Port of Redwood City Wharves 1 and 2 Replacement

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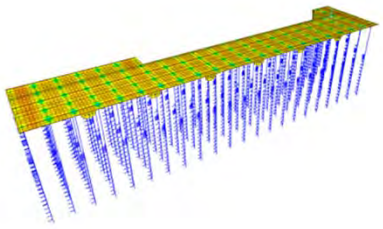

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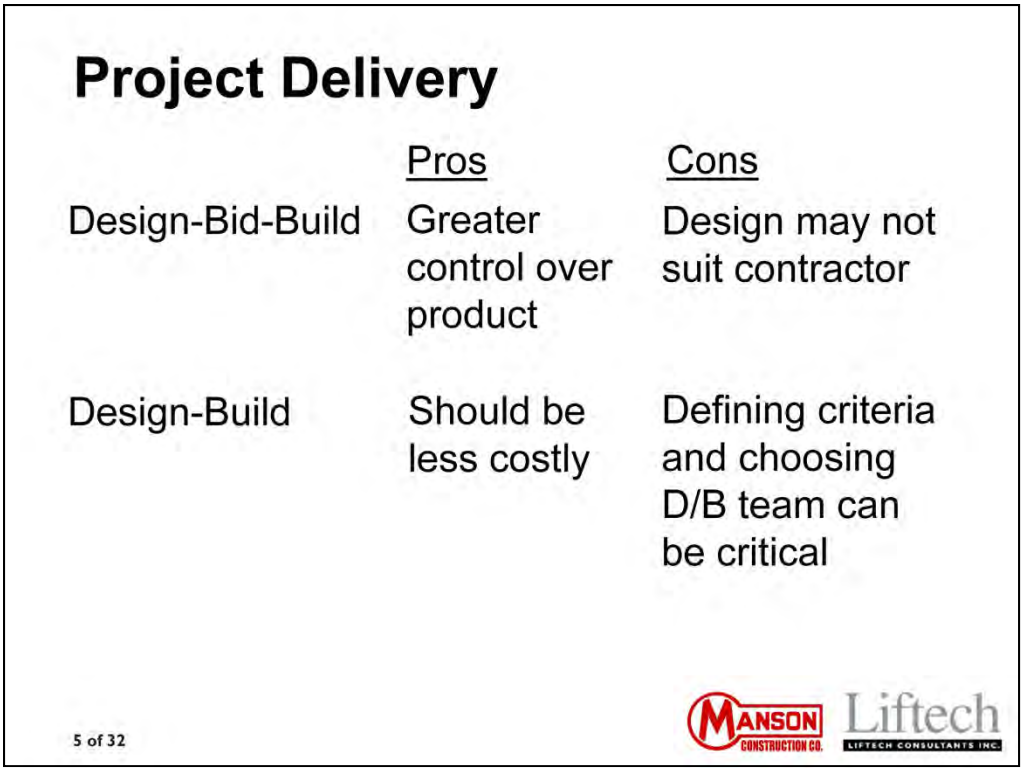
Manson is a marine contractor based in Seattle, Washington, with over 100 years of experience.

Liftech is an engineering company based in Oakland, California, with over 50 years of experience specializing in marine structures, crane structures, and heavy lift. Liftech engineers designed the world's first container crane and have participated in the design of some of the world's largest cranes.

Manson and Liftech have worked on many Bay Area projects together, including the Port of Oakland Berth 57-59 and Berth 30 & 32 wharves, the Cemex West Sacramento Import Terminal wharf, the McNear's Beach Park Pier repair, and multiple floats for WETA including the South San Francisco Ferry Terminal, two San Francisco Pier 9 layover berths, and the Oakland Clay Street Ferry Terminal float.

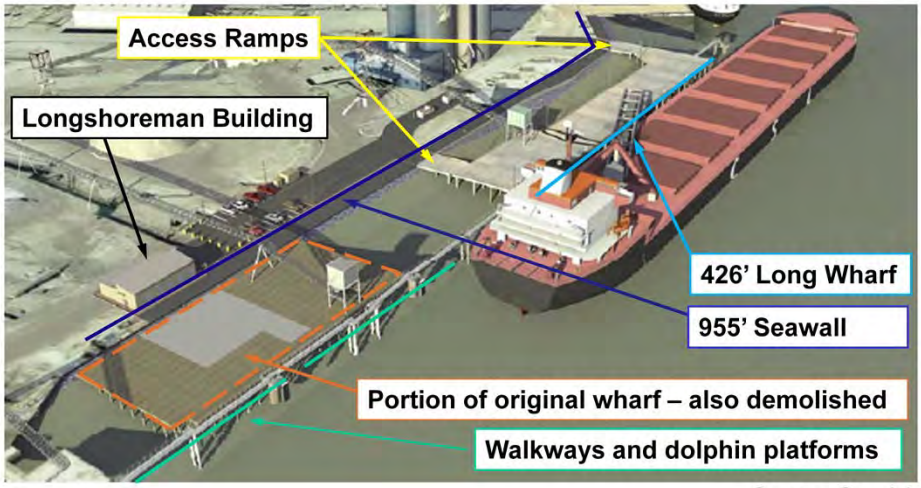


Two project delivery methods are most common for projects: design-bid-build and design-build. Design-bid-build involves the owner designing the structures and then having contractors bid on the work. Design-build involves the owner developing a performance specification and then having a contractor-engineer team design and build the work.

Each has advantages and disadvantages.

This project was a design-build project.

Project Components



Source: Gerwick

Demolition:
- 860' of original wharf
- Existing warehouse

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Sections 2-4:

Redwood City Project Manson/Liftech Perspective

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In the next sections, we will talk about the project from Manson-Liftech's perspective, including the bid process, the design, and the construction.

Section 2: Bid Process

Assemble team

Understand project

Identify significant design issues

Develop competitive bid design suited to strengths of team

Develop fee

Develop responsive, competitive proposal

Source: Gerwick

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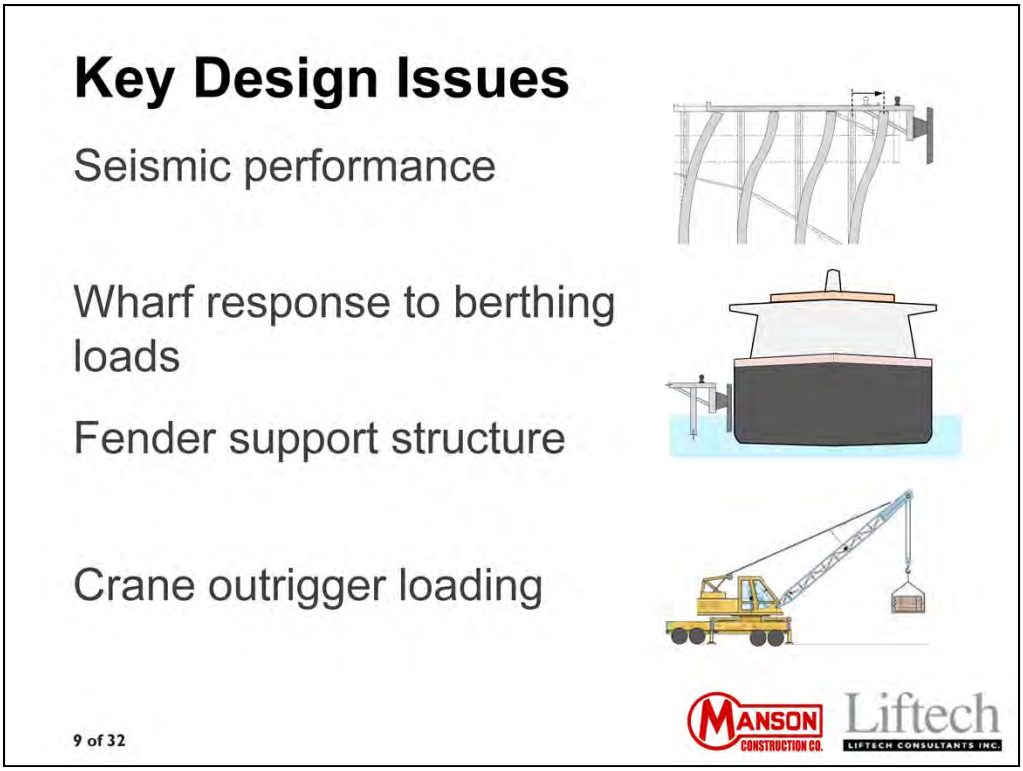
The bid process involved assembling a team suited for the work, understanding the project, identifying significant design issues, the Manson and Liftech team developing a competitive bid design, developing a fee, and developing a responsive competitive proposal.

A key challenge for the bid process was that all of this had to occur with little time, about a month.



For this project, some key design issues included the seismic performance requirements, the berthing loading, and the large 312,000 pound design crane outrigger loading.

Competitive Bid Design

Limit wharf deck mass – thin deck

Limit piling – 40 (29%) fewer piles than RFP design

Reuse existing formwork - pile spacing

Nearly flat deck bottom to facilitate forming

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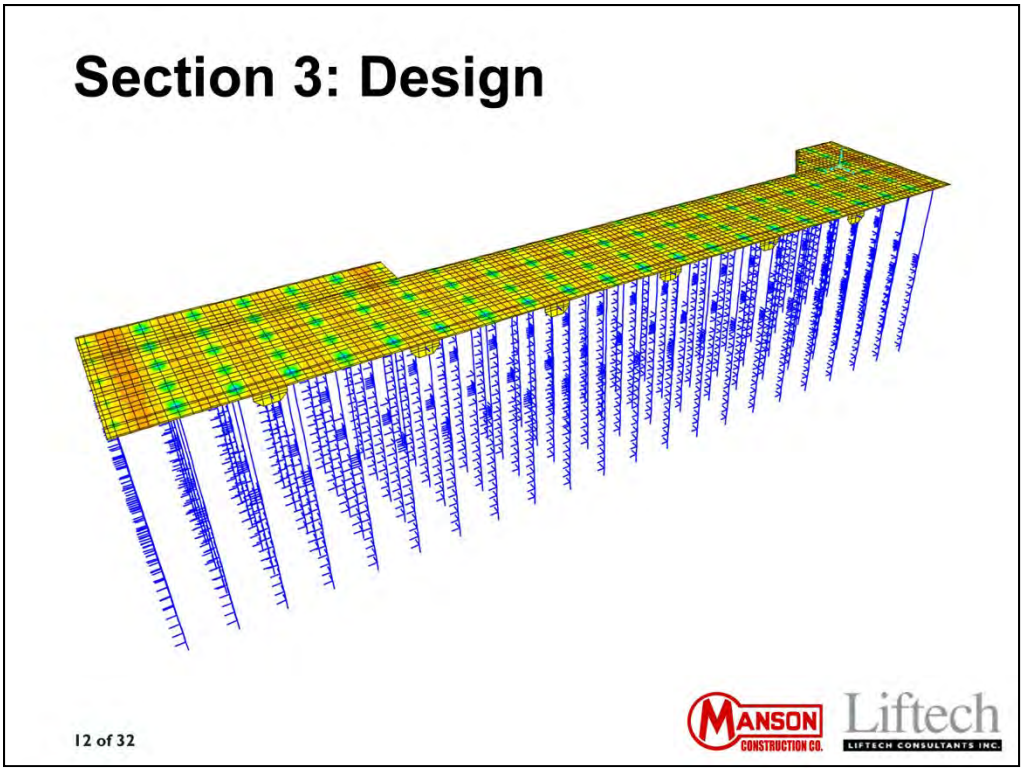
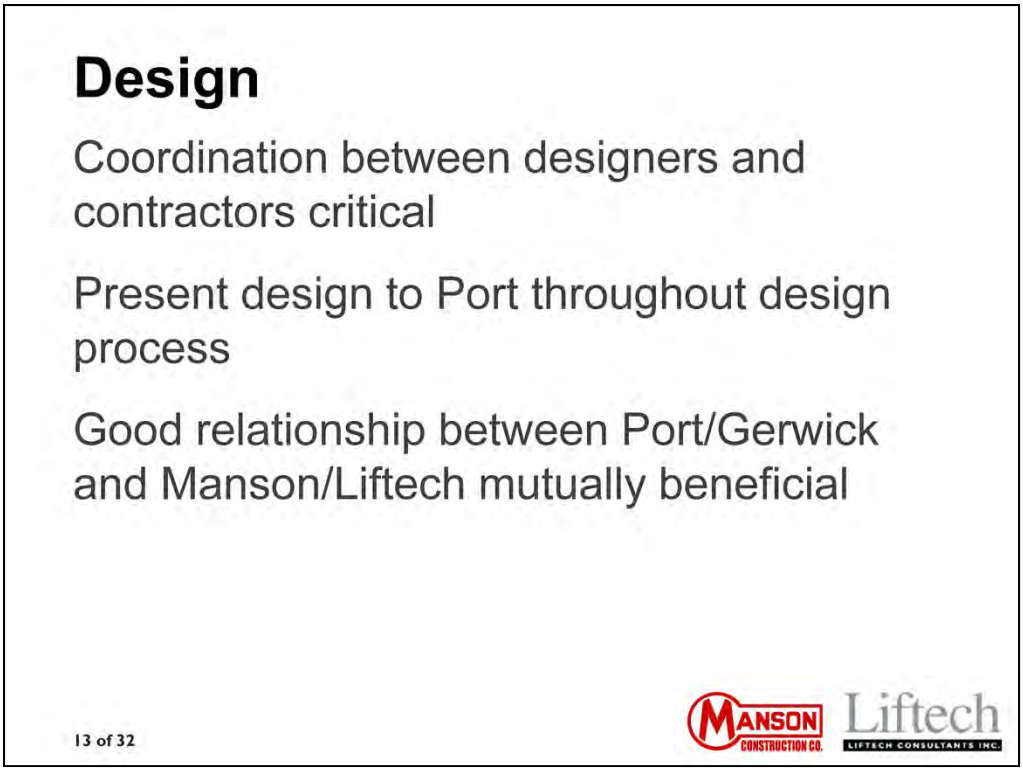
To provide a competitive bid design, the wharf deck was kept as light as practical and the piling was limited. Forty fewer piles were used than presented in the RFP design. The pile spacing was chosen to allow reuse of existing formwork. A nearly flat soffit was used to facilitate forming. Other things were done, but these were some of the key items.

A significant amount of effort was required for the bid proposal. Key elements of the proposal included presenting the team's credentials, understanding the project, what is proposed to be built and how, how the team will interact with the Port and the Port's tenants, and how the team will address environmental, safety, and other concerns.

The effort involved in the bid process was significant and there is no compensation if the team is not awarded the project.



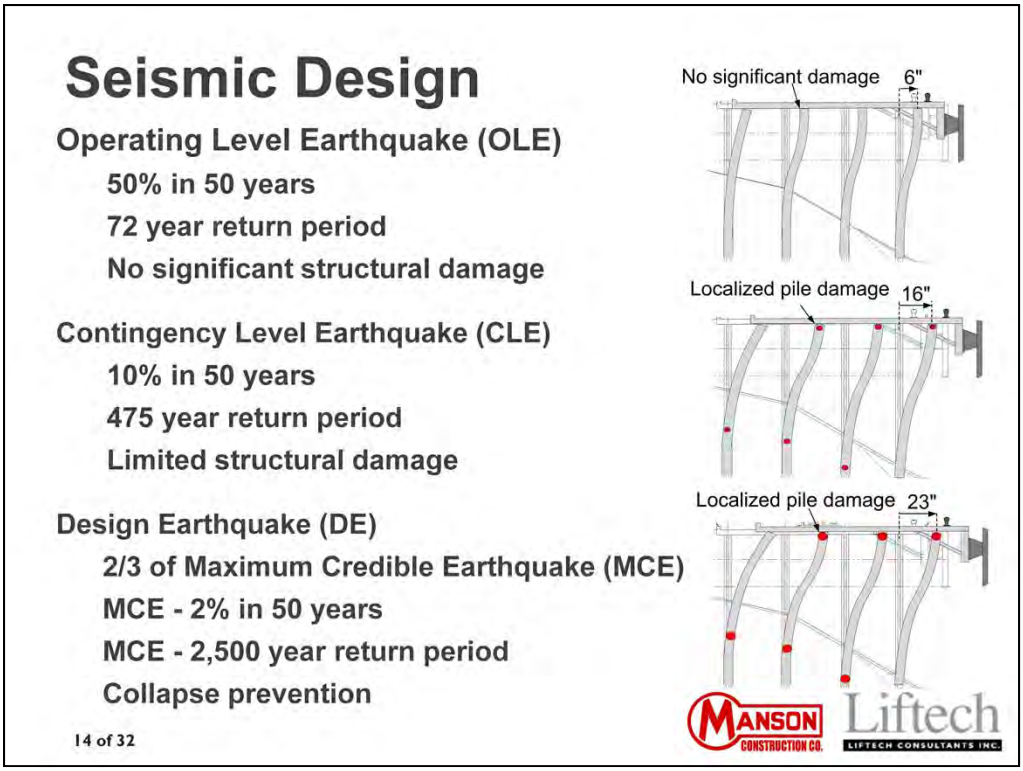
An explanation of the design process and some of the design aspects will be presented in this section.



During the design, coordination between the designers and contractors was critical to develop a completed design that met the project requirements while meeting the preferences of the contractor.

The design was presented to the Port and its consultants at stages throughout the design to help ensure the completed design was acceptable to them.

For this project, a good relationship between the Port-Gerwick and Manson-Liftech teams was mutually beneficial.

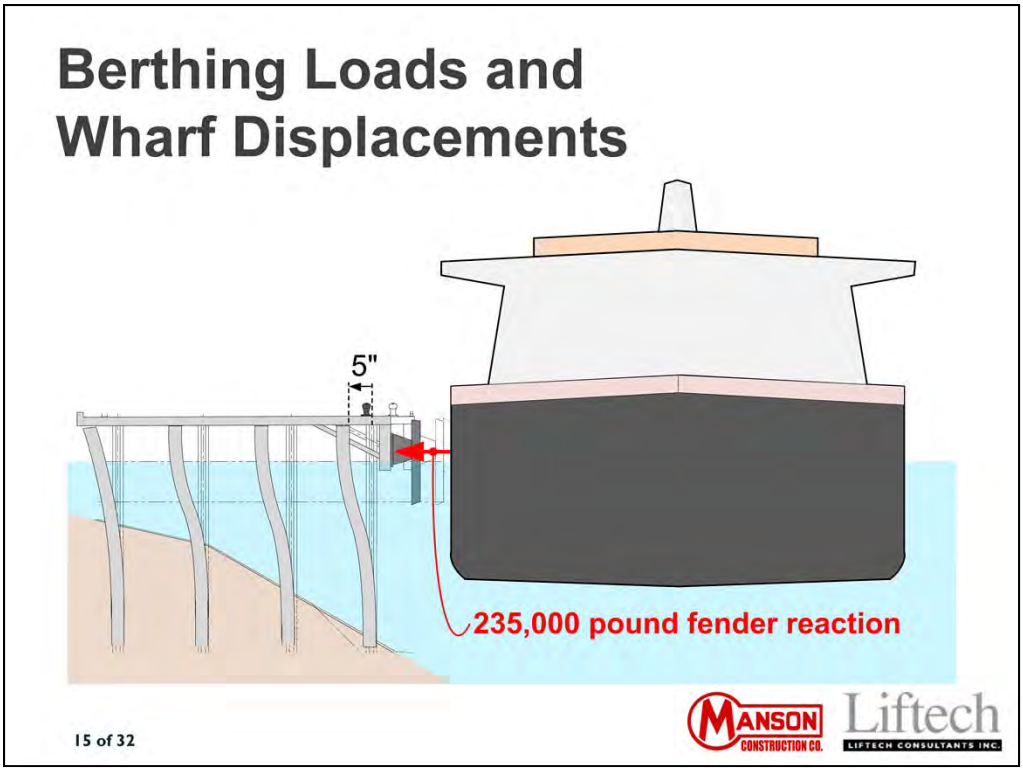


For this project, there are three levels of design earthquake with varying amounts of allowable damage.

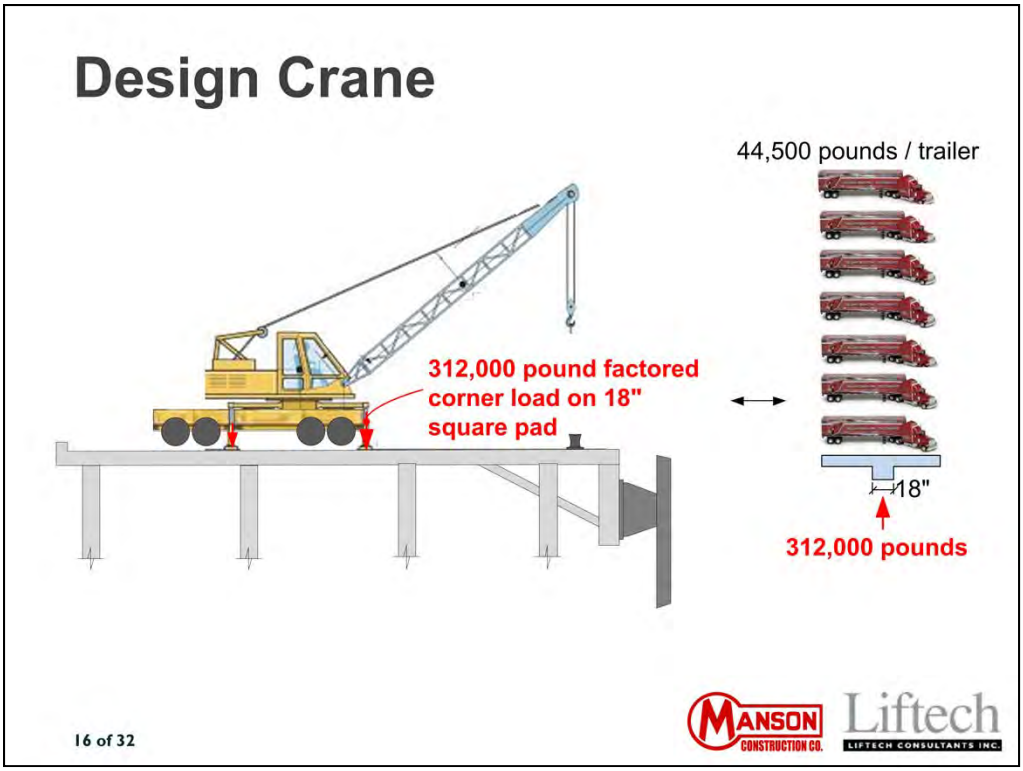
For the operating level earthquake, a small earthquake that is expected to occur every 72 years, minor concrete spalling may occur at some pile to wharf connections.

For the contingency level earthquake, a large earthquake that is expected to occur every 475 years, concrete spalling and steel reinforcing yielding is expected at many of the pile to wharf connections, and in some piles below ground. The wharf will require repairs after this earthquake.

For the design earthquake, 2/3 of the MCE, an earthquake expected to occur every 2,500 years, concrete spalling and steel reinforcing yielding is expected at many pile and wharf connections, and also in many piles below ground. For this level design earthquake, the wharf will be heavily damaged but will not collapse.



The design fender reaction is 235,000 pounds. This reaction can occur on all six fenders simultaneously when the design vessel berths parallel to the wharf at its design velocity. The wharf is expected to move about 5” during this loading.



The design crane loading for this wharf is a severe loading: a 312,000 pound loading on an 18” square outrigger anywhere on the wharf deck. This loading is equivalent to placing seven loaded tractor trailers on an 18” square pad anywhere on the wharf deck.

A steel sheet pile wall was installed instead of the RFP proposed concrete wall. The sheet pile wall is expected to perform better than the concrete wall, reducing the probability of water flowing under it.

The construction process and construction chonology will be presented in this section.

Construction Process

Submittals to designer and Port

Material procurement

Construction with ongoing QA/QC

Ongoing meetings to coordinate with Port, and to resolve construction issues, e.g., contaminated soil, defects in reinforcing

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Construction Chronology

Demolition of existing warehouse

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Construction Chronology

Demolition of existing wharf

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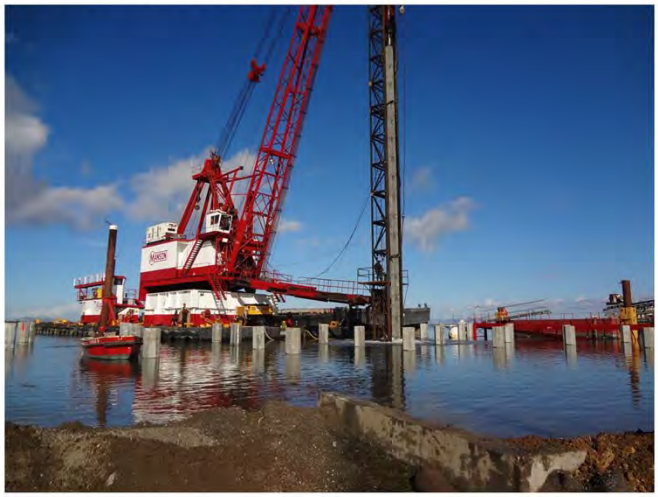
Construction Chronology

Wharf pile driving



108 piles

24” octagonal

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Construction Chronology

Seawall pile driving

950 ft of seawall

13 ft long sheet pile

WADIT sealant

Control density fill

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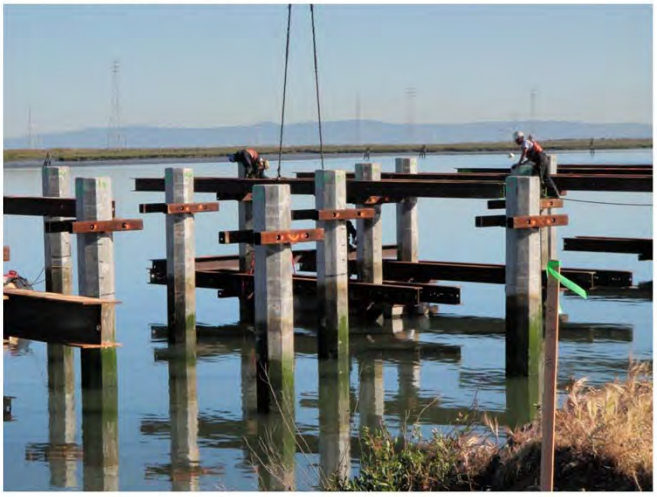
Construction Chronology

Setting falsework



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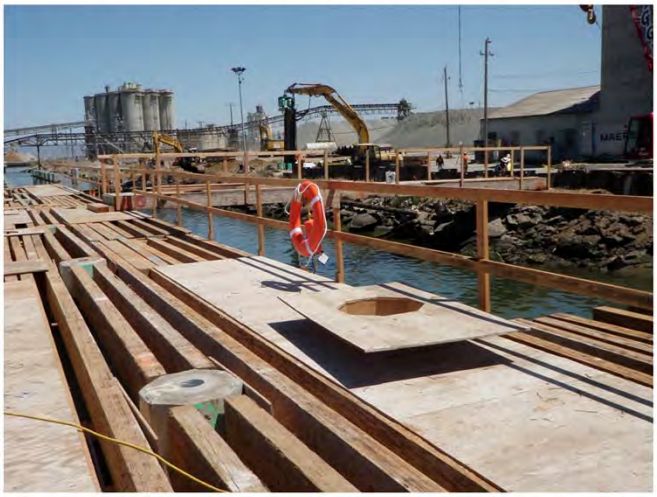
Construction Chronology

Concrete forming of new wharf



Pre-fabricated soffit panels

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Construction Chronology

Install rebar

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Construction Chronology

Pour concrete

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Construction Chronology

Form and pour wharf access ramps

Excavate for longshoreman building foundation

Pour Cell-Crete: longshoreman building foundation and wharf access ramp foundation

Construct longshoreman building

Install fusible PVC water and fire line

Install electrical, sewer, and storm water

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Section 5: Summary

Design-build successful, project cost over $1 million less than budget, permitting removal of entire existing wharf

Project expected to be completed on time and below budget

Source: Gerwick

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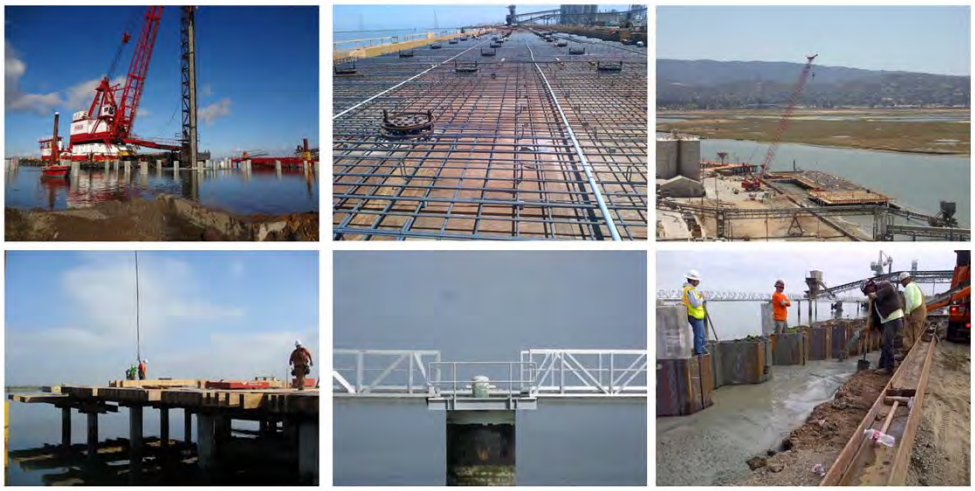
The design-build project delivery approach was successful for this project for both the design-build team and the Port and their team. The competitive design was over $1 million less than the budget, allowing the Port to demolish all of the original wharf structure. The project is expected to be completed on time and below budget.

Questions and Answers



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Thank You

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