CRITICAL PLANNING, SITE, AND DESIGN CONSIDERATIONS FOR DELIVERING OPC FRC HOMEPORT FOR USCG AT BASE KODIAK

Critical Planning, Site, and Design Considerations for Delivering OPC FRC Homeport for USCG at Base Kodiak

February 27, 2025

David Street, MSc, PE

Agenda

1. Safety Moment
2. Speaker Introduction
3. WSP and Maritime
4. WSP in Alaska
5. The USCG Base Kodiak
6. Project Needs – FRC/OPC Homeporting
7. Planning
8. Project Participants/ Stakeholders
9. Design-Build Project Delivery
10. Project Scope Elements
11. Site Conditions – Environmental
12. Site Conditions – Geotechnical
13. Site Conditions – Seismicity
14. Site Conditions – Permitting
15. Design Challenges
16. Project Schedule and Status
17. Closure

Safety Moment – Work in Oil Terminals

- Training and orientation program
- Correct gear with due consideration for flammables
- Follow all signs, rules and regulations
- Do not circumvent protocols
- Be escorted with client representative
- Stay away if you do not know
- Assess before you act
- Truthful reporting and lessons learnt

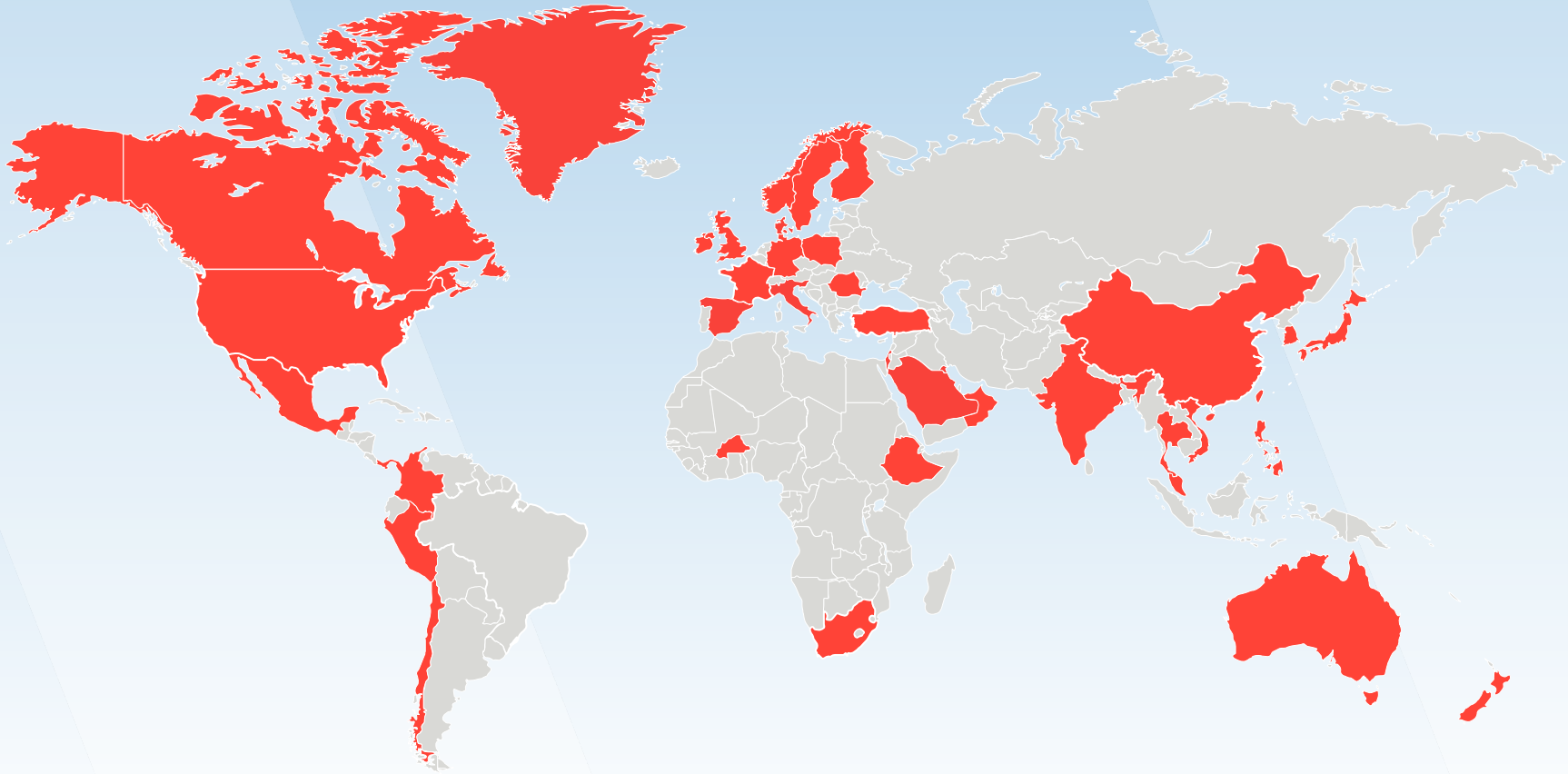
WSP

50
years of experience in Alaska

80
years serving federal market

22,500+
employees in the US

75,000
employees globally



WSP Maritime

Services

LEGEND

1. Berths
2. Breakwaters
3. Dredging
4. Buildings
5. Cruise and Ferry Facilities
6. Intermodal Yards
7. Marinas
8. Military Facilities
9. Offshore Platforms
10. Offshore Wind
11. Roads
12. Shipyards
13. Backlands
14. Wharves, Quays & Jetties
15. Subsea Cables
16. Subsea Pipelines

WSP Maritime

ENR #1 globally (2024) in ports and maritime design.

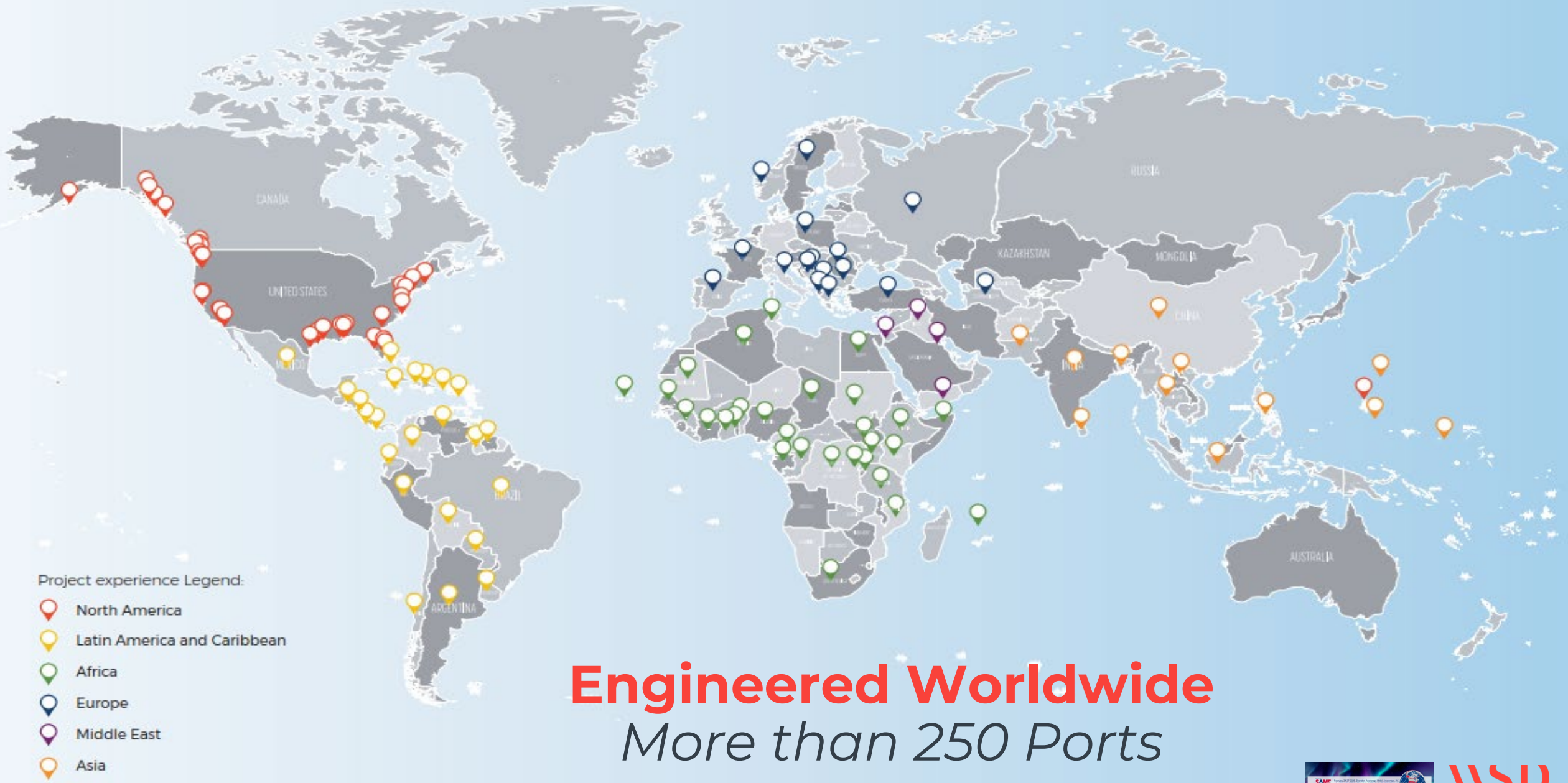
100+ US-based maritime staff and largest revenue generator amongst all WSP global maritime regions.

US$500 million US Navy SIOP, USCG, USACE, Public Ports, Private Terminals, Design-Build

Specialties

- Marine Structural/ Geotechnical Engineering
- Terminal Planning
- Regulatory Permitting
- New Terminal Construction
- Rehabilitation and Repurposing Design
- Above and Underwater Inspections
- Coastal Engineering
- Asset Management Systems
- Clean Fuels Experience
- Resiliency and Serviceability
- Alternate Project Delivery

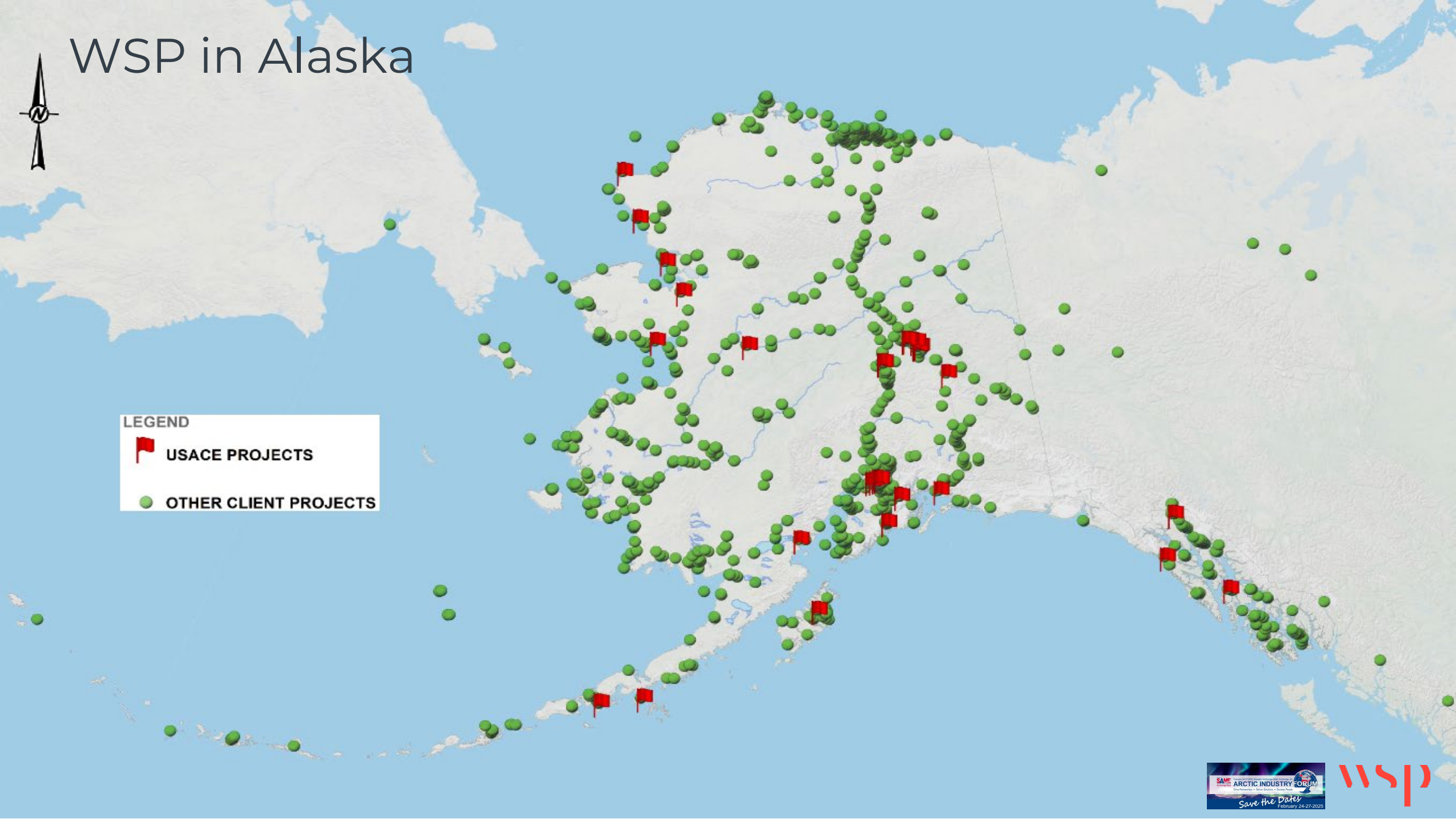
Global Maritime Experience



Engineered Worldwide

More than 250 Ports

WSP in Alaska



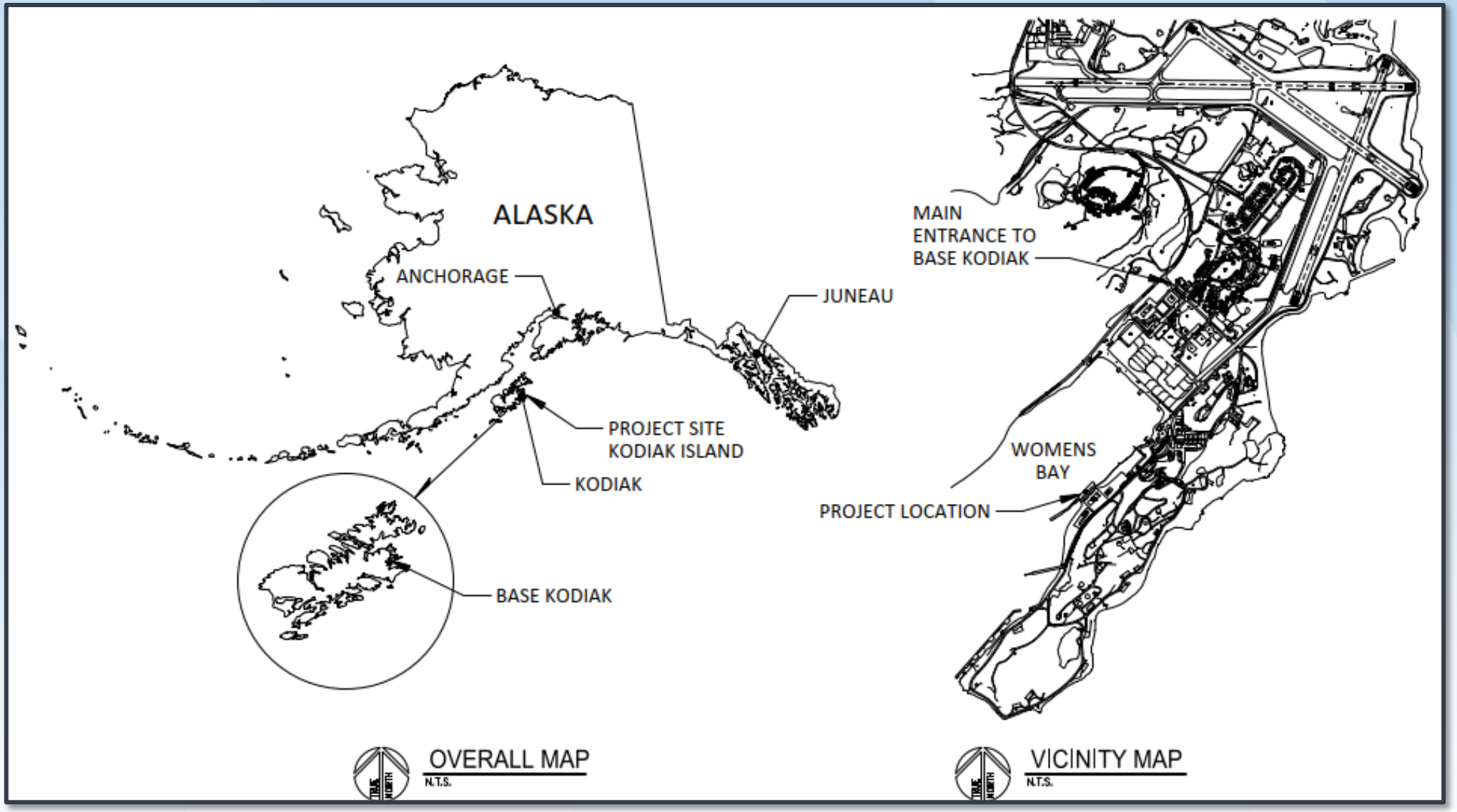
WSP Maritime History in Alaska

- **Port of Alaska Terminal 1 Replacement at Anchorage**
- **Port of Alaska North Extension Stabilization Step 1 Design-Build**
- **USCG Base Kodiak FRC/OPC Homeport Improvements**
- **Kodiak Ferry Terminal Seismic Consulting and Precast Member Design**
- **Juneau Cruise Berth Pontoon Design/Build**
- **Icy Strait Point Cruise Berth Development at Hoonah**
- **Valdez Container Terminal**
- **Gildersleeve Floating School**
- Carl E. Moses Floating Breakwater Mooring Anchorage Design
- Valdez Floating Dock Conveyor System Installation
- Floating LNG Terminal Skagway
- Haines Ferry Terminal Floating End Berth
- Hyder Harbor CIP Trestle Caps
- Borough of Juneau Transportation Plan
- Knik Arm Ferry Terminal Feasibility Study
- CB&I LNG Tank Technology Evaluation
- Cook Inlet Mooring Line Failure Analysis
- Nenana River Bridge Reactivation
- AKDOT&PF Bridge and Pier Condition Assessments On-Call
- Cordova Cannery Emergency Dock Stabilization
- Ketchikan-Revilla Airport Shuttle Ferry Pontoons and Mooring Structures
- Skagway Ferry Terminal Modifications
- USCG Juneau Wharf Piling Inspection
- Whittier Dolphin Seat Capacity Evaluation
- Matson Facility Port of Alaska Facility Planning

WSP Maritime History in Alaska

WSP Maritime History in Alaska

The USCG Base Kodiak – Location and Vicinity Map



The USCG Base Kodiak – Location and Vicinity Map

The USCG Base Kodiak – Importance and History

Major shore installation of the United States Coast Guard District 17

Homeport to Several Cutters (Commissioned Vessels, USCGC) – Alex Haley, Douglas Munro and Cypress

Only place to receive JP-5 aviation fuel

Critical tactical and logistics facility

Base began operations as US Navy Naval Air Station Kodiak on 15 June 1941

Commissioned as an Air Detachment on 17 April 1947.

National Historic Landmark in 1985

27,000 acres

Supports 1,000 personnel

The USCG Base Kodiak – Marine/Waterfront Facilities

Project Needs – FRC/OPC Homeporting

- **Existing cutters at end of life, need upgraded replacement.**
- **Increased mission demands in District 17 and neighboring geographies.**
- **Support Fast Response Cutters (FRCs) and Offshore Patrol Cutters (OPCs).**

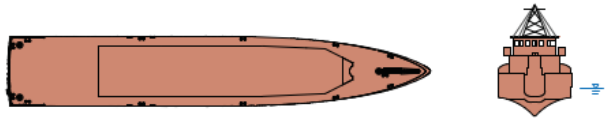
- **Base Kodiak only location for successful and cost-effective homeporting.**
- **Homeport 2 FRCs and 2 OPCs.**
- **Temporary homeport and maintenance for 3rd FRC based in Seward.**
- **Critical maritime, upland, utility improvements necessary.**

Project Needs – FRC/OPC Homeporting

OPC/FRC and Other USCG Vessels

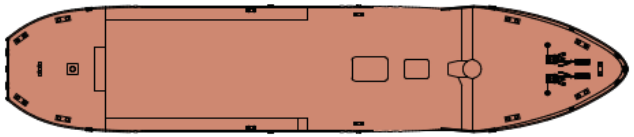
DESIGN VESSELS: THE FOLLOWING DESIGN VESSELS HAVE BEEN IDENTIFIED FOR THE PROJECT:

UNITED STATES COAST GUARD VESSEL NAME	OVERALL LENGTH	BEAM	MAX DRAFT	DISPLACEMENT	BERTHING VELOCITY	DESIGN BERTHING ENERGY
COAST GUARD FAST RESPONSE CUTTER (FRC)	152 FT	26 FT	10 FT	353 TONS	1.00 FT/SEC	56 KIP-FT
COAST GUARD OFFSHORE PATROL CUTTER (OPC)	359 FT	53 FT	18 FT	4,655 TONS	0.74 FT/SEC	315 KIP-FT
COAST GUARD NATIONAL SECURITY CUTTER (NSC)	421 FT	54 FT	15 FT	4,500 TONS	0.75 FT/SEC	363 KIP-FT
ALEX HALEY MEDIUM ENDURANCE CUTTER (WMEC-39)	282 FT	50 FT	15 FT	2,592 TONS	0.41 FT/SEC	29 KIP-FT
COAST GUARD SEA GOING BUOY TENDER (WLB)	225 FT	47 FT	13 FT	2,000 TONS	0.41 FT/SEC	22 KIP-FT

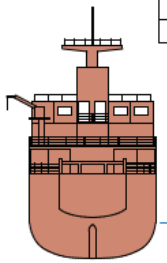


F1 VESSEL - FRC

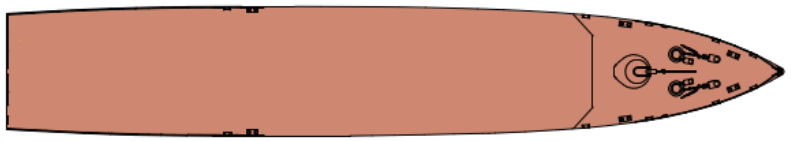
F3 VESSEL - FRC SECTION



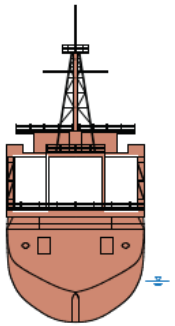
E1 VESSEL - WLB



E5 VESSEL - WLB SECTION

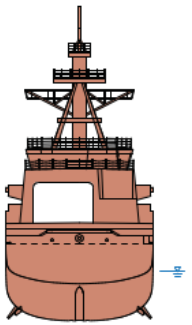


D1 VESSEL - WMEC

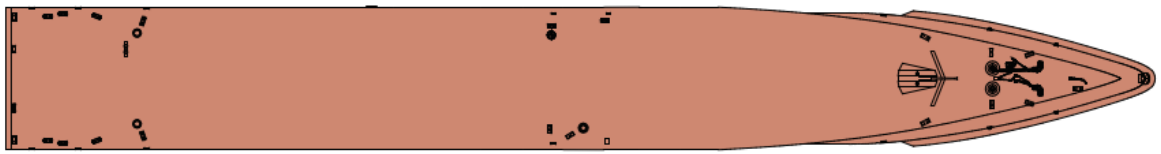


D7 VESSEL WMEC - SECTION

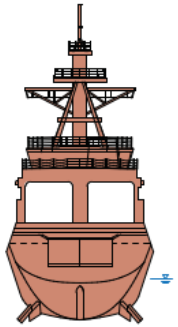
B1 VESSEL - OPC



B8 VESSEL - OPC SECTION



A1 VESSEL - NSC



A9 VESSEL - NSC SECTION

OPC Waterside Requirements

Water depth at mooring (mean lower low water [MLLW]): 23 ft (7 m)

Channel depth (MLLW): 27 ft (8.2 m)

Pier services, including cable TV/satellite (CATV), telephone, Local Area Network (LAN), and refuse approval

Mooring length: 460 ft (140.2 m; representing 360 ft [109.7 m] plus a 50 ft (15.2 m) clearance at each end of the OPCs)

Pier utilities, including electrical (2,000 amperes [amp]), potable water (6,300 gallons per day [gdp]), and sewage (150 gallons per minute [gpm] per berth).

FRC Waterside Requirements

Water depth at mooring (MLLW): 14 ft (4.3 m)

Channel depth (MLLW): 17 ft (5.2 m)

Pier services including CATV, telephone, LAN, and refuse removal

Mooring length: 194 ft (59.1 m; representing 154 ft [46.9 m] plus a 20 ft [6.1 m] clearance at each end of the FRCs)

Pier utilities, including electrical (236 amp per berth), potable water (1,100 gpd), and sewage (1,500 gpd per berth at 150 gpm)

Planning

OPC and FRC Homeport Feasibility Study

- Explore USCG-Owned or leased areas for viable homeport alternatives
- Minimize impacts to homeported occupants
- Facility condition and project execution
- Capital costs and schedules
- Maximize existing logistics and support amenities
- Meet FRC requirements
- Meet OPC requirements

Stakeholder Criteria

- Operations
- Shore Infrastructure Capacity
- Economics
- Environmental Impacts

Planning Outcome – Base Kodiak – Only Viable Option

Project Participants

Owner - US Coast Guard

Owner's Engineer - WSP USA Inc. (WSP)

Owner's Geotechnical Engineer - Shannon and Wilson (S&W)

Environmental Assessments - Weston Solutions

Phase 2 OPC/FRC Improvements Design-Builder - Gilbane + TNT Constructo

Design-Build Vs. Design-Bid-Build

PROS

Design-Bid-Build
- More control for owner
- Design changes easily accommodated
- Design completed prior to construction
- Easily understood

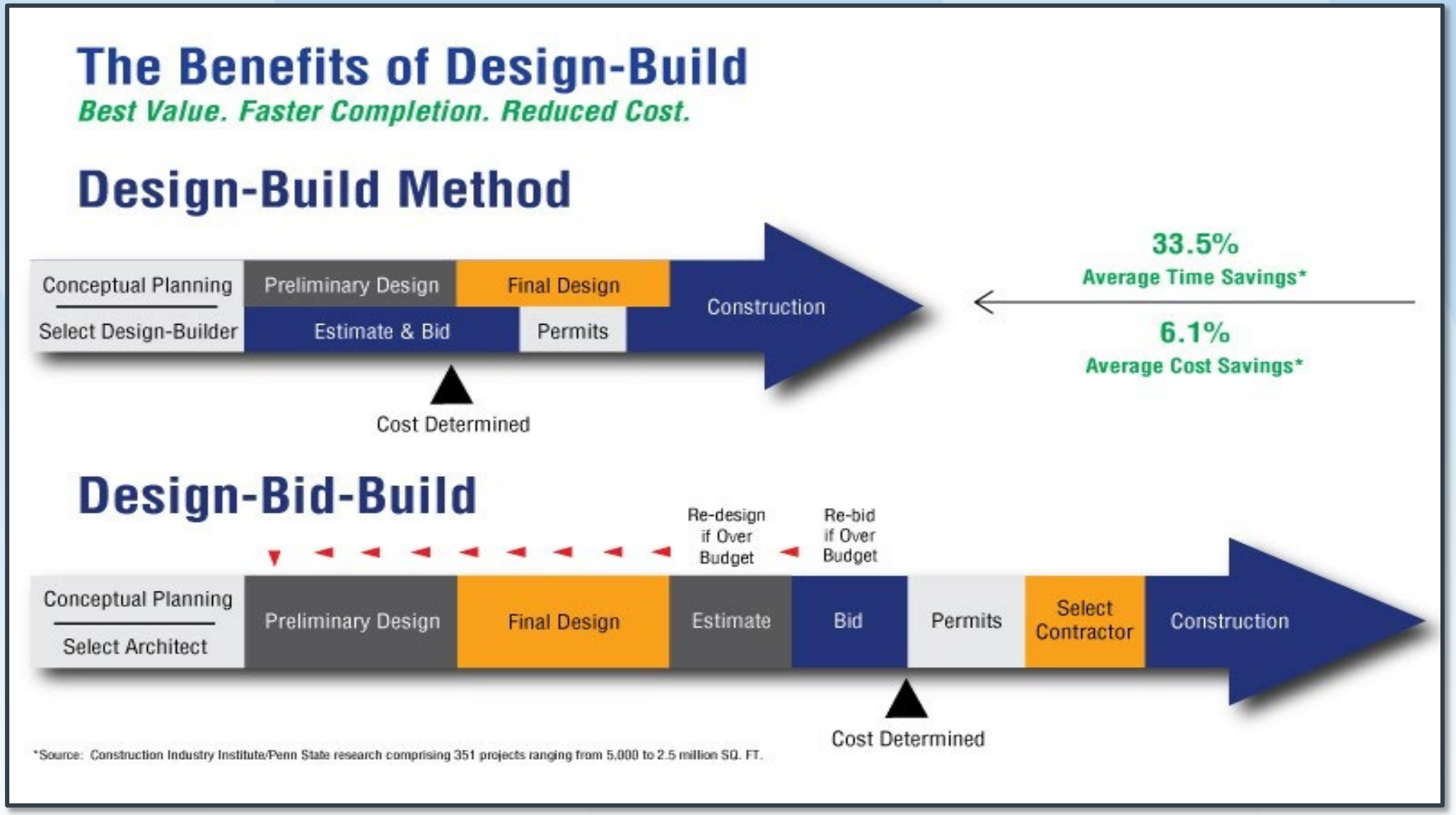
Design-Build
- Single entity for design and construction
- Potential cost savings
- Less risk for the owner
- Schedule savings

CONS

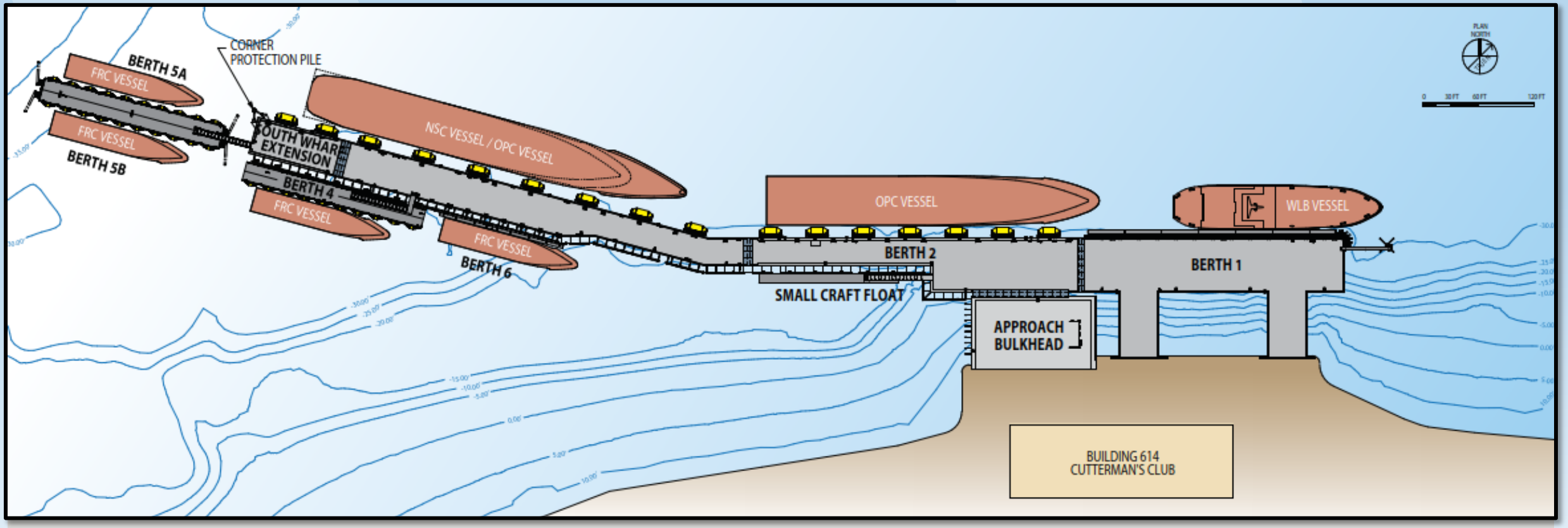
Design-Bid-Build
- Requires owner resources
- Owner at risk for design errors
- Design and construction are sequential
- Construction cost not final till award
- No contractor input into design
- May require redesign

Design-Build
- Restricted resources by regulations
- No party explicitly responsible for representing the owner's interests
- Owners have minimal control over the design and construction quality
- Cost is the driver, quality may be issue

Design-Build Vs. Design-Bid-Build

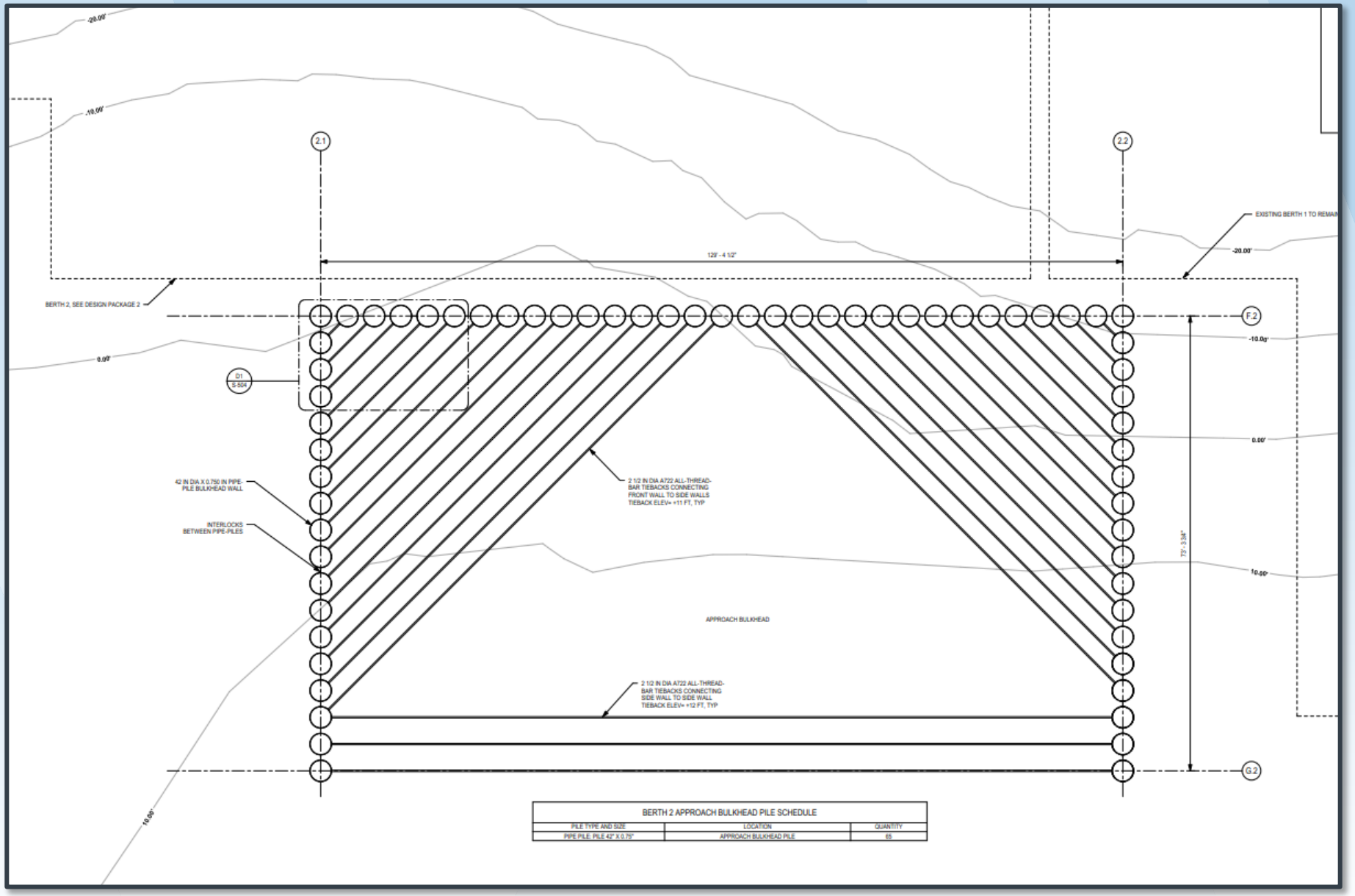


Project Scope Elements

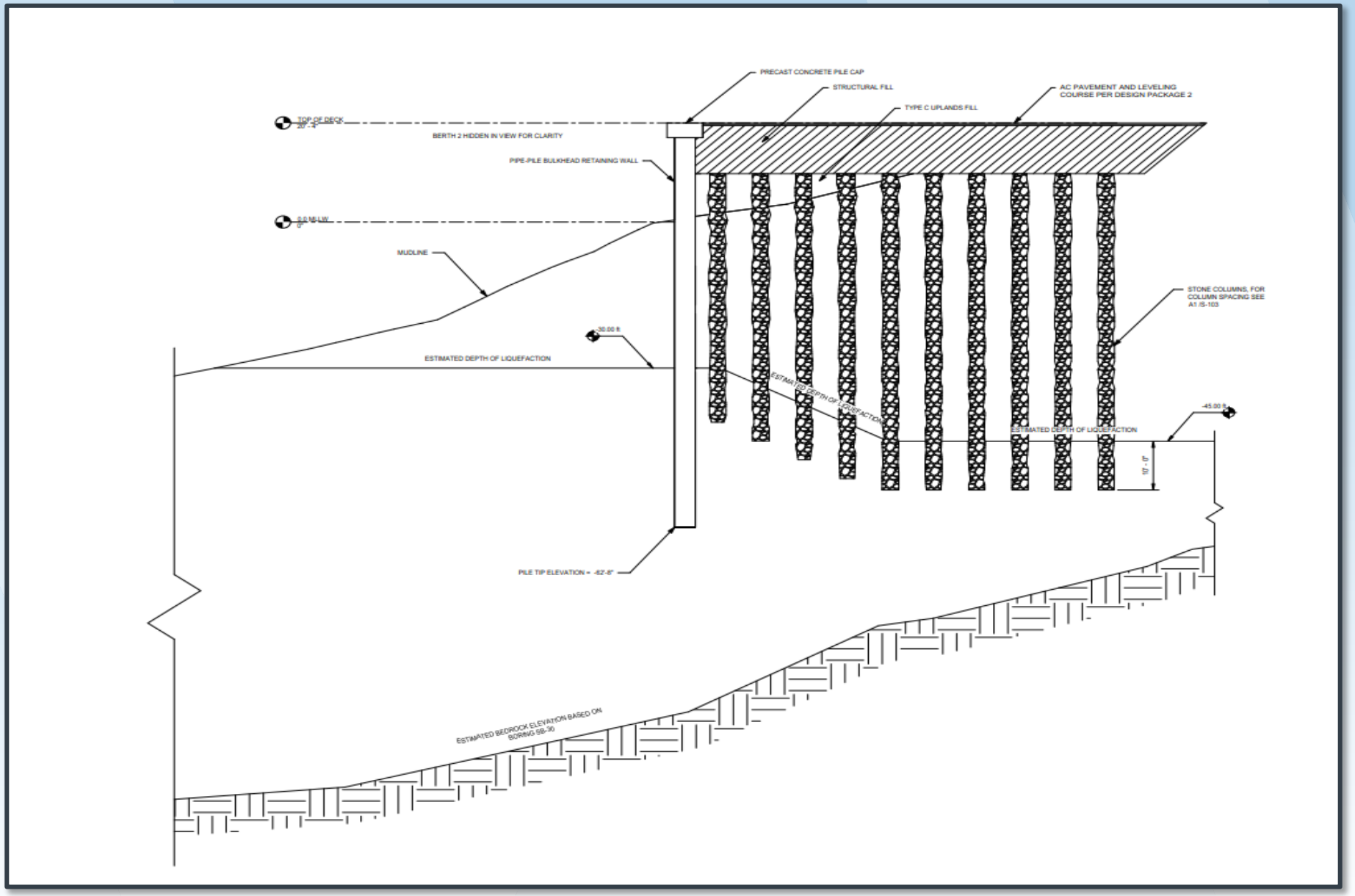


- Demolition, Berth 1 Utility Upgrades, Berth 2 Reconstruction (Including Approach Bulkhead), Berth 3 Fender Upgrade
- Option 2 – South Wharf Extension + Floating Dock Berths 5A/5B
- Option 3 – Floating Dock Berth 4
- Option 4 – Camel Log System at Berth 6

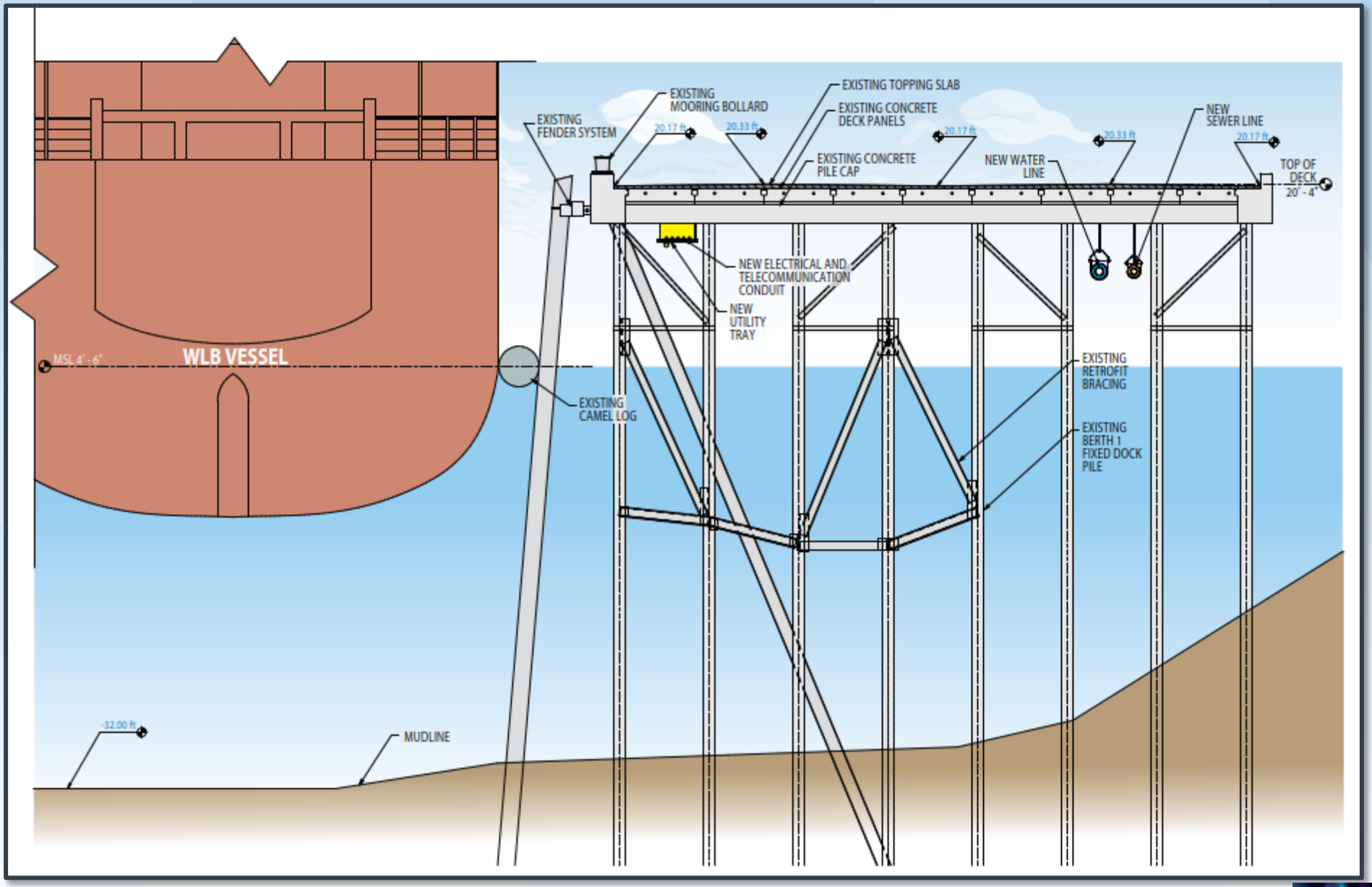
Approach Bulkhead



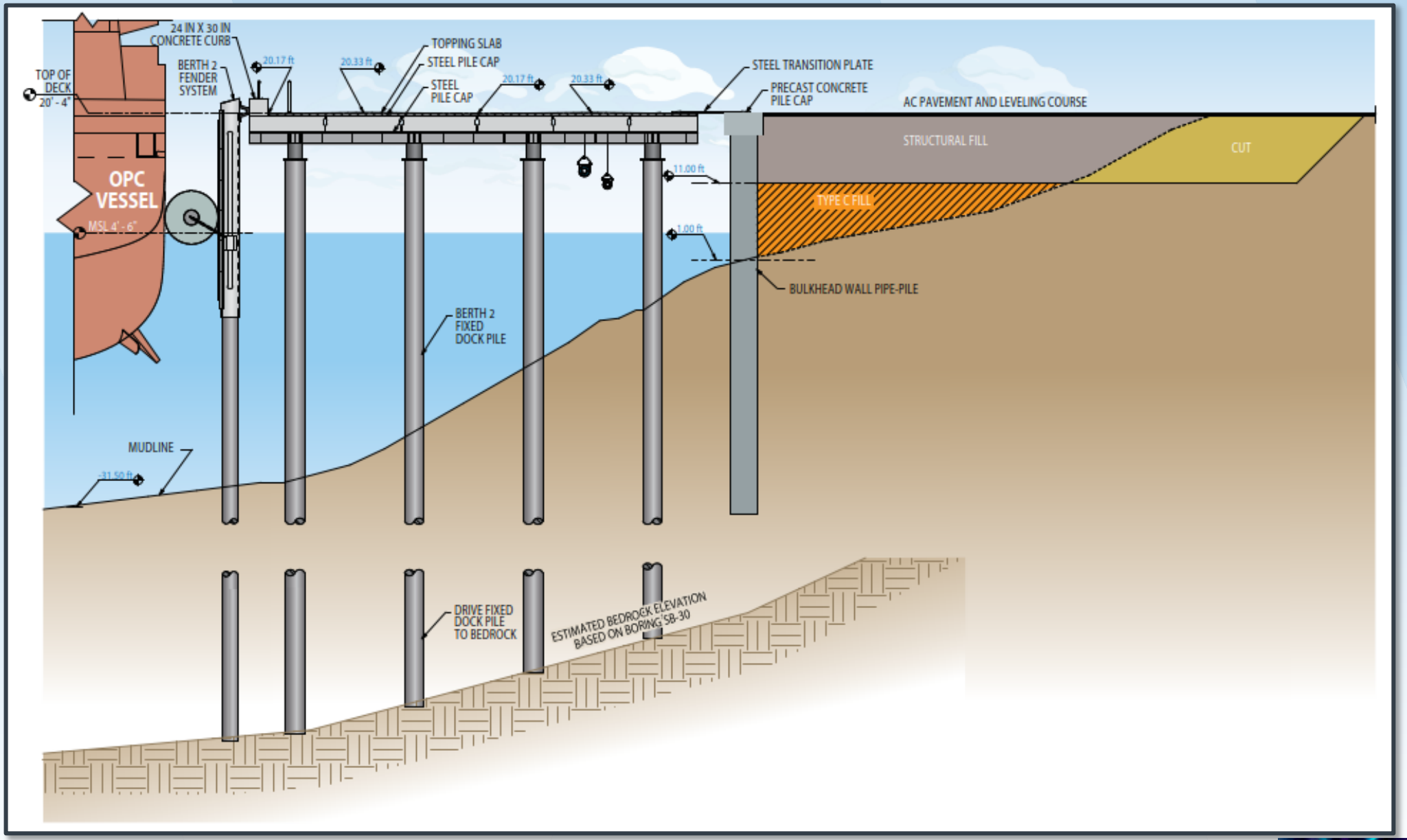
Approach Bulkhead



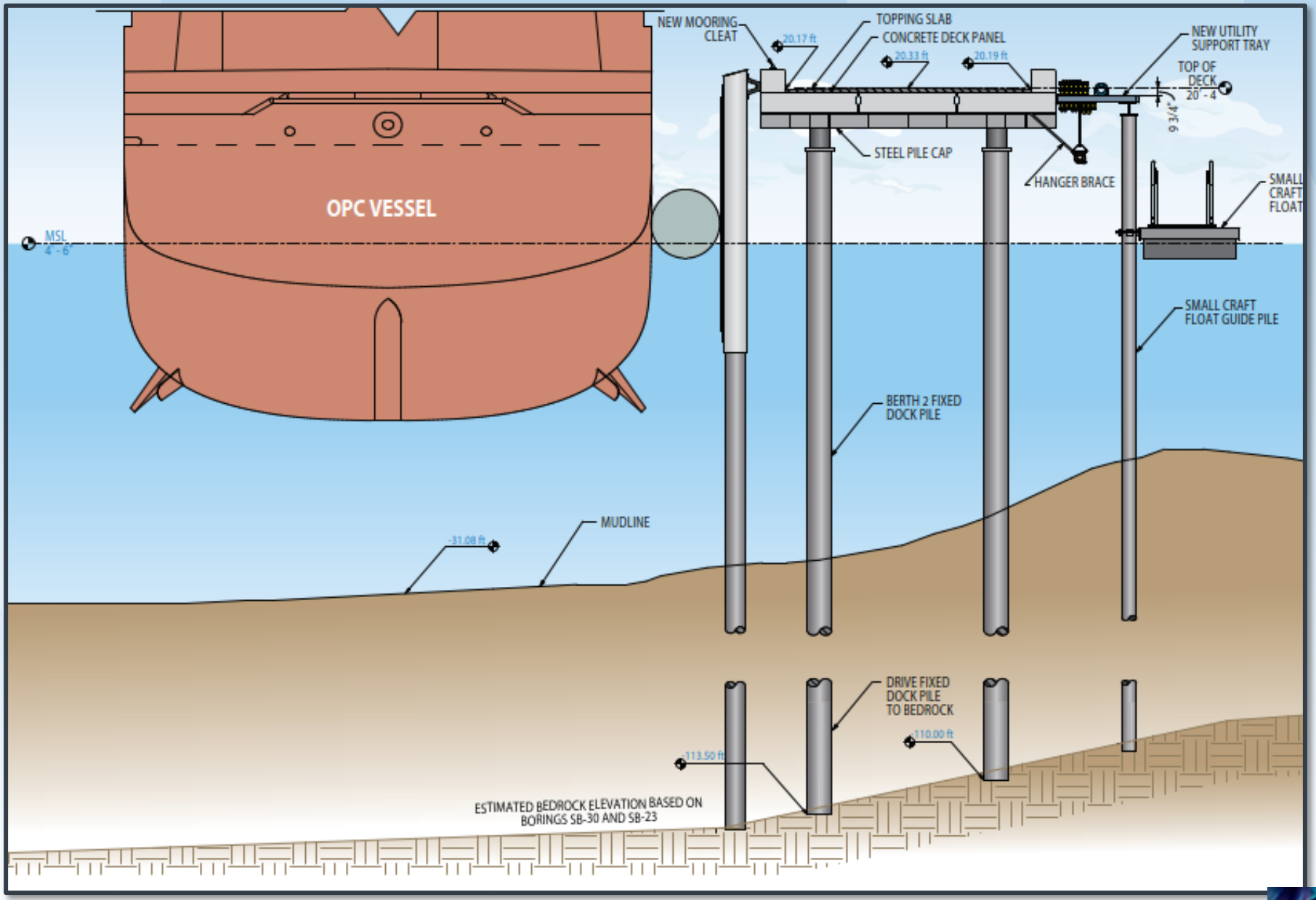
Berth 1 Utility Upgrades



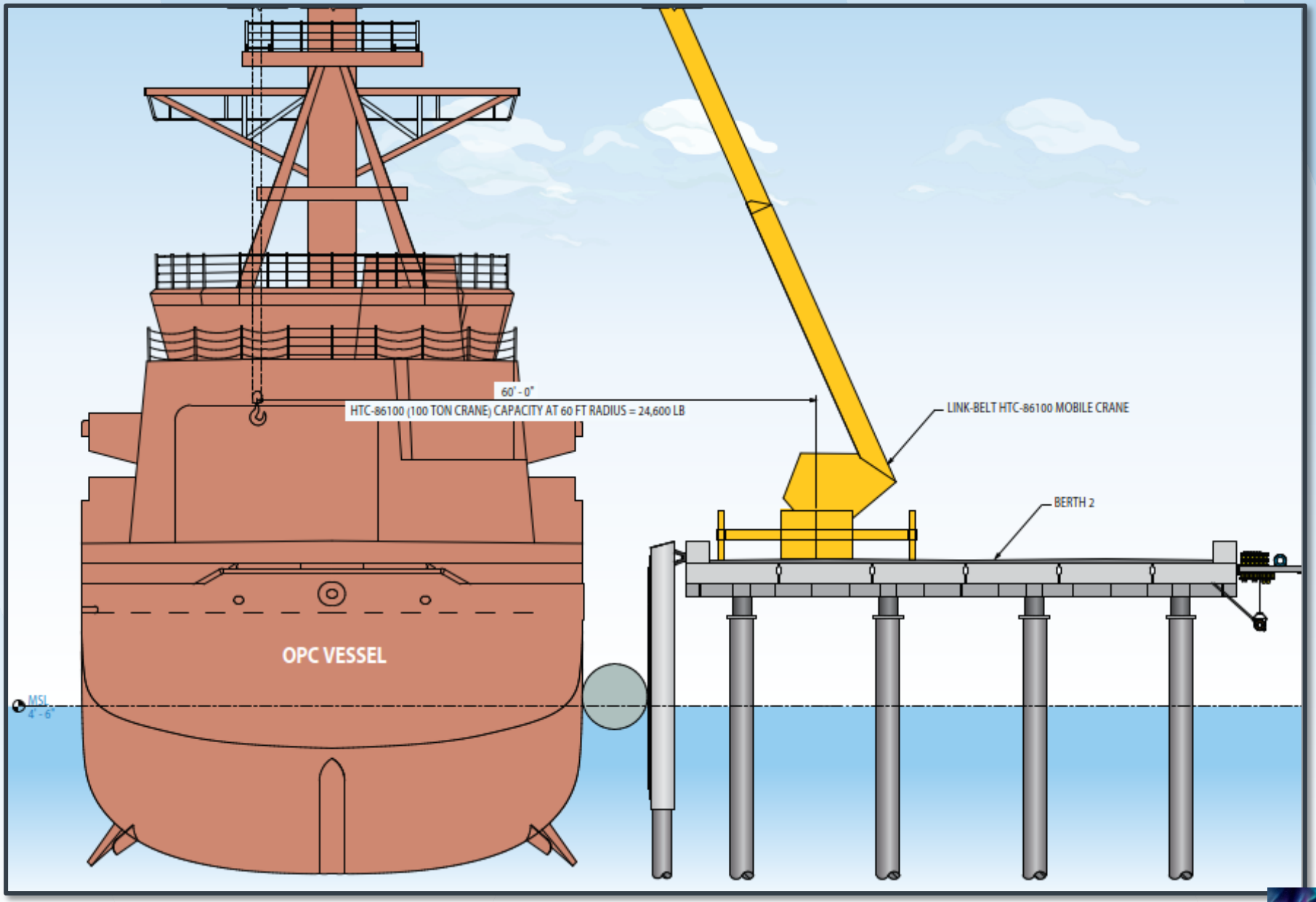
Berth 2 @ Bulkhead



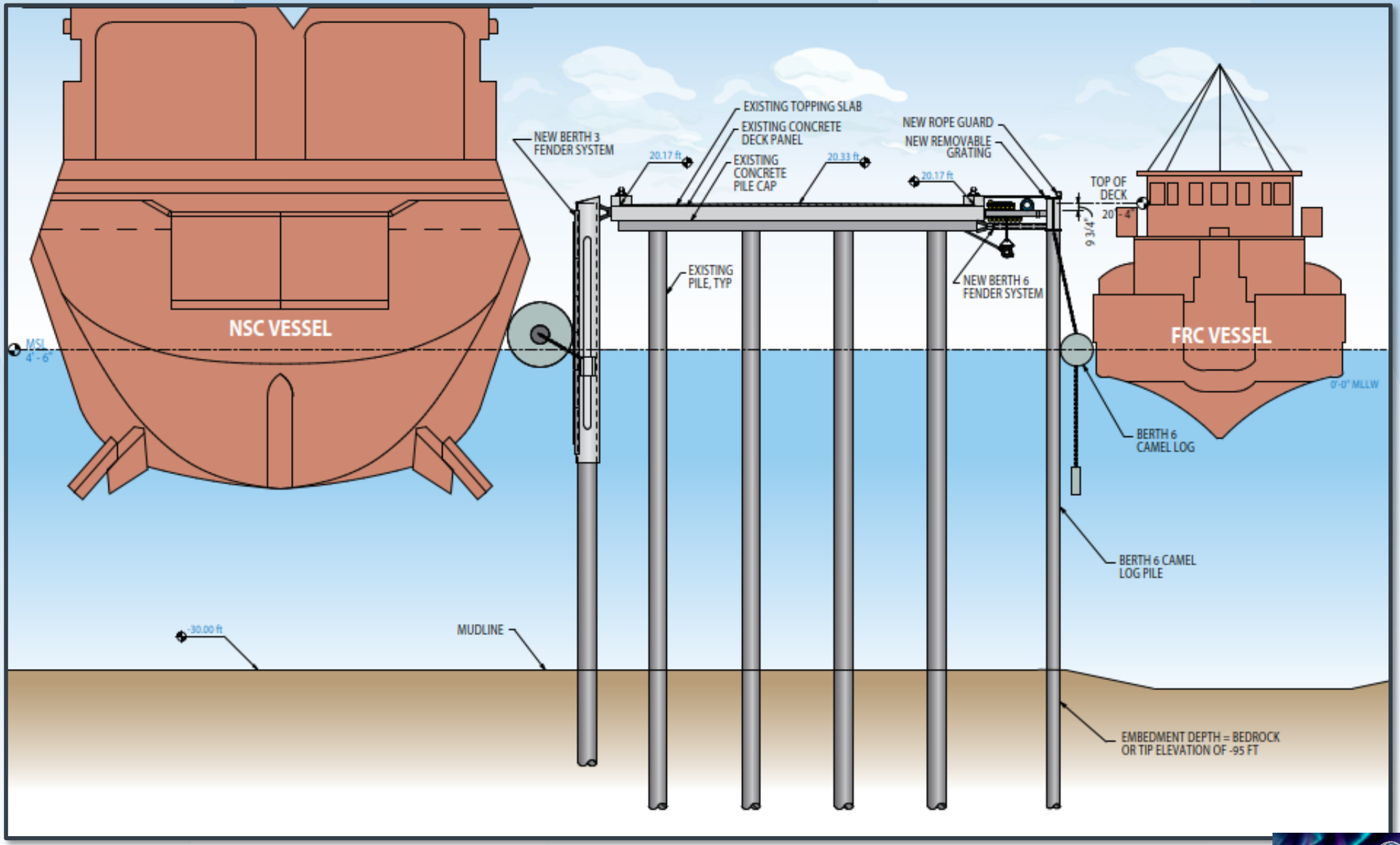
Berth 2 @ 30 Feet Wide Deck



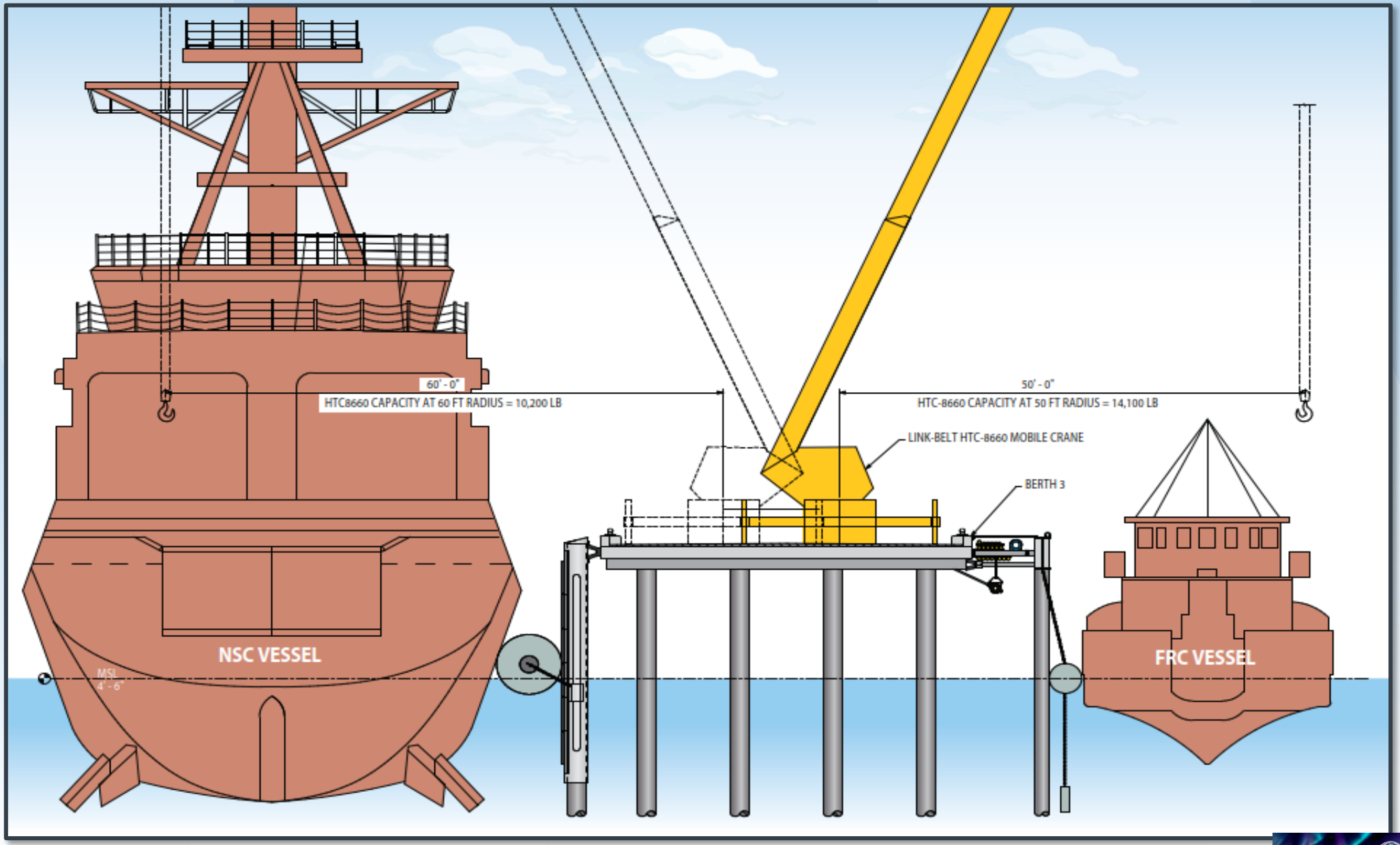
Berth 2 with Crane



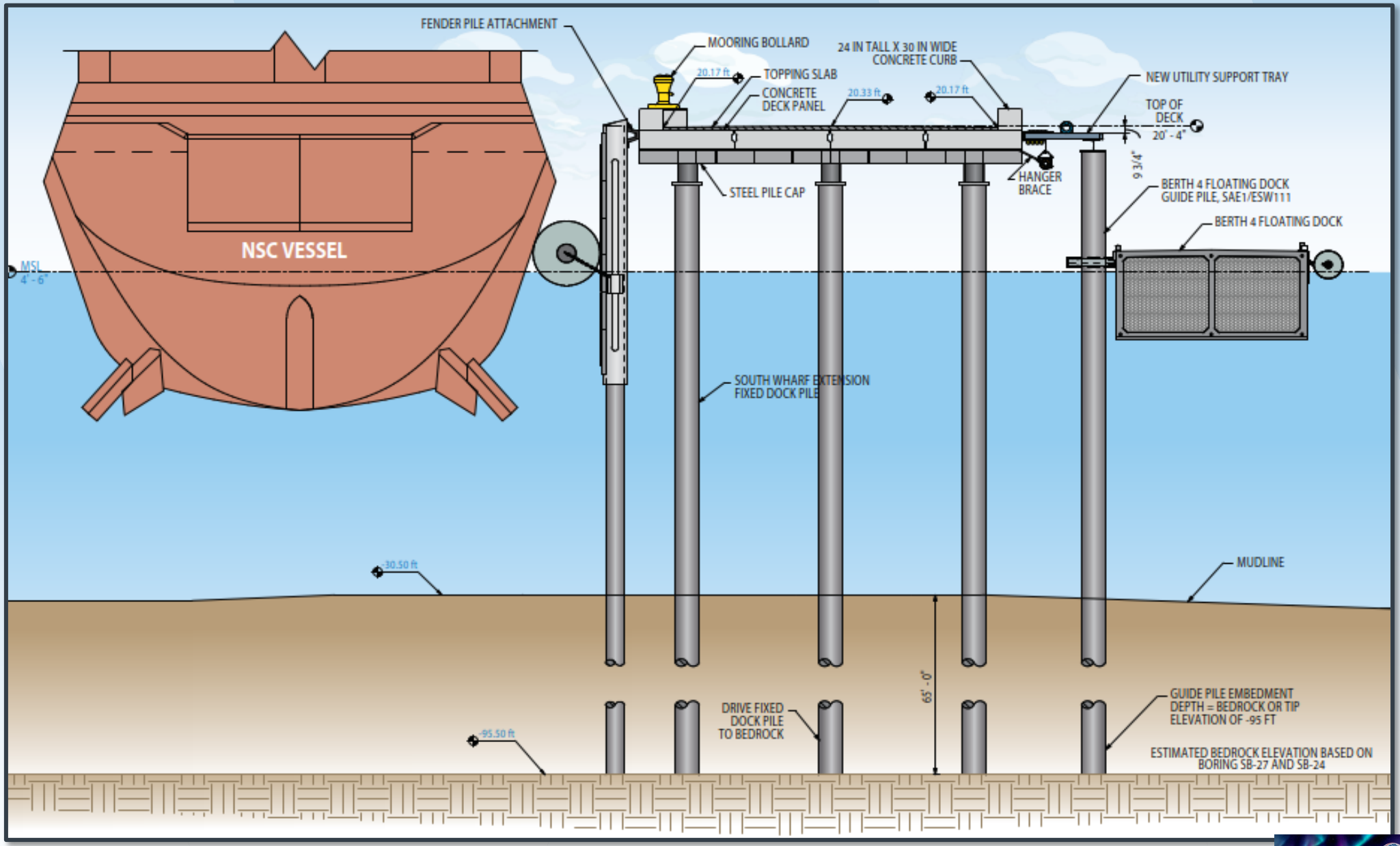
Berth 3 Fender Upgrades



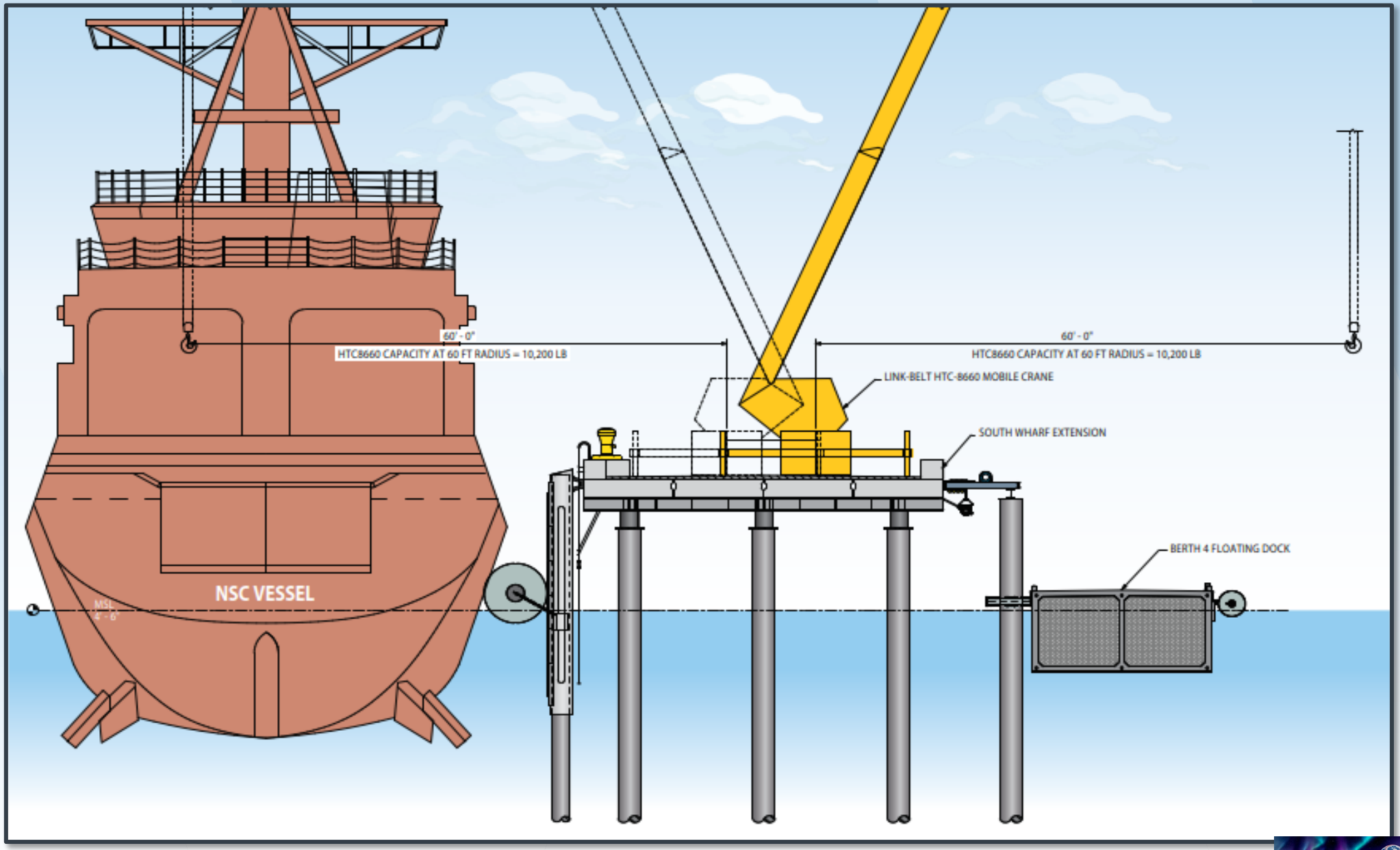
Berth 3 with Crane



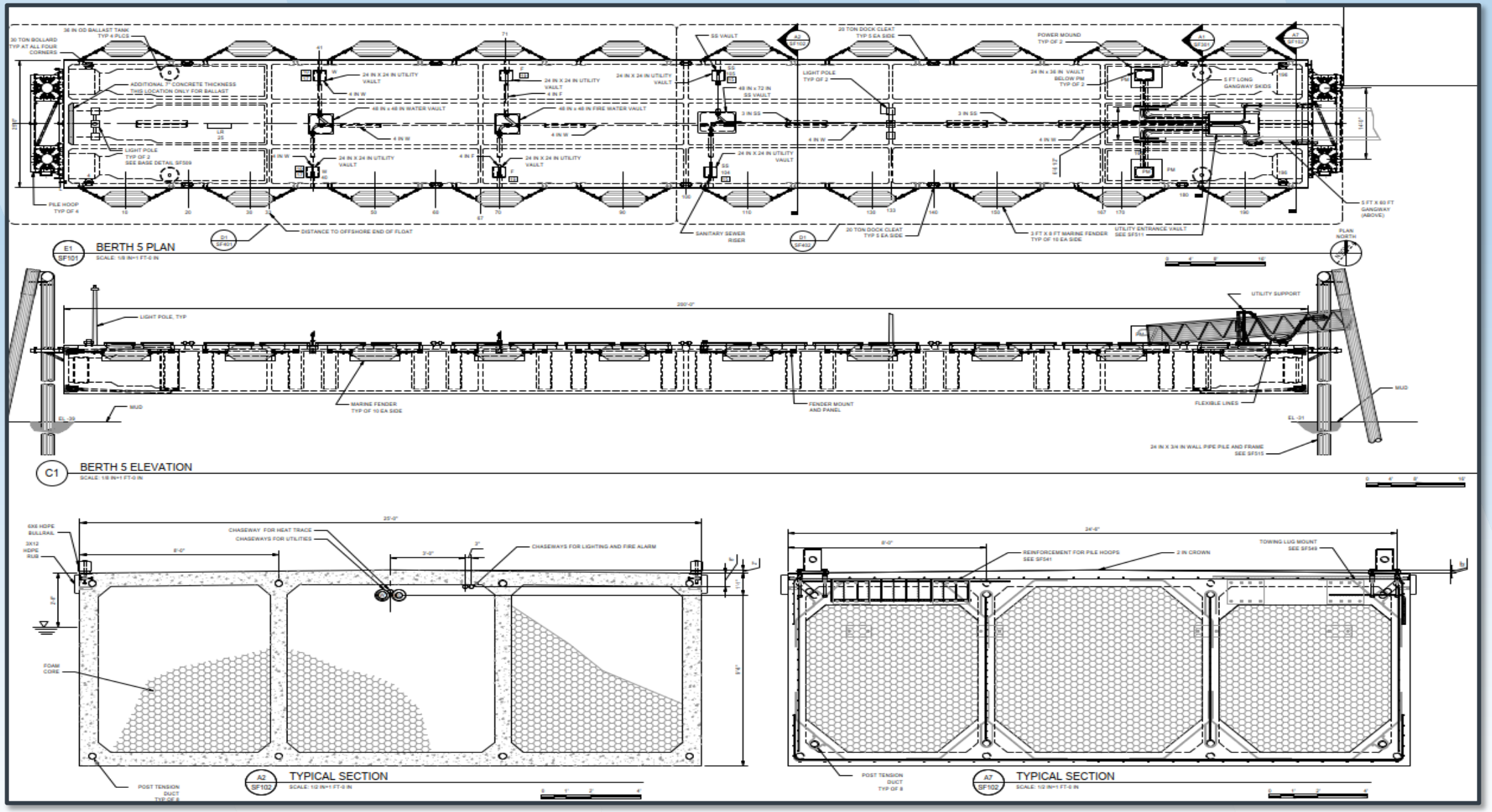
South Wharf Extension



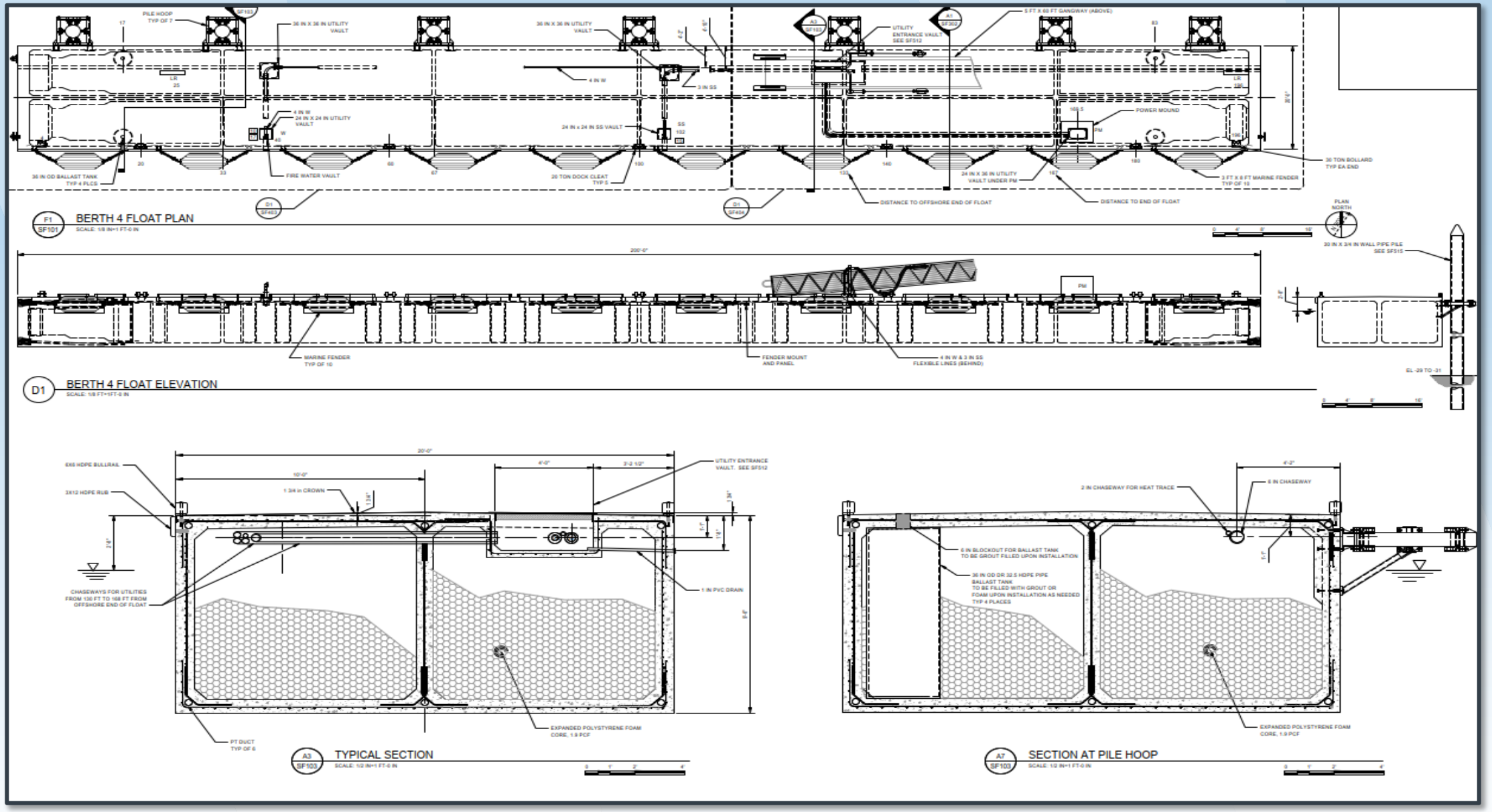
South Wharf Extension with Crane



Floating Docks – Berths 5A/5B



Floating Docks – Berths 4



Example Concrete Floats Designed by WSP

Juneau Cruise Berth Floating Pontoons

Example Concrete Floats Designed by WSP

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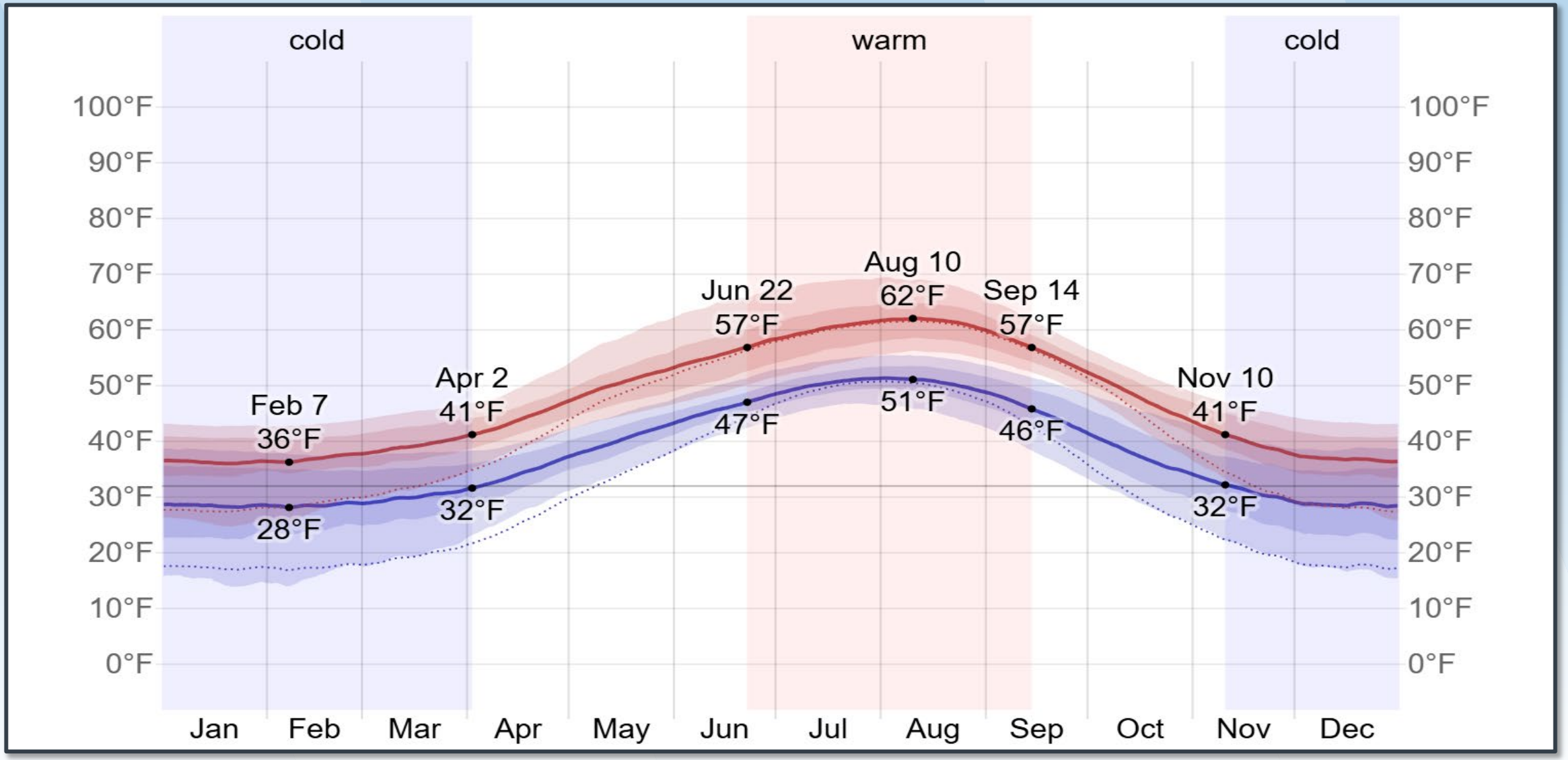
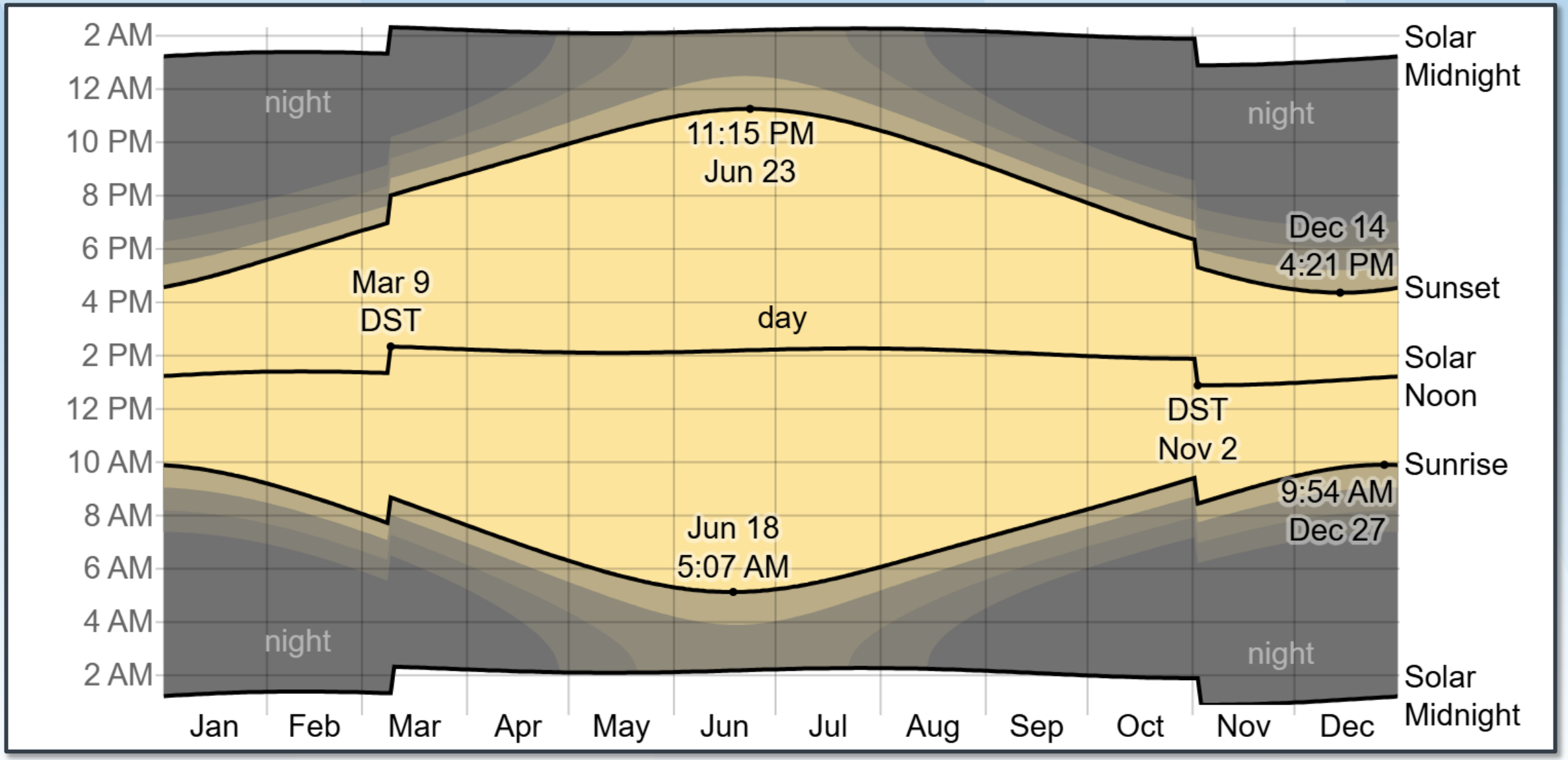
Site Conditions - Environmental

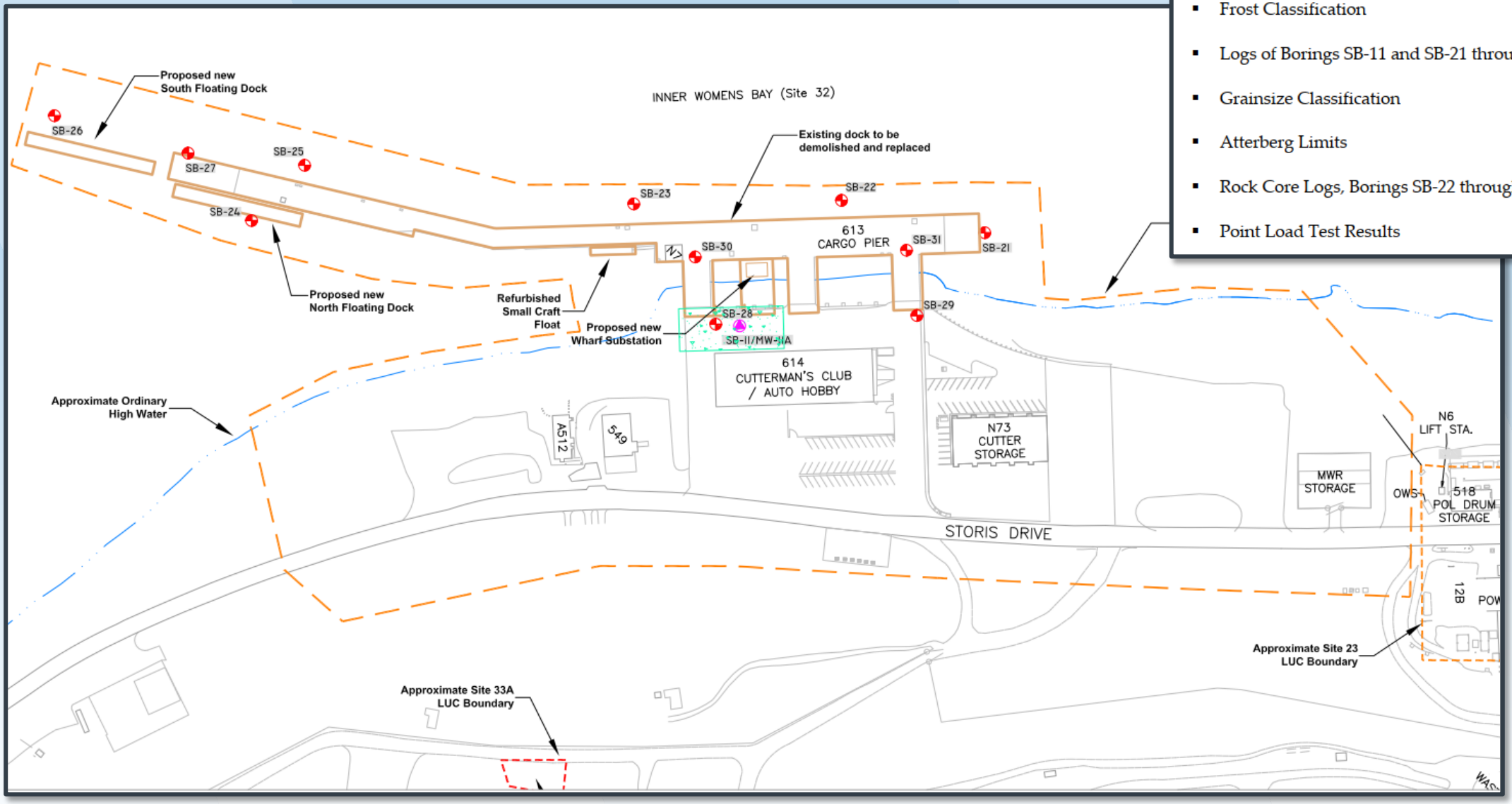


Site Conditions - Environmental



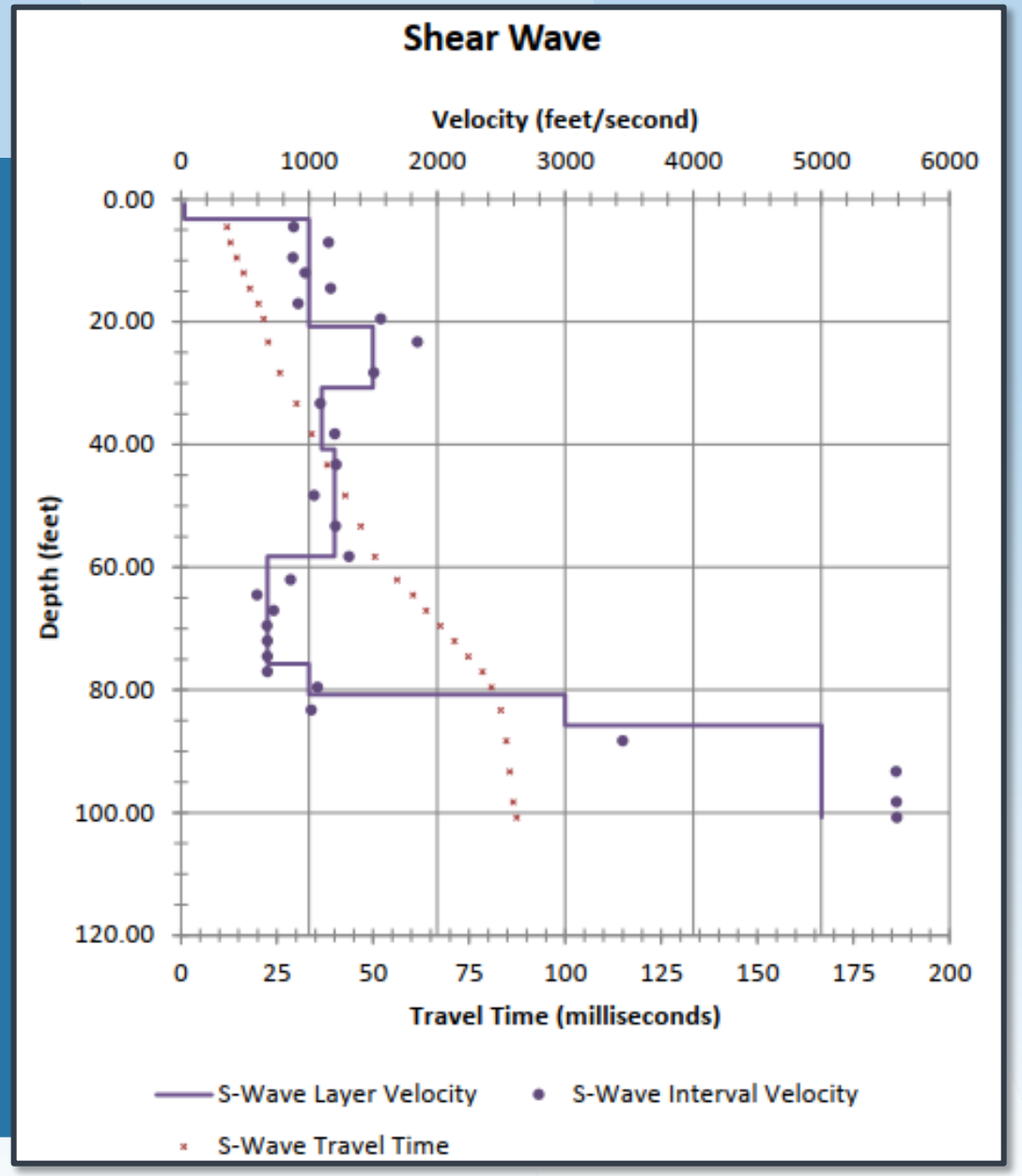
Site Conditions - Geotechnical

- USCS Soil Classification
- Rock Classification
- Frost Classification
- Logs of Borings SB-11 and SB-21 through SB-31
- Grainsize Classification
- Atterberg Limits
- Rock Core Logs, Borings SB-22 through SB-31
- Point Load Test Results



Shear Wave Velocity Testing

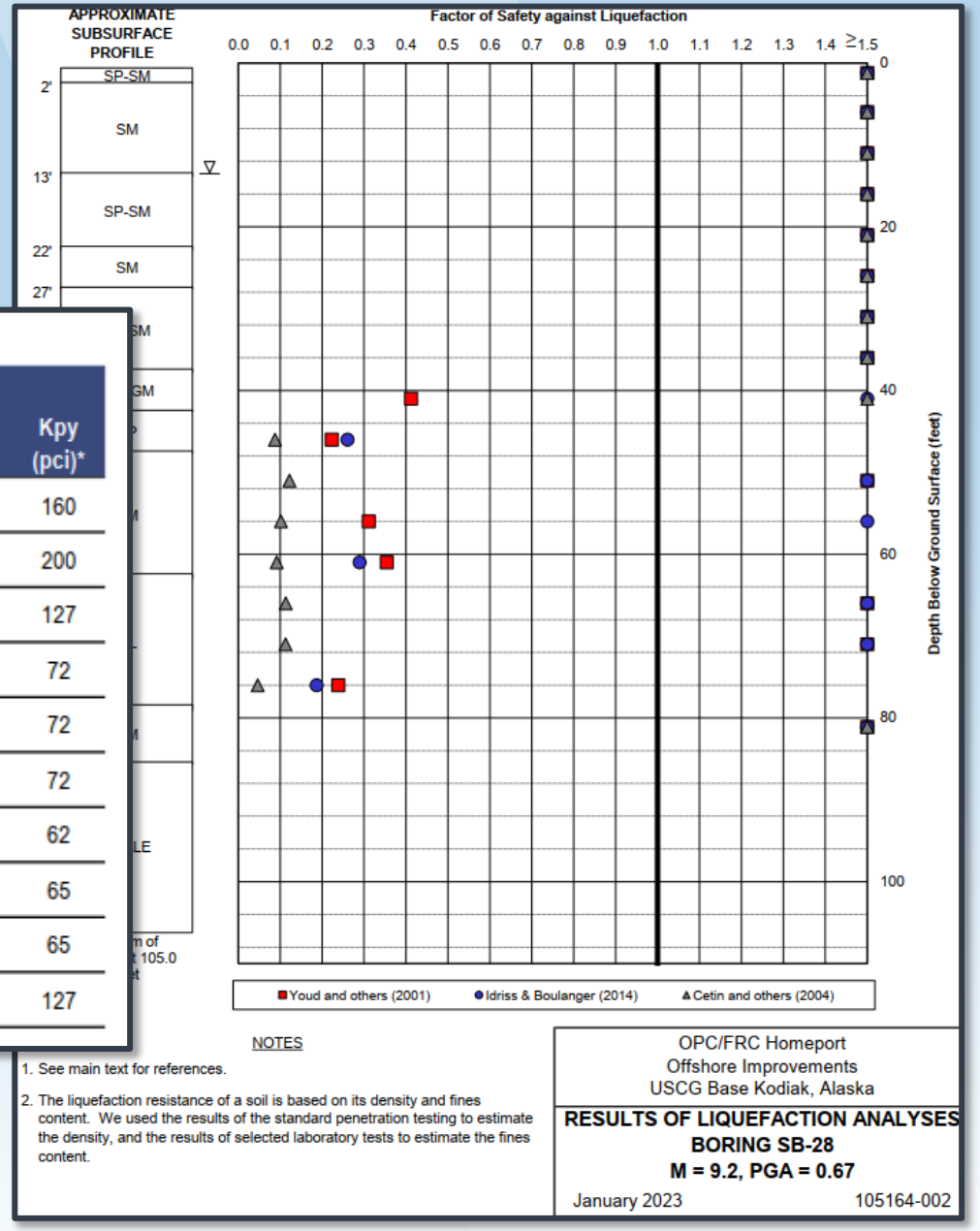
Shear wave velocity testing was completed in Boring SB-28 on October 9, 2022. The testing was performed in general accordance with the procedures of ASTM D7400. A shear wave beam, struck by sledgehammer, was used as the shear wave source. Data was collected using a Geostuff BHG-3 borehole geophone connected to a Geometrics Geode 24-channel seismograph. Data were generally collected at 2.5-foot intervals to 20 feet bgs and at 5-foot intervals thereafter to approximately 100 feet bgs. Interpreted shear wave velocity results along with the calculated interval velocities are presented in the Figure.



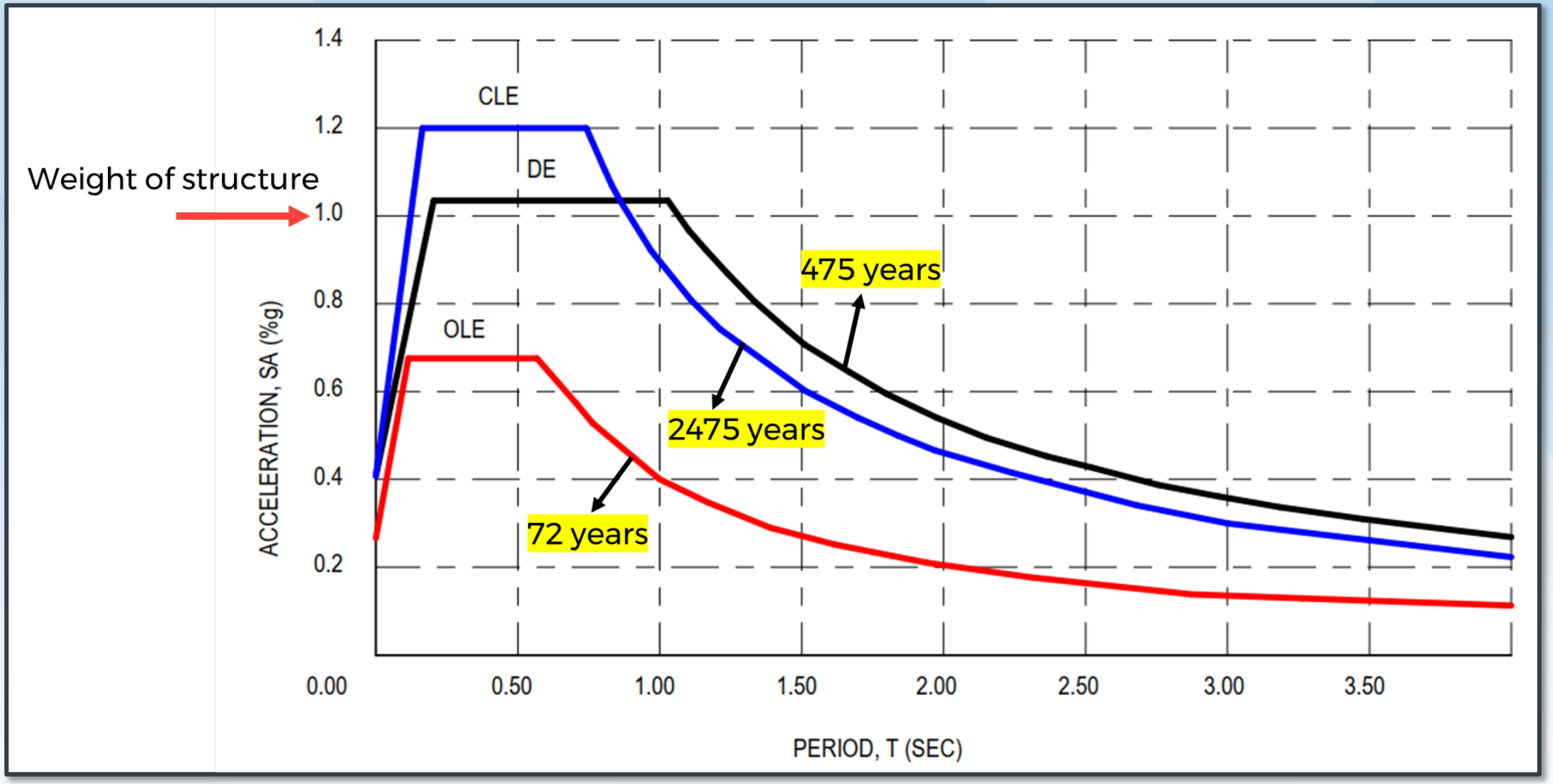
Liquefaction Potential

Boring SB-28

Soil Classification	Top of Layer/Bottom of Layer (feet bgs)*	Angle of Internal Friction (degrees)	Effective Unit Weight (pcf)*	Ultimate End Bearing (tsf)*			Kpy (pci)*
				Driven	Drilled	ktand	
Sand with Silt (SP-SM)	0/2	35	130	49	25	49	160
Silty Sand (SM) to Silty Sand with Gravel (SM)	44605	37	130	62	31	62	200
Sand with Silt and Gravel (SP-SM)	13/22	38	66	72	36	72	127
Silty Sand with Gravel (SM)	22/27	32	61	32	16	32	72
Sand with Silt and Gravel (SP-SM)	27/37	33	61	32	16	32	72
Gravel with Silt and Sand (GP-GM)	37/42	35	61	32	16	32	72
Sand (SP)	42/47	32	56	25	13	25	62
Silty Sand with Gravel (SM) to Silty Sand (SM)	47/62	31	61	28	14	28	65
Sandy Silt (ML)	62/78	28	61	28	14	28	65
Silty Sand with Gravel (SM)	78/85	37	61	72	36	72	127



Site Conditions - Seismicity



Kodiak Ferry Terminal Pile Driving

Vibrodensification – Stone Columns – Ground Improvement

Site Conditions – Required Permits and Approvals

- National Environmental Policy Act (NEPA)
- Commandant Instruction Manual (COMDINST)
- Endangered Species Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Marine Mammal Protection Act
- Migratory Bird Treaty Act
- Rivers and Harbors Act and Clean Water Act
- National Historic Preservation Act
- Resource Conservation and Recovery Act
- Toxic Substances Control Act
- Alaska Drinking Water Regulations
- Alaska Wastewater Regulations
- Alaska Stormwater Regulations

Endangered Species Act Listed Species

Species				Critical Habitat	
Species Name Scientific Name	**Management Unit**	**Federal Status**	**Present in Project Area**	**Status**	**Present in Project Area**
Class: Mammalia					
Beluga Whale *Delphinapterus leucas*	Cook Inlet DPS	Endangered	Potential presence	Final designation	Yes
Blue Whale *Balaenoptera musculus*	Eastern and Central North Pacific Stocks	Endangered	Potential presence	None proposed	N/A
Fin Whale *Balaenoptera physalus*	--	Endangered	Potential presence	None proposed	N/A
Gray Whale *Eschrichtius robustus*	Western North Pacific DPS	Endangered	Potential presence	None proposed	N/A
Humpback Whale *Megaptera novaeangliae*	Western North Pacific DPS	Endangered	Presence documented	Final designation	Yes
	Mexico DPS	Threatened			
North Pacific Right Whale *Eubalaena japonica*	--	Endangered	Potential presence	None proposed	N/A
Sei Whale *Balaenoptera borealis*	Eastern North Pacific Stock	Endangered	Potential presence	None proposed	N/A
Sperm Whale *Physeter macrocephalus*	North Pacific Stock	Endangered	Not likely	None proposed	N/A
Steller Sea Lion *Eumetopias jubatus*	Western DPS	Endangered	Presence documented	Final designation	Yes
Northern Sea Otter *Enhydra lutris kenyoni*	Southwest Alaska DPS	Threatened	Presence documented	Final designation	Yes
Class: Aves					
Steller's Eider *Polysticta stelleri*	Alaska Breeding Population	Threatened	Presence documented/ wintering	Final designation	No
Class: Asteroidea					
Sunflower Sea Star *Pycnopodia helianthoides*	Species level	Proposed Threatened[1]	Presence documented	None proposed	N/A

Notes:
[1]Sunflower sea stars were proposed for listing as a threatened species under the ESA on 16 March 2023 (88 FR 16212). A Final Rule had not been published at the time this document was prepared.
DPS — distinct population segment
N/A — not applicable

Endangered Species Act Listed Species

List of Stakeholders Contacted

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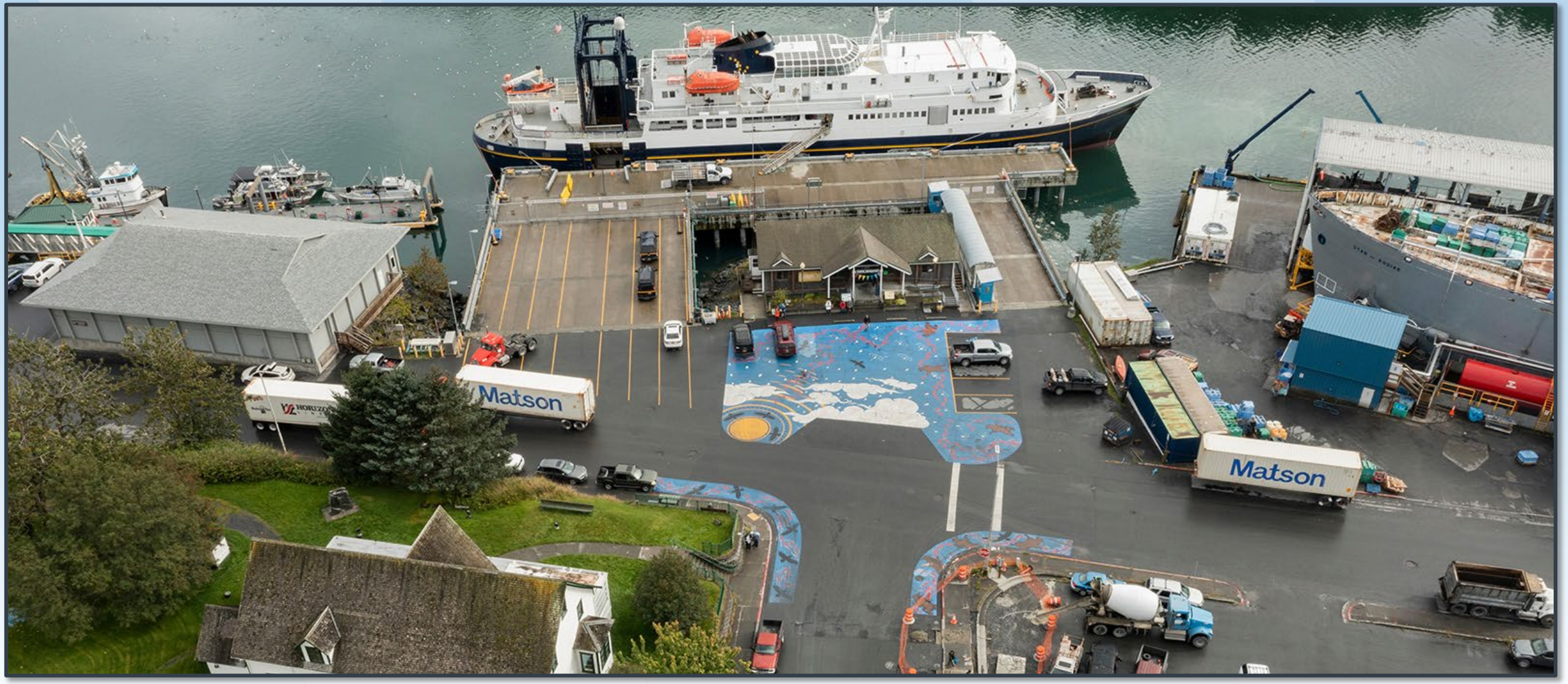
Akhiok-Kaguyak, Inc.	Kodiak Salmon Work Group
ADEC Division of Water	Native Village of Afognak
ADF&G Division of Commercial Fisheries	Native Village of Larsen Bay, Larsen Bay Tribal Council
ADF&G Division of Wildlife Conservation	Native Village of Old Harbor
Alaska Department of Natural Resources, Division of Mining, Land, and Water	Native Village of Port Lions
City of Old Harbor Native Corporation Kodiak	Natives of Kodiak, Inc.
Cook Inlet Regional Citizens Advisory Council	Ouzinkie Native Corporation
Kodiak Audubon Society	Samson Tug and Barge
Kodiak Chamber of Commerce	Sun'aq Tribe of Kodiak
KEA – Kodiak Electric Association	United States Army Corps of Engineers, Alaska District
Kodiak Island Borough	United States Fish and Wildlife, Marine Mammals Management, Alaska Region
Kodiak Regional Aquaculture Association	National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Region

Design Challenges

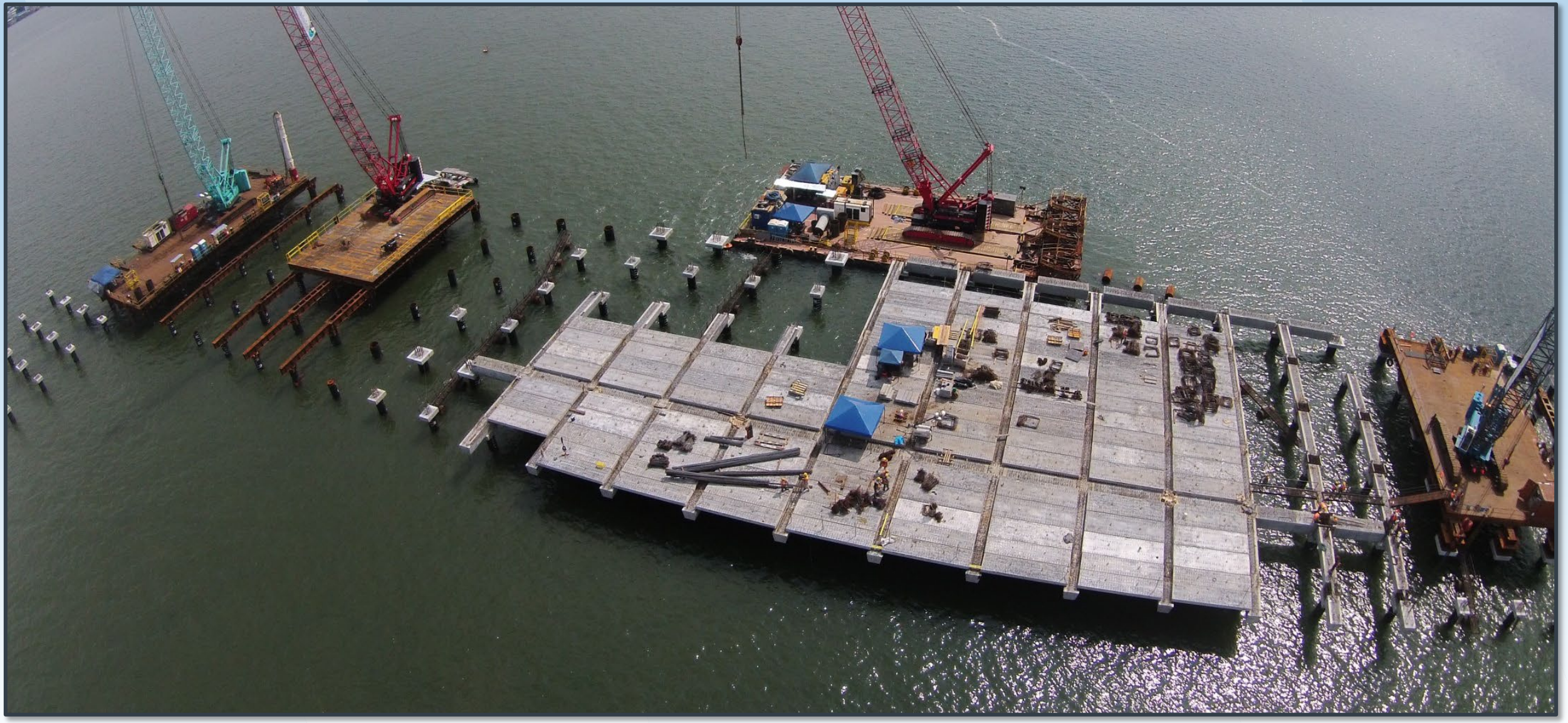
- Work within an active base
- Multidisciplinary work
- Remote site – logistics and quality
- Challenging site conditions
- Cost
- Schedule
- The Alaska Factor

Previous Kodiak Experience – Ferry Dock Reconstruction

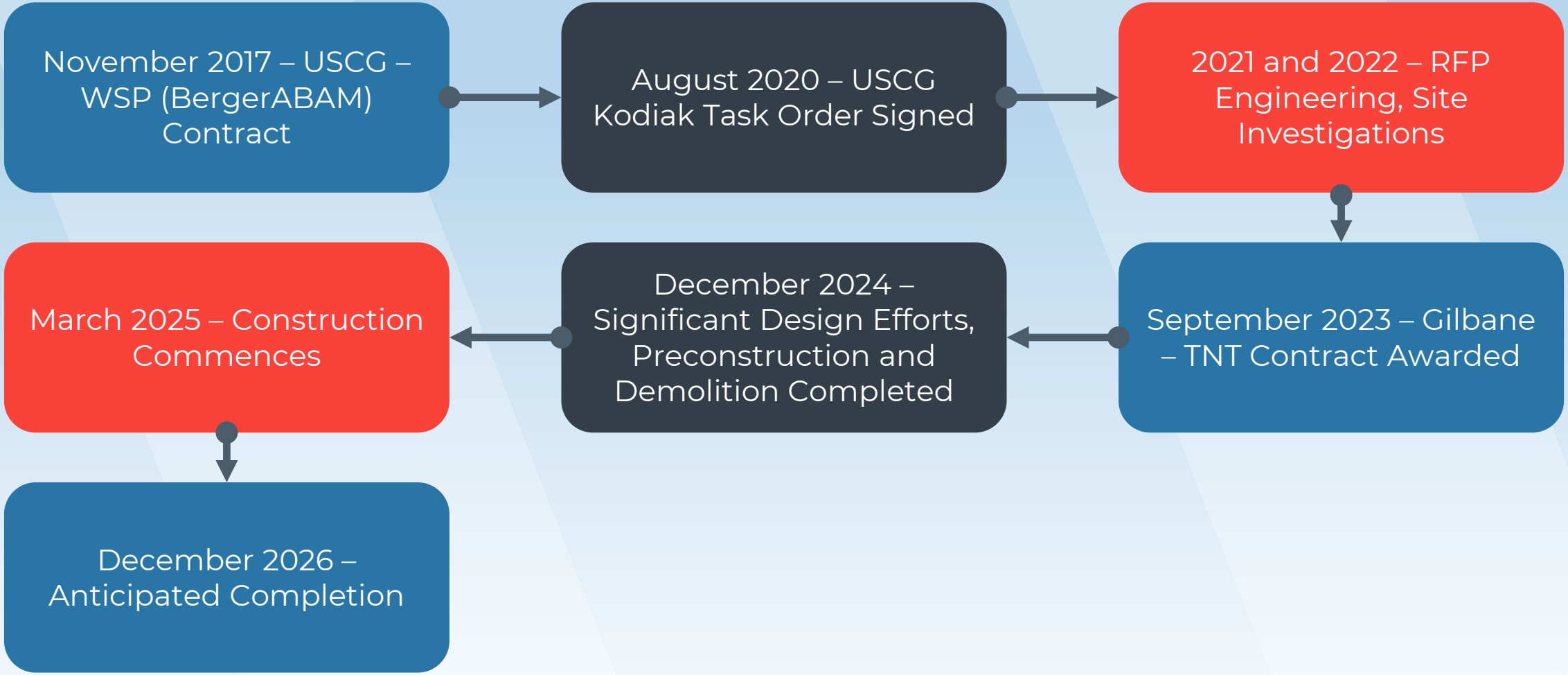


Concrete Float – Juneau Cruise Port

Maximizing Precasting – T1 Replacement Template



Project Schedule and Status



Closure

There is no such thing as “too much planning”

Critical project for the USCG, Alaska and USA

Ready for homeporting next generation FRCs and OPCs

Base Kodiak found to be most viable after extensive planning process

Challenging site conditions based on site investigations and assessments

Ideal for design-build project delivery based on thorough RFP documents

Protecting owner’s interest throughout project delivery is critical