
SR 520 Pontoon Construction
July 28, 2011
Aberdeen, WA

Credits

- Most of images and graphics provided by Kiewit—General but reformatted a bit.
- Images supplemented by J. Mahoney via July 28, 2011 site visit. All notes by JPM.
- Importantly, many thanks to Meagan McGrew along with her terrific Kiewit associates for the site visit arrangements.

Topics

- Introduction
- Casting Basin Construction
- Site Visit Views on July 28, 2011
- Pontoon Construction (as planned)
- Miscellaneous Project Information

Introduction

Project Management

- Phil Wallace, Project Director
- Cody Bishop, Contract Administrator
- Jeff Billows, Senior Project Engineer

Project Overview

Owner: Washington State Department of Transportation (WSDOT)

Contractor: Kiewit-General, a Joint Venture

Partners: Kiewit Bridge & Marine District, Sponsoring District (85%); Northwest District (12%); KECO (3%)

Contract Value: $367,330,000

Contract Model: Design-Build for the Casting Basin; Bid-Build for the Pontoon Construction

Pontoon Design: WSDOT Bridge & Structures Office

SR 520 Bid Results

SR 520 PONTOON CONSTRUCTION DESIGN-BUILD PROJECT
BEST VALUE DETERMINATION 4.5.1
BEST VALUE DETERMINATION EQUATION

Dec. 23, 2009

ABV $P - (SUM OF ALL TC)

CONTRACT: 7726
ENGINEER'S ESTIMAT $547,384,486.00
UPSET AMOUNT: $600,000,000.00

Where:
ABV = Apparent Best Value
$P = The Proposal Price from the Price Proposal B-1
TC = Assigned Technical Credits

$392,795,400

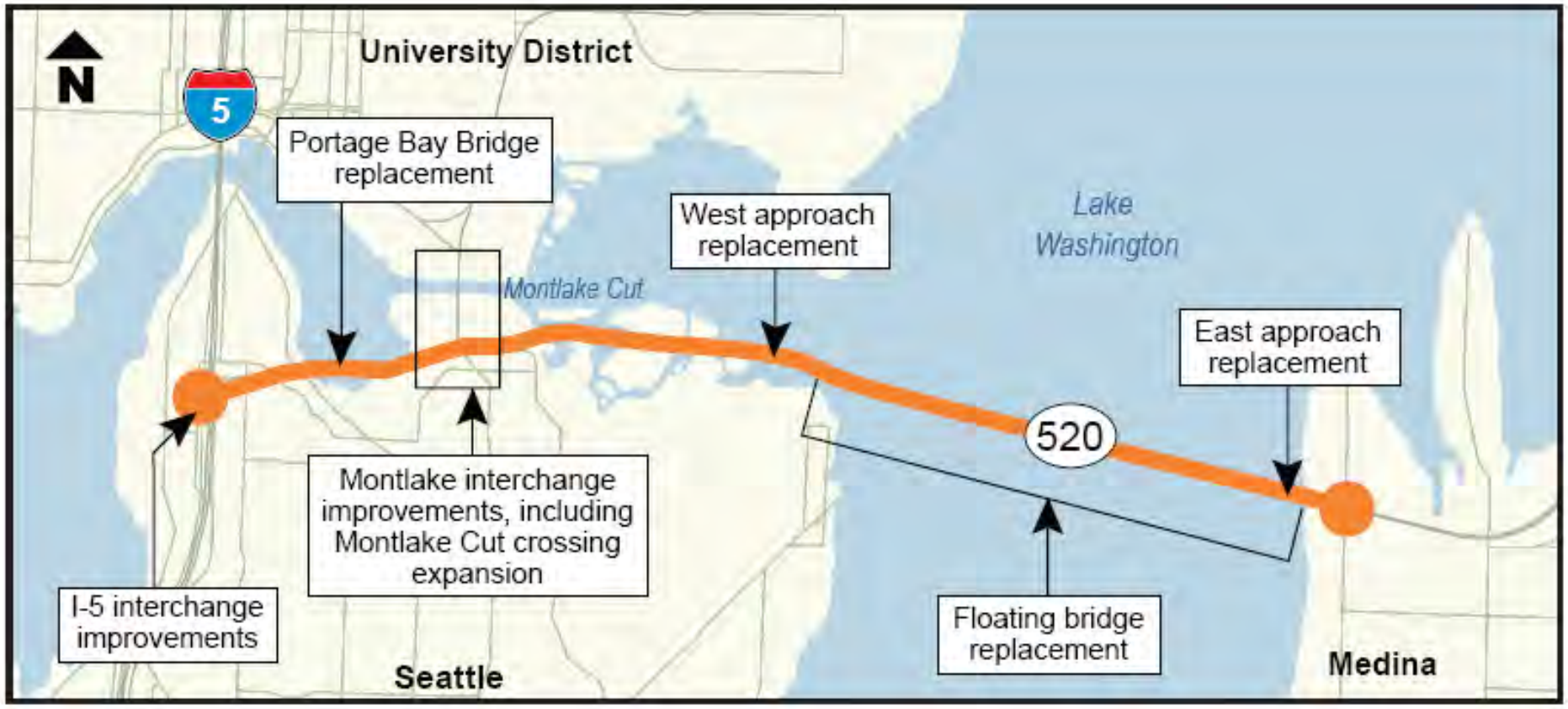
Apparent Best Value	Assigned Technical Credits	Proposal Price $P	PROPOSER NAME
419,311,000	45,883,000.00	465,194,000.00	Flatiron/Graham/Turner A Joint Venture
-18,093,300	18,504,600.00	411,300.00	Skanska/Mowat/Manson A Joint Venture
368,350,900	(1,020,900.00)	367,330,000.00	Kiewit-General A Joint Venture
470,000,000	80,000,000.00	550,000,000.00	Example Calculation

The successful Proposal will be the one calculated to have the lowest Apparent Best Value

APPARENT BEST VALUE DESIGN BUILDER Skanska/Mowat/Manson A Joint Venture
APPARENT 2ND BEST VALUE DESIGN BUILDER Kiewit-General A Joint Venture
APPARENT 3RD BEST VALUE DESIGN BUILDER Flatiron/Graham/Turner A Joint Venture

A PRICE PROPOSAL THAT EXCEEDS THE UPSET AMOUNT WILL BE CONSIDERED NONRESPONSIVE AND INELIGIBLE FOR AWARD!
UPSET AMOUNT:

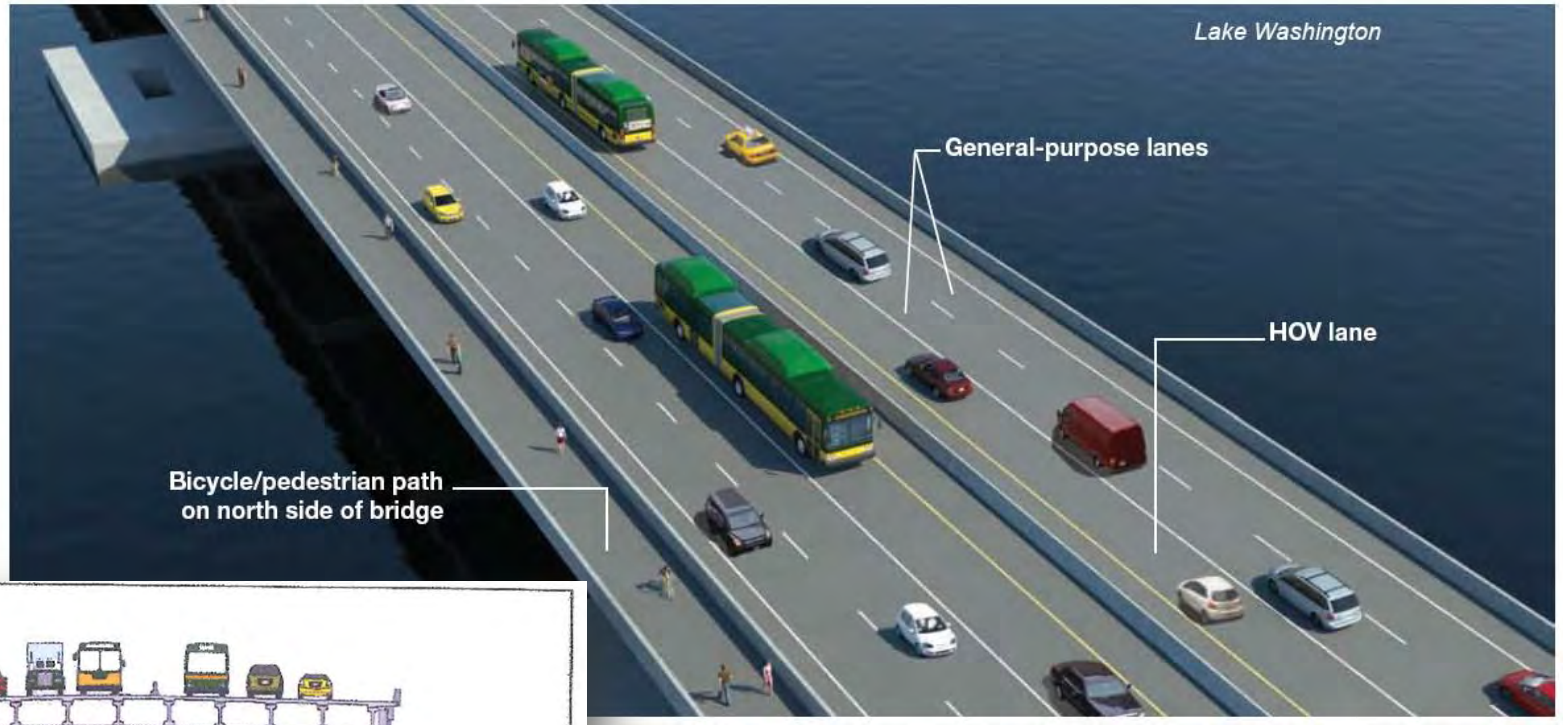
520 Bridge Floating Bridge Replacement

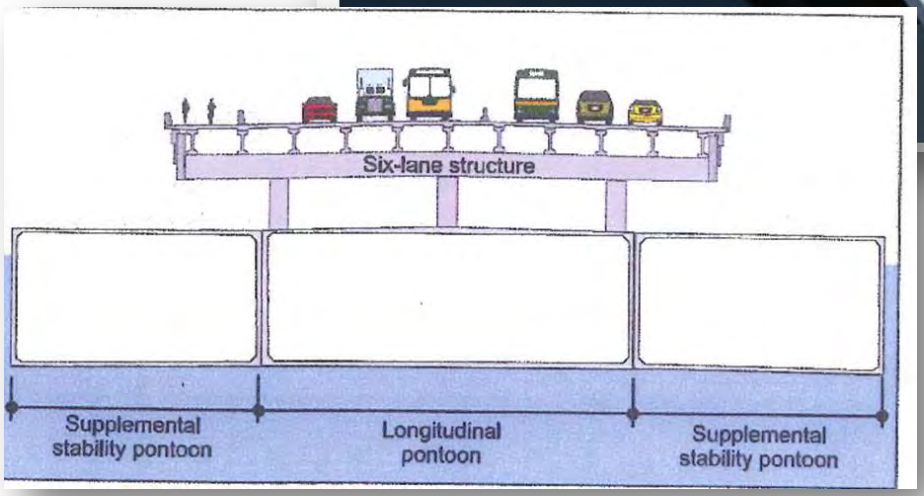


Pontoon Casting Project Location

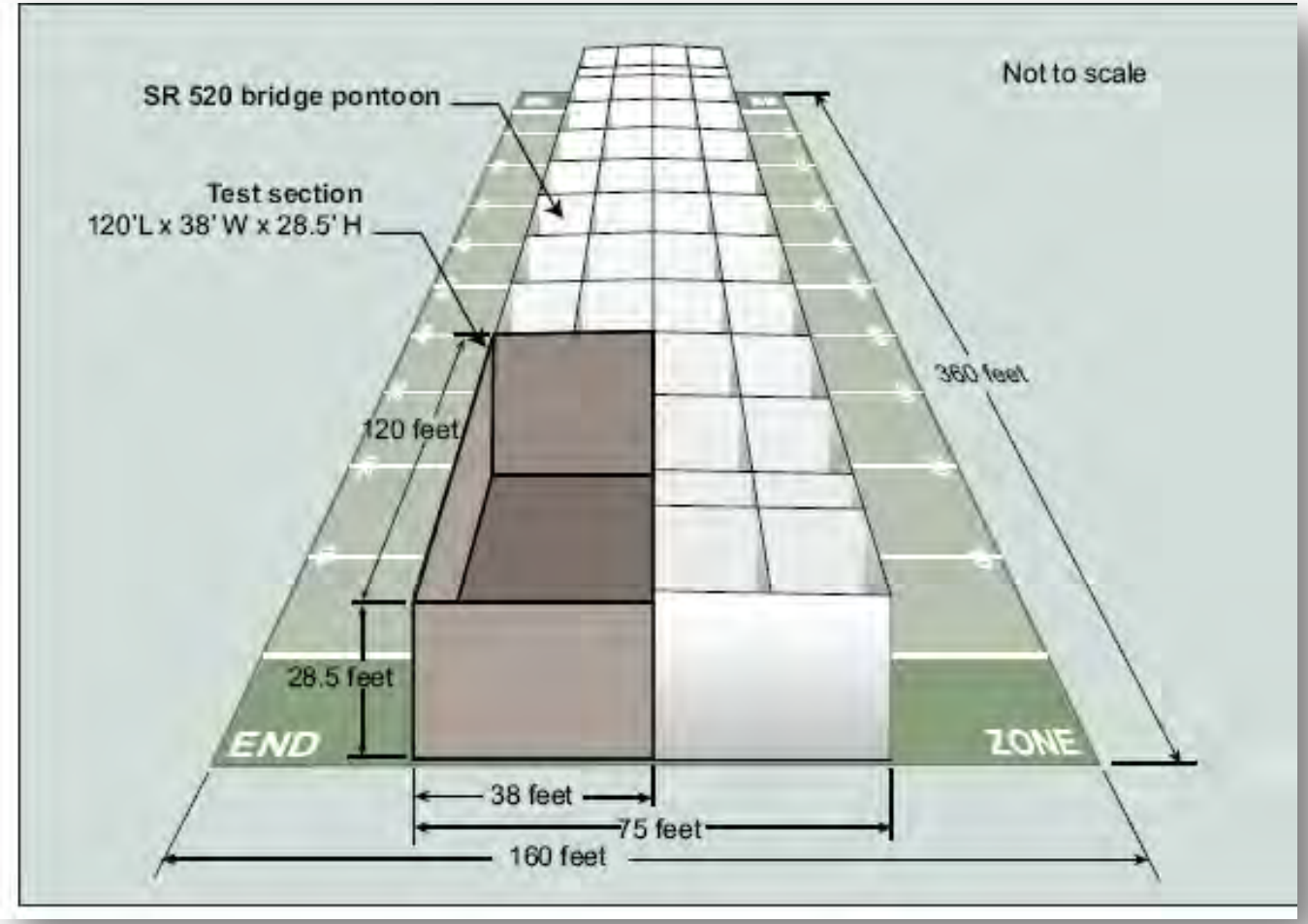
Pontoon Casting Project Location

Bridge Layout

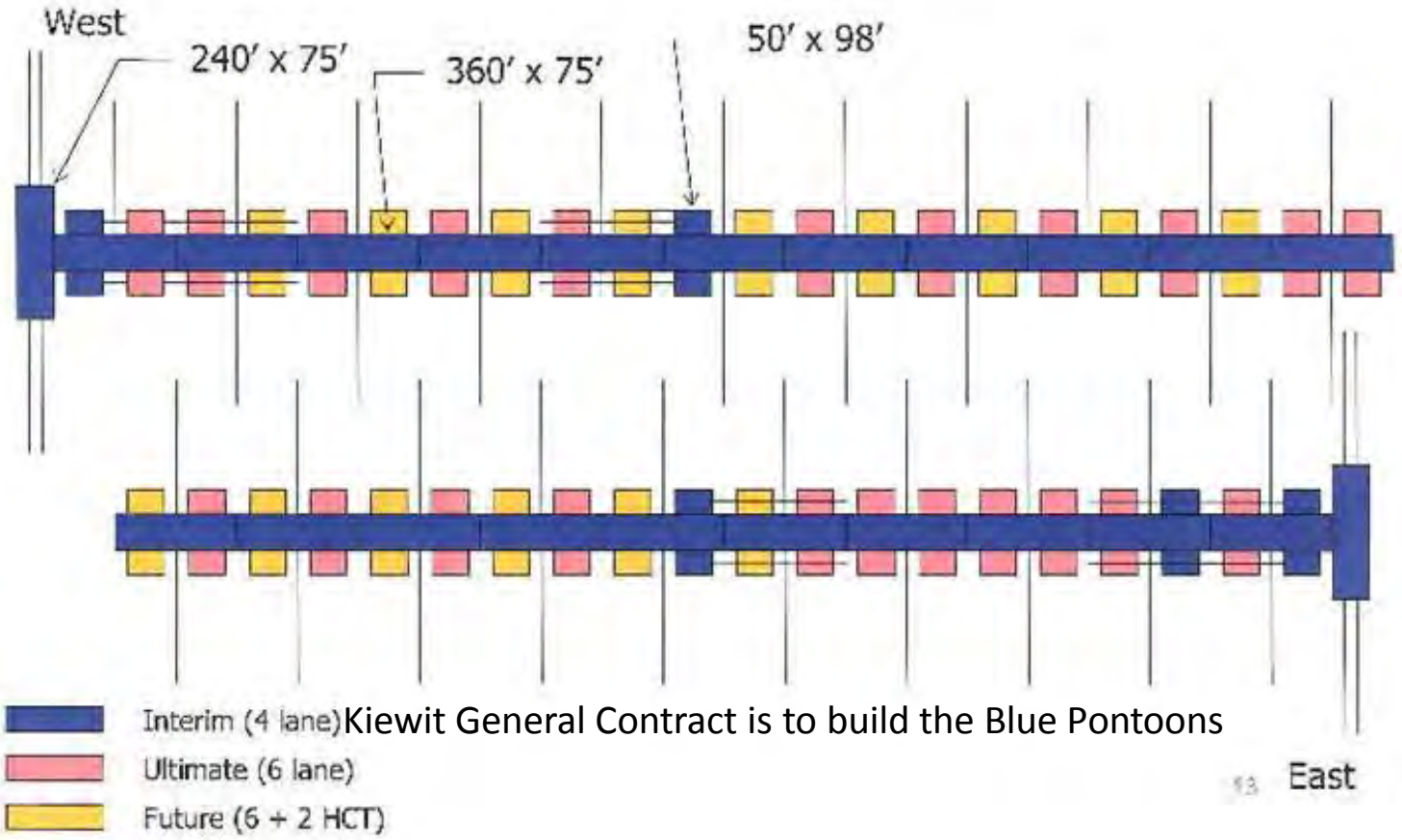




Bridge Section



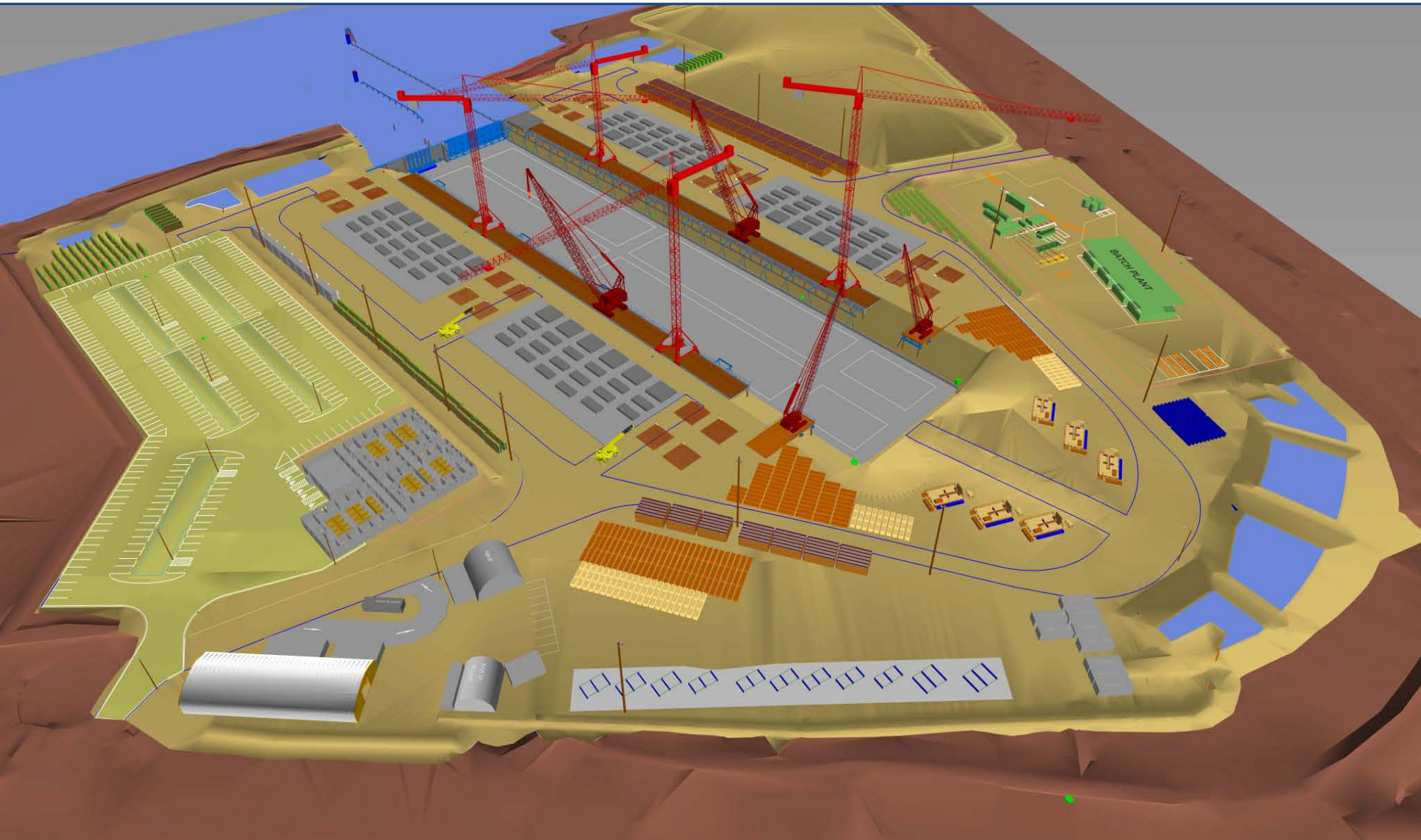
SR 520 Bridge Pontoon Configuration



Kiewit General Contract is to build the Blue Pontoons

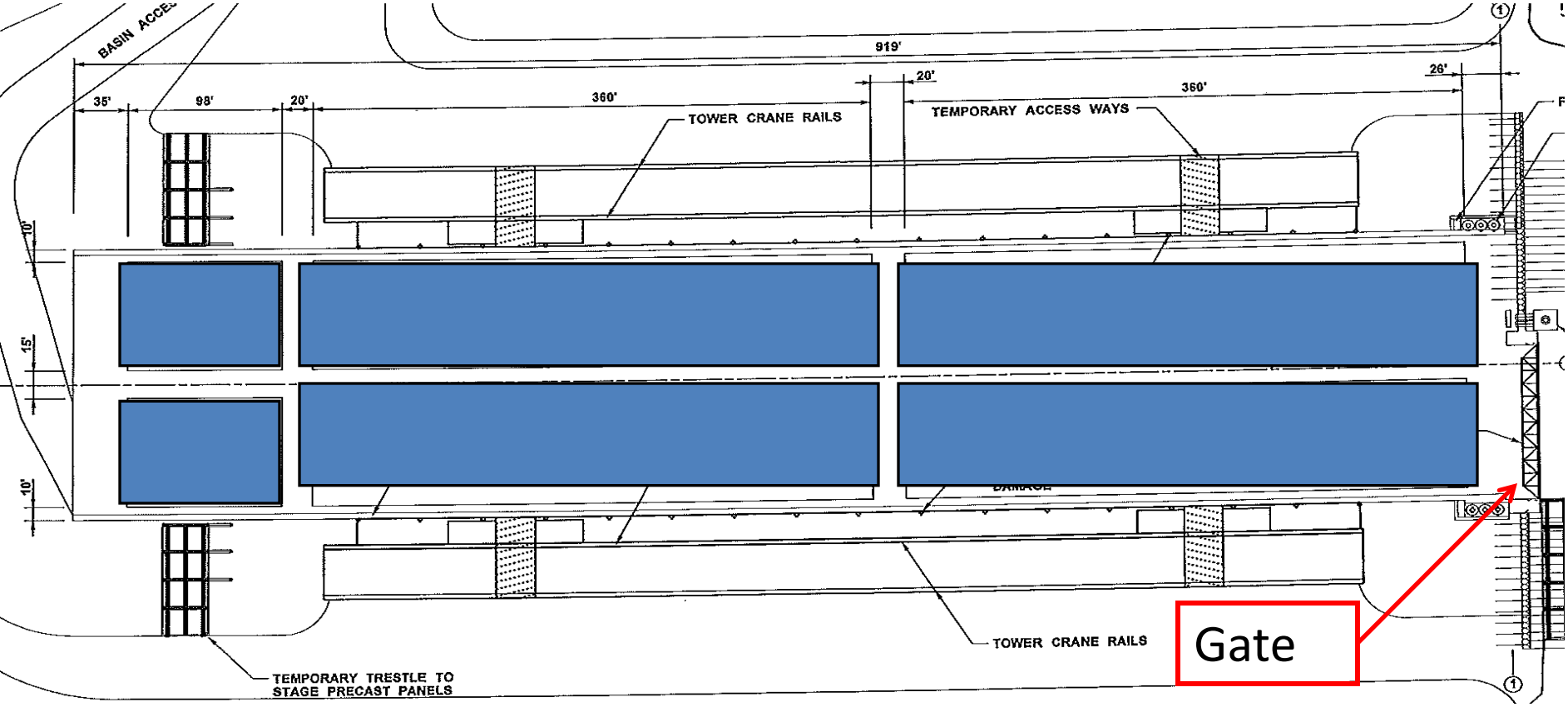
Casting Basin Layout

Casting Basin Layout

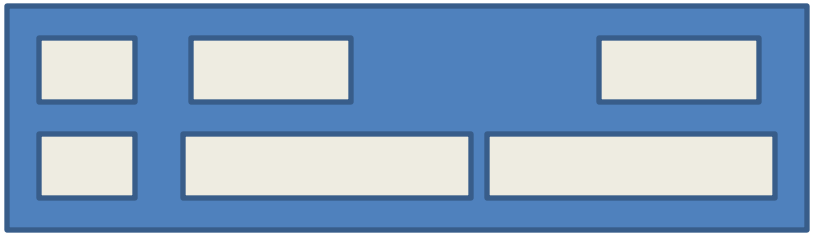


USS Nimitz

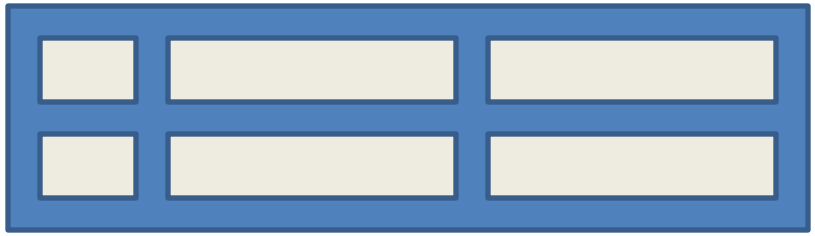
Kiewit-General Pontoon Cycle Layout



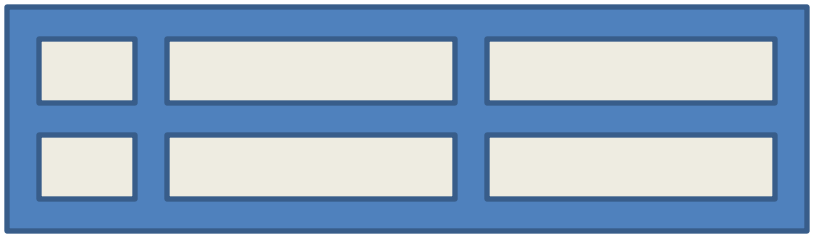
Kiewit-General Pontoon Cycles



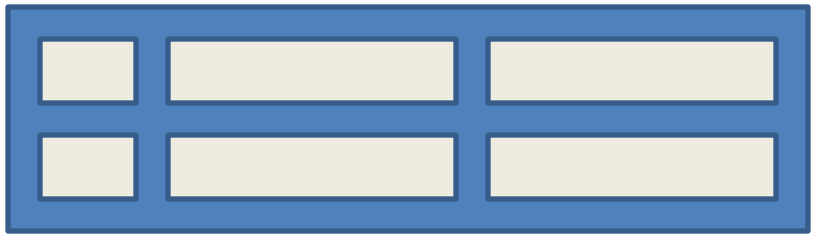
Cycle 1



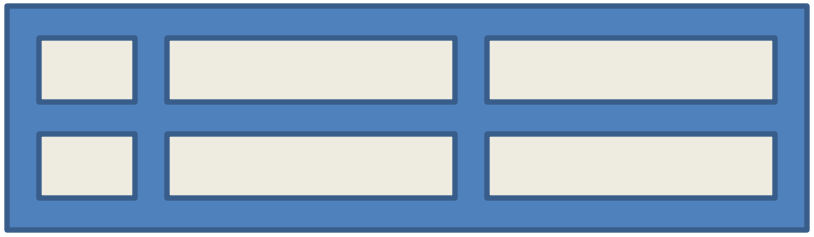
Cycle 4



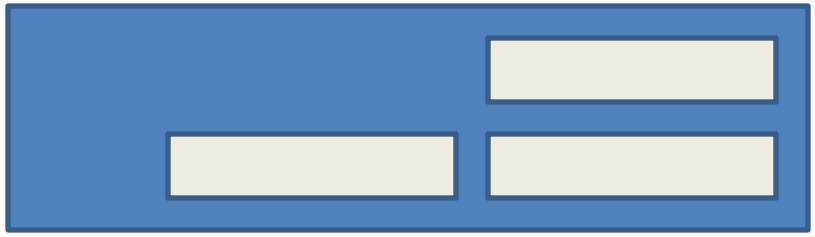
Cycle 2



Cycle 5



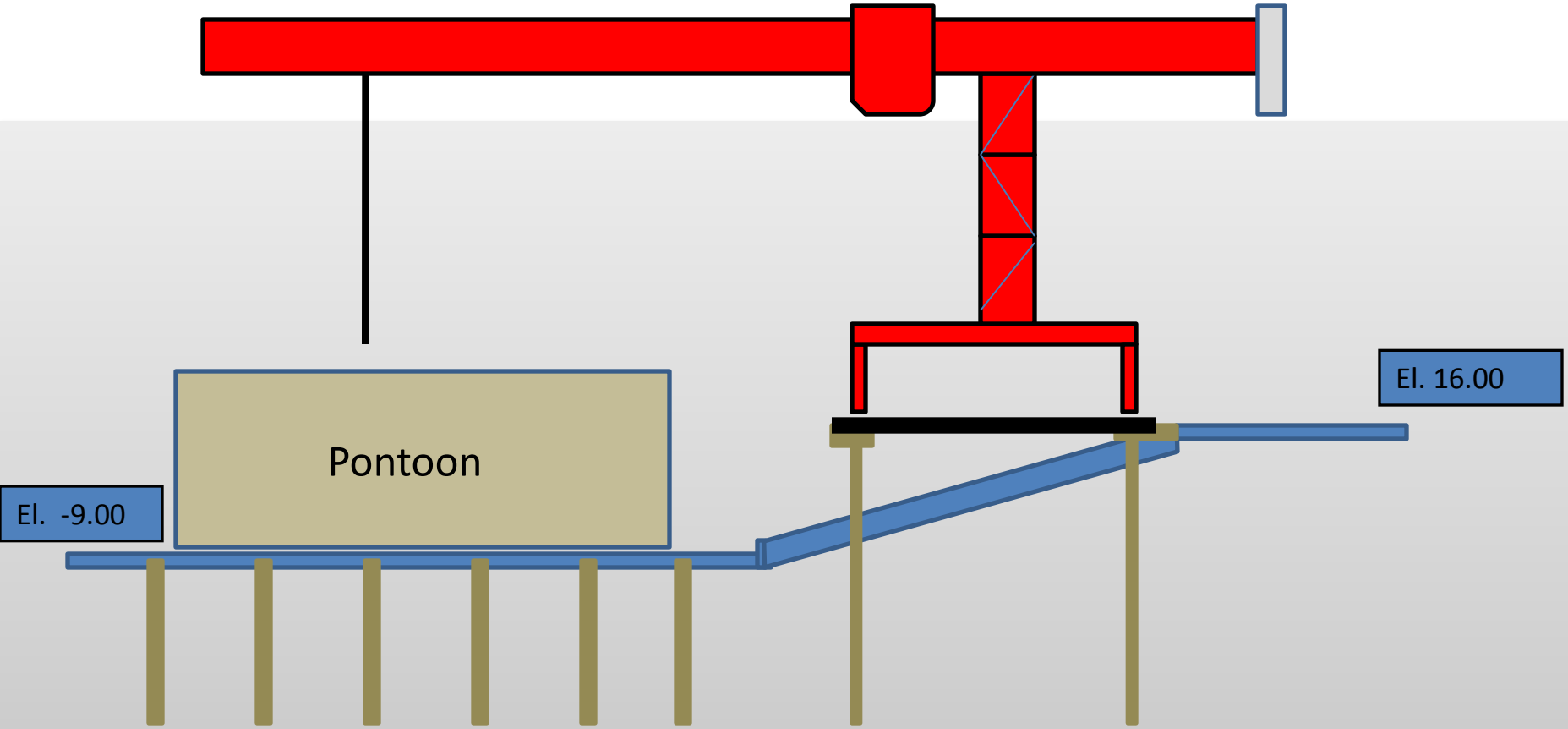
Cycle 3



Cycle 6

17,000 CY of concrete will be required to complete the 33 pontoons.

Crane Service for Pontoons



Kiewit - General Team Members

Design Subcontractors:
HNTB, Prime Designer
KPFF, Casting Basin Structural
Shannon & Wilson, Geotechnical
Floyd | Snider, Environmental
Columbia Sentinel, Naval Architect

Construction Subcontractors:
Pacific Coast Steel, Rebar
Grady Excavating, Trucking and Materials
Cal Portland , Batch Plant Concrete Redi-Mix
Farrow Construction, Casting Basin Slab
AVAR, Post Tensioning
Lakeside, Paving
Sleed Construction, Dewatering
PRR, Public Relations Consultant

Construction Suppliers:
Jesse Engineering, Gate and Pontoon Metals
Wayron, Casting Basin Piling/Basin Metals
Bay View Concrete, Casting Basin Concrete
Fibergrate, FRP Walkways

Casting Basin Construction

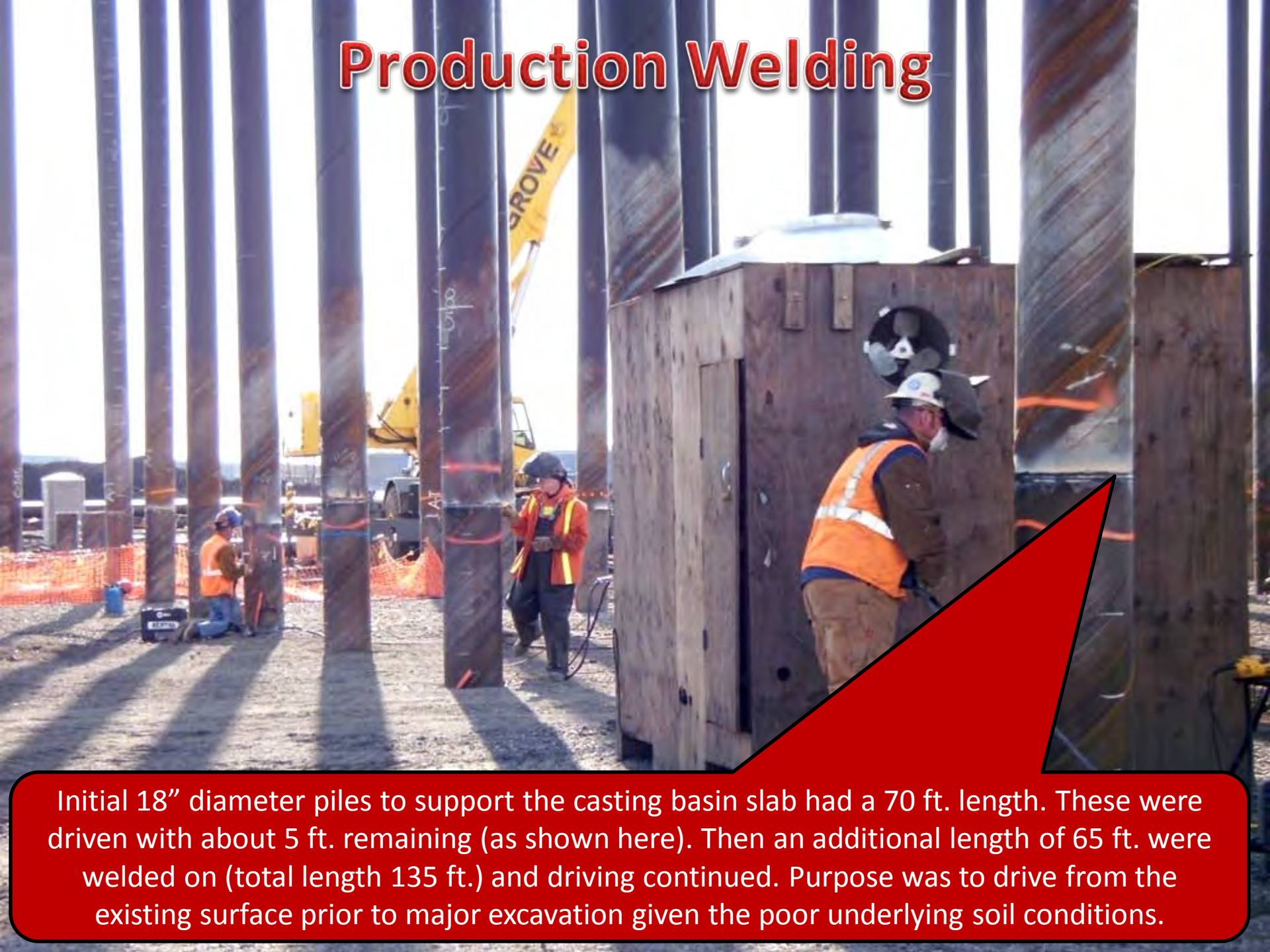
The Site—February 17, 2011

A Wet Site

Dewatering

Pile Driving

Production Welding



Initial 18” diameter piles to support the casting basin slab had a 70 ft. length. These were driven with about 5 ft. remaining (as shown here). Then an additional length of 65 ft. were welded on (total length 135 ft.) and driving continued. Purpose was to drive from the existing surface prior to major excavation given the poor underlying soil conditions.

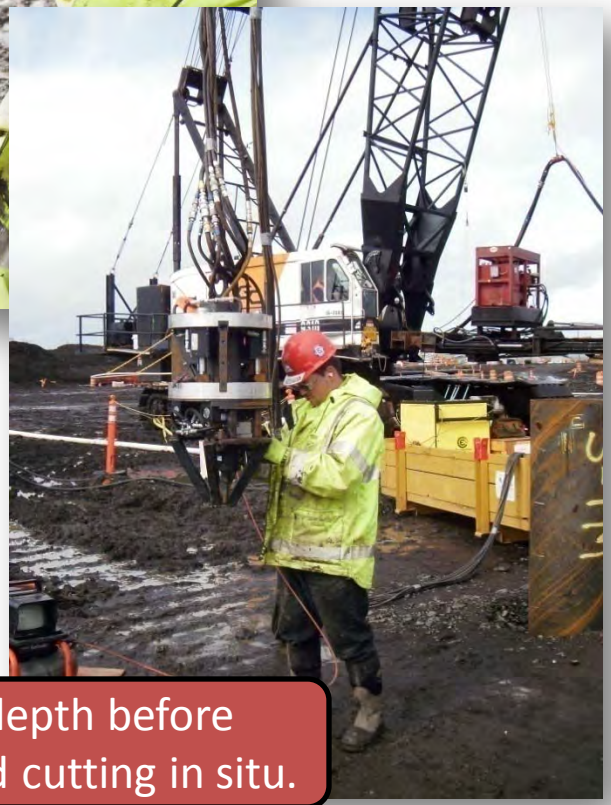
A Forest of Piles

705—18” piles were driven for the casting slab and jamb.

Delmag D62 Diesel Pile Hammer

Hammer used to drive most of pipe piles. Energy per blow range 79,000 to 165,000 ft-lb

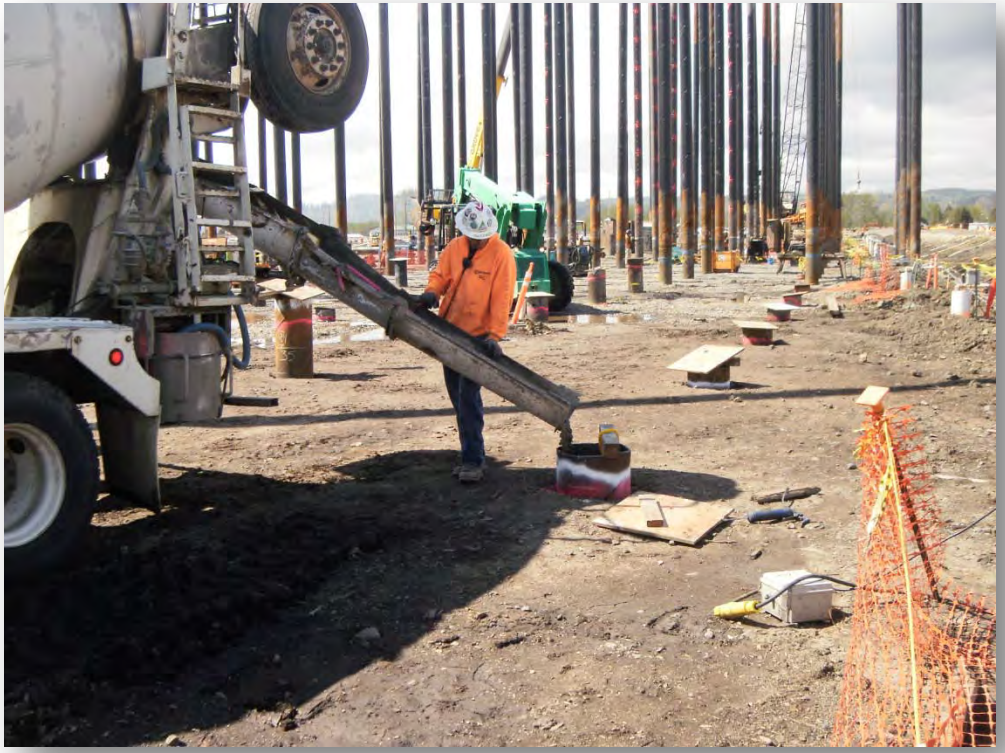
Pile Cutter



Cutting test in progress

Note: Piles were driven to required depth before excavation of the basin—hence required cutting in situ.

Plug and Pull Piles



Drainage System

Drainage Ponds

Excavation

Required removal of 260,000 CY with a depth of 25 ft.

Excavation

Hitachi 1200 – 8 CY Bucket

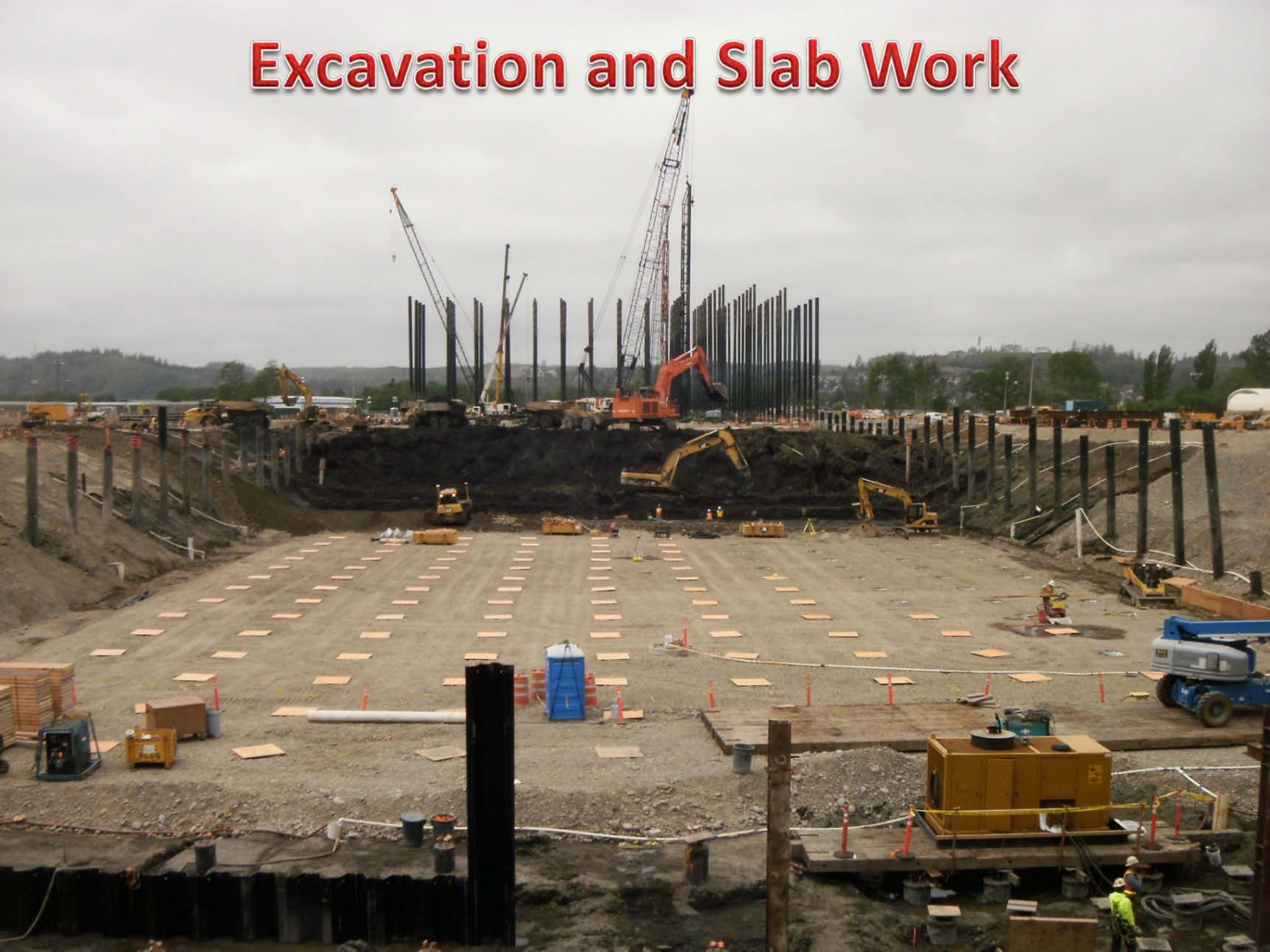
GPS Survey Control

Excavation at Gate

On Site Stockpile

Permanent Sheet Pile Wall at Gate

Excavation and Slab Work



Rebar Installation for Base Slab

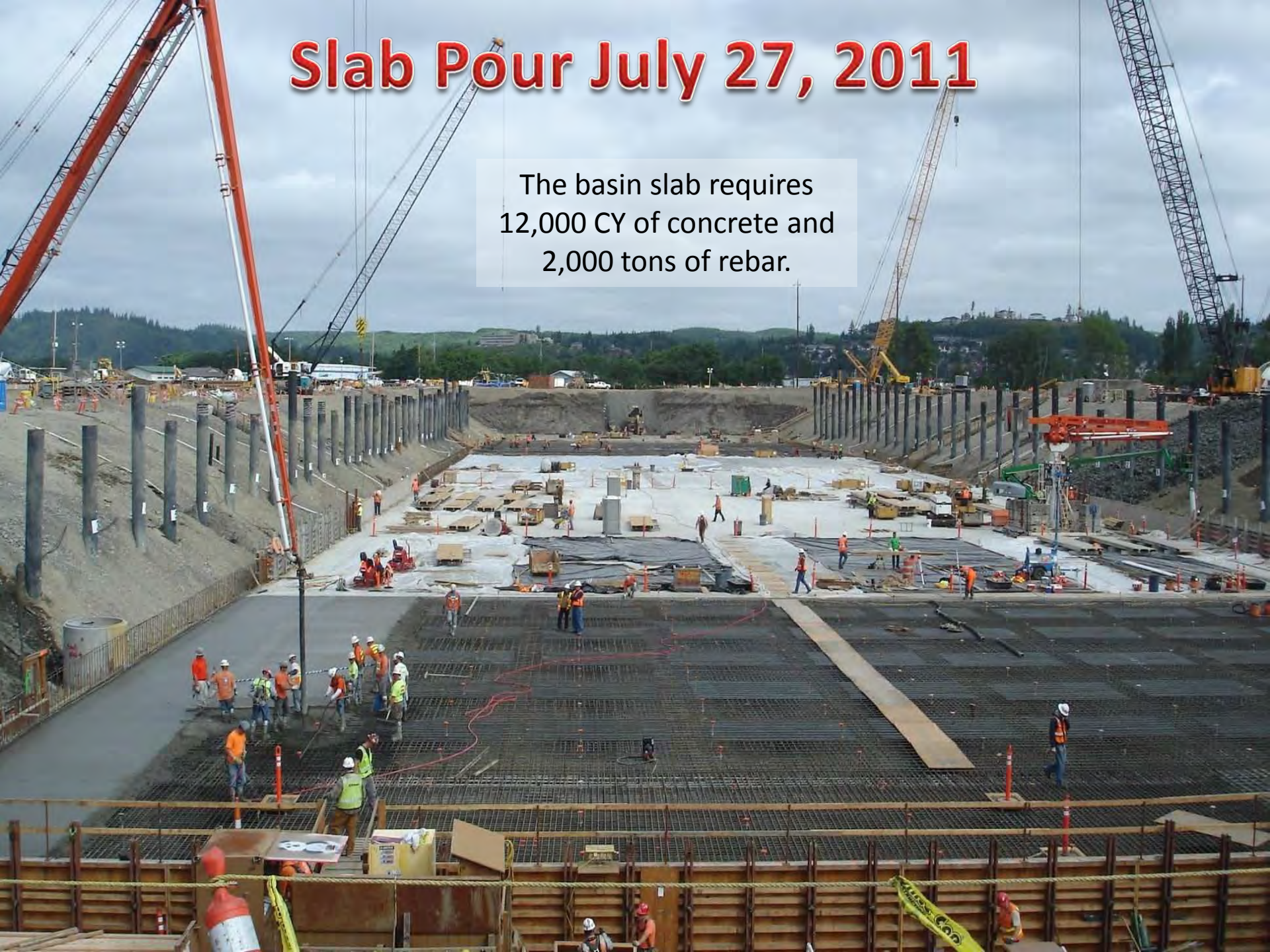
Rebar Installation—July 28, 2011 Site Visit

First Base Slab Pour – July 8, 2011

Slab is 18” thick

Pile Caps for Basin Slab Support

Slab Pour July 27, 2011



The basin slab requires 12,000 CY of concrete and 2,000 tons of rebar.

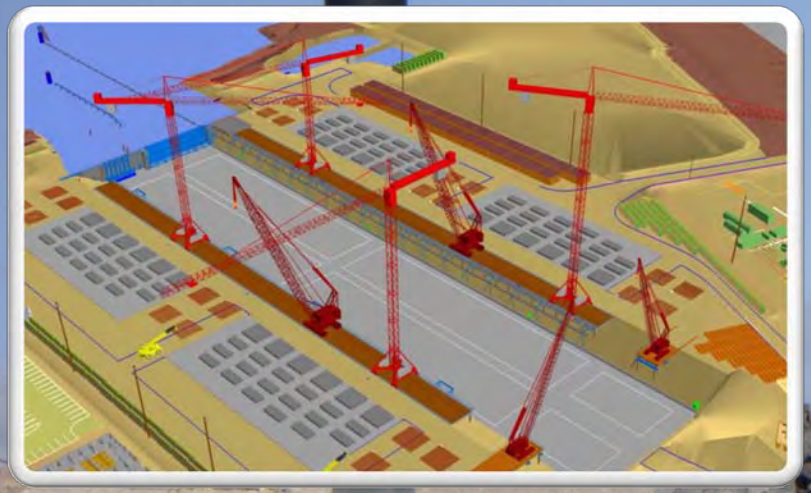
Finishing the Slab

Starter Wall

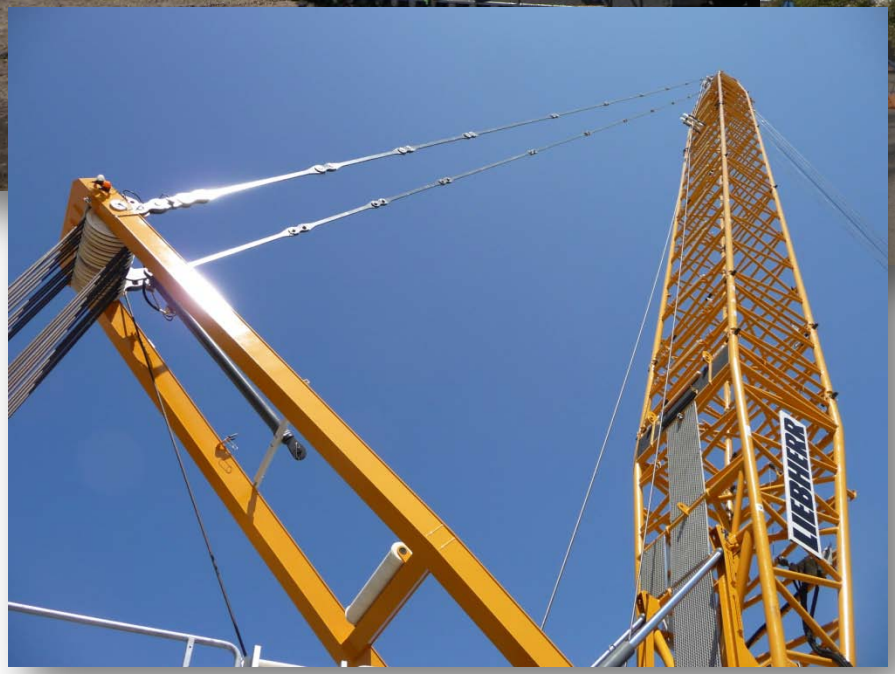
Side slope rip rap will key into this wall.

Rip Rap On Slope

Start Crane Beam Falsework

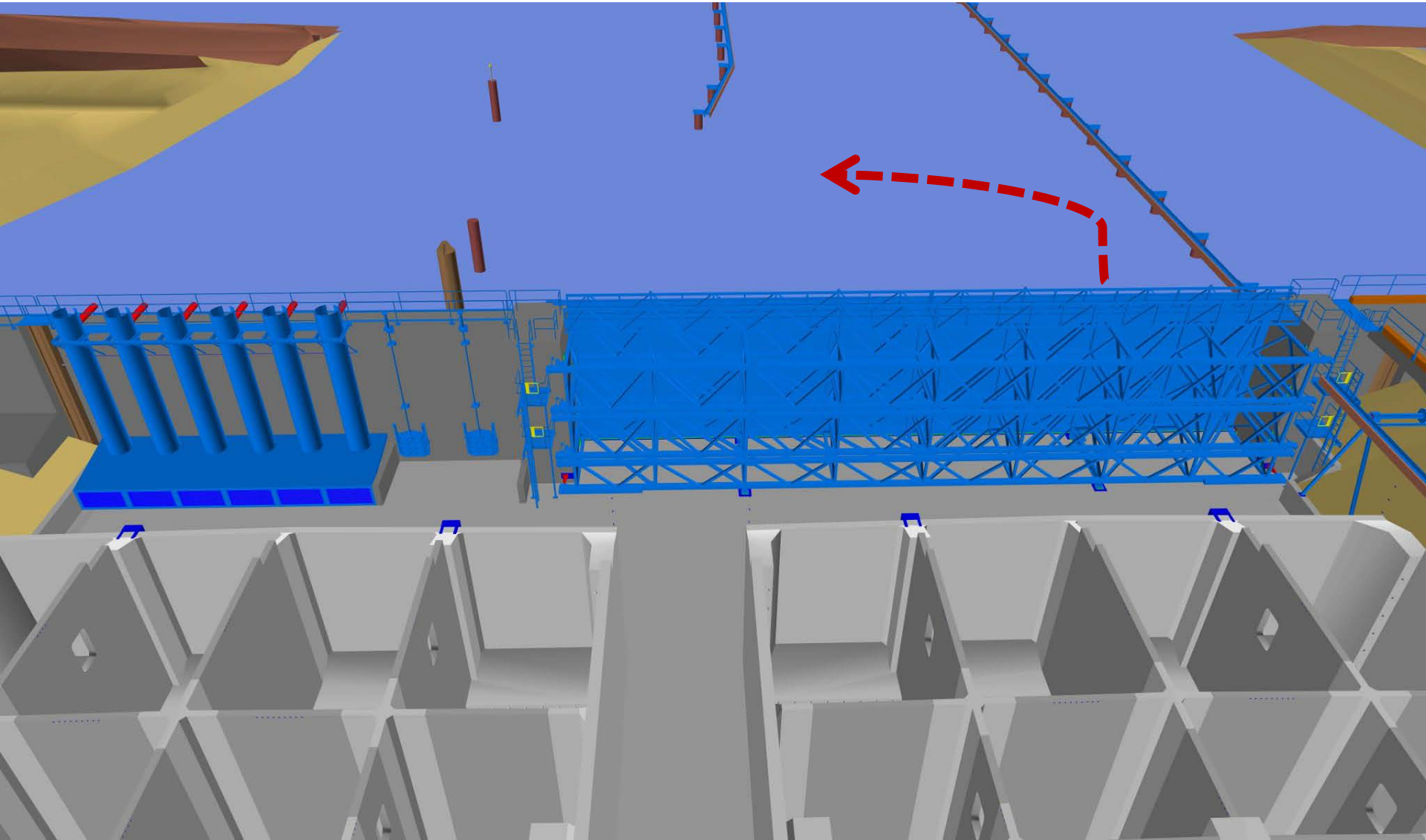


Liebhrer 1300 Crawler Crane Set Up

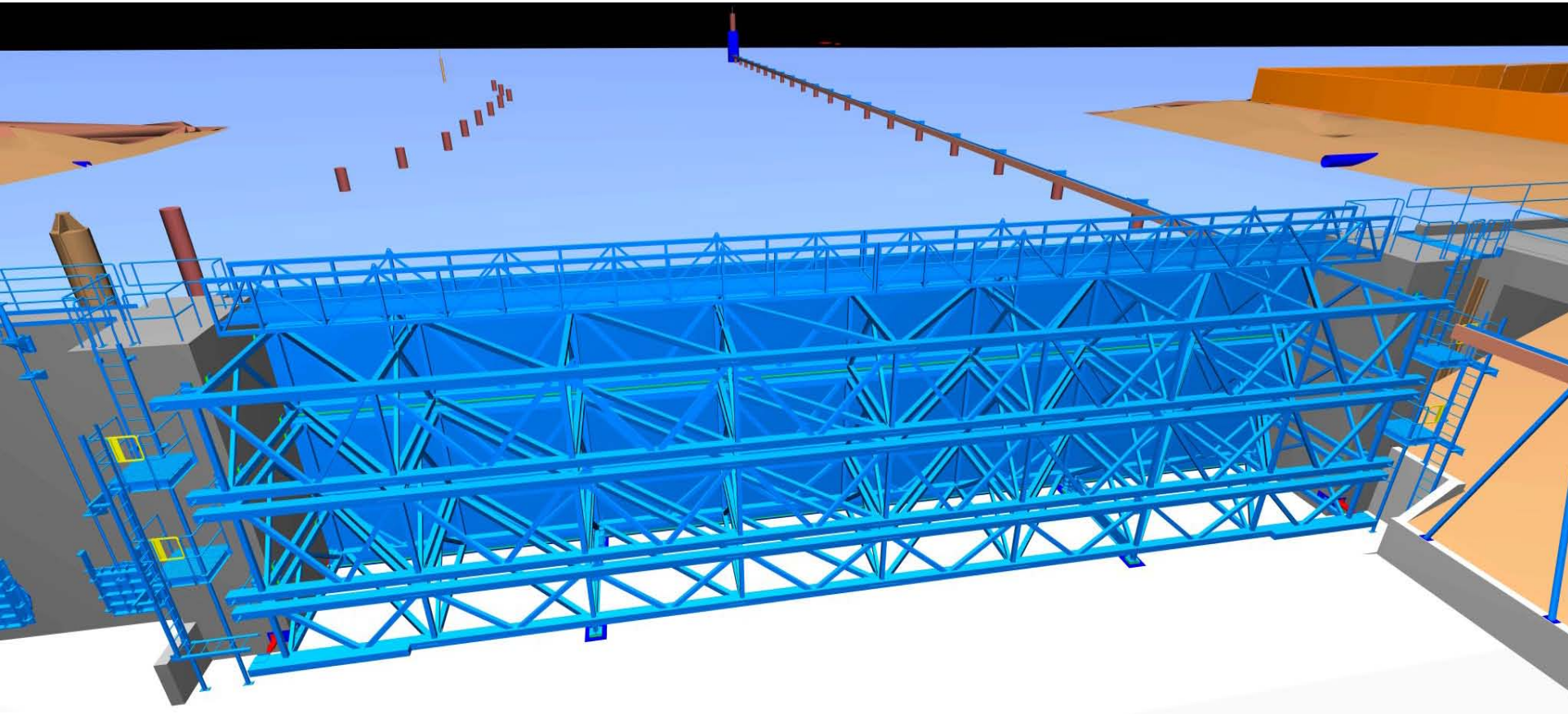


Erect On Site Batch Plant

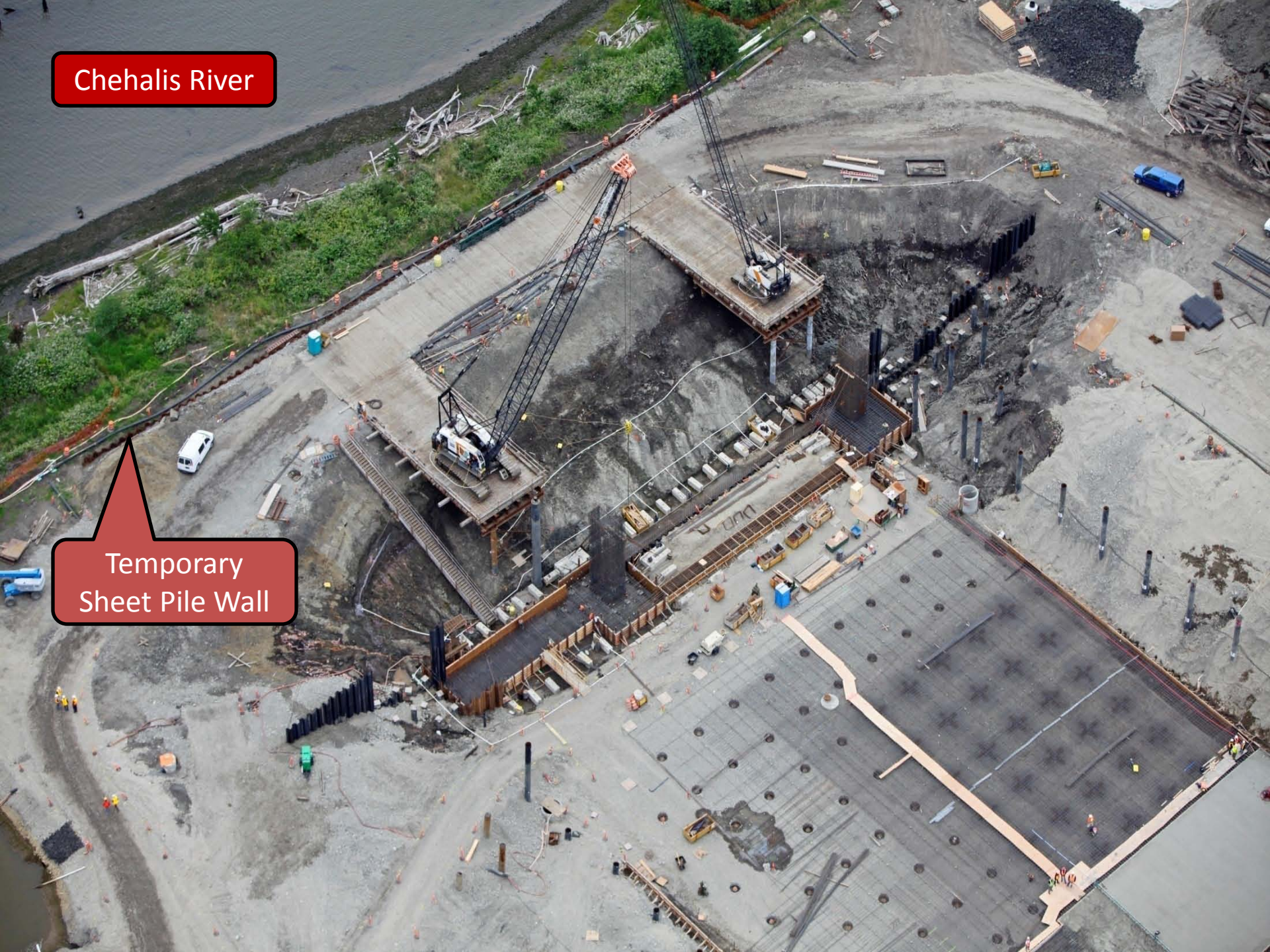
CAD Rendering – Gate Area



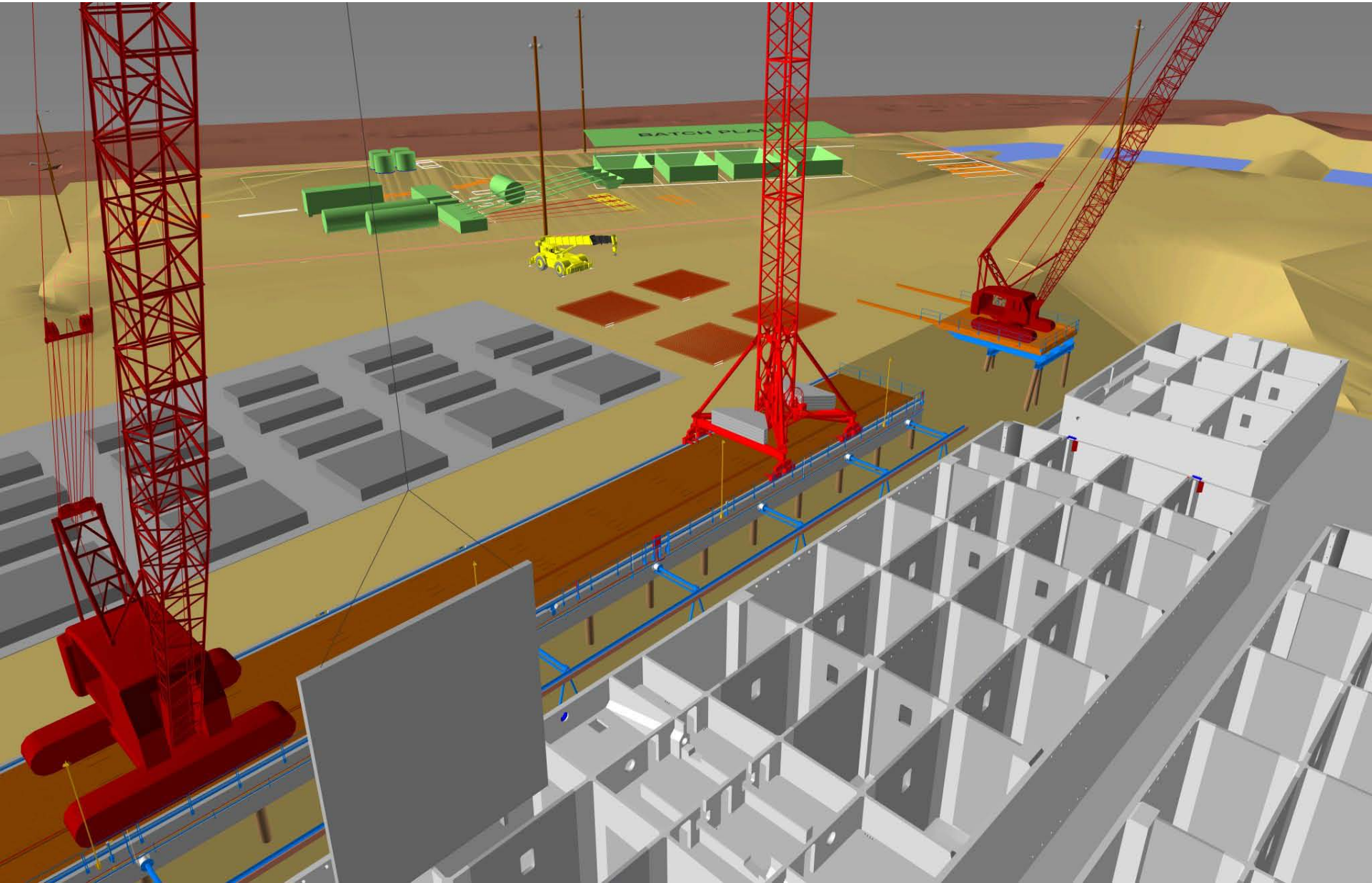
CAD Rendering – Gate



Sill and Jamb work for Gate


Chehalis River
Temporary
Sheet Pile Wall

CAD Rendering – Pre Cast Areas



Excavation Complete

Additional Site Views
July 28, 2011


Detention Ponds
View to West


Haul road dust control

Assembly and storage of pontoon formwork

Assembly of pontoon formwork

Assembly and storage of pontoon formwork

Maintenance Shelter


Note piles for crane rail support

Short wall formwork installation

Short wall formwork removal

Concrete pump support

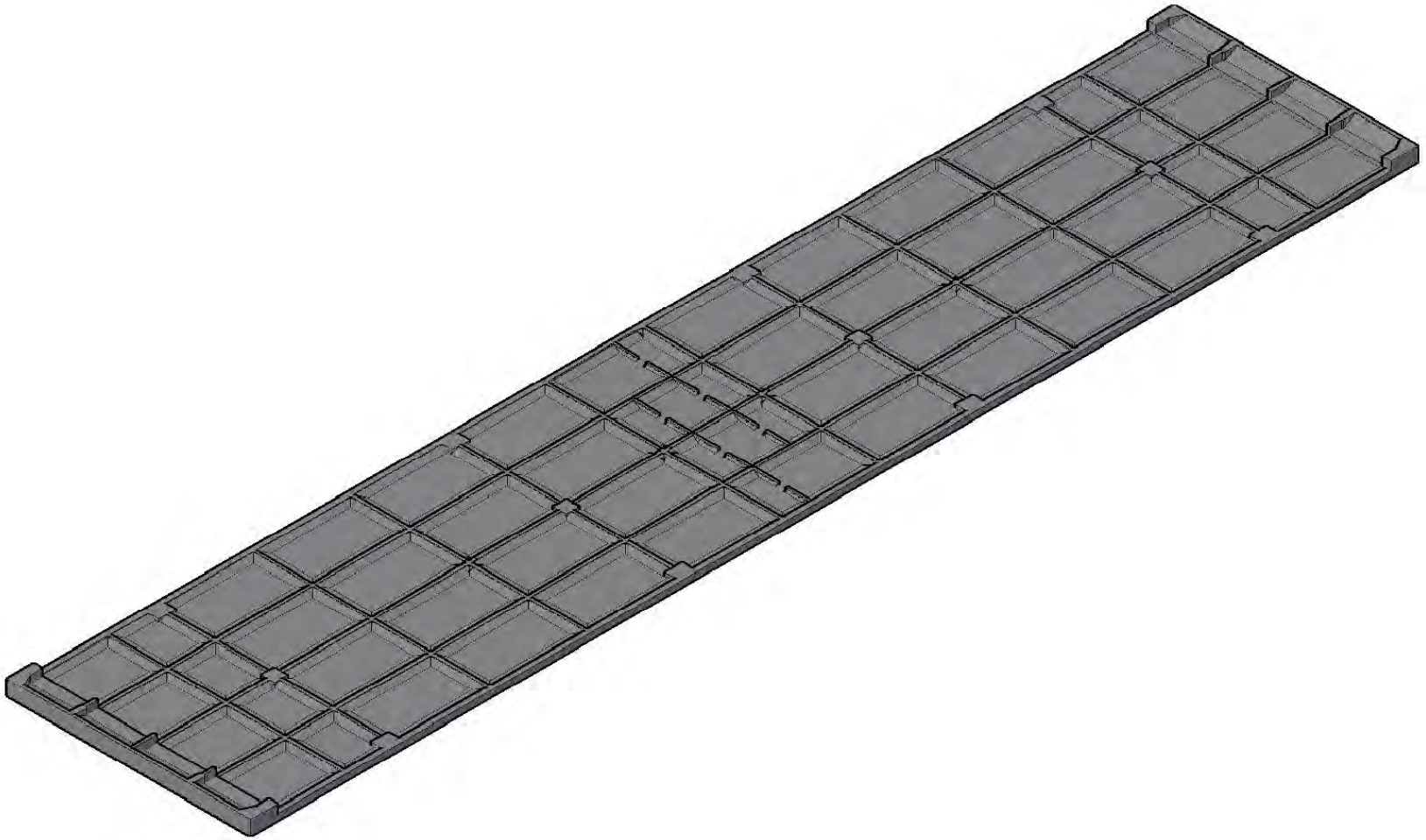

Filter for rip rap
In situ materials


Rip rap slope protection

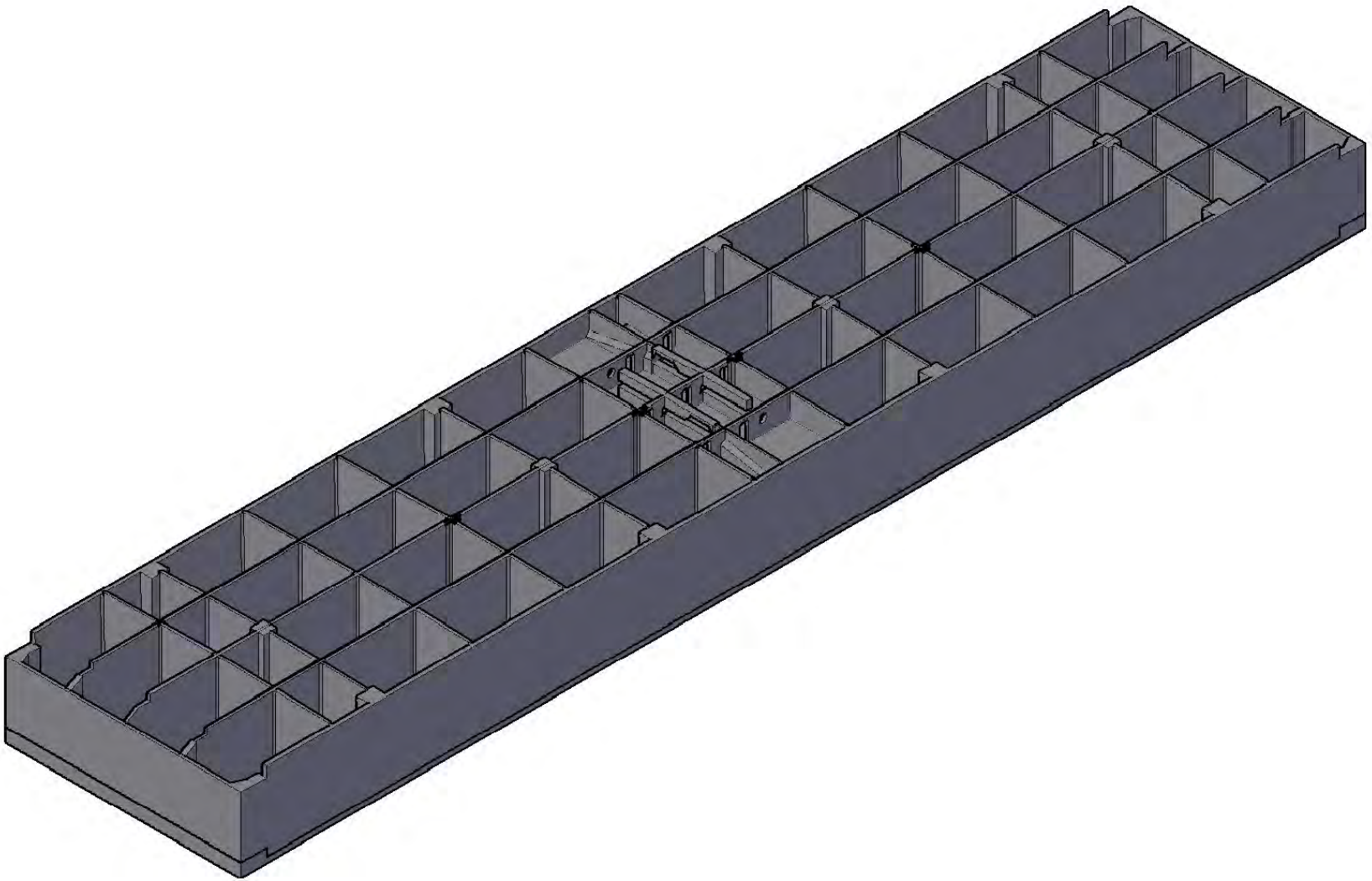

Falsework for gate construction

Pontoon Construction (as planned)

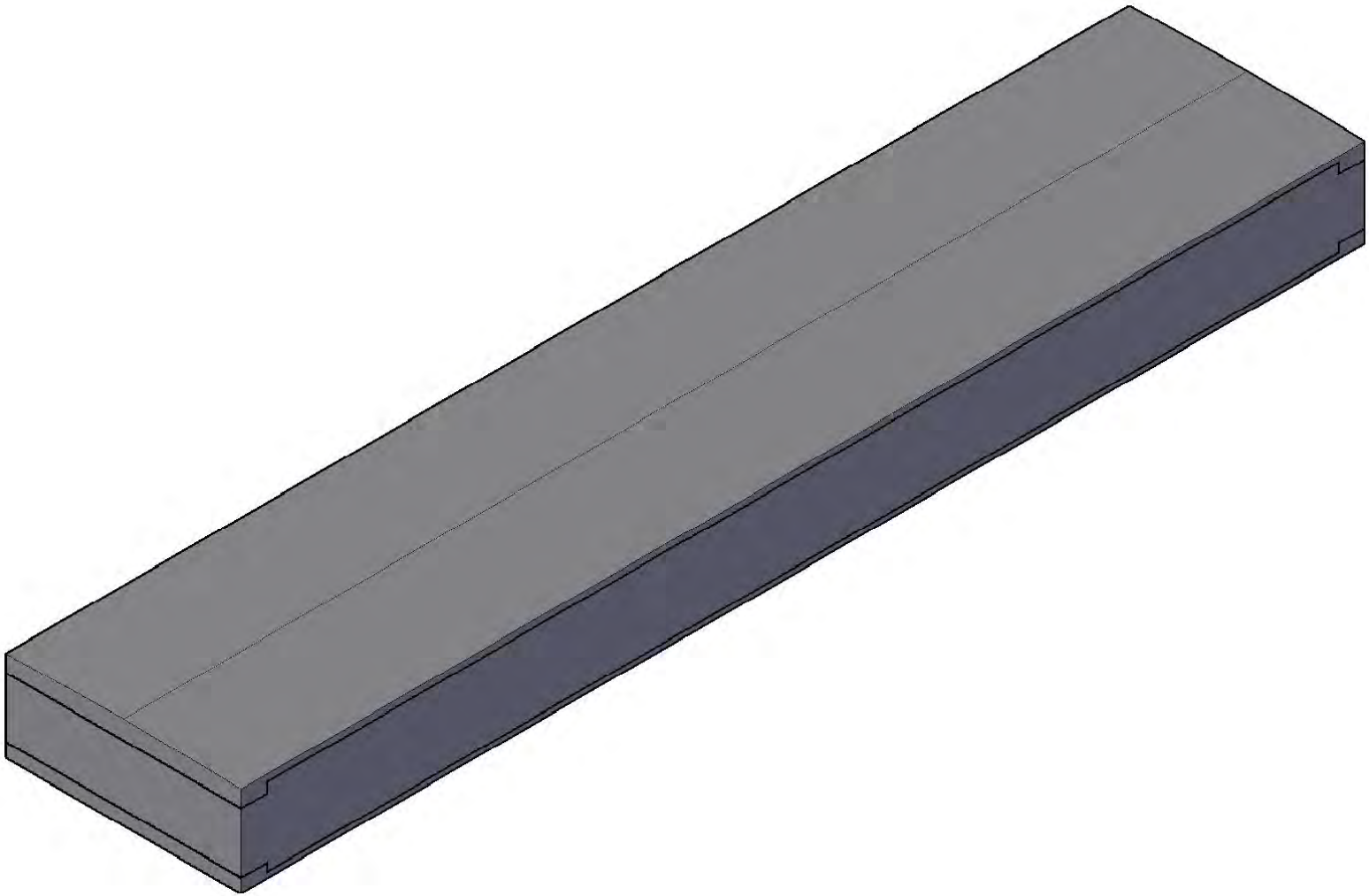
Keel Slab



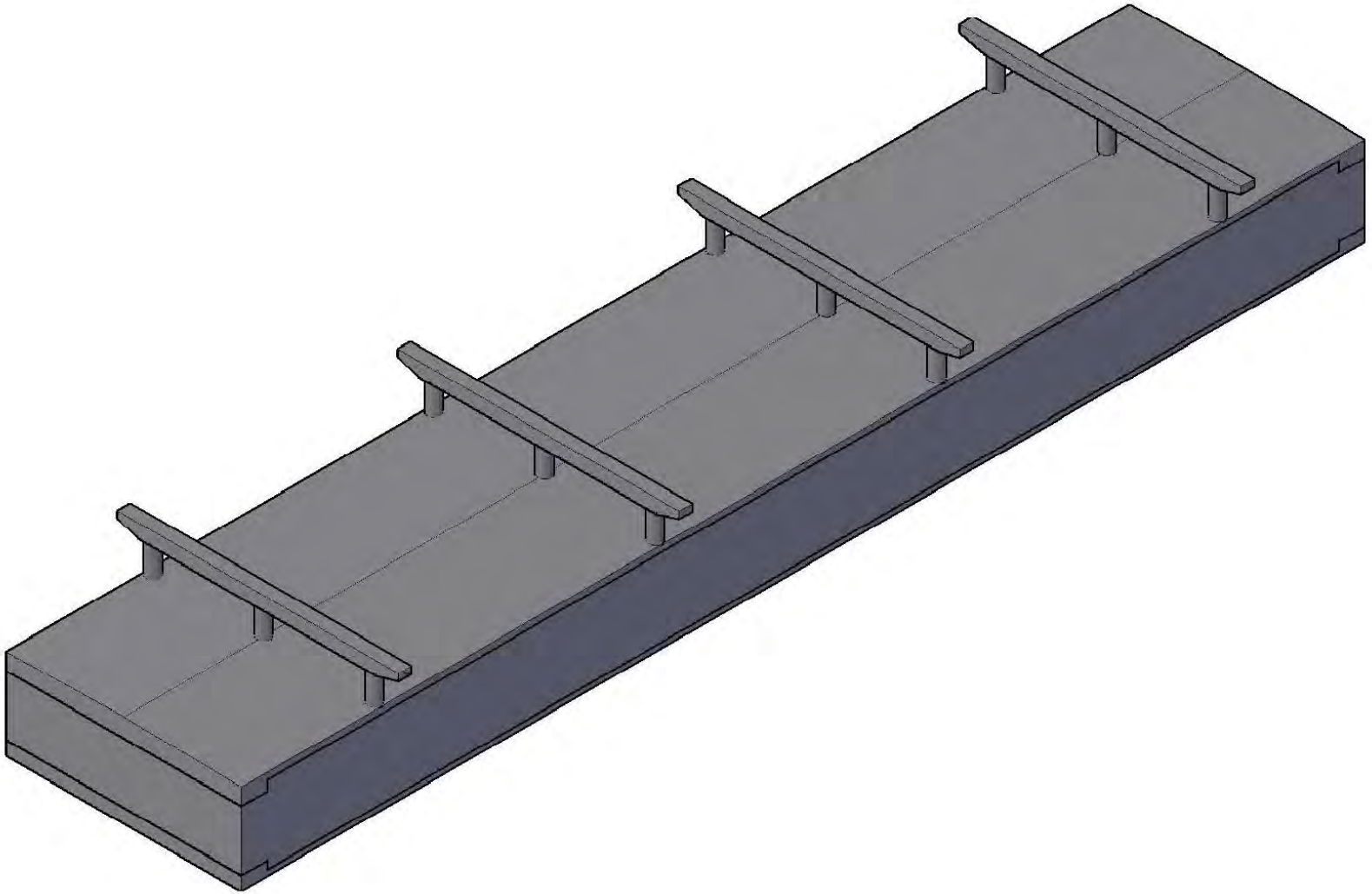
Walls



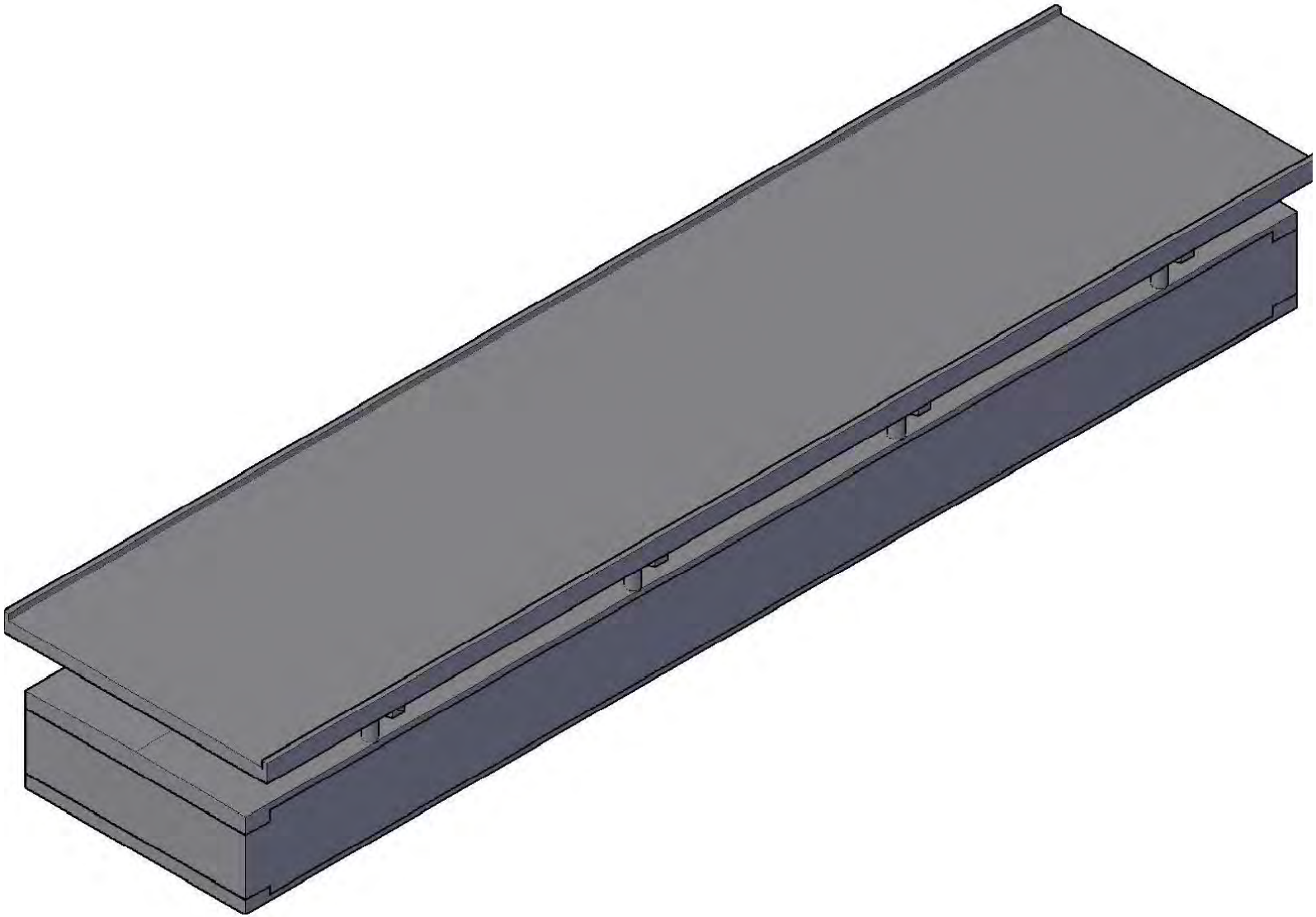
Top Deck



Columns and Caps

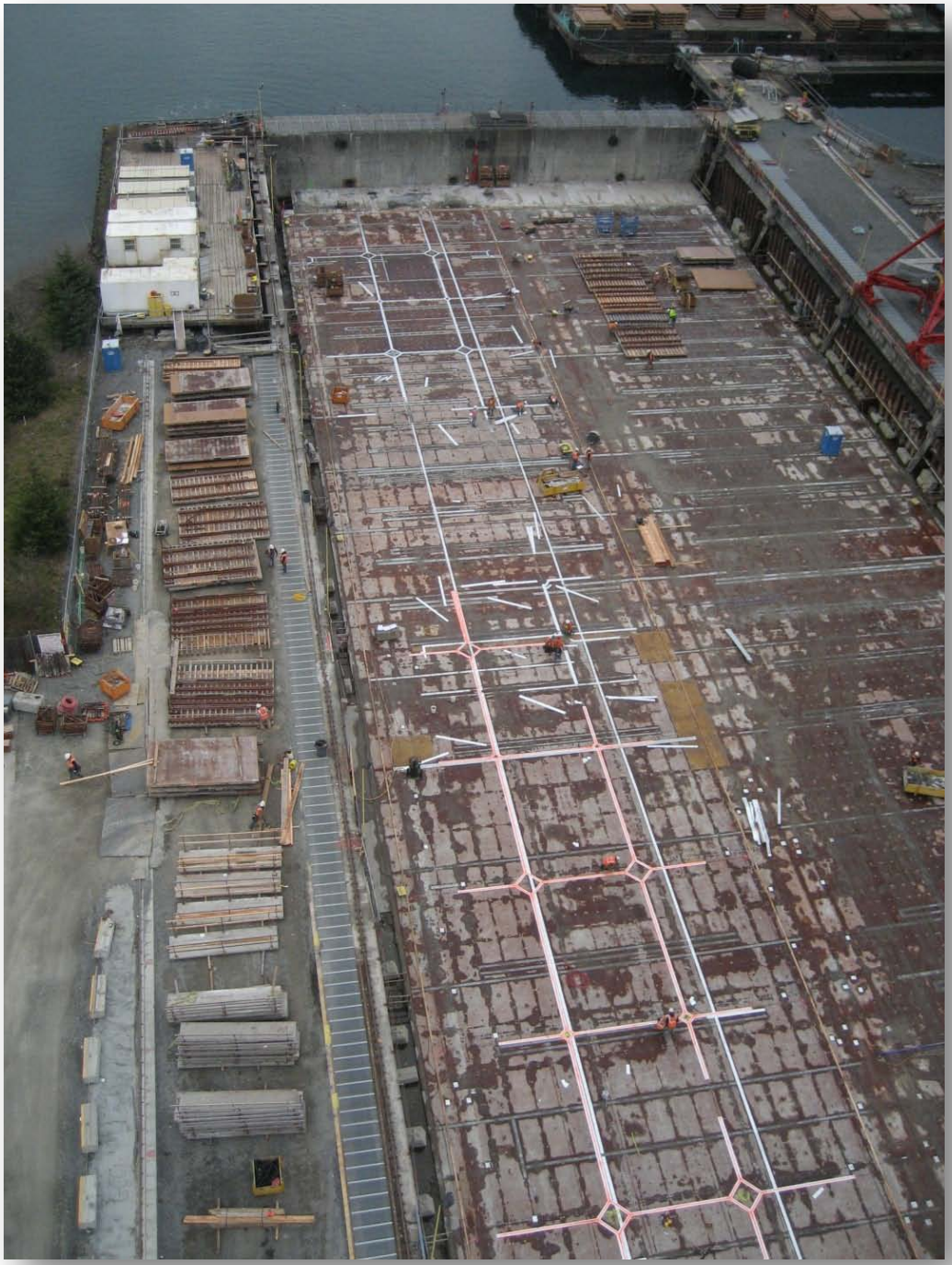


Roadway



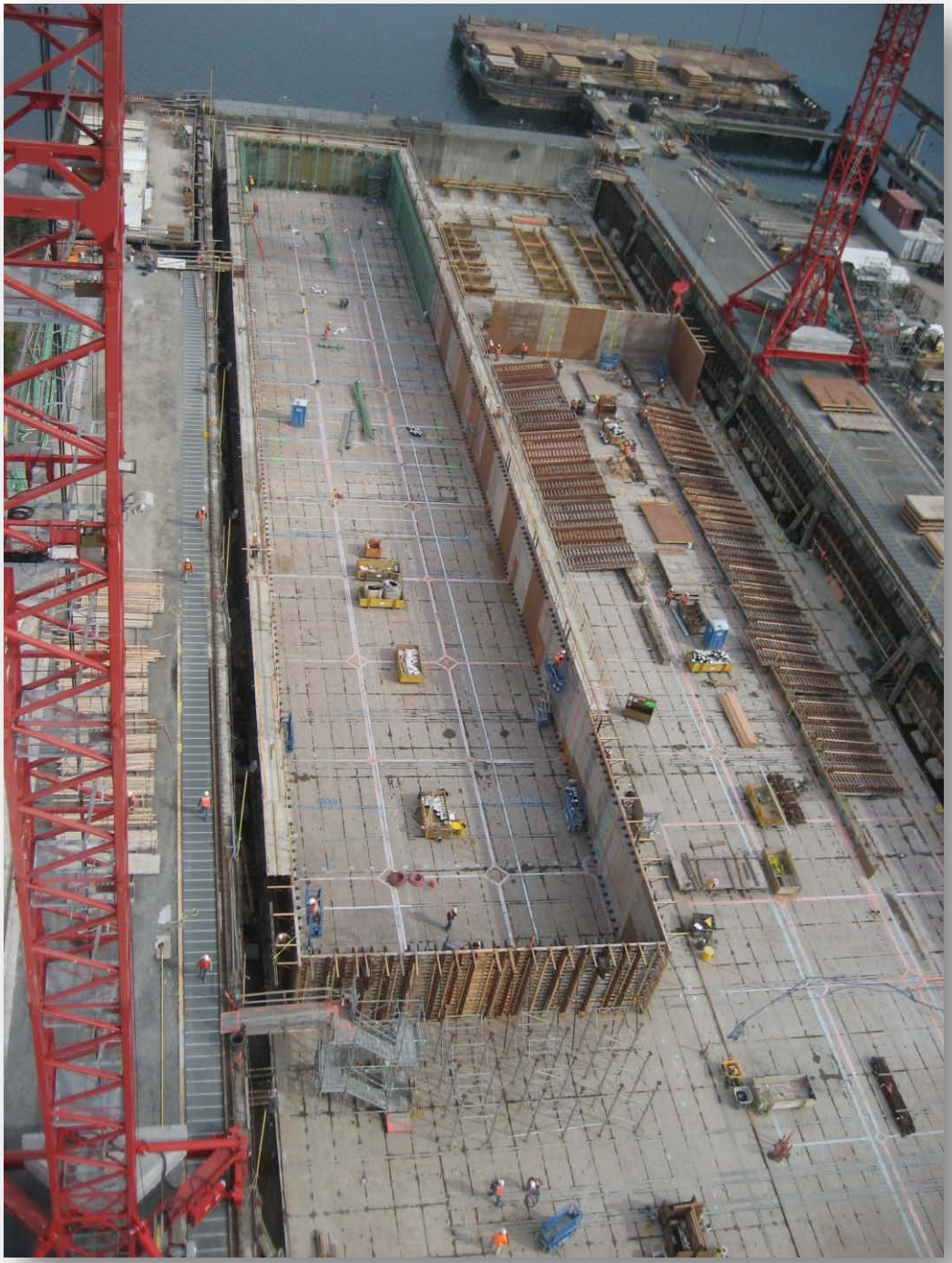
How they will be built

1. Install bondbreaker and layout pontoons
2. Set exterior wall forms, inserts, and embeds
3. Install keel slab and exterior wall rebar
4. Set precast walls
5. Pour keel slab
6. F/P/S (form, pour, strip) interior wall closures
7. F/P/S exterior walls
8. F/P/S soffits
9. Install access, post-tensioning, doors, and hatches
10. Float out and clean up



Install bondbreaker and layout pontoons

(photos from pontoon construction for Hood Canal Bridge and ACME)



Set exterior wall forms, inserts, and embeds


Set exterior wall forms, inserts, and embeds

Install keel slab and exterior wall rebar


Install keel slab and exterior wall rebar

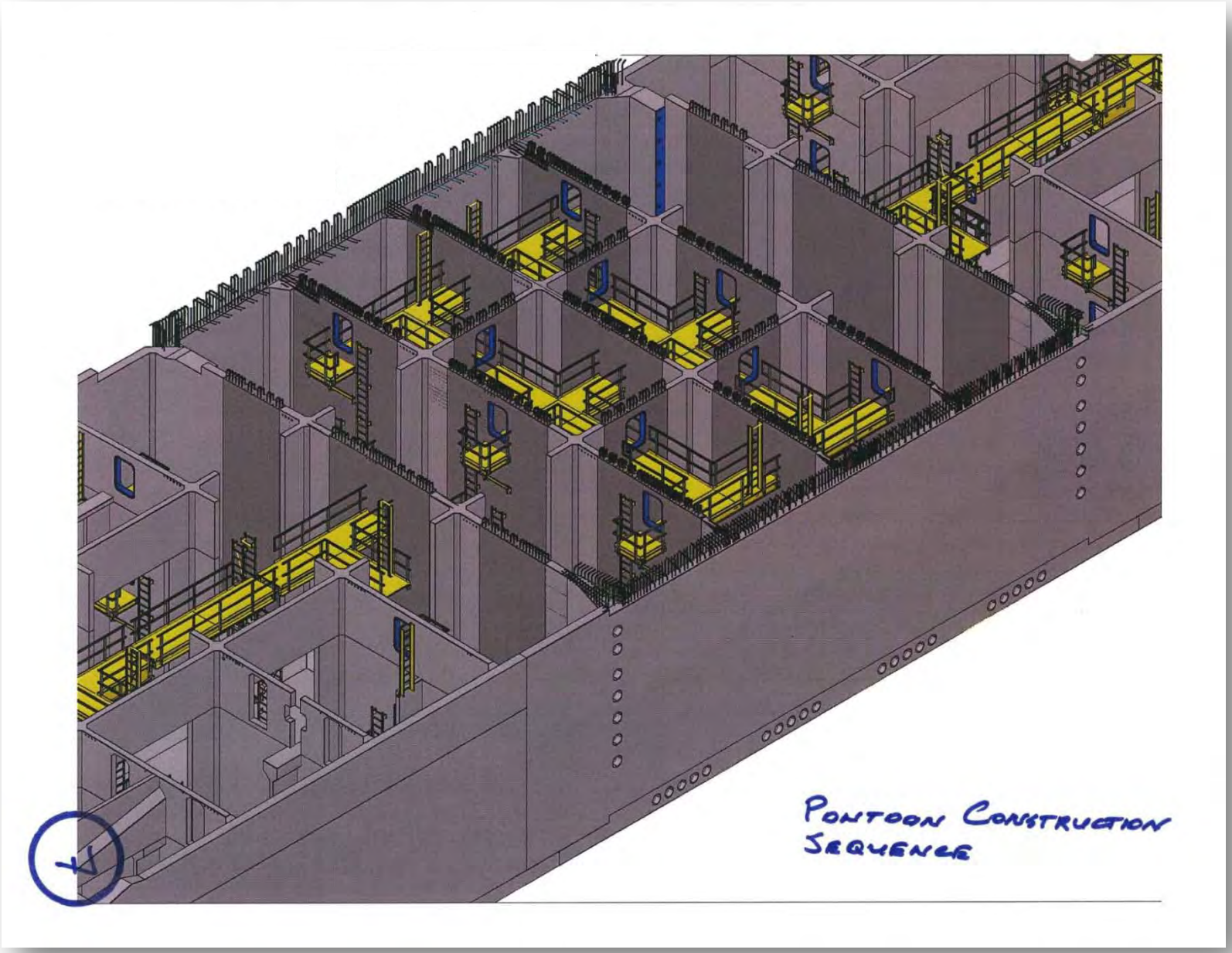
Set precast walls

Pour keel slab


Form, pour, strip walls
6 17'92


Form, pour, strip soffits/deck

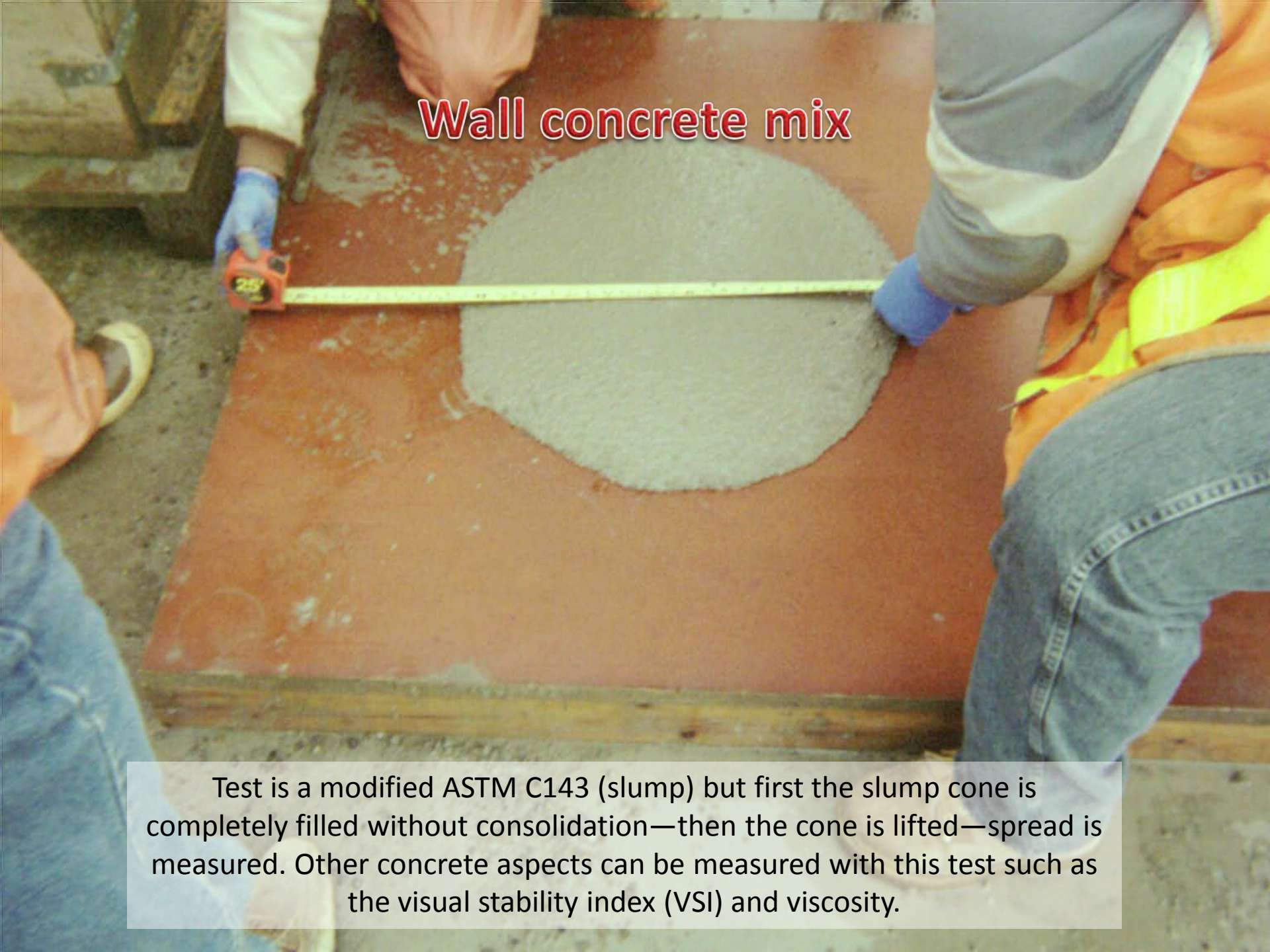
Install access, p-t, doors, and hatches



Miscellaneous Project Information

Formwork Systems

- Unique Challenges
  - Deflection limited to L/1000 or 1/16” each form face
  - Concrete mix has ~ 28” spread (or **slump flow test**)
  - External vibrators are preferred based on ACME results
- Considered:
  - Manufactured systems
    - Aluma, PERI, DOKA, EFCO, Harsco
  - Job built forms
    - Steel faced with external vibration
    - Wood faced with external vibration
    - Wood faced with internal vibration



Wall concrete mix

Test is a modified ASTM C143 (slump) but first the slump cone is completely filled without consolidation—then the cone is lifted—spread is measured. Other concrete aspects can be measured with this test such as the visual stability index (VSI) and viscosity.

Project Quantities

- Casting Basin Quantities
  - Piling = Casting Basin Slab – 643 Ea 18 inch piles
    Bulkhead Wall – 77 Ea 24 inch piles
    Crane Beam – 154 Ea 24 Inch piles
  - Excavation = 280,000 yards - (190,000 yards to stockpile)
  - Concrete = 16,000 cubic yards
  - Rebar = 2,000 Tons
  - Dredging = 82,000 cubic yards
- Pontoon Quantities
  - Concrete - Cast in Place = 91,500 cubic yards
    Pre-Cast = 20,600 cubic yards
  - Rebar = 35,000 Tons
  - Wall Form Work = 2,173,596 square feet
  - Soffit Formwork = 571,562 square feet

Schedule Milestones

- Record of Decision — January 10, 2011
- Permits Received - Start Work — February 17, 2011
- Cycle 1 Pontoons — April 20, 2012
- Cycle 2 Pontoons — September 11, 2012
- Cycle 3 Pontoons — February 7, 2013
- Cycle 4 Pontoons — July 9, 2013
- Cycle 5 Pontoons — November 30, 2013
- Cycle 6 Pontoons — May 7, 2014
- Project Physical Completion — July 6, 2014

Miscellaneous Notes from July 28, 2011 Meeting

- Aberdeen receives about 83” of rainfall/year.
- Piles: 18” diameter with 3/8” wall thickness on 17 ft. centers.
- 640 piles required for casting slab.
- Casting slab 165 ft wide by 18” thick by 910 ft long.
- Typical number of craft personnel on the job each day: 160. Peak employment will be about 300.
- Side slope for the basin is 2.5 to 1 (a bit steep). Rip rap on side slope falls into a 8 to 14” size range.
- Stormwater Management: Discharge of into Chehalis River must be ≤ 25 NTU. Currently discharging at about 6 NTU.

Miscellaneous Notes from July 28, 2011 Meeting

- Each pontoon will weigh about 11,000 tons.
- This project will construct 33 pontoons. Next contract to be let during August 2011 will construct an additional 44 pontoons (however, the smaller ones).
- Kiewit bid for the casting basin design-build contract was about $80 million. Bob Dyer from WSDOT stated that the Kiewit design reduced the casting basin costs by about $100 million based on an earlier WSDOT design.
- Pontoons: Post-tensioning longitudinally only. Keel slab thickness is 11” thick and the top slab is 9” thick. Wall slabs taper from 18” thick at the bottom to 16.5” at the top of the pontoon. Pontoon tolerance not to exceed 1/8”.
- Recent grad needs: **Autocad** and **design of formwork**.


The End