence is related to the PCT Project and the associated Department of the Army (DA) authorizations pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The POA is submitting the included revised DA permit application (DA file Number POA-2003-502-M11, Knik Arm) requesting authorization to construct the PCT. We are also seeking to modify DA permit POA-2003-502, Knik Arm, issued on March 9, 2016 for the Test Pile Program. Finally, we are informing you of the POA's use of nationwide permit (NWP) 6, Survey Activities associated with a limited soil investigation.

**PCT Revised Application POA-2003-502-M11, Knik Arm**

In the time since the POA filed the original application on March 6, 2017, the PCT design has been advanced and an agreement has been reached on a permitting approach that will allow the Regulatory Division to process two permits based on the PCT construction schedules for 2018 and 2019. As such, the revised application includes Workplans for the both 2018 and 2019 construction seasons, and together, the full PCT Project is represented. The POA seeks a DA permit for the 2018 Workplan in mid-April 2018 to support the 2018 construction season. The POA also seeks a second DA permit for the 2019 Workplan on a schedule that supports the 2019 construction season (early 2019). The POA understands that with this permitting approach offered by the Regulatory Division, a DA permit issued for the 2018 Workplan does not guarantee the issuance of a DA permit for the 2019 Workplan. As you are aware, this permitting approach supports the POA's intention to apply for an Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act with the National Marine Fisheries Service (NMFS) in April 2018 for work associated with the 2019 Workplan. We expect your office and NMFS will once again jointly consult for the 2019 Workplan under Section 7 of the Endangered Species Act after NMFS receives the IHA application.

The 2018 and 2019 Workplans are as follows:

### 2018 Workplan:

- Transitional dredging at the PCT and offshore disposal of the dredged material to achieve seismic requirements and provide the depths needed for berthing vessels at the new PCT facility
- Discharge of material at the PCT abutment for a temporary work pad to conduct soil augmentation in order to achieve seismic requirements for the PCT trestle
- Installation of landside utilities (water, electric, and communication) and product lines
- Removal of a drill casing left in-situ during the POA's 2017 geotechnical investigations (this geotechnical work was accomplished in accordance with NWP 6, Survey Activities, and initially authorized by your office on May 24, 2017 and subsequently amended on July 28, 2017).

### 2019 Workplan:

- Construction of the PCT, including installation of piles, platforms and trestles, dolphins, and catwalks
- Completion of any remaining work on landside utilities and product lines
- Relocation of the South Floating Dock

Also included with this application are technical reports with analyses of the anticipated effects of the 2018 and 2019 Workplans on their respective resources and recommended effect determinations for each resource. The POA requests to be USACE's designated non-Federal representative during your Endangered Species Act consultation with NMFS.

In this regard, attached please find:

- A revised application for DA permit
- Appendix A: Supplemental Information
- Appendix B: Design Drawings
- Appendix C: Endangered Species Act Technical Report
- Appendix D: Essential Fish Habitat Technical Report
- A Draft Public Notice for your review and use

Based on the POA's March 6, 2017 DA permit application, the Alaska Department of Environmental Conservation (ADEC) issued a Certificate of Reasonable Assurance (CRA) pursuant to Section 401 of the Clean Water Act on May 2, 2017, to the POA for the PCT Project. With the inclusion of transitional dredging, offshore disposal of the dredge material, discharges associated with the temporary work pad, and utility installations in the revised DA application, the POA will seek an amendment to ADEC's CRA.

**Modification to Test Pile Program Permit POA-2003-502, Knik Arm**

On March 6, 2017, the POA requested a modification to DA permit number POA-2003-502, Knik Arm, first issued on March 9, 2016, which authorized the installation of ten test piles at the POA. Specifically, we requested the permit be modified to allow test piles 8, 9, and 10 to be removed to a depth of -55 feet mean lower low water. This work will involve discharging into Knik Arm approximately 40 cubic yards of marine sediment from inside these test piles in order to create the space needed to lower a cutting device into the piles. The POA seeks this DA permit modification by mid-April 2018 to support the 2018 construction season.

**Use of NWP 6, Survey Activities**

For informational purposes, the POA will utilize the non-notifying NWP 6, Survey Activities, to collect soil samples in 2018. The samples are needed to support formulating the composition of the cement mix that will be used for augmenting the soil at the PCT trestle abutment. To collect this sample material, six to eight soil logs will be taken when the area is dewatered within the area where soil augmentation will occur.

I appreciate your continued assistance as we work to advance the PCT Project. Should you have any questions, need further information, or care to discuss this application, please contact the Port Engineer, Todd Cowles, at 907-343-6209, or our designated agent, Dave Casey (HDR), at 907-644-2191.

Regards,

Stephen Ribuffo
Director
Port of Alaska

cc: Todd Cowles, P.E., Port Engineer, PAMP PM
Jeff Bool, P.E., PAMP PMC PM (JACOBS, formerly CH2M)
Dave Casey, PAMP Permitting Lead (HDR)

U.S. ARMY CORPS OF ENGINEERS
**APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT**
33 CFR 325. The proponent agency is CECW-CO-R.

**Form Approved - OMB APPROVAL NO. 0710-0003 EXPIRES: 30-SEPTEMBER-2015**



***(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)***

| 1. APPLICATION NO. | 2. FIELD OFFICE CODE | 3. DATE RECEIVED | 4. DATE APPLICATION COMPLETED |
|---|---|---|---|
| | | | |

***(ITEMS BELOW TO BE FILLED BY APPLICANT)***

**5. APPLICANT'S NAME**
First- Stephen Middle- Last- Ribuffo
Company- Municipality of Anchorage, Port of Alaska
E-mail Address- ribuffos@muni.org

**8. AUTHORIZED AGENT'S NAME AND TITLE** *(agent is not required)*
First- Dave Middle- Last- Casey
Company- HDR, Inc.
E-mail Address- dave.casey@hdrinc.com

**6. APPLICANT'S ADDRESS:**
Address- 2000 Anchorage Port Road
City- Anchorage State- AK Zip- 99501 Country- USA

**9. AGENT'S ADDRESS:**
Address- 2525 C Street
City- Anchorage State- AK Zip- 99501 Country- USA

**7. APPLICANT'S PHONE NOs. w/AREA CODE**

| a. Residence | b. Business | c. Fax |
|---|---|---|
| | 907-343-6201 | |

**10. AGENT'S PHONE NOs. w/AREA CODE**

| a. Residence | b. Business | c. Fax |
|---|---|---|
| | 907-644-2191 | 907-644-2022 |

11. **STATEMENT OF AUTHORIZATION**

I hereby authorize Dave Casey to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Stephen Ribuffo 2/5/18
SIGNATURE OF APPLICANT DATE

**NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY**

12. PROJECT NAME OR TITLE *(see instructions)*
Port of Alaska Modernization Program – Petroleum and Cement Terminal Project

13. NAME OF WATERBODY, IF KNOWN *(if applicable)*
Knik Arm

14. PROJECT STREET ADDRESS *(if applicable)*
Address- 2000 Anchorage Port Rd
City- Anchorage State-AK Zip-99501 Country- USA

15. LOCATION OF PROJECT
Latitude: °N 61.233499 Longitude: °W -149.985068

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID Municipality: Municipality of Anchorage
Section- 7 Township- 13 N Range- 3 W; Seward Meridian

17. DIRECTIONS TO THE SITE-

From 5th Avenue and A Street, head north on A Street. Take the exit towards the Port and continue onto West Loop Rd. West Loop Rd. turns slightly right and becomes Ocean Dock Rd. (partial restricted usage road). Make slight right onto Anchorage Port Rd. (restricted use road). Destination will be on the left in 0.3 miles.

18. Nature of Activity *(Description of project, include all features)*

Please see attached Project Description included in Appendix A - Supplemental Information.

19. Project Purpose *(Describe the reason or purpose of the project, see instructions)*

The purpose of the PCT is to replace the existing POL 1 with a new structure that exceeds current seismic standards. A newly constructed and operational PCT would be designed to withstand a major seismic event and rapidly return to service.

**USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED**

20. Reason(s) for Discharge

The dredging and discharges are needed to construct and operate the PCT. See Appendix A – Supplemental Information for further details of the project components.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

| Type<br>Amount in Cubic Yards | Type<br>Amount in Cubic Yards | Type<br>Amount in Cubic Yards | Type<br>Amount in Cubic Yards |
|---|---|---|---|
| Approx. 680,000 cy (Transitional Dredging) | Approx. 14,800 cy (Temporary Work Pad) | Approx. 500 cy (Removed from inside piles) | |

22. Surface Area in Acres of Wetlands or Other Waters Filled *(see instructions)*

Acres Transitional Dredging (Disposal Area): Approx. 140 acres
Temporary Work Pad: Approx. 1 acre
Piles: 0.03 acres

23. Description of Avoidance, Minimization and Compensation *(see instructions)*

See the Avoidance, Minimization, and Compensation Statement included in Appendix A - Supplemental Information.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- Alaska Railroad, Pouch 7-2111

City – Anchorage State – AK Zip - 99501

b. Address-

City – State – Zip -

c. Address-

City - State – Zip -

d. Address-

City - State – Zip -

e. Address-

City - State – Zip -

26. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application

| AGENCY | TYPE APPROVAL* | IDENTIFICATION NUMBER | DATE APPLIED | DATE APPROVED | DATE DENIED |
|---|---|---|---|---|---|
| NMFS | IHA | | Pending for 2019 Workplan | | |
| MOA | Flood Hazard Permit | | Pending | | |
| USACE Civil Works | Section 408 Auth. | | February 24, 2017 | Pending | |
| | | | | | |

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the
duly authorized agent of the applicant.

SIGNATURE OF APPLICANT DATE

SIGNATURE OF AGENT 2 Feb 2018 DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

# Appendix A

# Supplemental Information

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Port of Alaska Modernization Program
Program Management Office

# PCT Project Description

## Project Purpose and Need

The Petroleum and Cement Terminal (PCT) is part of the first phase of a suite of construction projects proposed as the Port of Alaska Modernization Program (PAMP), which is intended to address the deteriorating conditions of the Port of Alaska's (Port's) marine facilities and enable safe, reliable, and cost-effective port operations. The Port has identified the PCT as a priority for the PAMP, due to the need to have a reliable terminal for moving goods into Alaska.

The PCT project will replace the existing Petroleum, Oil, and Lubricants Terminal (POL 1) with a structure designed and constructed to exceed current seismic standards. With all Port facilities in critical condition and limited secured funding, there is a significant need to construct the PCT with minimal delays, rather than waiting for funding or permitting of additional PAMP components. The existing POL 1 is the only bulk cement-handling facility in Alaska and is the primary terminal for the receipt of refined petroleum products. The PCT will be designed to withstand a major seismic event and rapidly return to service (within seven days). This is critical to providing Anchorage and other areas of Alaska with refined fuels and bulk cement in a major emergency, both of which are necessary for reconstruction activities.

PCT construction will occur during the ice-free months of 2018 and 2019. Construction of the individual PCT project components will be split between these two years as follows:

**2018 Workplan:**

- Transitional dredging at the PCT and offshore disposal of the dredged material to achieve seismic requirements and provide the depths needed for berthing vessels at the new PCT facility
- Discharge of material for a temporary work pad to conduct soil improvement work needed to achieve seismic requirements for the PCT trestle
- Installation of landside utilities (water, electric, communication) and product lines
- Removal of a drill casing left in-situ during the Port's 2017 geotechnical investigation

**2019 Workplan:**

- Construction of the PCT including installation of piles, platforms and trestles, dolphins, and catwalks
- Completion of any remaining work on landside utilities and product lines
- Relocation of the South Floating Dock

Appendix B provides concept-level drawings and details of PCT project components, including a vicinity map showing the location of the PCT (Figure 1). Additional descriptions of the individual project components and means and methods of constructing each are included below.

# 2018 Construction Workplan

The 2018 construction season will focus on preparatory activities for construction of the PCT platform and trestle structures. It will include completing transitional dredging, installing landside utilities, and improving the soil conditions for the PCT trestle, as shown in Figure 2 of Appendix B.

## Transitional Dredging and Disposal

To allow vessels to access and dock, achieve seismic requirements, and provide construction access in 2019, 680,000 cubic yards of material will be dredged from the transitional dredging area, as shown on Figure 3 of Appendix B, in 2018 (transitional dredging cross-sections are provided in Figures 4 through 9 of Appendix B). The dredge depth at the platform face will be to -40’ MLLW (with a maximum depth of -43’ MLLW to account of over dredging with a clam shell dredge). From the platform landward (foreslope), the depth will vary due to the existing grade but follow a 5:1 slope. Finally, a construction access slip centered on the PCT trestle to allow marine access to nearshore waters will be dredged.

Dredging the foreslope area will provide a stable transition zone between the South Backlands Stabilization Project and the PCT, which is important for earthquake resiliency. If an earthquake were to occur during winter, when ice conditions in Knik Arm often do not allow for dredging, sluffing could block ship access to the PCT and prevent it from being operational for longer than the seven-day design threshold.

Dredged material will be placed on a scowl or barge, transported to the U.S. Army Corps of Engineer’s (USACE’s) Anchorage Harbor open water disposal area and discharged, shown in Figure 1 of Appendix B.

## Landside Utilities

New utility lines will extend from the PCT to connection points with existing landside infrastructure, as shown in Figure 10, Appendix B. These will include water, power, and communication lines; as well as petroleum pipelines and a cement-carrying pipeline (product lines). Of these, only the water line will involve trenching below mean high water (MHW; 28.3 feet mean lower low water [MLLW]), the extent of USACE jurisdiction. The water line will be approximately 300 feet long and will connect the PCT with an existing water line on Anchorage Port Road.

Installation of the water line will involve the excavation of approximately 600 cubic yards of material from below MHW. Excavated material will be sidecast and, to the extent possible, used as backfill after the placement of the utilities. After the placement of the water line, up to approximately 600 cubic yards of material will be placed as backfill below MHW. It will be the responsibility of the contractor to dispose any excess overburden material left over after backfilling the utility trenches at a site permitted by the Department of Army (DA) or at a site outside of the DA’s authority. A detail of the water line trench is included in Figure 11, Appendix B.

## Soil Improvements for PCT Trestle

To properly stabilize the area where the PCT trestle meets the shoreline (abutment) and ensure the project meets seismic requirements, soil improvements are necessary (as shown in Figure 12 of Appendix B). Soil improvements will consist of in-situ mixing of soil with concrete to a depth of approximately 50 feet below grade. To allow access to the area for this work, a temporary work pad will be constructed. Construction of the pad will include the placement of approximately 14,800 cy of fill below the high tide line (approximately 10,100 cy below MHW). This fill will be removed at the end of the 2018 construction season.

## Drill Casing Removal

Two drill casings (Figure 12, Appendix B) were left in-situ when they broke beneath the existing mudline during summer 2017 geotechnical investigations (initially authorized on May 24, 2017 and subsequently amended on July 28, 2017 under Nationwide Permit No. 6, file number POA-2003-502, Knik Arm). One of these casings, RM17-05, will be removed to a depth of -55 feet MLLW. The other casing, RM17-06, was cut off at a depth of -66 feet MLLW and will be left in place.

# 2019 Construction Workplan

The 2019 construction Workplan will consist of installing the PCT platform and main trestle, the emergency trestle, and relocating the South Floating Dock. Additionally, any remaining work on landside utilities and product lines will be completed in 2019.

A total of 257 piles (213 permanent and 44 temporary) will be installed below the high tide line for construction of the PCT. The number of piles for each PCT component is provided in **Table 1**. Note that these quantities are representative of the current conceptual design. Final design and construction will be performed, and while the general design elements presented here are expected to remain, pile numbers may change in the future. The Port will communicate any relevant design changes to USACE, and will apply for permit modifications if necessary.

Table 1. PCT Pile Specifications

| Pile Type | Quantity | Outside Diameter (inches) | Approximate Area of Impact (square feet) |
|---|---|---|---|
| Main Trestle/Platform Piles | 72 | 48 | 907 |
| Emergency Trestle Piles | 15 | 48 | 189 |
| Mooring Dolphin Piles | 48 | 48 | 605 |
| Breasting Dolphin Piles | 40 | 48 | 504 |
| Fender Piles | 28 | 36 | 199 |
| South Floating Dock Piles | 10 | 24 | 31 |
| Temporary Piles | 44 | H-Piles (12” x 16”) | 704 |

## PCT Platform and Main Trestle

The PCT will be a pile-supported platform and trestle structure located above and below the high tide line and MHW mark (34.7 feet and 28.4 feet, respectively from 0.00 feet MLLW) of Knik Arm sited at the southernmost shoreline of the Port. It will include both breasting and mooring dolphins to receive and secure ships while in port. The platform will have a finished elevation of +40 feet MLLW. An overview of the new PCT structure is shown in Figure 13, Appendix B, and a typical cross-section is shown in Figure 14, Appendix B. The supporting piles will be designed for a 75-year lifespan, minimizing the need for future maintenance and replacement projects. The platform structure will be designed to meet or exceed seismic stability standards for resiliency in the event of a large earthquake. The platform structure will be accessed by the main trestle, which will attach to shore at an elevation of +35 feet MLLW. The platform and main trestle will be supported by 72, 48-inch diameter piles ranging in length between approximately 130 feet and 150 feet. Additionally, a second set of piles will be constructed immediately south of the main trestle to support the installation of an emergency trestle. If the main trestle is damaged in an earthquake or other event, the emergency trestle will be placed on these 15, 48-inch diameter piles, allowing for access to and use of the PCT platform until the main trestle can be repaired.

Another innovation incorporated into the PCT design is the use of concrete and steel composite piles to support the main trestle and platform structure. Installation of these hybrid piles will consist of driving a hollow, 48-inch-diameter steel pile and subsequently filling it with reinforced concrete to a level below the mudline. Above the mudline, the steel pile will be cut off at an elevation between +23 feet MLLW and +33 feet MLLW, which will allow the composite pile to absorb forces that would be impeded by the presence of the steel sheath. The steel pile will be structurally sacrificial, and the full strength of the pile will be provided by the reinforced concrete core. Each composite pile will be topped with a reinforced concrete cap, on which the main trestle or platform will sit. A design detail showing a cross-section of the hybrid pile is provided in Figure 15 of Appendix B.

Five breasting dolphins will be constructed parallel to the PCT platform face (three dolphins north of the main platform, and two to the south) and at an elevation of +40 feet MLLW, as shown in Figure 16, Appendix B. Each of these dolphins will be supported by eight 261-foot long, 48-inch-diameter battered hollow steel piles driven to a depth of approximately -225 feet MLLW. Additionally, 28 fender piles, approximately 70 feet long and 36 inches in diameter, will be installed on the docking faces of the breasting dolphins, driven to an approximate depth of -65 feet MLLW.

Six mooring dolphins will be constructed parallel to and landward of the platform face and breasting dolphins and at an elevation of +40 feet MLLW, as shown in Figure 17, Appendix B. These will provide additional secure mooring points for ships docking at the PCT. Each mooring dolphin will be supported by eight 206-foot long, 48-inch-diameter battered hollow steel piles driven to a depth of approximately -170 feet MLLW.

The breasting and mooring dolphins will be connected to each other and the PCT platform by a series of open-steel grate catwalks, also shown in Figure 13, Appendix B and detailed in Figure 18, Appendix B. These catwalks will be approximately 3 feet wide and supported by high strength steel beams (no additional piles will be installed between dolphins). The bottom elevation of the catwalk's structure will be +40 feet MLLW. A total of 910 feet of catwalk will connect the dolphins to the platform.

## Emergency Trestle

The PCT will also include construction of a set of secondary piles located parallel to and immediately south of the main trestle, which will allow for a temporary emergency trestle to be installed if the main trestle is damaged in a major earthquake. Much of the PCT's earthquake resiliency is provided by the ability of the above-mudline segments of the piles to flex and absorb shaking. Since the piles of the main trestle are in shallow water relative to those of the platform, more of their length is below the mudline, which limits their ability to flex and absorb the energy of a strong earthquake. To meet the need for providing an earthquake-resilient port, the secondary piles and emergency trestle will provide redundant access to the PCT platform in the case of main trestle failure. Fifteen 48-inch diameter steel pipe piles will be placed in sets of three for the emergency trestle, with a steel cap on top of each set. This will allow for the temporary emergency trestle, which will be stored on-site, to be quickly installed on the piles in an emergency. Temporary utility lines, including water, power, communication and product pipelines, will be installed with the emergency trestle.

## South Floating Dock

To accommodate construction of the PCT, the South Floating Dock will be relocated from its existing location immediately south of the existing Petroleum Oil and Lubricants Terminal 2 (POL 2), to a location south of the new PCT, as shown in Figure 19, Appendix B (with cross-section shown in Figure 20, Appendix B). Depending on their condition and compliance with current design standards, the existing trusses, gangways, and pile caps will be relocated to the new site. The support and float guide piles will not be reused, and will be cut off at the mudline. A total of ten new 24-inch-diameter hollow piles (four support piles and six float guide piles) will be installed to facilitate placement of the dock at its new location.

## Construction Methods and Temporary Piles

Installation of the hybrid piles will begin with driving hollow steel piles using impact-driving methods, likely from an anchored barge. Vibratory pile installation methods will not be used for permanent pile installation. Once the main trestle piles are driven into place, an air pump will likely be used to remove substrate from inside the piles to a depth of approximately 15 to 30 feet below the mudline. The removed substrate material, totaling approximately 1,500 cubic yards, will be immediately discharged and allowed to fall around the pile and be distributed by currents. Once the substrate material is removed, the piles will be backfilled and capped with concrete.

During construction of the PCT, temporary piles will be used to anchor the template that will guide the installation of battered piles at each of the 11 dolphin locations. It is anticipated that temporary piles will be 12-by-16-inches, and 130 feet in height, and will be installed 20 to 40 feet into the substrate. Four temporary piles will be needed per mooring and breasting dolphin, for a total of 44 temporary piles. Temporary piles will be installed and removed using vibratory methods.

## PCT Figures

Appendix B provides concept-level drawings and details of PCT project components including a vicinity map showing the location of the PCT, overviews of the PCT components, and project component details.

# Avoidance, Minimization, and Compensation Statement

The placement of fill and work in waters of the U.S. was minimized through the use of a pile-supported structure for the PCT instead of an extension of the coastline, which would have required extensive fill in the intertidal area in order to bring the area up to a usable grade. The number of piles was minimized to that necessary to construct a seismically resilient PCT, while maximizing the life of the structure in order to minimize the need for future in-water work. Additionally, catwalks will be constructed of prefabricated high-strength-steel segments, rendering additional piles unnecessary. Transitional dredging is limited to the area necessary to provide ship access to the PCT, and ensure that sluffing of substrate material in the event of an earthquake does not impede efforts to quickly reopen the PCT. Also, to the extent practicable, construction of the temporary pad for PCT soil improvements will be completed when the area is dewatered to minimize any incidental loss of fill into the marine environment. Due to these minimization measures, compensatory mitigation for impacts to waters of the U.S. is not proposed.

Additional mitigation measures will be implemented to avoid and minimize impacts to marine mammals listed under the Endangered Species Act (Cook Inlet beluga whales and the western Distinct Population Segment (wDPS) of Steller sea lions). These measures include the following:

1. **Construction Notification:** The Port shall notify USACE five working days prior to the start of the PCT waterside construction season.

2. **Training:** All construction personnel, to include project vessel operators, will be briefed on the endangered status of the Cook Inlet beluga whale and threatened status of the wDPS Steller sea lion, as well as their identification, and specific shutdown and reporting requirements related to vessel operations. The POA will prepare a training module and present it to construction personnel at the beginning of the waterside construction season. Shutdown distances, procedures, and the reporting protocol shall be reviewed weekly with construction personnel to build a working understanding of protocols and procedures.

3. **Shutdowns for Vessel-based Work:** The POA will monitor a 10-meter zone around project construction vessels (e.g., barges, tugboats, work boats, and skiffs) and shut down vessel operations when it can be safely done to avoid collisions with Cook Inlet beluga whales and Steller sea lions. Vessel crew members will conduct the monitoring for Cook Inlet beluga whales and Steller sea lions. When it does not jeopardize the safety of the vessel, the vessel's captain will slow the vessel or bring it to a stop when a species enters a 10-meter radius around the

vessel. When stopped, vessel operations shall remain suspended until the Cook Inlet beluga whales or Steller sea lions move beyond the 10-meter radius or the vessel's safety is at risk.

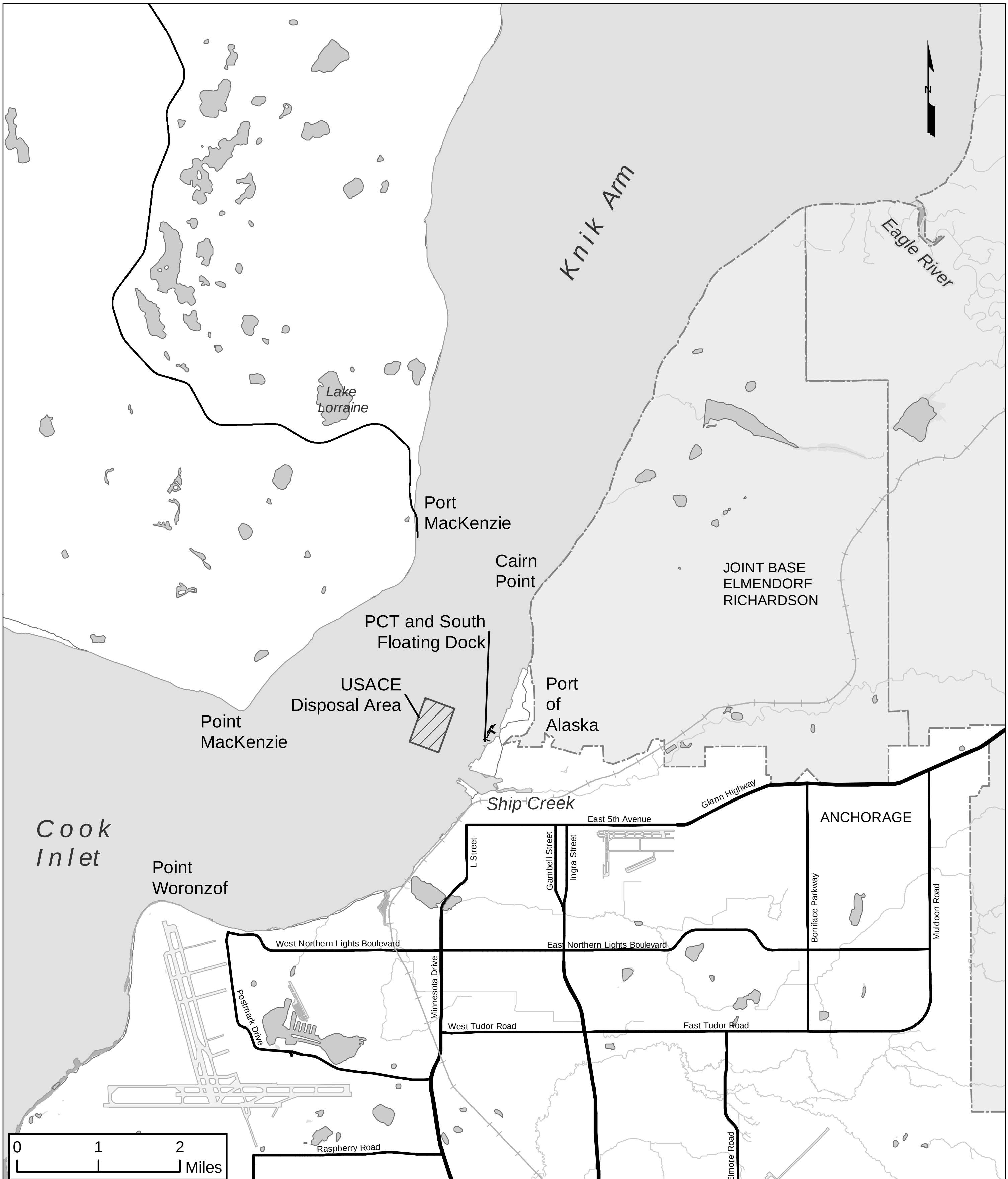
The conditional nature of the vessel shutdown is appropriate since some construction vessels may not be able to rapidly stop operations in the strong currents of Knik Arm without drifting into hazards such as other vessels, POA infrastructure, or shoals. Accordingly, whenever possible, construction vessels will slow down to avoid colliding with Cook Inlet beluga whales or Steller sea lions within the 10-meter radius around the vessel. Additionally, construction vessels may need to maintain a safe maneuvering speed and will do so as needed.

All construction vessels that are in transit or underway within the project area will slow down and/or alter course as conditions allow (to the minimum level required to maintain steerage and safe working conditions) to avoid approaching within 10 meters of a Cook Inlet beluga whale or a Steller sea lion.

4. **Reporting Shutdowns:** The number of Cook Inlet beluga whales or Steller sea lions sighted, time, date, duration of the observation, and vessel location will be recorded for each instance of a 10-meter slowdown or shutdown. The POA will provide this data to the USACE within 90 days following the completion of construction.

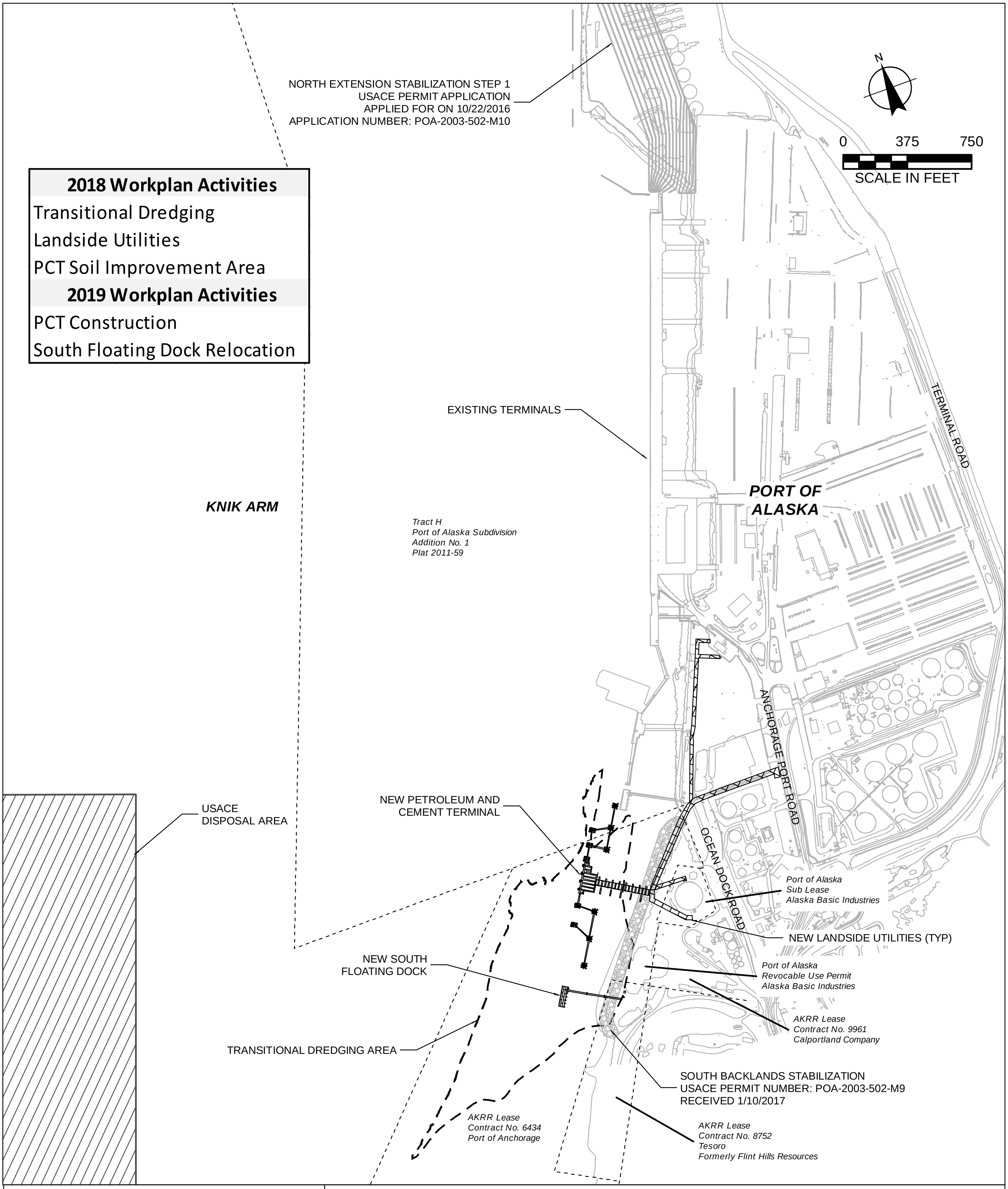
# Appendix B

Design Drawings



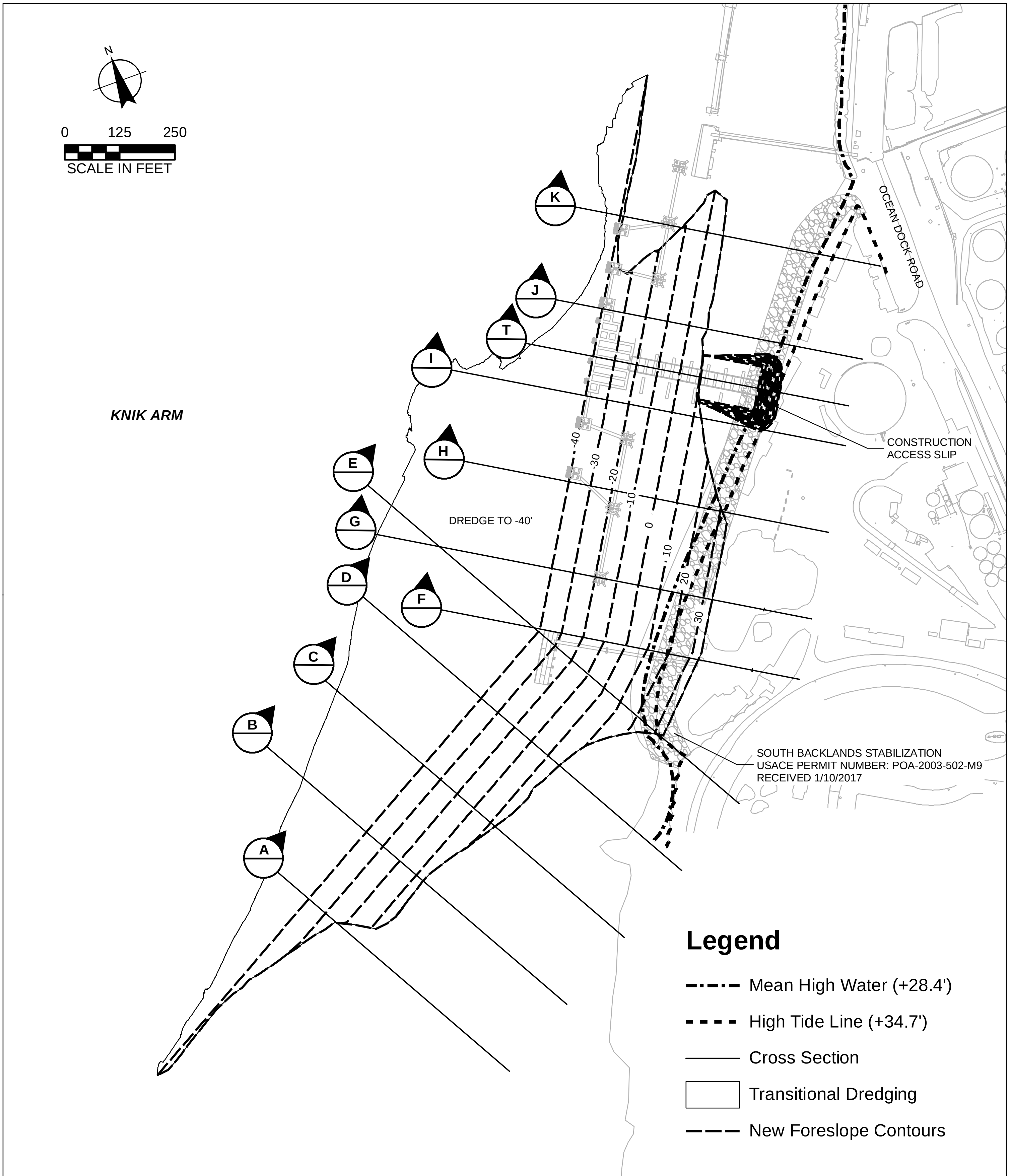

APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal (PCT)
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 1 of 20, Vicinity Map



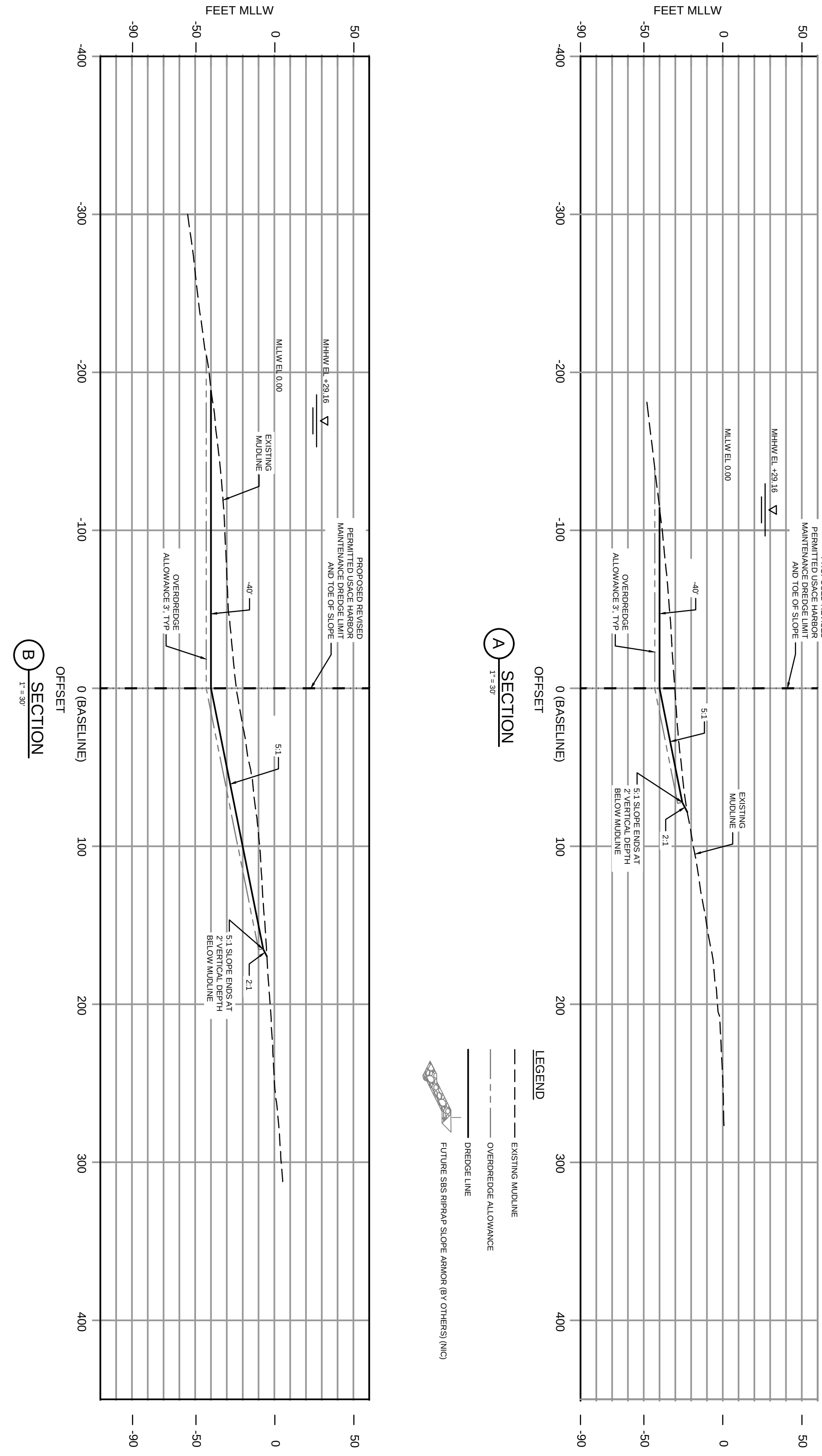

APPLICANT: Municipality of Anchorage,
Port of Alaska
Petroleum and Cement Terminal
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 2 of 20, Overall Site Plan



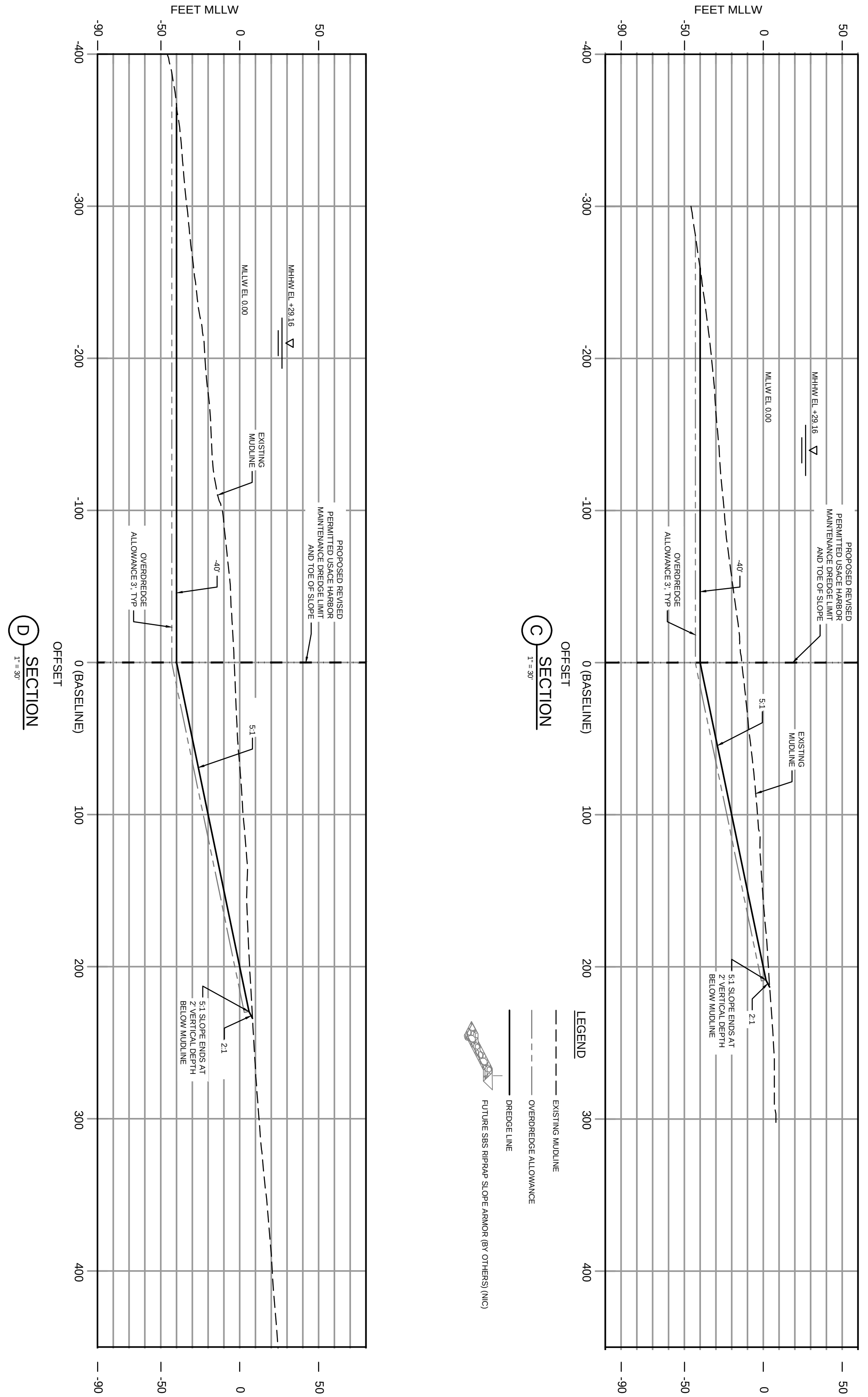

APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2018 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 3 of 20, Transitional Dredging



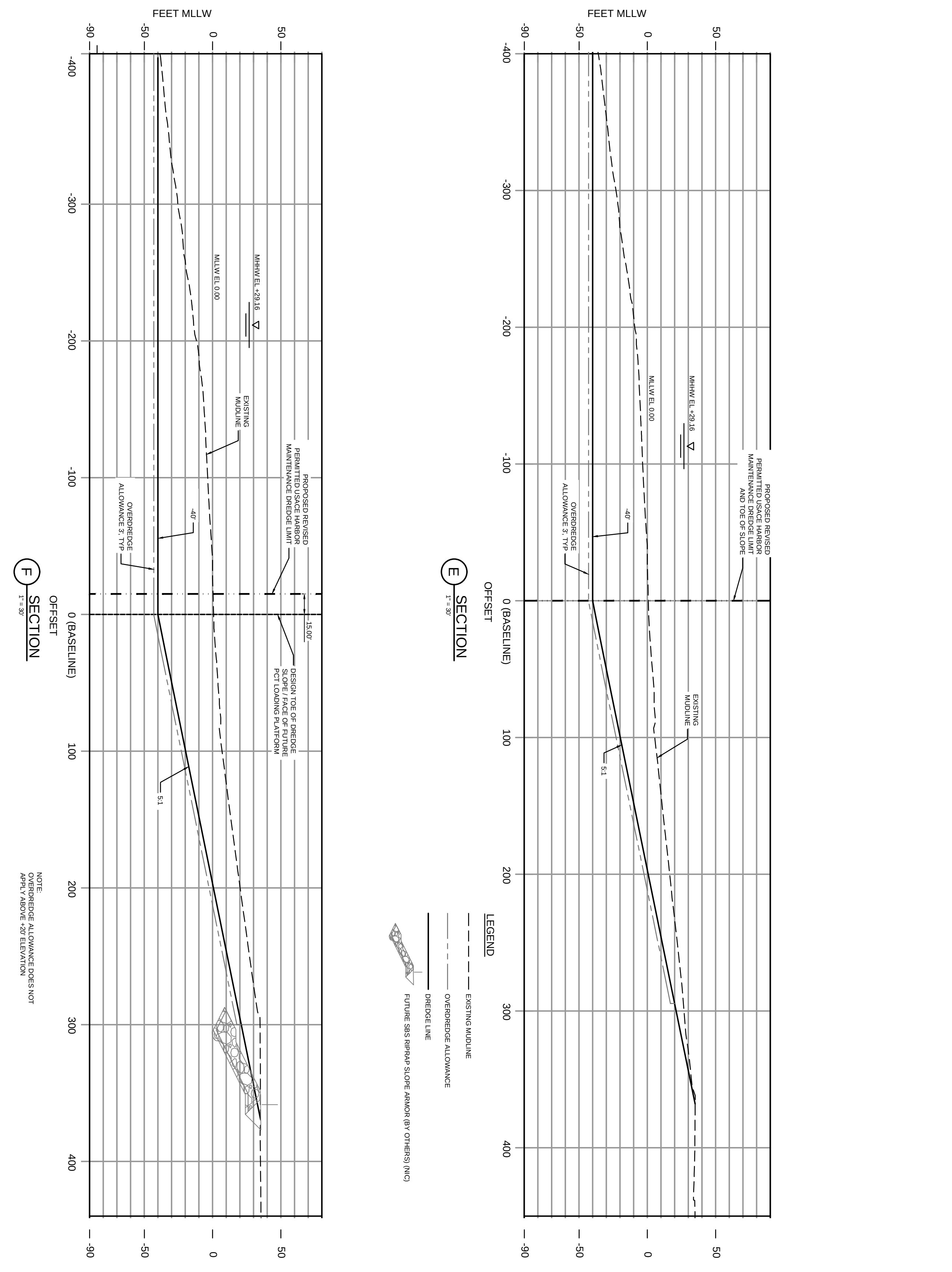

APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2018 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 4 of 20, Dredging Cross Section



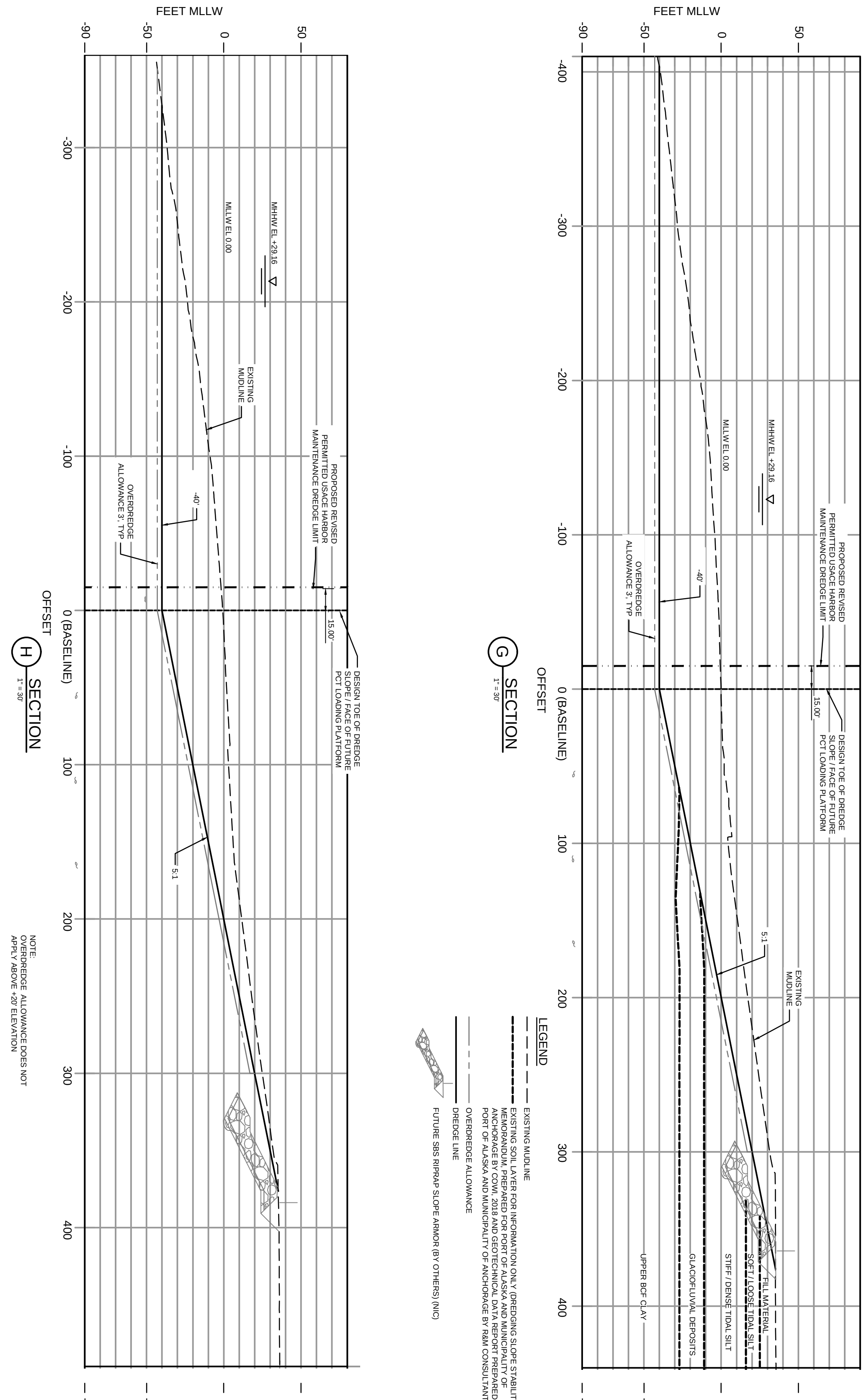

APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2018 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 5 of 20, Dredging Cross Section



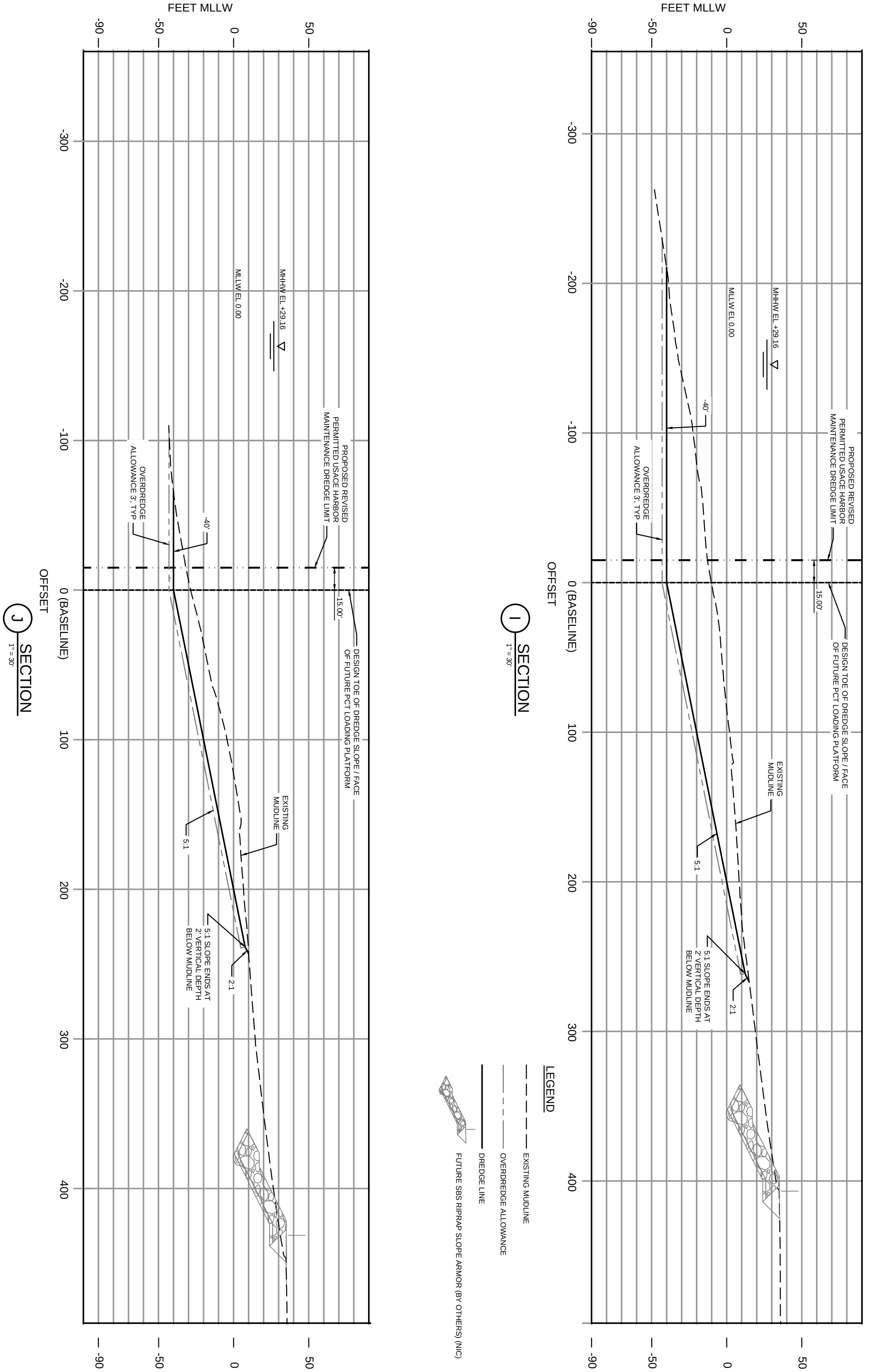

APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2018 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 6 of 20, Dredging Cross Section

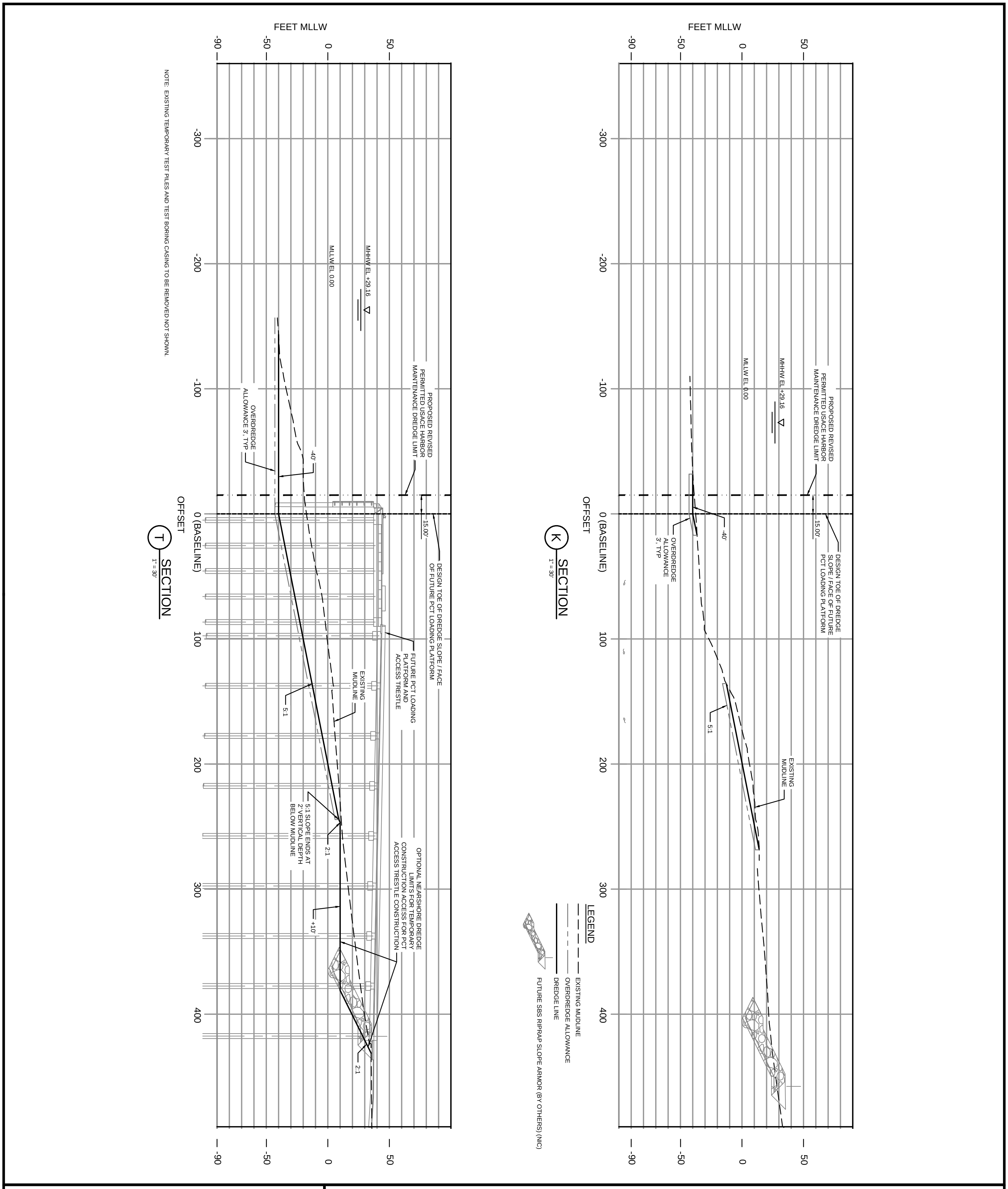



APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2018 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 7 of 20, Dredging Cross Section

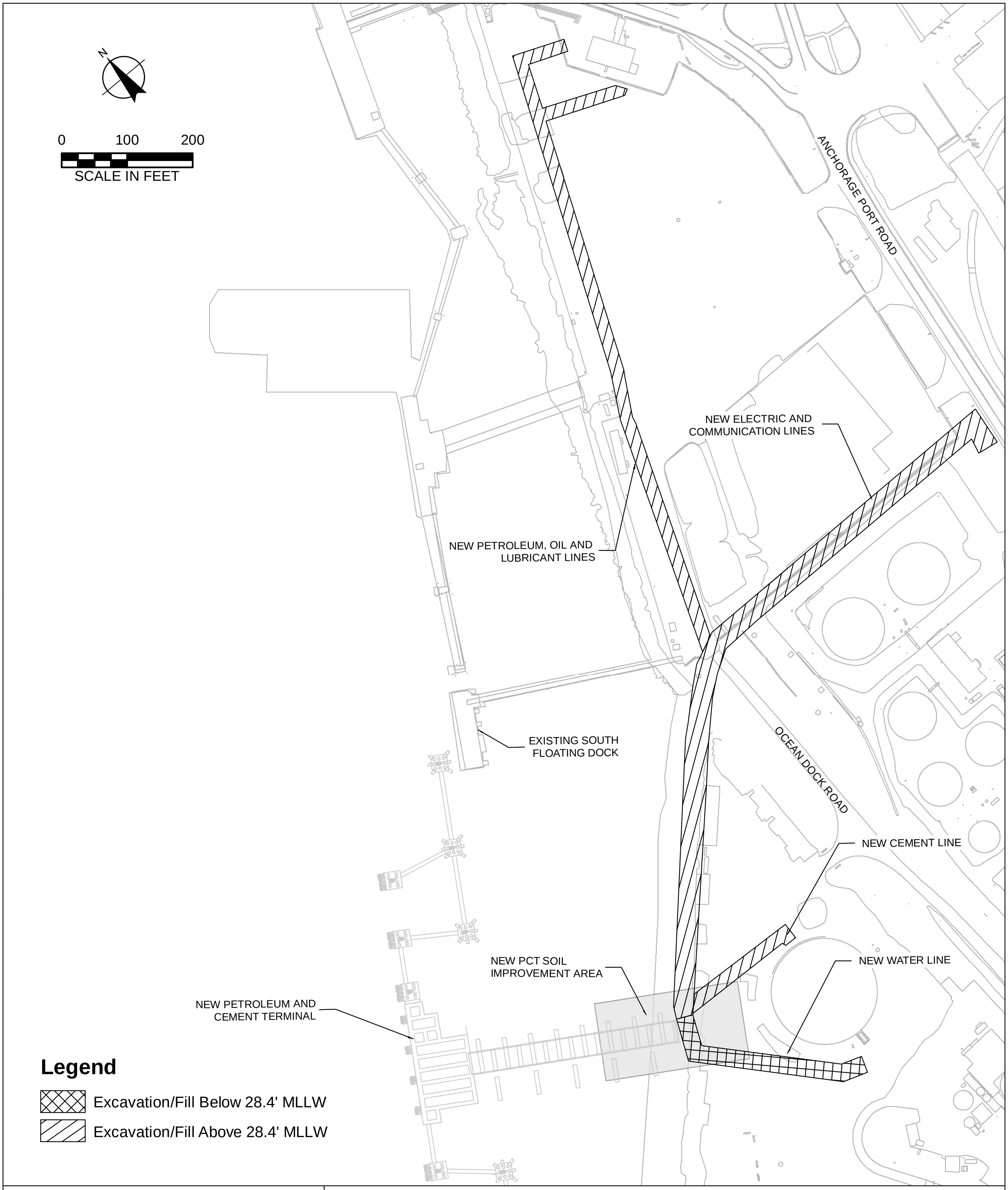



| | |
|---|---|
| APPLICANT: Municipality of Anchorage, Port of Alaska<br>Petroleum and Cement Terminal<br>2018 Workplan<br>FILE NO: | WATERWAY: Knik Arm<br>LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian<br>DATE: February, 2018<br>FIGURE 8 of 20, Dredging Cross Section |



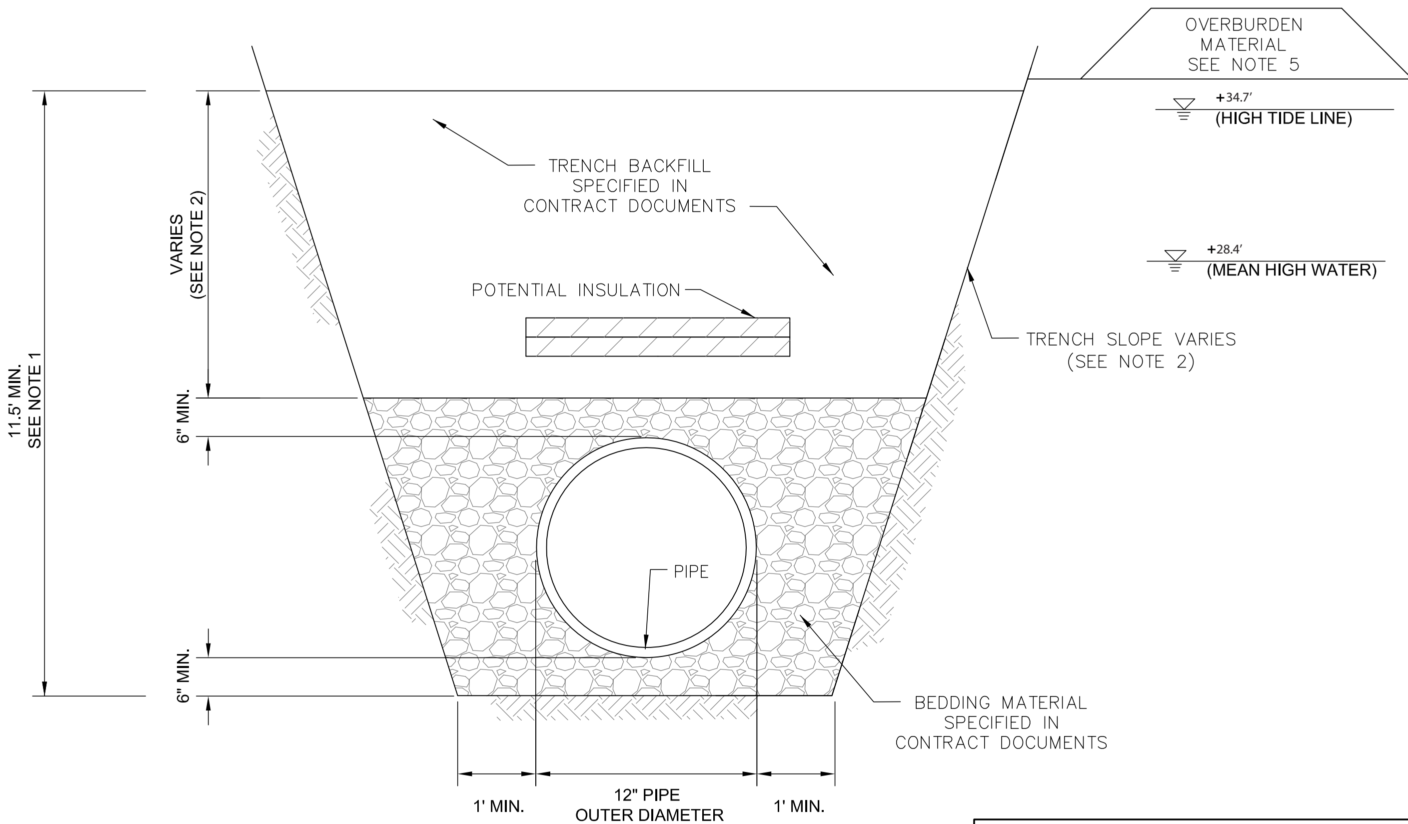

APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2018 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 9 of 20, Dredging Cross Section




APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2018 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 10 of 20, New Landside Utilities



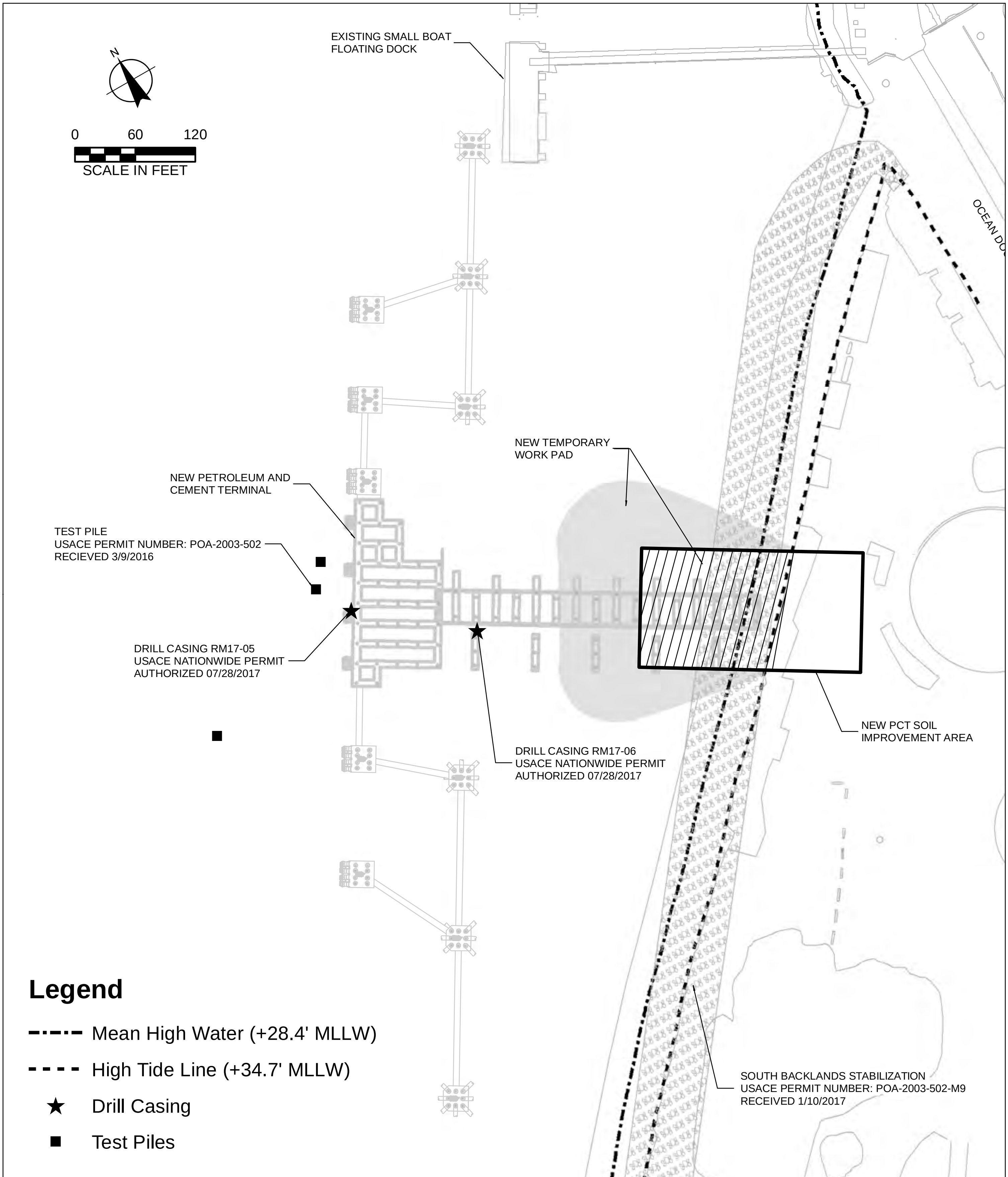

## WATER LINE SECTION

### GENERAL SHEET NOTES

1. PROPOSED UTILITY ROUTING IS CONCEPTUAL IN NATURE. FINAL DESIGN, INCLUDING BUT NOT LIMITED TO LINE, GRADE, UTILITY SIZE, AND TIE-IN LOCATION TO BE DETERMINED BY THE DESIGNER OF RECORD.
2. TRENCH BACKFILL MATERIAL PLACED AND COMPACTED TO DEPTHS SHOWN IN THE DRAWINGS OR AS DETERMINED BY ENGINEER. COMPACT TRENCH BACKFILL TO A MINIMUM OF 95% MAXIMUM DENSITY.
3. TRENCH WALL SLOPES WILL VARY WITH SOIL STRENGTH AND CHARACTER. SLOPES SHALL CONFORM TO OSHA SAFETY STANDARDS.
4. BACKFILL SHALL BE FREE OF CLAYS AND ORGANIC MATERIALS.
5. DISPOSAL OF OVERBURDEN MATERIAL IS THE RESPONSIBILITY OF THE CONTRACTOR. VOLUME OF OVERBURDEN MATERIAL FOR ALL UTILITY INSTALLATION IS APPROXIMATELY 4,200 CY.

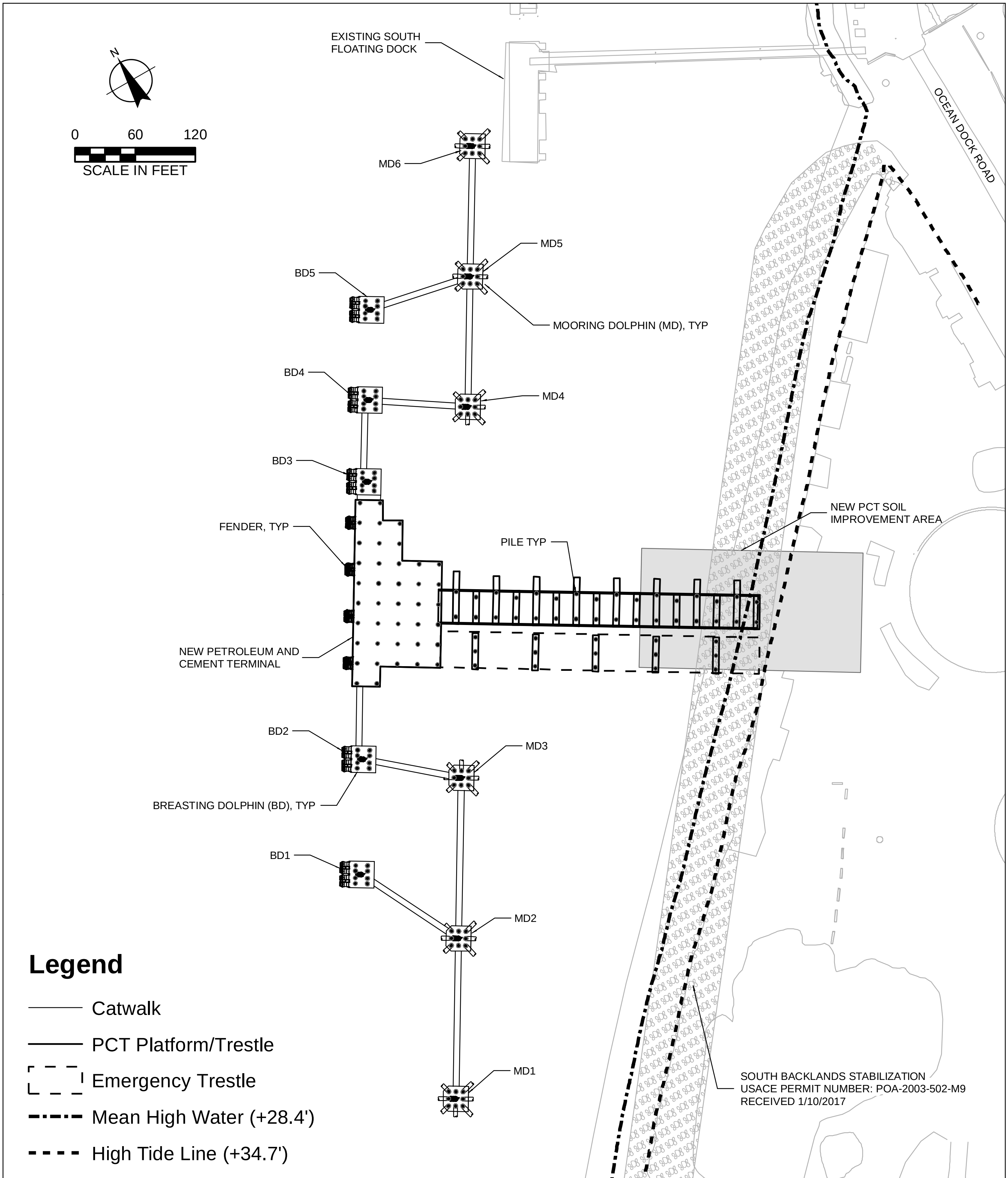
APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2018 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 11 of 20, Trench Backfill and Bedding Layout



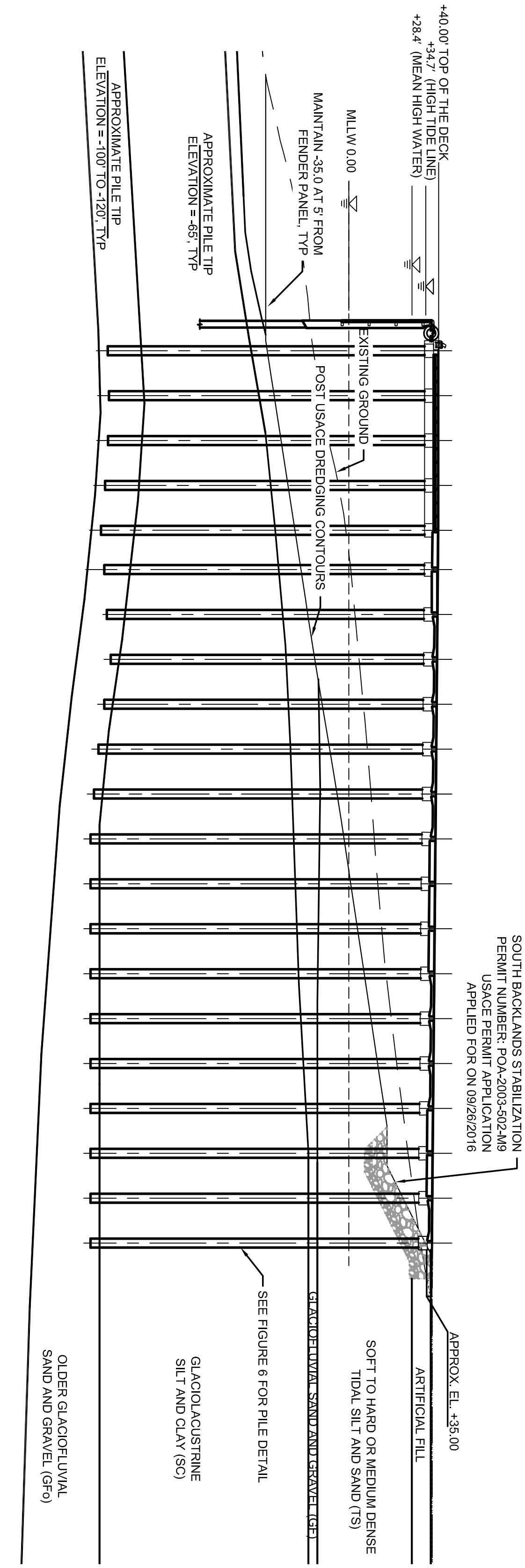

APPLICANT: Municipality of Anchorage,
Port of Alaska
Petroleum and Cement Terminal
2018 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 12 of 20, New PCT Soil Improvement Area and Drill Casings




APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2019 Workplan
FILE NO:

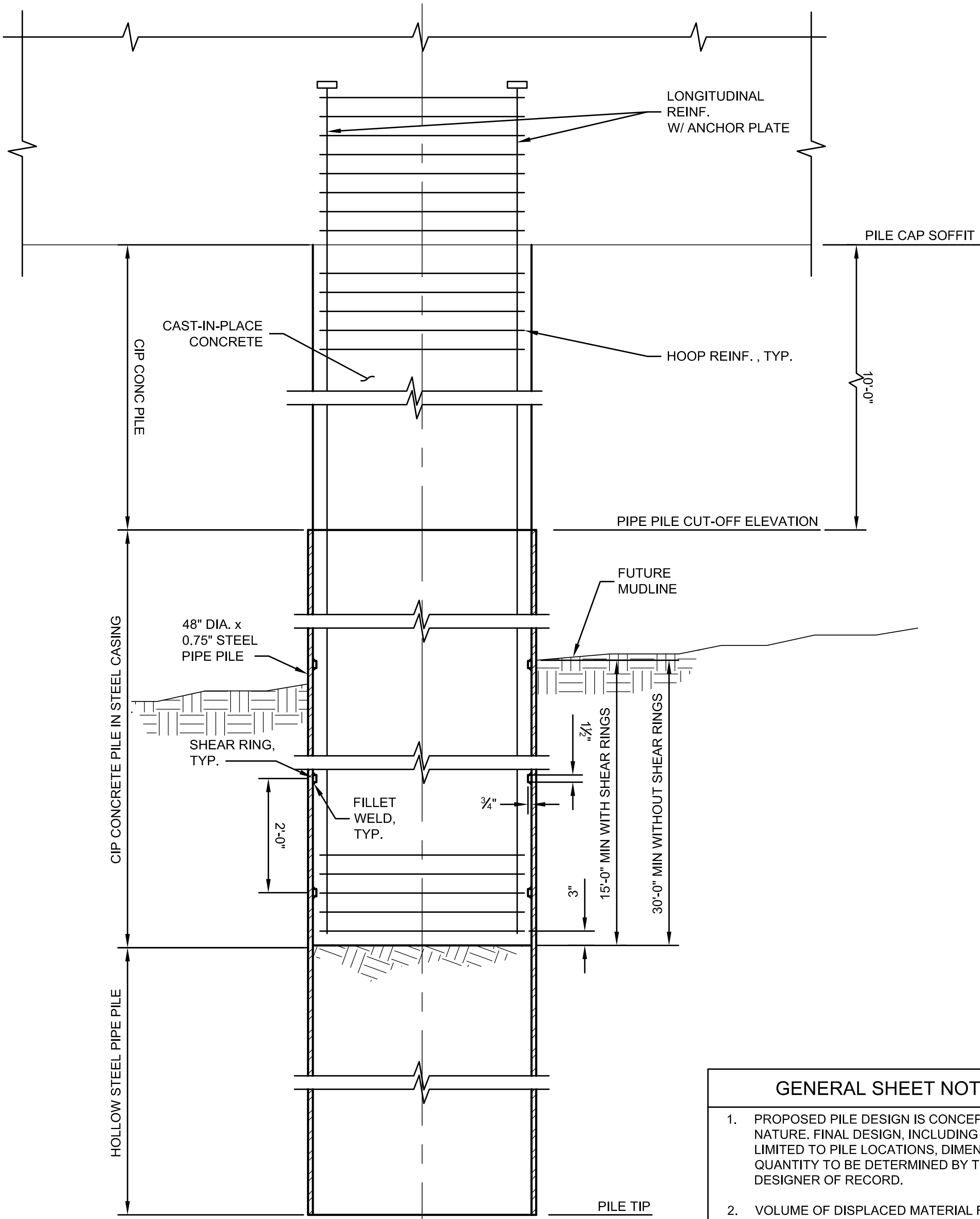
WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 13 of 20, New PCT Plan




1 TYPICAL SECTION
FIGURE 3 1" = 40'-0"

APPLICANT: Municipality of Anchorage,
Port of Alaska
Petroleum and Cement Terminal
2019 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 14 of 20, Typical Section




## HYBRID PILE ELEVATION

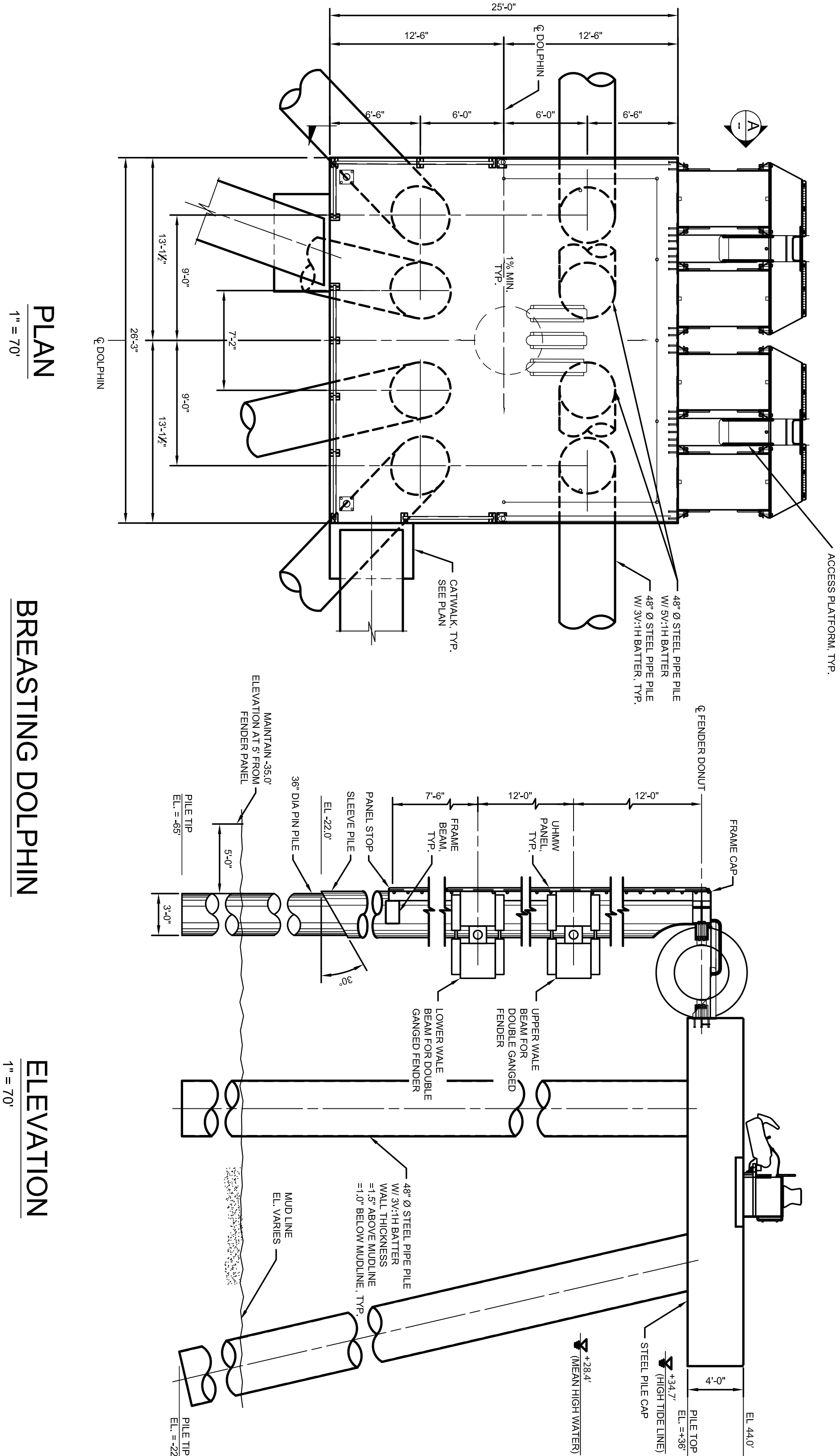
¾" = 1'-0"

### GENERAL SHEET NOTES

1. PROPOSED PILE DESIGN IS CONCEPTUAL IN NATURE. FINAL DESIGN, INCLUDING BUT NOT LIMITED TO PILE LOCATIONS, DIMENSIONS, AND QUANTITY TO BE DETERMINED BY THE DESIGNER OF RECORD.
2. VOLUME OF DISPLACED MATERIAL FROM PILE INSTALLATION IS APPROXIMATELY 500 CY.
3. VOLUME PF CIP CONCRETE FOR PILE INSTALLATION IS APPROXIMATELY 1,200 CY.

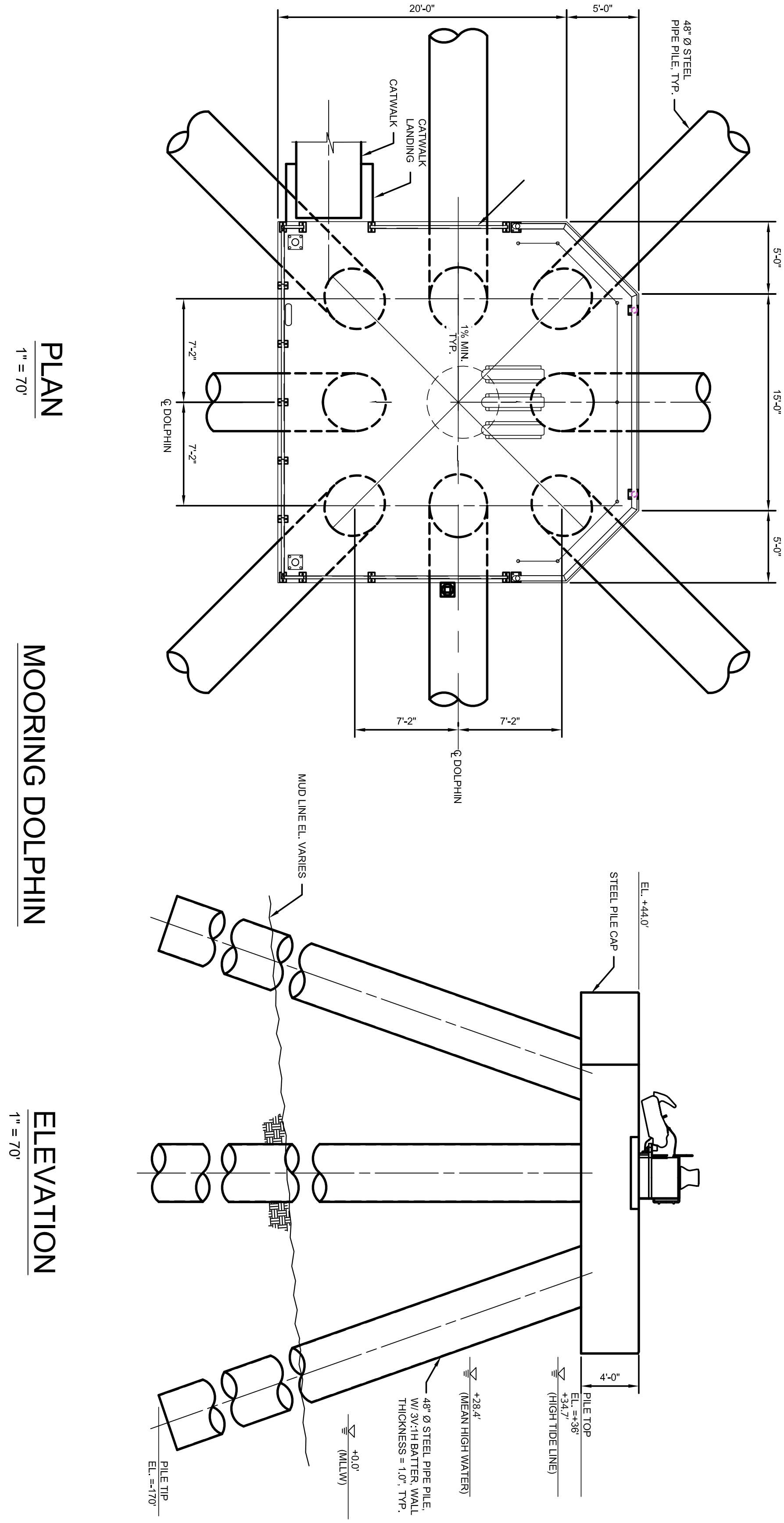
APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2019 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 15 of 20, Pile Detail



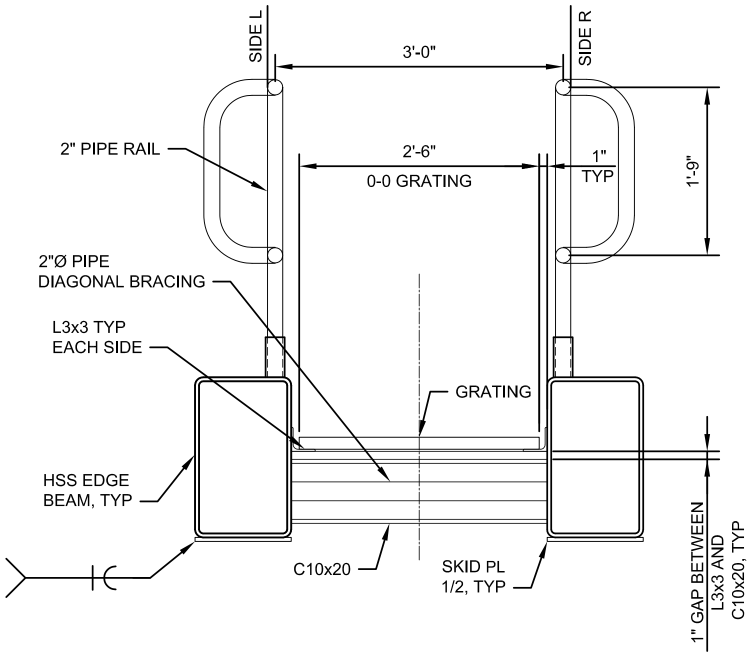

APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2019 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 16 of 20, Breasting Dolphin Details




APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2019 Workplan
FILE NO:

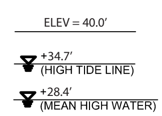
WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 17 of 20, Mooring Dolphin Details




2 CATWALK SECTION

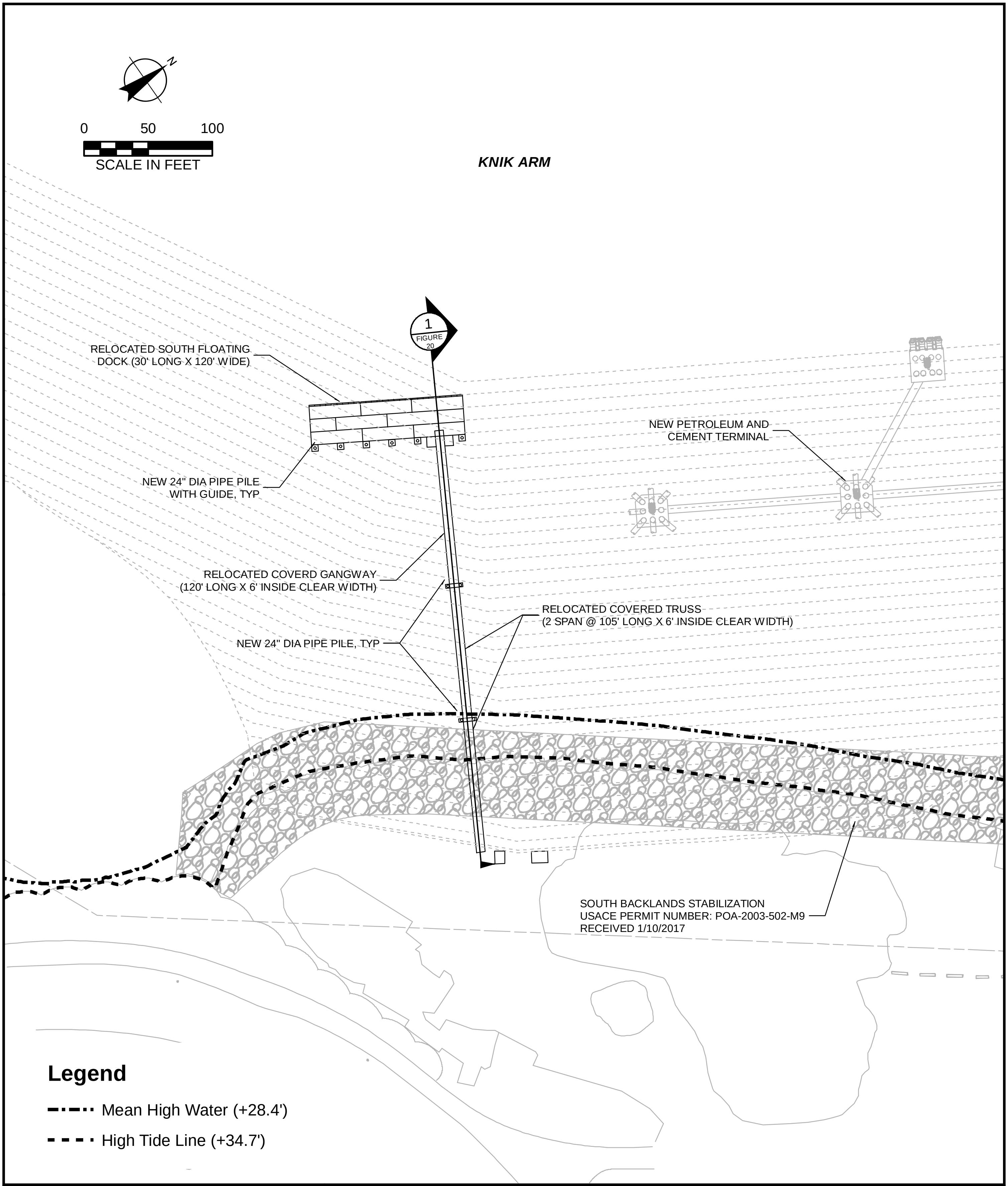
1" = 50'

FIGURE 3



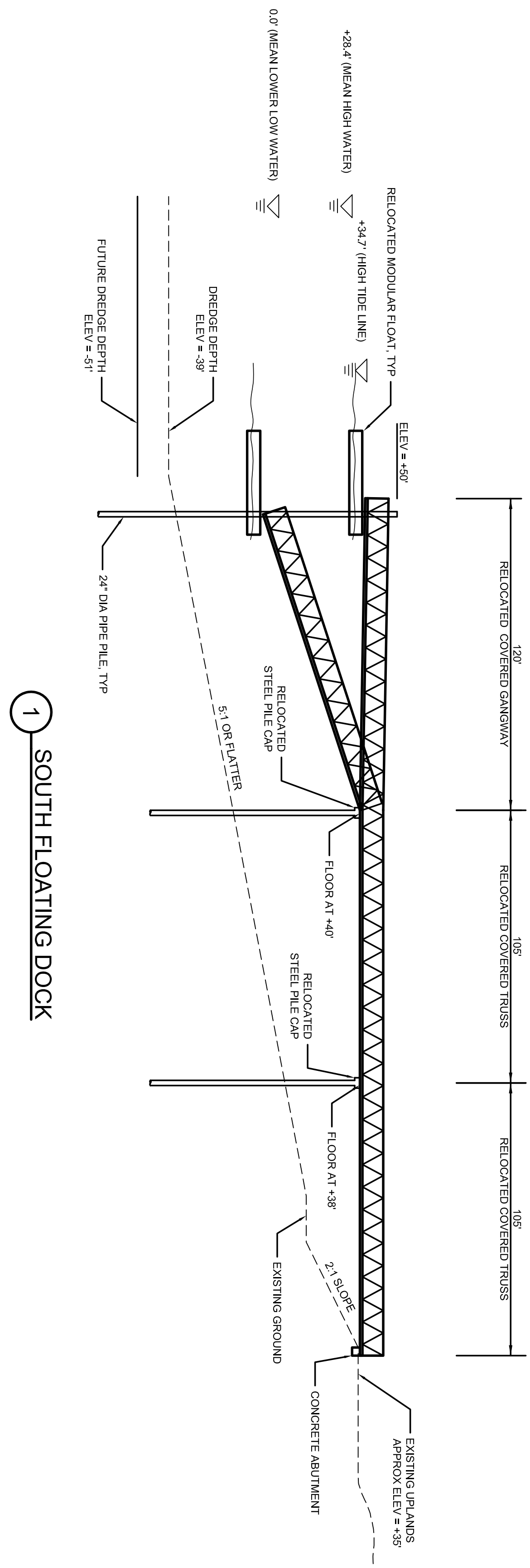

APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2019 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 18 of 20, Catwalk Detail




APPLICANT: Municipality of Anchorage, Port of Alaska
Petroleum and Cement Terminal
2019 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 19 of 20, South Floating Dock




1 SOUTH FLOATING DOCK

APPLICANT: Municipality of Anchorage,
Port of Alaska
Petroleum and Cement Terminal
2019 Workplan
FILE NO:

WATERWAY: Knik Arm
LOCATION: Section 7, Township 13N, Range 3W, Seward Meridian
DATE: February, 2018
FIGURE 20 of 20, South Floating Dock Detail

# Appendix C

# Endangered Species Act (ESA)

# Technical Report

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# Port of Alaska Modernization Program

## Recommended ESA Effect Determination for Listed Species – Petroleum and Cement Terminal Project

*Prepared for*

## Municipality of Anchorage/Port of Alaska

2000 Anchorage Port Road
Anchorage, Alaska 99501

February 2018

CH2M Hill, Inc.
Anchorage, Alaska

**Recommended Citation:**

Port of Alaska. 2018. Port of Alaska Modernization Program, Recommended ESA Effect Determination for Listed Species – Petroleum and Cement Terminal Project. Prepared by HDR, Inc., Anchorage, AK, for the Port of Alaska under contract to CH2M.

# Executive Summary

The Port of Alaska has applied to the U.S. Army Corps of Engineers (USACE) for a Department of the Army (DA) permit to construct a Petroleum and Cement Terminal (PCT) during the 2018 and 2019 construction seasons. USACE is processing the application in two stages according to the two yearly Workplans described in the application. Thus, USACE will make a permit decision for the 2018 PCT Workplan and, later, reach a second permit decision on the 2019 PCT Workplan. For each permit process stage, USACE will initiate a Section 7 consultation under the Endangered Species Act (ESA).

This document provides information for USACE to make an ESA effect determination for the 2018 PCT Workplan, which is the proposed action. The 2018 PCT Workplan involves conducting transitional dredging, disposing of the dredged material in Knik Arm, removing three test piles, installing landside utilities, and constructing a temporary pad and soil improvement work for the PCT. The proposed action's action area is defined by the 2018 Workplan's dominant activity, transitional dredging, and it includes the geographic extent of the area that will be dredged, the disposal area where dredged material will be discharged into Knik Arm, and the vessel movement corridor connecting these areas.

ESA-listed species that can occur within the action area include Cook Inlet beluga whales (*Delphinapterus leucas*), as well as Steller sea lions (*Eumetopias jubatus*) from the western distinct population segment. The action area does not contain designated critical habitat for either species. Based on the proposed action's anticipated direct and indirect effects, the Port's recommended effect determination for USACE's consideration for both species is **may affect,** but is **not likely to adversely affect**.

# Contents

# Acronyms and Abbreviations

| | |
|---|---|
| CFR | Code of Federal Regulations |
| DA | Department of the Army |
| dB | Decibels |
| DPS | Distinct Population Segment |
| ESA | Endangered Species Act |
| FR | Federal Register |
| $km^2$ | Square Kilometer |
| ICRC | Integrated Concepts and Research Corporation |
| IHA | Incidental Harassment Authorization |
| µPa | MicroPascal |
| MHW | Mean High Water |
| $mi^2$ | Square Mile |
| MMPA | Marine Mammal Protection Act |
| mph | Miles per Hour |
| MTRP | Marine Terminal Redevelopment Project |
| NMFS | National Marine Fisheries Service |
| PAMP | Port of Alaska Modernization Program |
| PCT | Petroleum and Cement Terminal |
| POL 1 | Petroleum Oil Lubricants |
| Port | Port of Alaska |
| rms | Root Mean Square |
| TPP | Test Pile Program |
| USACE | U.S. Army Corps of Engineers |

# 1 Introduction

The Port of Alaska (Port) has applied to the U.S. Army Corps of Engineers (USACE) for a Department of the Army (DA) permit under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act to construct a Petroleum and Cement Terminal (PCT) during the 2018 and 2019 construction seasons. USACE will process the application in two stages, according to the two yearly Workplans as described in the application. Thus, USACE will make a permit decision for the 2018 PCT Workplan and, later, reach a second permit decision on the 2019 PCT Workplan. For each permit process stage, USACE will initiate a Section 7 consultation under the Endangered Species Act (ESA). This document supports USACE's work to make an effect determination and initiate Section 7 consultation on the 2018 PCT Workplan. It is anticipated that the Section 7 consultation for the 2019 PCT Workplan will be a joint consultation between USACE and the National Marine Fisheries Service (NMFS) after the Port resubmits its application in April 2018 for an Incidental Harassment Authorization (IHA) pursuant to the Marine Mammal Protection Act (MMPA).

The 2018 PCT Workplan involves conducting transitional dredging, disposing of the dredged material in Knik Arm, removing three test piles, installing landside utilities, and constructing a temporary pad and soil improvement work for the PCT. The 2019 PCT Workplan involves the installation of the piles, decking, and other associated features of the PCT's superstructure. As stated previously, USACE will consult on the 2019 PCT Workplan separately. As such, this analysis focuses on potential impacts to ESA-listed species and their critical habitat in the action area for the 2018 PCT Workplan.

The Cook Inlet beluga whale (*Delphinapterus leucas*) is the most common ESA-listed marine mammal likely to occur in the action area. The Port is excluded from the Cook Inlet beluga whale critical habitat designation for national security reasons (76 *Federal Register* [FR] 20180), but designated critical habitat is located both north and south of the Port. In addition to Cook Inlet beluga whales, Steller sea lions (*Eumetopias jubatus*) from the western distinct population segment (DPS) have been observed near the Port on several occasions; however, Steller sea lions are considered rare in upper Cook Inlet.

# 2 Proposed Action

As described above, the 2018 PCT Workplan includes dredging and disposal, pile removal, utilities installation, and construction of a temporary pad and soil improvement work. Attachment 1 contains DA permit application; Appendix A, Supplemental Information; and Appendix B, Preliminary Design Drawings. These provide additional details on the proposed action scope of activities, location, and schedule associated with the 2018 PCT Workplan.

Activities such as utility installation and construction of the temporary pad, which will take place above mean high water (MHW) or within the intertidal zone during low tide, when the area is dewatered, will have no effect on marine mammals and are not considered to influence the action area. Additionally, pile cutting, which will be performed from inside the piles, is also not considered further here, as it is not anticipated to rise to the level of take for marine mammals.


Figure 1. Transitional Dredging Area, Disposal Area, and Vessel Movement Corridor

# 3 Action Area

The action area is defined as the area potentially affected directly or indirectly by a federal action (50 Code of Federal Regulations [CFR] §402.02). For this proposed action, defining the action area involves taking into consideration in-air and in-water noise from the different activities in the PCT's 2018 Workplan. The action area is defined by the dredging and disposal and the potential for disturbance or other adverse effects on marine mammals, their prey, habitat, or constituent elements of their critical habitat (Figure 1). The other proposed activities (installation of land side utilities, abutment construction, construction of a temporary pad and soil improvement work, pile cutting) will be conducted in various manners and/or locations that will have no effect on ESA-listed species.

NMFS defines Level B harassment of marine mammals from continuous noise, such as dredging, as any underwater noise level in excess of the ambient sound level (generally accepted as 120 decibels [dB] re 1 microPascal [µPa] root mean square [rms]).

During transitional dredging, the area of potential harassment as defined by NMFS will be small, based on estimated in-water noise levels produced by dredging in Cook Inlet. Received sound levels associated with the continuous sound from active dredging are anticipated to decline to 120 dB re 1µPa rms within 164 feet (50 meters) of the sound source (Dickerson et al. 2001). Received sound levels from a moving vessel (barge, dredge, or support vessel) are anticipated to decline to 120 dB re 1µPa rms within 328 feet (100 meters) of the sound source (NMFS 2017).

For the activities proposed in the 2018 Workplan, the action area will be the sum of the areas within which transitional dredging, vessel movements, and disposal occur (Figure ). The entire action area (transitional dredging area, disposal area, and movement corridor) is located within the area excluded from the critical habitat designation for the Cook Inlet beluga whale (Figure 2; Section 4.1.3).

Additionally, there is no designated critical habitat for Steller sea lions from the western DPS in the action area. The action area is also not influenced by any other ESA-listed species as they are not anticipated to occur within the vicinity of the proposed action.

.


*Figure 2 The Action Area for Transitional Dredging (Transitional Dredging Area, Disposal Area, and Vessel Movement Corridor Combined) and Cook Inlet Beluga Whale Critical Habitat*

# 4 Listed Species and Critical Habitat

The Cook Inlet beluga whale, ESA-listed as endangered, and western DPS of Steller sea lions, ESA-listed as endangered, are known to occur in the action area. No other ESA-listed species are anticipated to occur in the action area.

## 4.1 Beluga Whales

### 4.1.1 Status and Distribution

The Cook Inlet beluga whale is the most common ESA-listed marine mammal to occur in the action area. Five beluga whale stocks are recognized in Alaska: Beaufort Sea, eastern Chukchi Sea, eastern Bering Sea, Bristol Bay, and Cook Inlet (Muto et al. 2017). Only the Cook Inlet stock inhabits the action area.

NMFS aerial surveys documented a 50 percent decline in Cook Inlet beluga whale abundance between 1994 and 1998, from an estimate of 653 to 347 whales (Rugh et al. 2000). In response to this decline, NMFS initiated a status review of the Cook Inlet beluga whale pursuant to the MMPA and the ESA in 1998 (63 FR 64228). The Cook Inlet beluga whale stock was designated as depleted under the MMPA in 2000 (65 FR 34590). Annual abundance surveys conducted each June from 2002 to 2012 indicated that the population continued to decline at an annual rate of 0.6 percent (Muto et al. 2017). On 17 October 2008, NMFS listed the Cook Inlet beluga whale DPS as endangered under the ESA (73 FR 62919). The most recent population estimate for the Cook Inlet beluga whale, completed for the year 2014, is 340 individuals (Hobbs et al. 2016).

### 4.1.2 Presence in the Action Area

The Port conducted NMFS-approved monitoring programs for beluga whales and other marine mammals, focused at the Port and surrounding waters, from 2005 to 2011, and again in 2016. Data on beluga whale sighting rates, groupings, behavior, and movements indicate that the Port is a relatively low-use area, occasionally visited by lone whales or small groups of whales (Table 1). They are observed most often in fall, with numbers peaking in late August to early October (Funk et al. 2005). Although groups with calves have been observed entering the Port area, data do not suggest that the area is an important nursery (Markowitz and McGuire 2007).

*Table 1. Beluga Whales Observed in the Port Area during Monitoring Programs*

| Year | Dates of Monitoring Effort | # of Hours of Monitoring Effort | Total Number of Groups[a] Sighted | Total Number of Beluga Whales | Monitoring Type |
|---|---|---|---|---|---|
| 2005 | August 2 – Nov. 28 | 374 | 21 | 157 | MTRP - Scientific Monitoring |
| 2006 | April 26 – Nov. 3 | 564 | 25 | 82 | MTRP - Scientific Monitoring |
| 2007 | Oct. 9 – Nov. 20 | 139 | 20 | 86 | MTRP - Scientific Monitoring |
| 2008 | June 24 – Nov. 14 | 612 | 54 | 283 | MTRP - Scientific Monitoring |
| | July 24 – Dec. 2 | 607[b] | 59 | 431 | MTRP - Construction Monitoring |
| 2009 | May 4 – Nov. 18 | 783 | 54 | 166 | MTRP - Scientific Monitoring |
| | March 28 – Dec. 14 | 3,322[b] | NA | 1,221 | MTRP - Construction Monitoring |
| 2010 | June 29 – Nov. 19 | 600 | 42 | 115 | MTRP - Scientific Monitoring |
| | July 21 – Nov. 20 | 862[b] | 103 | 731 | MTRP - Construction Monitoring |
| 2011 | June 28 – Nov. 15 | 1202 | 62 | 290 | MTRP - Scientific Monitoring |
| | July 17 – Sept. 27 | NA | 5 | 48 | MTRP - Construction Monitoring |
| 2016 | May 3 – June 21 | 85.3 | 9 | 10 | TPP - Construction Monitoring |

[a] A group consists of one or more individuals.
[b] In-water pile-driving hours.
Source: Cornick and Seagars 2016; Cornick et al. 2010, 2011; Cornick and Pinney 2011; Cornick and Saxon-Kendall 2008, 2009; ICRC 2009, 2010, 2011, 2012; Markowitz and McGuire 2007; Prevel-Ramos et al. 2006
Notes: MTRP = Marine Terminal Redevelopment Project; NA = not available; TPP = Test Pile Program

### 4.1.3 Critical Habitat

On 11 April 2011, NMFS designated two types of beluga whale critical habitat in Cook Inlet that represent specific areas containing essential biological and physical features (76 FR 20180). The designation includes 7,800 square kilometers (km$^2$; 3,013 square miles [mi$^2$]) of marine and estuarine habitat within Cook Inlet, encompassing approximately 1,909 km$^2$ (738 mi$^2$) in Area 1 and 5,891 km$^2$ (2,275 mi$^2$) in Area 2. The Port, the adjacent navigation channel, and the turning basin (the wider area offshore of the Port in which larger ships such as cargo ships can turn around) were excluded from the critical habitat designation for national security reasons (76 FR 20180).

Transitional dredging and disposal of dredged material will take place entirely within the critical habitat exclusion zone (e.g., not in critical habitat; Figure ).

## 4.2 Steller Sea Lion

### 4.2.1 Status and Distribution

Two DPSs of Steller sea lion occur in Alaska: the western DPS and the eastern DPS. The eastern DPS was removed from the federal list of threatened and endangered species in 2013 (78 FR 66140). The western DPS includes animals that occur west of Cape Suckling, Alaska, and therefore includes individuals within the action area. The western DPS was listed under the ESA as threatened in 1990, and its continued population decline resulted in a change in listing status to endangered in 1997. Since 2000, studies have documented a continued decline in the population in the central and western Aleutian Islands; however, the population east of Samalga Pass (including the population that inhabits Cook Inlet) has increased and is potentially stable (Muto et al. 2017). The most recent abundance estimate for the western DPS, completed in 2015, was 50,983 individuals (Muto et al. 2017).

### 4.2.2 Presence in the Action Area

Steller sea lions have been observed on 3 days during monitoring at the Port, once in June 2009 (ICRC 2009) and on 2 days in May 2016 (Cornick and Seagars 2016). All occasions were during summer, when the sea lions were likely attracted to ongoing salmon runs. However, the likelihood of occurrence of Steller sea lions in the action area is low, and sightings are rare, despite the many hours of observation that have taken place in and near the Port.

### 4.2.3 Critical Habitat

Critical habitat for the western DPS of Steller sea lions is defined as all land and air within 3,000 feet, and all marine waters within 20 nautical miles, of a designated major haulout (58 FR 45269). As discussed above (Section 3), the haulout nearest to the Port is approximately 150 miles away near Homer, Alaska. Therefore, designated critical habitat for the western DPS of Steller sea lions will not be affected by the proposed action.

# 5 Effects of the Action

Under the ESA, direct effects are defined as the direct or immediate effects of the project on a listed species or its habitat. Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur.

# 5.1 Direct Effects

Direct effects to ESA-listed marine mammals during transitional dredging and dredge material disposal include potential exposure to underwater anthropogenic sound, increases in turbidity, and vessel collisions (Todd et al. 2015).

## 5.1.1 Underwater Noise

The proposed action will introduce additional elevated anthropogenic underwater noise levels within the action area. Significantly elevated levels of underwater noise could potentially harass marine mammals and affect communication, foraging, migration, and predator detection. NMFS defines harassment of marine mammals as any act of pursuit, torment, or annoyance. NMFS categorizes harassment as Level A or Level B, where Level A harassment has the potential to injure a marine mammal or marine mammal stock in the wild, and Level B harassment has the potential to disturb, but not injure, a marine mammal stock in the wild by causing disruption of behavioral patterns.

The area of potential Level B harassment, as defined by NMFS, from exposure to in-water sound during transitional dredging and disposal will be small. In-water sound levels produced by dredging in Cook Inlet are relatively low compared to sound levels produced by other in-water activities. Received sound levels associated with the continuous sound from active dredging are anticipated to decline to 120 dB re 1µPa rms within 164 feet (50 meters) of the sound source (Dickerson et al. 2001). Received sound levels from a moving vessel (barge, dredge, or support vessel) are anticipated to decline to 120 dB re 1µPa rms within 328 feet (100 meters) of the sound source (NMFS 2017). These zones of ensonification are limited in size, allowing marine mammals, including beluga whales and Steller sea lions, to avoid exposure to elevated sound levels by swimming around the sound source.

Transitional dredging will take place in an area that has been part of a working port for more than 50 years. Dredging and other industrial activities are common in the action area. Anchored dredging and disposal activities have introduced continuous sounds into the water near the Anchorage Harbor since the 1960s, yet beluga whales are observed regularly at the Anchorage Harbor, perhaps suggesting a level of habituation to activities in that area or a need to access available concentrations of prey or critical habitat (NMFS 2017). Beluga whales have been observed during the same time period (peaking in September/October) in the Port area despite the presence of dredging, construction, and other maritime activities (Prevel-Ramos et al. 2006; Markowitz and McGuire 2007; Cornick and Kendall 2008; ICRC 2009, 2010, 2011, 2012). Monthly monitoring reports indicate that beluga whales are primarily transiting through the Port while opportunistically foraging, and that dredging and disposal do not present a barrier to this transit.

Because of the low intensity and stationary nature of the sound from dredging, and its perennial presence over many years in the same general location, beluga whale response to dredging noise is not expected to result in any measurable changes in survival or fitness, or to significantly disrupt normal behavioral patterns (NMFS 2017). Therefore, NMFS (2017) concluded that dredging sound is not likely to result in acoustic harassment to beluga whales under the ESA (Wieting 2016), and considered the acoustic effects of dredging insignificant (NMFS 2017).

In areas with heavy vessel traffic, such as the Port, beluga whales appear to habituate to vessel noise. NMFS (2008) reports that Alaska Native beluga whale hunters believe that Cook Inlet beluga whales are sensitive to boat noise, and that they will leave areas subjected to high boat use. However, at the Port, beluga whales appear to be relatively tolerant of intense vessel traffic, as they are commonly seen during summer and early fall. Indeed, Blackwell and Greene (2002) report that beluga whales were observed “within a few meters” of a large cargo ship, suggesting that they were not strongly affected by the sounds produced by the ship.

Observations of beluga whales at the Port suggest that they are not harassed by vessel noise to the point of abandonment, although the whales may tolerate noise that would otherwise disturb them in order to reach feeding areas or to conduct other biologically significant behaviors (NMFS 2008). In areas where they are subjected to heavy boat traffic, beluga whales are thought to habituate and become tolerant of the vessels, and to exhibit plasticity in their choice of call types, rates, and frequencies in response to changes in the acoustic environment (Blackwell and Greene 2002).

Similarly, although Steller sea lions may be exposed to dredging and vessel noise, it is unlikely that any individual will be displaced from the area. Any disturbance to an individual will be limited in space and time, given the rare occurrence of Steller sea lions in the action area. No haulouts, foraging areas, or other areas of known importance to Steller sea lions occur in or near the action area, and any effects on Steller sea lions are anticipated to be insignificant.

Port activities, including vessel traffic and dredging, contribute to existing ambient noise levels in the action area, and have not resulted in abandonment from the area by beluga whales or Steller sea lions. It is unlikely that beluga whales or Steller sea lions will exhibit significant behavioral modification due to underwater noise and vessel activity associated with transitional dredging and disposal.

### 5.1.2 Turbidity and Suspended Sediment Levels

Turbidity affects the ability of light to penetrate water, and therefore can affect the amount of primary productivity or plant growth in an area. During transitional dredging and disposal of dredged material, a temporary and localized increase in turbidity is anticipated to occur. Knik Arm is already a highly turbid ecosystem, however, with high and variable concentrations of suspended sediments such as silts and clays. Plant growth in parts of Cook Inlet with high turbidity levels is already limited (Larrance et al. 1977; Speckman et al. 2005), and therefore a temporary increase in turbidity in the action area is not likely to produce detectable effects on plant growth.

It is not anticipated that dredging or disposal of dredged materials in Knik Arm will elevate suspended sediment levels above typical levels for the area. Cook Inlet beluga whales are highly adapted to navigate, forage, and perform other important behaviors in their turbid environment, and their sophisticated echolocation abilities are one manifestation of that specialization (NMFS 2016). NMFS (2017) concluded that, "Because Knik Arm waters have a very high baseline opacity, have extreme tidal currents that re-suspend and transport huge volumes of sediment, and because this project is relocating relatively small volumes of sediment that have been deposited at the Anchorage Harbor by these tidal currents, NMFS has determined that sediment concentrations from the dredging and dredge disposal activities in Knik Arm will result in only temporary, highly localized, and very small increases in turbidity that will be undetectable a short distance away. We therefore conclude that effects from increased suspended sediments during the proposed dredging activities will be insignificant to Cook Inlet beluga whales."

The action area represents the extreme northern edge of the Steller sea lions' range in Cook Inlet, and occurrence of Steller sea lions in the action area is rare. Similar to Cook Inlet beluga whales, a temporary, localized increase in turbidity is unlikely to measurably affect Steller sea lions during passage through or while foraging in the action area.

### 5.1.3 Vessel Collisions

Collisions with vessels are a known source of injury and mortality for marine mammals, including beluga whales (one probable collision, Neilson et al. 2012) and Steller sea lions (two individuals between 2006 and 2010, Carretta et al. 2013). The dead beluga whale was observed in Knik Arm in 2002, with probable propeller cuts on its back; the cause of death could not be verified, and the circumstances of the incident (including the location) are unknown (Neilson et al. 2012).

The vessel-based dredge used for transitional dredging has a low potential for collision with beluga whales and Steller sea lions during all stages of dredging and disposal, including transit to and from the disposal site. However, no known occurrences of a collision between a dredge in Cook Inlet and any marine mammal has been documented during the many decades of dredging activity at the Port. Furthermore, only one occurrence of a collision between a marine mammal and a dredge has been documented worldwide. This isolated incident in South Africa in 1984 resulted in the death of a southern right whale calf after being struck by a suction dredge that was under way (Best et al. 2001 *in* Todd et al. 2015).

Studies of whale strikes have established that vessel speed is correlated with risk of striking a whale and with the resulting level of injury (Laist et al. 2001; Neilson et al. 2012; Vanderlaan and Taggart 2007). In Alaska, an analysis of the characteristics of whale strike incidents found that 44 percent of the vessels were traveling at speeds of 12 knots or greater, and 14 percent were traveling at speeds of less than 12 knots prior to collision (Neilson et al. 2012). In addition to vessel speed, factors that increase a vessel's risk of striking a whale include drifting with the engine off, sailing with the motor off, and following or watching whales (Neilson et al. 2012). The influence of vessel speed in contributing to either a lethal or a non-lethal injury of a whale was examined in records of ship strikes worldwide (Laist et al. 2001; Vanderlaan and Taggart 2007). Among collisions between motorized vessels and whales that caused lethal or severe injuries, 89 percent involved vessels moving at 14 knots or faster, and 11 percent involved vessels moving at 10–14 knots; no lethal or severe injuries were documented at speeds below 10 knots (Laist et al. 2001).

The Port dredge will be actively dredging, not drifting with the motor off or following whales. Further, the operating speed of an active dredge is very slow, generally in the range of 1 to 3 knots (Vasblom 2003). Any barges associated with transitional dredging will also travel at slow speeds (less than 6 knots, or 7 miles per hour [mph]) and the survey vessel will travel at speeds less than 13 knots (15 mph;  NMFS 2017). Combined, these factors result in a discountable likelihood that dredge-related vessels will collide with marine mammals. In addition, some transitional dredging is likely to take place from a stationary dredge with a mounted backhoe for access to shallow nearshore areas, thus avoiding potential for collision. Dredge travel speeds during transit are higher, but do not generally approach the vessel speeds most frequently reported to result in collisions with marine mammals (i.e., greater than14 knots). The trailing suction hopper dredge *Westport*, which was used by Manson Construction for several years at the Port, transits at about 3 knots (3.5 mph) when loaded and 6 knots (7 mph) when empty (NMFS 2017). The short travel distance between the Port transitional dredging area and the dredge material disposal area will preclude the Port dredge and barges from attaining high transit speeds. Therefore, the potential for the dredge or other project-associated vessels to collide with a beluga whale during transitional dredging and disposal is considered so remote as to be discountable.

Little information is available on risks of collision with vessels for Steller sea lions and other pinnipeds. Based on the relationship between vessel speed and risk of collision for whales, the low likelihood of occurrence of a Steller sea lion in the action area, and the high maneuverability of swimming adult sea lions, the likelihood of collision between a Steller sea lion and a slow-moving dredge or project-associated vessel is also discountable.

### 5.1.4 In-Air Noise

Transitional dredging and dredge material disposal will produce in-air noise that could disturb ESA-listed species. No habitat for ESA-listed terrestrial species exists in the action area, and no pinniped haulouts are located within or near the action area. The closest known haulout for an ESA-listed pinniped, the Steller sea lion, occurs approximately 150 miles away, near Homer, Alaska (Fritz et al. 2016). This haulout is well beyond the distance that in-air noise from dredging could travel. Marine mammals in water are not generally affected by in-air sound, which attenuates markedly at the air-water interface, limiting transmission of in-air sound into water. Potential impacts from in-air noise, therefore, are discountable.

## 5.2 Indirect Effects

An increase in turbidity from transitional dredging and disposal could affect phytoplankton primary productivity and the subsequent food web, including beluga whale and Steller sea lion prey species, resulting in an indirect effect on beluga whales and Steller sea lions. Fish may change their behavior by moving away from highly sediment-laden waters. However, any increase in suspended sediment levels in the water column is likely to be quickly and fully dispersed due to the high tidal currents in Knik Arm. Therefore, any effects from increased turbidity or suspended sediments are anticipated to be temporary and localized, and will not measurably affect beluga whales, Steller sea lions, or their prey.

Sound levels from transitional dredging and disposal are much lower than those from other industrial activities (Section 5.1.1) and are not anticipated to approach levels that cause harm to fish. Sound from transitional dredging and disposal is not anticipated to impede migration of adult or juvenile salmon or adversely affect the health and survival at the individual or population level.

Physical characteristics of the action area (water depth, substrate type, turbidity, and suspended sediments) could be modified by dredging. However, continued use of the area by Cook Inlet beluga whales, Steller sea lions, and other marine mammals during the ongoing dredging program is well-documented (NMFS 2017). Any impacts on biological communities from dredging at the Port are undetectable and do not appear to be impacting habitat use by beluga whales or Steller sea lions.

Potential affects to fishes are discussed in more detail in the *Port of Alaska Modernization Program Essential Fish Habitat Technical Memorandum – PAMP Petroleum and Cement Terminal Project* (HDR 2018).

## 5.3 Interrelated or Interdependent Actions

An interdependent activity is one that has no independent utility apart from the proposed action (50 CFR §402.02). An interrelated activity is one that is part of a larger action and depends on the larger action for its justification (50 CFR §402.02).

Construction of the proposed PCT is part of the Port of Alaska Modernization Program (PAMP), which is intended to address the deteriorating conditions of the Port's marine facilities to enable safe, reliable, and cost-effective operations. Although the proposed PCT Project is part of the larger PAMP, the PCT Project is completely independent of all other projects associated with the PAMP, and future phases and projects of the PAMP are based on funding being available, which it is not. The PCT Project will replace the existing and corroding Petroleum Oil Lubricants (POL 1) Terminal with a new structure designed and constructed to exceed current seismic standards at a new location, and will include new construction of a pile-supported terminal, trestles, and dolphins; and installation of utility (electricity, water, and communication), petroleum, and cement lines linking the terminal and shore. The existing POL 1 Terminal is the only bulk cement-handling facility in Alaska and is the primary terminal for receipt of refined petroleum products. The proposed PCT will be designed to withstand a major seismic event and rapidly return to service, which will allow for continued shipment of refined fuels and bulk cement to Anchorage and other areas of Alaska.

Section 7 consultation under the ESA for the PCT's 2019 Workplan will occur separately from this proposed action (the 2018 Workplan), as described in the introduction (see Section 1).

Maintenance dredging has been occurring at the Port for decades. Section 7 consultation recently concluded between USACE's Civil Works Branch and NMFS.

## 5.4 Effects on Critical Habitat

The action area, including areas of transitional dredging and dredge material disposal, will be located entirely within the Cook Inlet beluga whale critical habitat exclusion zone (Section 4.1.3; Figure ). NMFS has determined that, due to extreme tidal fluctuations in Cook Inlet, it will take only minutes for waters of elevated turbidity from transitional dredging and disposal to dissipate to ambient turbidity levels (NMFS 2017). A temporary, localized increase in turbidity within the action area would not be measureable (NMFS 2017) and is not anticipated to impact habitat quality or use by beluga whales within or beyond the action area (Section 5.1.2). Therefore, transitional dredging and disposal will have **no effect** on critical habitat for the Cook Inlet beluga whale.

There is no designated critical habitat for the western DPS of Steller sea lions within or near the action area (Section 4.2.3). Therefore, transitional dredging and disposal will have **no effect** on critical habitat for this population.

# 6 Recommended Effect Determination

Cook Inlet beluga whales occur occasionally in the action area. Therefore, the proposed action **may affect** individuals that swim through the action area during dredging activities. Any disturbance from transitional dredging and disposal is anticipated to be temporary in nature, short in duration, and will not result in measurable changes to beluga whale use of and behavior in the action area. Therefore, the proposed action **may affect,** but is **not likely to adversely affect,** Cook Inlet beluga whales.

The action area defined for the proposed actions is located solely within the area excluded from the Cook Inlet beluga whale critical habitat designation. Although transitional dredging and disposal of dredged material may cause a minor, temporary increase in turbidity levels within the action area, elevated turbidity is anticipated to dissipate to ambient turbidity levels within minutes (NMFS 2017). Waters in Knik Arm are already characterized by high turbidity levels; any increase in turbidity in the action area will be temporary in nature, short in duration, and quickly dispersed by tides and currents. Therefore, transitional dredging and disposal will have no effect on critical habitat for the Cook Inlet beluga whale.

Steller sea lions from the western DPS have been observed in low numbers on a few occasions within the action area, and the Port is considered extralimital for this population. Therefore, the proposed transitional dredging and disposal **may affect** Steller sea lions that swim through the action area during transitional dredging and disposal. It is unlikely that Steller sea lions will be affected by the proposed transitional dredging and disposal; impacts will be insignificant if they were to occur. Therefore, transitional dredging and disposal **may affect,** but is **not likely to adversely affect** the western DPS of Steller sea lions.

There is no designated critical habitat for the western DPS of Steller sea lions within or near the action area. Therefore, transitional dredging and disposal will have **no effect** on critical habitat for the western DPS of Steller sea lions.

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# Appendix D

# Essential Fish Habitat (EFH)

# Technical Report

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# Port of Alaska Modernization Program Essential Fish Habitat Technical Memorandum - Petroleum and Cement Terminal Project, 2018 Workplan

*Prepared for*

Municipality of Anchorage/Port of Alaska

2000 Anchorage Port Road
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February 2018

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Anchorage, Alaska

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# Executive Summary

The Port of Alaska has applied to the U.S. Army Corps of Engineers (USACE) for a Department of the Army (DA) permit to construct the Petroleum and Cement Terminal (PCT) Project during the 2018 and 2019 construction seasons. USACE is processing the application in two stages according to the two yearly Workplans described in Attachment 1. Thus, USACE will make a permit decision for the 2018 PCT Workplan, and later reach a second permit decision on the 2019 PCT Workplan. USACE will initiate an essential fish habitat (EFH) consultation with the National Marine Fisheries Service (NMFS) separately for each permit process.

Knik Arm is EFH for five Pacific salmon species, which are managed under a federal fishery management plan. The Magnuson-Stevens Fishery Conservation and Management Act requires that federal agencies consult with NMFS when an activity may adversely affect EFH. The intent of this document is to inform USACE of the PCT Project's potential effects and facilitate required EFH consultation for the 2018 PCT Workplan. The 2018 Workplan involves conducting transitional dredging, disposing of the dredged material in Knik Arm, removing three test piles, installing landside utilities, constructing a temporary pad to conduct soil improvement work for the PCT trestle. A separate EFH assessment focusing on the 2019 in-water work associated with the PCT will be completed at a later date.

The transitional dredging and the offshore disposal of the excavated material proposed in the 2018 PCT Workplan may affect EFH; construction of utilities and the concrete abutment will occur on land or in the dry, and will therefore not impact EFH. Dredging and disposal activities and test pile removal will cause a temporary and localized increase in turbidity, which may adversely affect EFH and fish that occupy affected habitat during such activities. Increased turbidity has the potential to temporarily decrease habitat quality, modify habitat function, and under some circumstances may harm fish and/or alter behavior. The 2018 PCT Workplan may therefore have a temporary and localized adverse effect on managed fish species during the proposed in-water activities. However, temporary increases in turbidity from the 2018 Workplan are not anticipated to cause substantial adverse effects to EFH or stocks of managed species.

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# Contents

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# Acronyms and Abbreviations

| | |
|---|---|
| ADF&G | Alaska Department of Fish and Game |
| CFR | Code of Federal Regulations |
| DA | Department of Army |
| EFH | Essential Fish Habitat |
| FHWA | Federal Highway Administration |
| FMP | Fishery Management Plan |
| GOA | Gulf of Alaska |
| JBER | Joint Base Elmendorf-Richardson |
| MSFCMA | Magnuson-Stevens Fishery Conservation and Management Act |
| NES | North Extension Stabilization |
| NMFS | National Marine Fisheries Service |
| NPFMC | North Pacific Fishery Management Council |
| NTU | Nephelometric Turbidity Unit |
| PAMP | Port of Alaska Modernization Program |
| PCT | Petroleum and Cement Terminal |
| POL 1 | Petroleum Oil Lubricants |
| Port | Port of Alaska |
| SBS | South Backlands Stabilization Project |
| USACE | U.S. Army Corps of Engineers |

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# 1 Introduction

The Petroleum and Cement Terminal (PCT) project is the first phase of a suite of construction projects proposed as part of the Port of Alaska Modernization Program (PAMP), which is intended to address the deteriorating conditions of the Port of Alaska's (Port's) marine facilities to enable safe, reliable, and cost-effective Port operations. The PCT Project would involve new construction of the pile-supported terminal, trestles, and dolphins to replace the existing POL 1 (Petroleum Oil Lubricants) terminal. The existing POL 1 is the only bulk cement-handling facility in Alaska and is the primary terminal for receipt of refined petroleum products. The PCT will be designed to withstand a major seismic event and rapidly return to service, which would provide Anchorage and other areas of Alaska with refined fuels and bulk cement. The new PCT would be located at the southern extent of the Port and would include breasting and mooring dolphins to receive and secure ships.

The Port is located within the Municipality of Anchorage on Knik Arm in upper Cook Inlet (see Attachment A for figures). The estuarine and marine waters in Cook Inlet provide habitat for fish species managed under federal fishery management plans (FMPs) and are considered Essential Fish Habitat (EFH) for some of these species. The PCT would involve transitional dredging and installing up to 257 support piles, constructing overwater structures, and placing fill below the mean high water elevation, and therefore has the potential to affect federally managed fish species and EFH.

PCT construction will occur during the ice-free months of 2018 and 2019. The 2018 Workplan will focus on preparatory activities for construction of the PCT dock and terminal structures; transitional dredging and material disposal, and removal of the test piles and test boring casing are the components of the 2018 work that will occur below mean high water. In 2019, the Port will install support piles and construct the main and emergency platforms and trestles.

The purpose of this report is to inform the U.S. Army Corps of Engineers (USACE) of potential effects to EFH associated with the PCT 2018 Workplan and facilitate processing of applicable authorizations administered by the USACE. While this document considers potential impacts to EFH from 2019 components in the cumulative effects analysis (**Section 4.2**), a separate EFH assessment focusing on the 2019 in-water work associated with the PCT will be completed in 2018.

In accordance with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)[1], this report summarizes components of the proposed PCT Project that may affect EFH and/or FMP species, identifies proposed conservation measures to minimize potential effects, and presents an analysis of potential impacts to EFH and managed species.

The MSFCMA defines EFH as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The MSFCMA notes that:

> *…for the purpose of interpreting the definition of EFH, 'waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities, 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species full life cycle.*

[1] A provision of the MSFCMA requires that Fisheries Management Councils (FMCs) identify and protect EFH for fish species managed by a federal FMP (U.S. Code 1853 (a)(7)).

# 2 Proposed Action

Project activities and schedule are described in the DA Permit Application Appendices A (Supplemental Information) and B (Preliminary Design Drawings), included with this report as Attachment 1.

# 3 Essential Fish Habitat and Species

The North Pacific Fishery Management Council (NPFMC) identifies habitat in Cook Inlet as essential for Pacific salmon[2] and groundfish species (NPFMC 2012, 2016). Estuarine and marine waters in the vicinity of the Port provide EFH for Chinook (*Oncorhynchus tshawytscha*), chum (*O. keta*), coho (*O. kisutch*), sockeye (*O. nerka*), and pink salmon (*O. gorbuscha*) (NPFMC 2012). Freshwater streams, lakes, ponds, wetlands, and other water bodies that support Pacific salmon, as identified by the Alaska Department of Fish and Game (ADF&G) *Anadromous Waters Catalog* (AWC), are also considered EFH.  The subsections that follow present a summary of freshwater, estuarine, and marine habitat conditions within approximately 1.6 kilometers (1 mile) of the Port, and ecological notes on FMP-managed fish species.  In some cases, the discussion of habitat and fish species extends beyond these limits to provide additional context.

Eulachon (*Thaleichthys pacificus*); low numbers of Pacific cod (*Gadus macrocephalus*), walleye pollock (*Theragra chalcogramma*), and Pacific herring (*Clupea pallasii*)[3]; longfin smelt (*Spirinchus thaleichthys*); and Pacific staghorn sculpin (*Leptocottus armatus*) have also been captured in upper Cook Inlet (NOAA 2016; Houghton et al. 2005). While these species are managed by the FMP for groundfish of the Gulf of Alaska (GOA), waters in the vicinity of the Port are not identified as EFH for these species (NPFMC 2016; Eagleton 2016).  Available data are insufficient for the National Marine Fisheries Service (NMFS) to identify EFH for eulachon[4], longfin smelt, Pacific herring, and other species in the forage fish complex (NPFMC 2016; Eagleton 2016). Since eulachon occur near the Port and are a common prey species for the Cook Inlet beluga whale[5] (*Delphinapterus leucas*) (Moore et al. 2000), the eulachon is discussed below. Ecological notes are also provided for Pacific cod, walleye pollock, and the Pacific staghorn sculpin.

## 3.1 Habitat Description

### 3.1.1 Marine EFH

Cook Inlet is a large, semi-enclosed tidal estuary in Southcentral Alaska that ultimately opens into the GOA.  Cook Inlet is divided into upper and lower regions by the East and West Forelands.  Upper Cook Inlet is generally shallow, with most waters less than 73 meters (240 feet) deep (NMFS 2008). Near its northern extent, upper Cook Inlet branches into two shallower extensions: Knik Arm to the north and Turnagain Arm to the southeast. The Port is located in Knik Arm in upper Cook Inlet.

[2] Marine EFH for salmon in Alaska includes all estuarine and marine areas utilized by salmon of Alaska origin, extending from the influence of tidewater and tidally submerged habitats to the limits of the U.S. Exclusive Economic Zone; marine habitat extends from the mean high line to the to the 200-nautical-mile limit offshore; the estuarine component includes the area within the mean high tide line and the salinity transition zone within nearshore waters (NOAA 2005).

[3] The NMFS determined that Chinook, sockeye, chum, and coho salmon; Pacific eulachon; Pacific cod; walleye pollock; saffron cod; and yellowfin sole are primary prey species that are essential to the conservation of the Cook Inlet beluga whale (NMFS 2016).

[4] Eulachon are also locally referred to as “hooligan” and “candlefish.” A personal use and small commercial fishery for eulachon is located nearby in Knik Arm.

[5] The Cook Inlet beluga whale is federally listed as “endangered” under the Endangered Species Act.

Freshwater input to Knik Arm comes from snowmelt and rivers, many of which are glacially fed and carry high sediment loads. The Matanuska and Knik rivers, located north of the Port, contribute the majority of freshwater and suspended sediment load into the Knik Arm during summer. Mud and sand flats dominate intertidal habitat in Knik Arm (KABATA 2006). As of 2006, approximately 60 percent of Knik Arm is exposed at mean lower low water. Tidally influenced areas of Knik Arm consist primarily of vegetated and unvegetated mudflats with fine, silt-size glacial flour.

Knik Arm is considered a harsh, extreme marine environment in terms of the powerful interacting effects of large tidal changes; strong currents; massive glacial and coastal sediment inputs from rivers and coastal erosion; and extreme winter ice scour (Houghton at al. 2005). These harsh conditions limit primary productivity and thus populations of marine flora and benthic invertebrates to relatively low densities, including on the beaches and throughout the water column (Houghton at al. 2005).

Average natural turbidity levels in Upper Cook Inlet and Knik Arm typically range from 400 to 600 nephelometric turbidity units (NTUs) (USACE 2008); monthly averages peak during spring breakup and increase again in late summer (to more than 650 NTUs; Houghton et al 2005). Water quality data indicate that despite high turbidity levels, relatively high levels of dissolved oxygen are maintained throughout the water column due to the turbulent nature of Knik Arm (USACE 2008). Pacific salmon and several other species have adapted to the naturally high levels of turbidity. Data suggest that small lenses of clearer water within the turbid waters of Knik Arm may be especially important feeding areas for juvenile salmon, as they are typically visual feeders (Houghton et al. 2005). These clearwater pockets occur throughout Knik Arm and do not seem to be limited to specific areas.

The Port boundary currently encompasses an area of approximately 129 acres. Other commercial and industrial activities related to secure maritime operations are located south of the Port; Joint Base Elmendorf-Richardson (JBER) is to the east. The perpendicular distance to the west bank directly across Knik Arm is approximately 4.2 kilometers (2.6 miles) from the Port. The distance from the Port (east side) to nearby Port MacKenzie (west side) is approximately 4.9 kilometers (3.0 miles).

The quantity and quality of nearshore habitat within the Port's vicinity has been reduced through numerous shoreline modifications, fill placement, dredging, and other development activities. Most of the intertidal habitat along the Port's shoreline has been modified, and annual dredging occurs in subtidal waters adjacent to the Port, including a portion of the PCT area, to maintain operational depths.

The new PCT would be located near the Port's southern extent and adjacent to the South Backlands area, which was created in 2008 by placing fill under DA permit POA-2003-N. The Port received a second authorization in January 2017 to discharge additional fill for construction modifications of the South Backlands Stabilization (SBS) Project through a DA permit[6]. The SBS Project will place armor rock and gravel fill across approximately 3.7 acres of intertidal fill along approximately 525 linear meters (1,722 feet) of shoreline in 2018 to protect the shoreline from continued erosion. The new PCT would extend waterward from the newly stabilized shoreline. Therefore, the majority of affected habitat within and adjacent to the PCT area would be subtidal, post-SBS Project construction. **Photographs** that show the extent of intertidal fill in the vicinity of the PCT and SBS projects over time are provided below. **Figures** of the proposed PCT Project are provided in Attachment 1.

[6] Work proposed under the SBS Project was permitted in August 2011 (DA permit POA-2003-502-M7, Cook Inlet) as part of the Port Intermodal Expansion Project. (The SBS Project was then named "South Backlands Slope Hardening" and described in Narrative B of the June 2011 permit application). The work was not completed within the timeframe allowed by that permit; therefore, the Port requested reauthorization for construction of the project. Reauthorization was granted in January 2017.

*Photo 1. Intertidal habitat visible before construction of South Backlands area, 2006.*

*Photo 2. South Backlands area, 2010.*

*Photo 3. Existing South Backlands area, 2016.*

*Photo 4. Fill footprint of future SBS Project superimposed on 2016 imagery.*

## 3.1.2 Freshwater EFH

Freshwater habitat near the Port is limited. Ship Creek (247-50-10060) and Sixmile Creek (247-50-10090) are the two nearest streams identified as anadromous by the AWC. Several other anadromous streams that empty into Knik Arm outside the assessment area provide essential spawning and/or rearing habitat for Pacific salmon. Fish migrating to and/or from these freshwater systems[7] contribute to the numbers and species that occur in Knik Arm; some of these fish likely use habitat in waters adjacent to the Port as they migrate to and from streams throughout Knik Arm.

### 3.1.2.1 Ship Creek

Ship Creek, located along the southern edge of the Port and about 2.2 kilometers (1.4 miles) south of the Port, supports Pacific salmon (Johnson and Litchfield 2016). Ship Creek is a clearwater stream that flows for nearly 48 kilometers (30 miles) from its headwaters in the Chugach Mountains to Knik Arm, draining approximately 319 square kilometers (123 square miles; KABATA 2007). The upper watershed, which flows through Chugach State Park for most of its length, is in a natural state and accounts for more than 80 percent of Ship Creek's watershed. In the lower watershed, Ship Creek has been modified as it flows through portions of JBER, urban Anchorage, and associated industrial areas.

Ship Creek provides EFH for coho, Chinook, chum, and pink salmon (Johnson and Litchfield 2016) and serves as an important recreational fishing resource[8]. Ship Creek Chinook and coho salmon runs, and to a lesser degree the pink and chum salmon runs, are enhanced by hatchery operations (KABATA 2007). Juvenile salmonids are reared at the William Jack Hernandez Sport Fish Hatchery for up to 2 years prior to release as smolts.  Many of the smolts released from the hatchery reside in the Ship Creek area for a limited period of time before out-migrating to other parts of Knik Arm and Cook Inlet. Juvenile Chinook salmon captured from between Cairn Point and Point Woronzof were primarily of Ship Creek hatchery origin (Houghton et al. 2005).

The Ship Creek substrate consists primarily of gravel and cobble with some fines and is characterized mostly as riffle-run habitat in its lower reaches (KABATA 2007). The quality of habitat in the lower reaches has been negatively affected by fish passage barriers, impaired water quality, and industrial and commercial development. Although habitat quality has been compromised, lower Ship Creek still provides good quality habitat for fish and invertebrates (GeoNorth 2009). Roughly 80 percent of the habitat for which data are available in lower Ship Creek is considered good for fish and moderate for invertebrates (GeoNorth 2009).

### 3.1.2.2 Sixmile Creek

Sixmile Creek, the nearest anadromous stream north of the Port, provides EFH for coho, sockeye, and pink salmon (Johnson and Litchfield 2016). During low tides, its intertidal channel extends south to Cairn Point, just north of the Port, while the mouth is located farther north.  Between tidal phases, Sixmile Creek flows south across the tide flats within a confined, shallow (less than 15 centimeters [6 inches]), intertidal channel approximately 46–91 meters (150–300 feet) seaward of the toe of the bluff. This channel traverses approximately 4 kilometers (2.5 miles) before reaching subtidal waters offshore from Cairn Point (KABATA 2007).

[7] Other freshwater EFH streams include Goose, Fish, Willow and Cottonwood creeks; the Matanuska, Knik, and Eklutna rivers; Peters and Fire creeks; and Eagle River (Johnson and Litchfield 2016).

[8] Dolly Varden char (*Salvelinus malma*) and rainbow trout (*O. mykiss*) also use Ship Creek, but are not FMP-managed species.

## 3.2 FMP-Managed Fish Species

Life history summaries for fish species that are managed under a federal FMP and have been documented within 1.6 kilometers (1 mile) of the Port are provided below.

### 3.2.1 Pacific salmon

Marine and estuarine habitats in Knik Arm, including waters adjacent to the Port, support five species of Pacific salmon during juvenile and adult life stages. Nearby Ship Creek supports Chinook, coho, chum, and pink salmon, and Sixmile Creek provides habitat for sockeye, coho, and pink salmon (Johnson and Litchfield 2016). Adult salmon use the nearshore environments of Knik Arm as a migratory corridor to access spawning streams[9] in Knik Arm between May and September (KABATA 2006). Pacific salmon are important species for the sport and commercial fishery[10] within Cook Inlet and its tributaries, and are prey species for beluga whales.

Biologists sampled shoreline habitats in Knik Arm from July through November 2004, and both shoreline and mid-channel habitats from April through July 2005. Results indicate that juvenile salmon numbers throughout Knik Arm peak from May into August, depending on species. Biologists captured juvenile salmon in nearshore areas as well as in mid-channel surface waters of Knik Arm (Moulton 1997; KABATA 2006). Analysis of length, frequency, and timing patterns suggests that juvenile pink and chum salmon move through Knik Arm relatively quickly and do not grow much in this environment. Knik Arm appears to be important rearing habitat for the juvenile coho, Chinook, and sockeye salmon that emerged from streams that discharge into Knik Arm. Juveniles of these species appear to feed and actively grow in Knik Arm through August (FHWA and DOT&PF 1983; Houghton et al. 2005; KABATA 2006; Moulton 1997).

Juvenile salmon use of the Knik Arm shoreline and mid-channel habitats differs from juvenile salmon use of clearwater estuaries (Houghton et al. 2005), where early out-migrants are found residing primarily in nearshore habitats (see reviews by Healey 1991; Salo 1991; and Sandercock 1991). Physical conditions within Knik Arm are less like those of a clearwater estuary (e.g., moderate turbidity, high marine primary productivity) and more like those of a glacial river system (e.g., very high turbidity, low primary productivity, substantial allochthonous carbon inputs from decaying organic matter). This is especially true in the spring and summer, when freshwater inputs (and coincidentally juvenile salmon use) are at their highest. This disparity between classic estuarine conditions and Knik Arm conditions substantially influences the ecological functions of Knik Arm and resulting behavior of juvenile salmon.

Researchers have indicated that many of the generalizations common to juvenile Pacific salmon use of nearshore environments of clearwater estuarine habitat may be partially or totally inapplicable in Knik Arm (Houghton et al. 2005)[11]. Extremely turbid waters of Knik Arm reduce the necessity of using shallow waters to escape predation (e.g., Cyrus and Blaber 1987a and 1987b; Gregory and Levings 1998 as cited in Houghton et al. 2005) and appear to obviate schooling behavior. The absence of natural intertidal structures limits nearshore physical refugia and the distribution of food sources (e.g., crustaceans, amphipods, insects [Hemiptera and Diptera]); organic detritus and vegetative mats within both mid-channel and shoreline waters likely reduce dependence on littoral habitat for feeding; and reduced

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[9] Other freshwater EFH streams that empty into Knik Arm include Goose, Fish, Willow, and Cottonwood creeks; the Matanuska, Knik, and Eklutna rivers; Peters and Fire creeks; and Eagle River ((Johnson and Litchfield 2016).

[10] The nearest principal fishery is the salmon fishery in the Northern District of the Upper Cook Inlet Management Area.

[11] These include use of shallow water as refuge from predators (e.g., Heiser and Finn 1970); use of intertidal structures such as large woody debris, eelgrass, and kelp beds as refuge from predators (e.g., Brennan and Culverwell 2001); use of intertidal habitats due to abundance of epibenthic prey (e.g., Simenstad et al. 1982); and use of stream mouths and smaller estuaries for relief of osmoregulatory stresses (e.g., Myers et al. 1998); references cited in Houghton et al. 2005 Most of these functions are not provided for or are not necessarily exclusive to Knik Arm shorelines.

salinity within Knik Arm waters (averaging below 10 parts per thousand between June and August [KABATA 2006], coincident with peak juvenile use) provides favorable conditions for smoltification.

#### 3.2.1.1 Coho salmon

Coho salmon typically enter Knik Arm spawning streams from July through September, with a peak runtime in August (KABATA 2006). Eggs hatch in early spring, after which embryos remain in the gravel, relying on egg yolk until emerging in May or June. Juvenile coho spend one to three winters in streams before migrating to the sea as smolt (ADF&G 1994). Juvenile coho may also use estuarine areas in summer and return to fresh water to overwinter. Coastal streams, lakes, estuaries, and tributaries to large rivers generally provide rearing habitat for coho. Coho spend about 16 months at sea before returning to coastal areas to spawn in natal streams (NPFMC 1998b; KABATA 2006).

Sixmile and Ship creeks provide spawning and rearing habitat for coho salmon; juvenile coho may linger in intertidal channels during out-migration. Hatchery-released coho salmon likely constitute the majority of coho in Ship Creek.

Biologists sampled shoreline habitats in Knik Arm from July through November 2004, and both shoreline and mid-channel habitats from April through July 2005. Coho salmon were the most abundant juvenile salmonid captured in nearshore beach seines in 2005 and the second most abundant in 2004 (Houghton et al. 2005). Coho were the most abundant juvenile salmon captured in April and their numbers in Knik Arm peaked in July and were still present into late November (Houghton et al. 2005).

Adult coho were commonly caught in beach seines during July and August, but were not captured after August (KABATA 2006). These results are consistent with reported Anchorage and Matanuska-Susitna freshwater runtimes. Coho salmon likely use waters adjacent to the Port while migrating to spawning habitat.

#### 3.2.1.2 Chinook salmon

Adult Chinook salmon occur over a broad geographic range that encompasses different ecotypes and diverse habitats throughout Alaska. Chinook salmon generally spawn from mid-June to mid-August. The freshwater runtime for Chinook salmon in Knik Arm typically peaks in June and July; adult Chinook are present during May through August (KABATA 2006). Eggs hatch in the late winter or early spring, and juveniles may immediately migrate to the ocean or remain in streams for up to a few years (ADF&G 1994). Chinook salmon spend between 1 to 6 years at sea before returning to natal streams to spawn (KABATA 2006).

Ship Creek supports spawning and rearing Chinook salmon. Hatchery-raised juveniles are released into Ship Creek and likely comprise the majority of Chinook salmon returning to Ship Creek. Both hatchery and natural stocks of Chinook salmon may linger in lower Ship Creek during out-migration and may use the upper intertidal mudflats during high stages of the tidal cycle during both out-migration and return (KABATA 2006).

Juvenile Chinook salmon abundance peaked in Knik Arm in May and June, and declined into mid- and late summer during the 2004–2005 sampling efforts (Houghton et al. 2005). Juvenile Chinook salmon captured in May were considerably longer than those captured in June, likely due to the May smolt releases from the hatchery on Ship Creek. A single adult Chinook salmon was captured during a beach seine survey in May 2005, prior to peak spawning (Houghton et al. 2005).

#### 3.2.1.3 Sockeye salmon

Sockeye salmon exhibit a greater variety of life history strategies than other Pacific salmon (NPFMC 2012). Sockeye salmon generally spawn in late summer and autumn, in a wide variety of spawning habitats, such as rivers, streams, and upwelling areas along lake beaches. Eggs hatch during winter and the young salmon move into the rearing areas. In systems with lakes, juveniles usually spend 1 to

3 years in fresh water before migrating to the ocean as smolt, usually in spring. However, in systems without lakes, many juveniles migrate to the ocean soon after emerging from the gravel (ADF&G 1994). Anadromous sockeye salmon typically spend 1 to 4 years in the ocean before returning to spawn (NPFMC 2012).

Sockeye salmon were the most abundant juvenile salmonids captured from Knik Arm during beach seine sampling from July to November 2004 (Houghton et al. 2005). During the April through July 2005 sampling period, juvenile sockeye were third in abundance among salmonids, behind coho and Chinook in beach seine samples. Overall, juvenile sockeye catches were variable from May through August, highest in August, and lowest in April and in September through October. No juvenile sockeye were captured in November. Adult sockeye were caught in beach seine samples during July. No adult sockeye salmon were captured during August to November beach seine sampling. This is consistent with the local freshwater adult sockeye salmon runtime peak of July through August (KABATA 2006).

Sixmile Creek provides spawning and rearing habitat for sockeye salmon (Johnson and Litchfield 2016). Migrating juveniles and adults likely use habitat adjacent to the Port during migration. Additionally, juveniles likely use the intertidal channel of Sixmile Creek and nearshore intertidal habitat within and adjacent to the Port while their osmoregulatory systems adjust to the brackish waters (relatively low salinity) of Knik Arm.

#### 3.2.1.4 Pink salmon

Pink salmon are distinguished from other Pacific salmon by having a fixed 2-year life span. Because of their life span, pink salmon spawning in natal streams in odd and even years are reproductively isolated from each other and have developed into genetically different lines (NPFMC 2012). Adult pink salmon enter spawning streams between late June and mid-October. Pink salmon spawn within a few miles of the coast; spawning within the intertidal zone or the mouth of streams is quite common. Shallow riffles, where flowing water breaks over coarse gravel or cobble-size rock, and the downstream ends of pools are favored spawning areas. Eggs hatch in early to mid-winter and the fry swim up out of the gravel and migrate downstream into salt water by late winter or spring (ADF&G 1994; KABATA 2006).

No juvenile pink salmon were observed in July through November 2004 during shoreline sampling in Knik Arm (KABATA 2006). Few were expected because the larger even-year pink runs in this region of Alaska produce odd-year out-migrants. In 2005, only 33 pink salmon juveniles were captured in beach seines (1.9 percent of all juvenile salmonids), and most of those were captured in May (Houghton et al. 2005). A few pink salmon juveniles were captured in April, June, and July. Adult pink salmon were caught in beach seine samples in July but not captured during August to November surveys (KABATA 2006). This pattern is consistent with the local area freshwater runtime peak of July (present during July and August) for adult pink salmon.

Sixmile and Ship creeks support spawning pink salmon (Johnson and Litchfield 2016). Adult pink salmon likely pass through habitat within and adjacent to the Port during migration to spawning habitat, and juveniles may linger in intertidal habitats during out-migration.

#### 3.2.1.5 Chum salmon

Chum salmon spawn between June and November in streams, side-channel sloughs, and intertidal portions of streams (NPFMC 2012). In Knik Arm area streams, freshwater run time peaks for chum salmon in July and August (KABATA 2006). Juvenile chum salmon tend to linger and forage in the intertidal areas at the head of bays; estuaries are important for chum salmon rearing during spring and summer. Chum salmon fry, like pink salmon, do not overwinter in the streams, but migrate out of the streams directly to the sea shortly after emergence. This out-migration occurs between February and June, but most fry leave the streams during April and May (NPFMC 2012).

Shoreline sampling of Knik Arm in 2004 and 2005 yielded few chum salmon juveniles in April, followed by significant increases in May and June (Houghton et al. 2005). Chum salmon were not captured during July in either year sampled. Overall, chum salmon capture numbers were not as high as capture numbers for coho, Chinook, or sockeye salmon. Low numbers of adult chum were caught in beach seine samples during July 2004; no adult chum salmon were captured during August to November beach seine sampling (Houghton et al. 2005).

Habitat in Ship Creek supports chum salmon (Johnson and Litchfield 2016). As with the other salmon species, chum salmon use estuarine habitat during out-migration, return to Knik Arm as adults, and likely use intertidal habitats throughout the Knik Arm during high tidal stages.

## 3.2.2 Forage fish

Forage fish species, including Pacific herring and anadromous longfin smelt and eulachon, are known to occur in Knik Arm. Longfin smelt was the second most abundant species captured during the 2004 sampling events and third most abundant species captured in beach seines during 2005 (Houghton et al. 2005). Few longfin smelt were captured during a spring 1983 sampling event. Relatively low numbers of Pacific herring have been captured from Knik Arm during the 1983 sampling, 2004-2005 surveys, and sampling efforts at Nearshore Fish Atlas sites (Houghton et al. 2005; NOAA 2016).

### 3.2.2.1 Eulachon

Eulachon, also commonly referred to as hooligan, are anadromous fish that spawn in the lower reaches of coastal streams from northern California to the Bering Sea (Bartlett and Ryan 2012). Eulachon reach up to 25 centimeters (about 10 inches) in length (Mecklenberg et al. 2002), weigh 40–60 grams, and are sexually dimorphic. Eulachon are a valuable prey species for humans and wildlife, including beluga whales and other marine mammals, fish, and birds, because of their high lipid content (Bartlett and Ryan 2012).

Adult eulachon migrate to the mouths of spawning streams and gather in large schools typically in April, prior to spawning in May (Bartlett and Ryan 2012). While eulachon return to the same general area to spawn, they do not necessarily spawn in their natal stream. Eulachon broadcast their eggs, which adhere to sand, gravel, or woody debris. Eggs hatch in 3 to 6 weeks and the young are carried to the sea with the current, where they feed mainly on copepod larvae and other plankton (Bartlett and Ryan 2012). Eulachon are believed to leave estuary habitats within their first year of life (Cambria Gorton Ltd. 2006). Juvenile and adult eulachon feed primarily on plankton. After 3 to 6 years at sea, adults return to their spawning grounds.

In 2004 and 2005, 199 eulachon were captured in beach seine sets at stations within the middle and outer Knik Arm and 8 were caught during tow net sampling (KABATA 2006). Several gravid adults were captured in April, but most fish were caught in May as post-spawn fish, indicating a relatively short spawning period within the streams and rivers of Knik Arm. Eulachon spawning in the Susitna River generally peaks in late May. No eulachon were observed in July through November 2004 or 2005 (KABATA 2007). Data suggest that eulachon use habitat in Knik Arm primarily during migration.

## 3.2.3 Groundfish

### 3.2.3.1 Pacific cod

Pacific cod are demersal schooling fish that concentrate in shelf edge (i.e., 0- to 50-meter [0- to 164-foot] depth) and upper slope habitat from January through April. Spawning occurs in these deeper waters in the spring, followed by a general movement to shallower waters (<100 meters [328 feet]) in summer (DiCosimo 2001). Pacific cod prefer mud, sandy mud, muddy sand, or sand in deep waters (Morrow 1980). Pacific cod eggs are found on the inner and middle continental shelf habitat. Larvae are epipelagic (zone where photosynthesis can occur), occurring in the upper 45 meters (148 feet) of the ocean. Juveniles can be found in water between 60 and 150 meters (197 to 492 feet) deep. Pacific cod adults feed on fishes, octopuses, and large benthic and benthopelagic crustaceans (Cohen et al. 1990), while young are expected to feed on copepods and similar organisms (Morrow 1980; KABATA 2006).

Data suggest that the density of Pacific cod is very low in Knik Arm. The Nearshore Fish Atlas of Alaska documents the capture of low numbers of Pacific cod in nearby waters, including six in Eagle River Bay and two near Fire Island (NOAA 2016). No Pacific cod were collected during the 2004 Knik Arm shoreline sampling or during the subsequent year’s shoreline and mid-channel sampling efforts from April through July, or during extensive seine and trawl surveys conducted in Knik Arm in 1983 (Houghton et al. 2005; FHWA and DOT&PF 1983).

#### 3.2.3.2 Walleye pollock

Walleye pollock eggs and larvae are pelagic and are found on the middle and outer continental shelves of the GOA. Juvenile pollock inhabit the inner, middle, and outer continental shelves and oceanographic features such as basins, fronts, and upwelling. Adults are semidemersal (generally demersal but sometimes near the surface). Pollock spawn in waters more than 90 meters (295 feet) deep. Adult walleye pollock congregate where food is concentrated in middle and outer continental shelf areas, feeding on a variety of fishes and crustaceans, but primarily on krill (NPFMC 2016; KABATA 2006).

Only 28 walleye pollock were collected during the 2-year sampling effort of Knik Arm (Houghton et al. 2005). Three were caught in beach seine sampling conducted in April through July 2005, and tow nets captured 25 walleye pollock in July (Houghton et al. 2005). Shoreline sampling of Knik Arm during July through November 2004 and mid-channel sampling in April to July 2005 produced no walleye pollock (KABATA 2006). Walleye pollock were not reported as having been captured during trawl and beach seine sampling conducted throughout Knik Arm in 1983 (FHWA and DOT&PF 1983). Moulton (1997) reports the capture of walleye pollock in Upper Cook Inlet during two net surveys in 1993, including near Fire Island. These data suggest that the density of this species is quite low in Knik Arm. Walleye pollock captures in Knik Arm are not identified by the Nearshore Fish Atlas of Alaska (NOAA 2016).

#### 3.2.3.3 Sculpin

The sculpin family includes numerous species that have successfully adapted to a wide range of salinities and environments. Cottids are found in freshwater as well as in marine and estuarine areas of high and low salinity. Cottids, which are generally small (10–15 centimeters [4–6 inches], but up to 100 centimeters [about 39 inches]) bottom-dwelling fishes, are known to use a wide range of substrates, including rock, sand, mud, cobble, gravel, and sandy mud (NPFMC 2016).

Pacific staghorn sculpin was the only cottid species collected during the 2-year sampling in Knik Arm (KABATA 2006). A total of three Pacific staghorn were captured. The three Pacific staghorn sculpin were captured during the April–July 2005 beach seine sampling near the Port MacKenzie area. Low capture numbers suggest a low species density in Knik Arm. The low density of this species in Knik Arm is also supported by sampling conducted during 1983, wherein only 3 of the 5,455 fish caught by beach seine were Pacific staghorn sculpin, the only sculpin species collected (FHWA and DOT&PF 1983).

Pacific staghorn sculpin spawn in shallow coastal waters during October through March, with a peak in January and February (Jones 1962 as cited in KABATA 2006). Larvae of this species are planktonic, and juveniles and later stages are demersal. Pacific staghorn sculpins become sexually mature near the end of their first year of life, at which time they leave the shallow spawning ground to inhabit deep offshore waters (Tasto 1975 as cited in KABATA 2006). Pacific staghorn sculpin are opportunistic feeders, consuming a wide variety of prey items, including crabs, shrimp, worms, mollusks, and many kinds of juvenile and adult fishes (KABATA 2006). The Nearshore Atlas of Alaska identifies the capture of one great sculpin (*Myoxocephalus polyacanthocephalus*) near Fire Island (NOAA 2016).

# 4 Analysis of Effects to EFH

This section presents an analysis of effects the proposed action may have on EFH and managed fish species. An adverse effect refers to any impact that reduces quality or quantity of EFH, and may include direct (e.g., habitat loss or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 Code of Federal Regulations [CFR] § 600.810).

## 4.1 Direct and Indirect Effects

Impacts to FMP-managed fish species and EFH from activities proposed by the PCT Project in 2018 may include:

- Fish injury or mortality during dredging and disposal
- Disruption in fish behavior or movement during dredging and disposal
- Reduction in habitat quality and/or modification of habitat function dredging and disposal
- Increased turbidity during dredging and disposal
- Re-suspension and distribution of contaminants, if present
- Physical alteration of habitat during and after dredging and disposal
- Changes in hydrologic patterns after dredging and disposal

Direct and indirect effects associated with the proposed 2018 Workplan project components are summarized in the subsections that follow. **Section 5** presents a summary of conservation measures and **Section 6** summarizes potential impacts of the 2018 Workplan to EFH.

### 4.1.1 Transitional Dredging and Disposal

#### 4.1.1.1 Temporary Impacts

Transitional dredging and the offshore disposal of the excavated material are the primary activities that may affect EFH. Dredging and disposal activities will cause a temporary and localized increase in turbidity, which may adversely affect EFH and fish that occupy affected habitat during such activities. Increased turbidity has the potential to temporarily decrease habitat quality, modify habitat function, and under some circumstances may harm fish and/or alter behavior.

An estimated **680,000 cubic yards (cy)** of excavated material will be disposed of at the existing Anchorage Harbor Open Water Disposal Site, which is regularly used to dispose material dredged from **Area A (see Attachment 1**). Such disposal typically occurs in 1,500 cy increments and is not limited by tidal stage. Existing disposal volumes vary from year to year but annual dredge quantities have ranged from about 620,000 to 1.8 million cy since 2005 (USACE 2017). Due to the naturally high suspended sediment load and similarity of dredged material to that of the natural sediment load, mixing zones are not necessary (USACE 2008). Monitoring has determined that previous dredging and disposal activities create localized increases in sediment concentrations and turbidity and slightly lower dissolved oxygen concentrations within several hundred feet downstream of the dredging and disposal activity (USACE 2008).

Impacts from disposal of the estimated **680,000 cy** of material excavated for the PCT project will likely be similar to those described above, resulting in localized increases in turbidity. Dumping this material, has the potential to harm or kill individual fish and other organisms within the water column. However, the activity would not be anticipated to adversely affect species at the population level. Knik Arm is a highly turbid ecosystem with naturally high and variable suspended sediment concentrations subject to strong tidal forces. Pacific salmon and several other fish species have adapted to the naturally high levels of turbidity found in Knik Arm. Literature suggests that potential effects of activities that temporarily increase sediment loads in naturally turbid systems, such as Knik Arm where strong tides continually shift, suspend, and deposit, and re-suspend large volumes of sediment, likely have less impact to fish than in clearwater systems. The increase in turbidity would temporarily decrease habitat quality and may temporarily eliminate or reduce the availability of clearer-water microhabitats that appear to be especially important for juvenile salmon. Material that will be dredged is not anticipated to be contaminated, so the potential for contaminants to be released as part of this action is low.

Transitional dredging will occur in an area that has been part of a working port for more than 50 years. Dredging and other industrial activities are typical for the area. Sound levels from transitional dredging and disposal are much lower than from other industrial activities (e.g. pile installation) (Dickerson et al. 2001, NMFS 2017) and are not anticipated to approach levels that cause harm to fish.

Based on species life histories, habitat preferences, and fish sampling results throughout Knik Arm, the 2018 transitional dredging and material disposal will temporarily alter or eliminate EFH that supports Pacific salmon and eulachon. The 2018 work may therefore have a temporary and localized adverse effect on these species during the proposed in-water activities. However, temporary increases in turbidity from the 2018 work are not anticipated to cause substantial adverse effects to EFH or stocks of managed species.

#### 4.1.1.2 Permanent Impacts

Excavating and regrading the existing nearshore environment will physically alter the characteristics of available EFH. Post-project conditions are anticipated to remain suitable to support juvenile salmon, migrating eulachon, and adult salmon[12]. While alteration of the physical habitat may affect some habitat function the project will not result in a blockage to juvenile or adult fish migration after dredging, regrading, and material disposal is complete. Potential changes in hydrologic patterns from the proposed 2018 work is not anticipated to substantially affect EFH or FMP-managed species.

### 4.1.2 Test Pile Removal

Three existing test piles will be cut off below the mudline at a depth of approximately -55 feet MLLW. The sediment removed from the inside each pile, prior to cutting and removing the pile, will cause a temporary increase as it is discharged into surrounding waters. Impacts from pile removal on EFH and managed species are anticipated to be minor and temporary in nature. Noise associated with underwater pile cutting is expected to be similar to noise from other machinery used for in-water construction. Noise impacts to EFH from pile cutting are expected to be negligible, especially when considered against the existing high ambient sound levels in this area.

## 4.2 Cumulative Effects

Cumulative effects are impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR § 1508.7). Cumulative effects can result from several individually minor impacts, which may be collectively substantial over time. An analysis of cumulative effects is intended in a generic sense to examine actions occurring within a watershed or marine ecosystem that adversely affect the ecological structure or function of EFH.

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[12] Adult salmon migrate along nearshore habitat to spawning streams from May through September. Data suggest that eulachon likely use habitat in Knik Arm primarily during migration, typically from April through June (KABATA 2006).

The Port is located within an industrialized area that experiences effects from dredging, commercial shipping, and other industrialized uses. Past development throughout Knik Arm has adversely affected the quality and quantity of available EFH. Hundreds of acres of marine and intertidal fill and wetlands have been filled and eliminated due to industrial development (Balsiger 2004). Past and current projects in proximity to the Port include dredging and fill associated with the Port, businesses adjacent to the Port, the Alaska Railroad on either side of Ship Creek north of the Port, and infrastructure associated with Port MacKenzie across Knik Arm (Balsiger 2004).

Reasonably foreseeable future actions include the 2019 components of the PCT Project and other future plans associated with the PAMP. While the future projects are not part of the PCT Project, the projects are proposed under Phase 1 of the PAMP. Potential impacts to EFH from the 2019 components of the PCT Project and three other projects proposed under Phase 1 include:

- *SBS Project (Phase 1).* The Port received DA permit authorization in January 2017 to construct the SBS Project; construction is anticipated to occur in 2018. The SBS Project would place fill across approximately 3.7 acres of EFH, which spans approximately 1,500 feet of shoreline in Knik Arm. The SBS Project would result in an additional 4.6 acres of armored shoreline (3.7 acres of which is EFH).
- *PCT Project (2019 Workplan).* The Port will install the PCT main platform and trestle, the emergency platform and trestle, and relocate the South Floating Dock in 2019. As described in Attachment 1, the Port anticipates installing up to 247 support piles, constructing overwater structures, and placing fill below the mean high water elevation, activities that may affect federally managed fish species and EFH. Impact hammer installation of 36-inch- and 48-inch-diameter piles is expected to produce underwater sound pressure waves that may displace, harm, or kill fish in Knik Arm. Sound pressure levels produced by impact hammers also have the potential to alter the migration path of adult salmon. Fish within proximity to impact hammer operation may be affected. The PCT Project therefore has the potential to adversely affect FMP-managed juvenile and adult Pacific salmon and temporarily affect habitat quality during impact hammer operations. An EFH assessment that will evaluate impacts to EFH specific to the 2019 workplan will be completed in 2018.
- *North Extension Stabilization (NES)-Step 1 Project (Phase 1).* The Port submitted a DA application for this proposed project in 2016, however, the project was put on indefinite hold in 2017. If constructed, NES-Step 1 would result in a temporary increase in turbidity during excavation and offshore disposal of Anchorage Port Intermodal Expansion Program fill material, removal of the Open Cell Sheet Piles, stabilization of the new bulkhead, and the placement of class IV riprap as armor rock. This project would physically alter the characteristics and quantity of available EFH as it reconfigures the shoreline, resulting in a slight increase in the amount of EFH available.
- *Future dredging in the Transitional Dredging Area.* USACE Civil Works will conduct annual maintenance dredging within the PCT’s transitional dredging area (with the exception of the foreslope area which will no longer be accessible) in future years. Dredged material will be disposed of within the USACE Anchorage Harbor Project Disposal Site. Increased turbidity from maintenance dredging and disposal has the potential to adversely affect EFH and managed species. While individual fish may be harmed or killed during operations, dredging and disposal activities are not anticipated to pose harm to fish at the population level.

Other future PAMP projects during Phase 2 and beyond would involve replacing additional pile-supported infrastructure and further stabilizing the North Extension area. Pile driving associated with future PAMP development, if authorized, will have temporary adverse impacts to EFH and managed fish species in proximity to impact hammer driving, similar to impacts anticipated for the 2019 pile installation for the PCT Project (which will be evaluated in a separate EFH Assessment). The applicant will work with resource agencies during the permitting process to offset unavoidable impacts. The applicant will prepare project-specific EFH Assessments for other PAMP construction activities once design for each project has advanced to a level that allows for site-specific impact assessment.

The PCT Project 2018 Workplan would result in temporary, localized impacts to EFH and managed fish species during construction and would contribute to cumulative impacts from other activities in upper Cook Inlet. Impacts to EFH are not anticipated to be substantial[13] or adversely affect FMP-managed fish species at the population level.

# 5 Proposed Conservation Measures

The following conservation and mitigation measures to avoid and minimize unavoidable impacts to EFH during construction of the 2018 components of the PCT have been incorporated into the project design:

- Standard spill-prevention measures will be implemented during construction; spill cleanup equipment (e.g., oil-absorbent pads) will be available on-site during construction.
- A Storm Water Pollution Prevention Plan will be prepared and adhered to during this project. Best management practices will be used during construction to prevent avoidable impacts to aquatic habitats.

# 6 Conclusion

Estuarine and marine waters in the vicinity of the Port are identified as EFH for Chinook, chum, coho, sockeye, and pink salmon. Eulachon and low numbers of Pacific cod, walleye pollock, and Pacific herring; and longfin smelt and Pacific staghorn have also been captured in upper Cook Inlet. Migrating eulachon occur in Knik Arm between April and June. While these species are managed by the FMP for groundfish of the GOA, waters in the vicinity of the Port are not identified as EFH for these species.

The 2018 transitional dredging and disposal of dredged material proposed for the 2018 PCT Workplan will result in the modification of habitat in Knik Arm, which is considered EFH for managed fish species. Dredging and disposal activities, and pile removal will cause a temporary and localized increase in turbidity, which may adversely affect EFH and fish that occupy affected habitat during such activities. Increased turbidity has the potential to temporarily decrease habitat quality, have localized impacts to habitat function, and under some circumstances may harm fish and/or alter behavior.

While the Project will have temporary adverse effects to marine EFH and managed fish species, impacts are anticipated to be localized and relatively minor. The Project is not anticipated to result in substantial adverse impacts to marine EFH or managed stocks. Post-project conditions are anticipated to remain suitable to support juvenile salmon, migrating eulachon, and migrating adult salmon, as well as other managed fish species.

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[13] Substantial adverse effects are those that may pose a relatively serious threat to EFH and typically could not be alleviated through minor modifications to the proposed action (NMFS 2004).

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