



May 20, 2021

Preliminary Engineering

- Alternatives Analysis for Constructability and Permitting
- Advance Design to validate scope, schedule, costs and permitting
- Final Deliverable Request for Proposal to procure design services





Alternatives Analysis for Constructability and Permitting

Preliminary Engineering and Enabling Activities



Alternatives Analysis

Investigate Design Alternatives and Construction Means and Methods Alternatives

Focused on design and construction practices that support a permittable project and accelerate construction:

- Delivering Project as Defined (Project Definition from Essential Features and Accepted Stakeholder Requirements)
- Meeting engineering best practices and achieving code compliance
- To the extent practicable, providing lower cost constructable solutions



Alternatives Analysis - Construction Duration

PAMP needs to find potential methodologies to reduce construction durations because:

- Condition of existing POA General-Purpose Terminals
 - Remaining service life?
 - Potential for derating in near future?
 - Seismic resiliency?
 - Potential threat to stakeholder operations likely grows with passing time
- Potential to reduce investment costs by shortening construction durations (speed wins)



Alternatives Analysis - Hydroacoustic Noise

PAMP must minimize acoustic disturbances from impact and vibratory pile driving:

- Supports avoidance of harassment and injury to Cook Inlet Bulga Whales, a listed endangered species, and other marine mammals present within the vicinity
- Reductions may be necessary to obtain:
 - Letter of Authorization (LoA) under the Marine Mammal Protection Act (MMPA) and Section 7 Consultation under the Endangered Species Act (ESA)
 - Other federal permits



Alternatives Analysis - Hydroacoustic Noise

- PCT 2020 project, constructed with 71-permanent piling and 111-temporary piling resulted in 26 “takes” of a maximum allowable 55 “takes” of beluga whales
- T1 and T2 include an estimated pile count total of 700-1000 (approximately 650 permanent piles plus temporary piles) over 5-7years – without alternatives, project may not be permittable
- Exceeding the number of “allowable takes” could delay or stop the project in mid-construction at great financial risk



Alternatives Analysis - Scope

- Alternative Analysis will research and present design and construction alternatives that could reduce the potential of incidental takes by:
 - Reducing the number of temporary and template piles
 - Evaluating alternative structures with fewer piles
 - Evaluating alternative pile installation methodologies that reduce in-water noise levels during construction



Pile Supported Structure (2017-concept 48-inch piles)

- Construction Methods for consideration (1 of 2):
 - Drilled shafts
 - Double wall or mandrel driven piles – *reduce noise at source* [Marine Construction Technologies, PBC \(marinecontech.com\)](http://marinecontech.com)
 - Jetting – *reduce noise at source*
 - Jetting and grouting – *reduce noise at source*
 - Oscillator and Rotator Drilled Shaft(likely from jack-up rig) – *reduce noise at source*
 - BLUE Piling Technology (Huisman/ Fistuca BV) – *reduce noise at source* [BLUE Piling Technology - IHC IQIP](#)



Pile Supported Structure (2017-concept 48-inch piles)

- Construction Methods for consideration (2 of 2):
 - Silent Piler System/ Gyro Piler/ Tubular King Piler (Giken) – *reduce noise at source* [press-in_gyropress.pdf \(giken.com\)](http://press-in_gyropress.pdf(giken.com))
 - Sound dampening caisson (submergible multi-chambered floating structure) – break sound path
 - Hydro sound dampers (HSD) – *break sound path* [The Hydro-Sound-Damper-System \(HSD-System\) – OffNoise-Solutions GmbH](#)
 - Use of hanging leads and cast-in-place pile cap construction to reduce the quantity of template piling



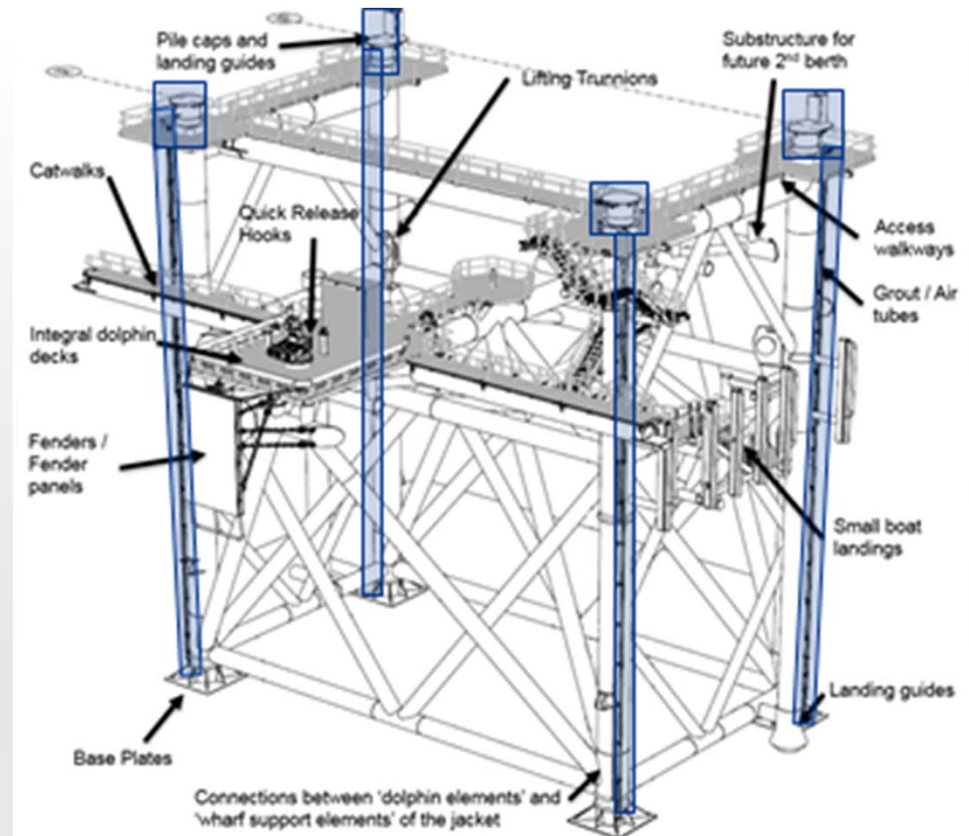
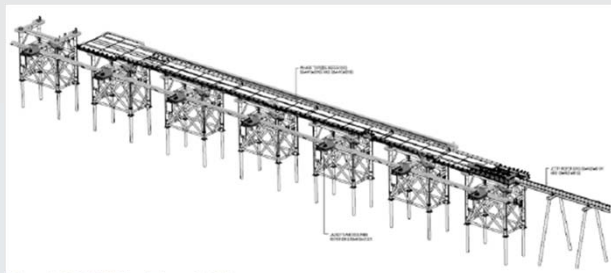
Pile Supported Structure – Larger Diameter/ Fewer Piles

- Construction Methods for consideration:
 - Jetting – *reduce noise at source*
 - Jetting and grouting – *reduce noise at source*
 - Oscillator and Rotator Drilled Shaft(likely from jack-up rig) – *reduce noise at source*
 - BLUE Piling Technology (Huisman/ Fistuca BV) – *reduce noise at source*
 - Silent Piler System/ Gyro Piler/ Tubular King Piler (Giken) – *reduce noise at source*
 - Sound dampening caisson (submergible floating structure) – *break sound path*
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Modular Prefabricated Jacket System (space frame) with Anchor Piles through Jacket Legs

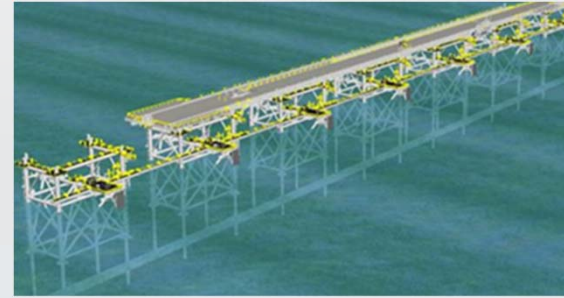
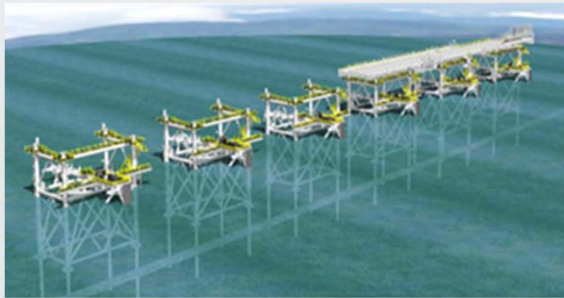
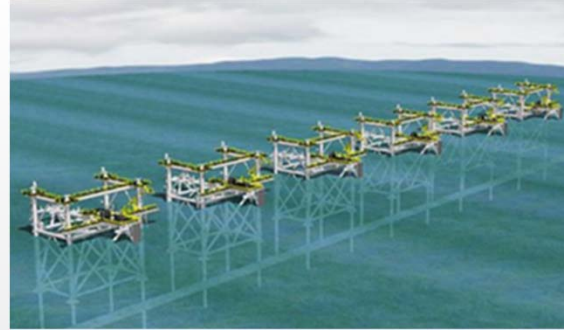
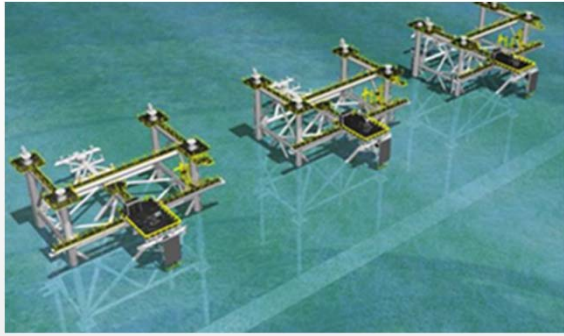
- Upward to 60-percent pile reduction – reduce noise at source
- Double wall piles – reduce noise at source
- Jetting – reduce noise at source
- Jetting and grouting – reduce noise at source



Example from actual design



Modular Prefabricated Jacket System Construction Sequence



- Used in Petroleum and Mineral Extraction Industries



Process Outline and Deliverables

Preliminary Engineering and Enabling Activities



Preliminary Engineering & Enabling Activities

- **Starts with one concept decision**
- **Alternative Analysis for foundation systems**
 - Permittable Project
 - Constructability
- **Confirm design criteria**
 - Seismic/ Structural with Geotechnical Advisory Commission
- **Document Stakeholder Requirements**
- **Additional Data Collection**
 - Ship Simulations / Pilot Evals
 - Field Data Collection
 - Alternative Pile Test(s)
- **Develop 15% Design**
 - Revise Soil Structure Interaction Modelling, Structural Modelling/ Analysis, Update Mooring Analysis/ Update Crane Analysis/ Utility Planning
 - Update PAMP Design Manuals
- **Develop 30% Design Deliverables**



Preliminary Engineering & Enabling Activities

- 30% Design Deliverables - Technical Documents for Municipality of Anchorage Designer of Record Procurement
 - Concept Drawings
 - Prescriptive Requirements Document
 - Cost Estimate
- Update Engineering Information to NEPA documents



Questions?



Thank you



PAMP – Phase 2 Design Process Milestones Retrospective

- 2015 Planning Charrette
- 2016 Requirements Collection
- 2017 Concept Design
- 2019 Round Table
- **2019 – 2021 POAUG Interactions**
- 2021 Essential Features Published
- **2020 – 2021 Modified Concept/ Near Shore Hybrid Concept/ Modified 2021 TOTE Concept Design/ T2 Liquid Bulk Capability Memorandums**



PAMP – Phase 2 Process Milestones Going Forward (Notional)

- **2021 Round Table Update – Project Definition**
- 2021 Preliminary Engineering and Enabling Activities
- 2021 Ship Simulations and Pilot Evaluations
- 2021 Draft Preliminary Design
- 2021 Preliminary Review
- 2022 Final Preliminary Design
- 2022 DOR Procurement
- 2022 DOR 65-percent and 95-percent Design w/ Reviews
- 2023 DOR IFC Design