FINAL ENVIRONMENTAL IMPACT STATEMENT
SR 520 BRIDGE REPLACEMENT AND HOV PROGRAM

DECEMBER 2010

SR 520 Pontoon Construction Project

Appendix B
Description of Alternatives and Construction Techniques Discipline Report

U.S. Department of Transportation
Federal Highway Administration

Washington State Department of Transportation

THE INFORMATION IN THIS REPORT IS ACCURATE; HOWEVER, THE PONTOON CONSTRUCTION PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT IS THE SOURCE OF THE MOST CURRENT PROJECT INFORMATION AND ANALYSIS.

SR 520 Pontoon Construction Project Final Environmental Impact Statement

Description of Alternatives and Construction Techniques Discipline Report

Prepared for

Washington State Department of Transportation
Federal Highway Administration

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Washington State Department of Transportation

U.S. Department of Transportation Federal Highway Administration

Contents

Exhibits

Abbreviations and Acronyms

CTC	Concrete Technology Corporation, Inc.
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
GIS	geographic information system
HOV	high-occupancy vehicle
IDD #1	Port of Grays Harbor Industrial Development District #1
MHHW	mean higher high water
MLLW	mean lower low water
MTCA	Model Toxics Control Act
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
SR	State Route
WSDOT	Washington State Department of Transportation

Glossary

Aggregate	Granular materials used in construction, including but not limited to sand, gravel, and crushed stone that, when mixed with water and Portland cement, produce concrete.
Bedding material	Material used to surround a pipe from the bottom of the trench foundation surrounding and extending above a pipe.
Berm	A mound or wall of earth, in this case used to protect a site from wave action.
Biofiltration swale	A best management practice that uses vegetation (typically grass) to provide basic treatment of stormwater runoff.
Chitosan	A fiber-like product made from ground shrimp shells that can be used as an additive in the filtration process to remove fine sediments, turbidity, phosphorus, heavy minerals, and oils from water.
Cross pontoons	The deepest draft (up to 18 feet) pontoons, slightly shorter than longitudinal pontoons (approximately 240 feet long by 75 feet wide). Cross pontoons are placed perpendicular to the longitudinal pontoons at each end of the bridge in the final bridge alignment and support half of each eastside and westside transition span as it connects the column-supported roadway to the floating bridge.
Fly ash	A residue generated when coal is burned that is used to supplement or replace some of the Portland cement used in concrete production. It is known as a “cement extender.”
Longitudinal pontoon	The largest pontoons (approximately 360 feet long by 75 feet wide) that are connected end-to-end in a linear fashion when placed in the bridge alignment.
MHHW	The average of the higher of the two high tides each day on a 19-year cycle.
MLLW	The average of the lower of the two low tides each day on a 19-year cycle.
Portland cement	The most common type of cement used as the binding agent in concrete.

Riprap	Rocks, large rock fragments, or other hard material used to armor shorelines or outfalls against erosion.
Silica fume	A very fine form of silica. It is a chemical compound known for its hardness and used as a supplement in concrete production. Adding silica fume improves the concrete strength in general, as well as its bonding strength.
Supplemental stability pontoons	The smallest pontoons (approximately 98 feet long by 60 feet wide) that attach on either side of a longitudinal pontoon at key points along the bridge to provide stability to the floating structure.

1. Range of Alternatives

This chapter presents the alternatives evaluated in the Final Environmental Impact Statement (EIS), including two build alternatives and the No Build Alternative, provides an overview of the proposed actions, and describes the general characteristics of the build alternative sites.

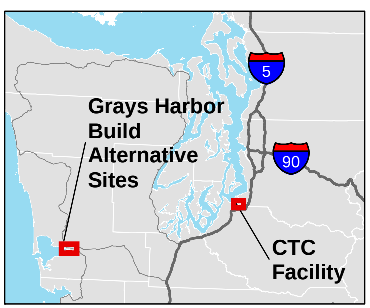
What alternatives did WSDOT evaluate in the Final EIS?

The Final EIS evaluated the following three alternatives:

- Aberdeen Log Yard Alternative (Preferred Alternative) in Aberdeen, Washington (Exhibit 1)
- Anderson & Middleton Alternative in Hoquiam, Washington (Exhibit 1)
- No Build Alternative

Each build alternative would include the following actions:

- Constructing a new casting basin facility in Grays Harbor
- Constructing the 33 pontoons needed to replace the existing capacity of the Evergreen Point Bridge
- Potentially using the existing Concrete Technology Corporation, Inc. (CTC) casting basin facility in Tacoma (Exhibit 2) to construct some of the 33 pontoons if its use presents cost, schedule, or logistical advantages supporting the proposed project's purpose and need
- Transporting pontoons from the casting basin to the approved moorage location in Grays Harbor and, if the CTC facility is used for pontoon construction, transporting pontoons to approved moorage sites in Puget Sound
- Mooring the 33 pontoons built for the proposed SR 520 Pontoon Construction Project
- Maintaining the Grays Harbor casting basin facility while it is owned and operated by the Washington State Department of Transportation (WSDOT)



- Potential haul route
- Existing railroad
- Build Alternative Site
- Existing CTC facility
- City limits

N 0 2,000 4,000 Feet

Source: Grays Harbor County (2006) GIS Data (Waterbody and Street). Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

Exhibit 1. **Alternatives Vicinity Map with Proposed Truck Haul Routes**

SR 520 Pontoon Construction Project

Washington State Department of Transportation

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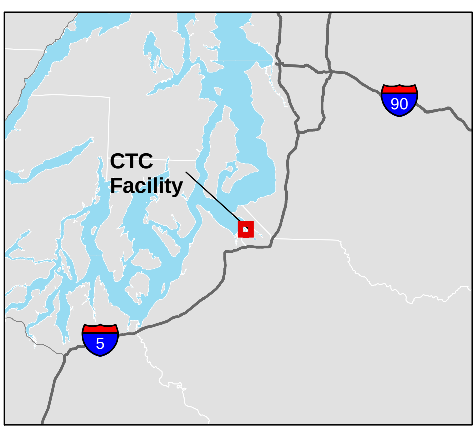

- CTC facility
- Laydown area
- Office space
- Parking lot
- Parking, office, and laydown areas

N

0 0.125 0.25 Miles

Source: USDA-FSA (2006) Aerial Photo, Pierce County (2007) GIS Data (Waterbody), and Pierce County (2006) GIS Data (City Limit and Road). Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

Exhibit 2. **CTC Facility Overview**

SR 520 Pontoon Construction Project

Washington State Department of Transportation

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The build alternatives do *not* include the following actions:

- Constructing additional pontoons needed for the proposed State Route (SR) 520, I-5 to Medina: Bridge Replacement and High-Occupancy Vehicle (HOV) Project
- Transporting pontoons built at the Grays Harbor facility to Lake Washington
- Transporting pontoons built at the CTC facility to Lake Washington
- Building the Evergreen Point Bridge roadway structure on the 33 pontoons built for the proposed SR 520 Pontoon Construction Project and/or on top of additional pontoons built for the proposed SR 520, I-5 to Medina: Bridge Replacement and HOV Project
- Constructing the emergency replacement of the Evergreen Point Bridge
- Using the Grays Harbor casting basin facility for future unforeseen uses

As noted previously, with either of the build alternatives for pontoon construction, WSDOT might elect to use the existing CTC casting basin facility in Tacoma during the life of the proposed project. Because the CTC site has an existing facility that can accommodate pontoon construction, WSDOT could start building pontoons at the CTC facility while the new Grays Harbor casting basin facility was being constructed. Once built and operating, WSDOT could begin accelerated pontoon production at the new casting basin facility where several pontoons could be built at the same time. WSDOT would launch the completed pontoons into Grays Harbor and tow them to an approved moorage location in the harbor until needed. Any pontoons constructed at the CTC facility would be moored at existing marine berths in Puget Sound.

What is the No Build Alternative?

An EIS analyzes a No Build Alternative to assess what would happen if the project were not built. The No Build Alternative is also used as a baseline condition, against which a proposed project’s build alternatives are measured and compared.

For the proposed SR 520 Pontoon Construction Project, the No Build Alternative means that WSDOT would not construct or store pontoons needed to respond to a catastrophic failure of the Evergreen Point Bridge. Under the No Build Alternative, WSDOT would not build a new casting basin facility, nor would WSDOT use the existing CTC casting basin facility to manufacture pontoons for catastrophic failure response. Therefore, the resulting environmental effects of the proposed project activities would not occur. Under the No Build Alternative, because pontoons would not be available for catastrophic failure response, emergency bridge replacement would take approximately 5 years, as opposed to 1.5 years with either build alternative.

For the purposes of the Final EIS, WSDOT assumed that, if unused by this proposed project, the build alternative sites would continue to be used as they are today—the Aberdeen Log Yard would remain a log yard, the Anderson & Middleton site would remain largely inactive, and the CTC facility would continue to be used as a casting basin for other projects and clients. While either Grays Harbor build alternative site could be developed for new uses should the proposed SR 520 Pontoon Construction Project not occur, the use of these properties has remained unchanged since the 1990s. There are no known plans for development of either site. Potential future uses for these two properties, other than the proposed project, are speculative and, therefore, not considered under the No Build Alternative.

What are the Grays Harbor build alternative site characteristics?

Aberdeen Log Yard Alternative (Preferred Alternative)

The 55-acre Aberdeen Log Yard site lies on the north shore of Grays Harbor in Aberdeen. The mostly flat site is undeveloped except for unpaved access roads. The site is bounded on the west by a Port of Grays Harbor industrial terminal property, on the east by a wastewater treatment plant, and along the north by railroad tracks. The casting basin and support facilities would occupy the entire site. The shoreline at this site is relatively natural, with gradual vegetated slopes and limited hard armoring, which minimizes erosion potential.

Aberdeen Log Yard property in November 2008 (view looking south). The property is now vacant.

A lumber mill was built on the site in the early 1900s. Nearly all visible mill structures were removed before 1971. Since then, the site has been used mostly to store logs. However, all logs have been removed and the site is now vacant. Between 1971 and 1981, the shoreline was extended southward through backfilling with sediments dredged from Grays Harbor and the Chehalis River, accumulated wood waste, and other fill material.

Anderson & Middleton Alternative

The privately owned Anderson & Middleton site is located about 2,000 feet west of the Hoquiam River on the north shore of Grays Harbor in Hoquiam. The site is surrounded by industrial maintenance shop buildings to the west, railroad tracks to the north, and vacant industrial property to the east. The site is currently vacant except for an office building on the northern edge of the property, gravel roads, an asphalt pad, and a truck scale. A rock berm borders the shoreline of the 105-acre property. WSDOT would purchase about 93 acres of this property, and the proposed casting basin facility would occupy about 55 acres.

Anderson & Middleton property (view from Grays Harbor shoreline looking east).

In the early 20th century, there were machine shops, refuse burners, and a lumber mill on this site, but by the late 1960s, all former mill structures were gone. The site was used for timber storage until the late 1980s and has been mostly unused since then.

What are the CTC facility site characteristics?

The CTC casting basin facility site is adjacent to the Blair Waterway on the eastern edge of Commencement Bay in Tacoma. It is located within the industrial zone of the Port of Tacoma, an active deep-water Port facility. Establishment of the Port of Tacoma around the turn of the 19th century led to the dredge and fill of intertidal mudflats and wetlands to develop usable land that would support the burgeoning timber industry. The CTC site is an existing industrial facility used to fabricate concrete structures. WSDOT used the small casting basin at this site to construct pontoons for the SR 104 Hood Canal Bridge Project.

The CTC casting basin facility.

The CTC casting basin facility is next to an existing concrete batch plant. Although the batch plant has sufficient capacity to serve the needs of the proposed project, the CTC facility lacks construction laydown areas, parking areas, and office space. For the SR 104 Hood Canal Bridge Project, WSDOT leased about 17 acres at several nearby properties for these purposes. To support the proposed SR 520 Pontoon Construction Project, WSDOT would lease those and/or other nearby properties again (Exhibit 2).

Why would WSDOT use the existing CTC facility?

WSDOT could build some of the pontoons at the CTC casting basin facility under either of the build alternatives. The CTC casting basin is not large enough to construct the two deepest pontoons (cross pontoons) and is too small to accommodate the timely construction of the many large (longitudinal) pontoons required for the proposed SR 520 Pontoon Construction Project. Therefore, the CTC facility would be used only to supplement the pontoon construction that would occur at the new Grays Harbor facility. It is likely that the decision related to whether to use the CTC facility would be driven by whether an acceptable delivery schedule could be achieved without the cost and logistical challenges associated with operating two sites.

If the CTC facility were used, then the pontoons manufactured there likely would be the smaller supplemental stability pontoons. However, up to three large longitudinal pontoons could be built there as well, one pontoon at a time. See *What types of pontoons would WSDOT construct?* in Chapter 3, Proposed Actions, for more information about the types of pontoons that would be constructed for this proposed project.

How would WSDOT maintain the casting basin facility after pontoons for this proposed project were built?

After all pontoons needed for the proposed SR 520 Pontoon Construction Project were built and towed out of the casting basin, while it owned the property, WSDOT would maintain the facility in a manner that complied with all site permits and approvals. If the casting basin were used for anything other than building pontoons for the Evergreen Point Bridge, all applicable environmental regulatory and permitting processes would be reinitiated, as appropriate.

For the duration of its existence, the casting basin would be kept dry when not in use. The operation dewatering system would be maintained and stormwater would be pumped out of the basin periodically, which would allow for easier maintenance and inspection activities. The casting basin would need to remain dry because the gate could not withstand water pressure from the inside. For instance, if the casting basin contained water when the tide was out, the water level inside the casting basin might be higher than the water level in Grays Harbor. Because the casting basin gate acts like a dam, this would put pressure on the gate from the inside.

2. Alternatives Development

This chapter describes how WSDOT determined the range of alternatives to be fully analyzed in the EIS. This process included identifying candidate sites, developing screening criteria, and gathering enough information on each candidate site to assess it using a screening process. This chapter concludes with a discussion of why WSDOT analyzed the casting basin method of building pontoons in the Final EIS rather than other potential construction methods, which are briefly described later in this chapter.

How did WSDOT identify candidate sites?

During the period of 2004 through 2008, WSDOT identified potential pontoon construction sites according to the following sequence of events:

- 2004: Solicited for potential locations
- 2005 to 2006: Received private proposals
- 2006: Reviewed recommendations from an expert review panel
- 2008: Received new site recommendations and conducted an independent real estate search for properties
- 2008: Completed final screening of 39 sites, resulting in 3 potential sites in Grays Harbor

Solicitation and Advertisements

In December 2004, WSDOT began the site identification process with a public solicitation for suitable commercial or waterfront sites to build pontoons and anchors for the SR 104 Hood Canal Bridge and the Evergreen Point Bridge. On December 22, 2004, WSDOT sent a solicitation letter to 38 port districts, 6 individuals or companies, and 2 tribes in Washington state.

The *Seattle Daily Journal of Commerce* published the text of the solicitation letter on December 23 and 30, 2004, and WSDOT posted the letter on its Contract Ad & Award Website (http://www.wsdot.wa.gov/biz/contaa/) for 2 weeks beginning on December 27, 2004. The letter stated that both developed and undeveloped sites would be considered and that the preferred site would have the following attributes:

- Be at least 30 acres
- Have 900 to 1,000 feet of waterfront in a protected harbor or channel
- Have adequate draft and room to maneuver large tugboats in combination with barges and pontoons

The solicitation noted that sites smaller than 30 acres would be considered for use in conjunction with other sites submitted for review. The letter also stated that consideration would be given to other site features, including, but not limited to, the following:

- Land and water access
- Presence of existing facilities such as docks or bulkheads
- Proximity of other commercial marine facilities such as docks, bulkheads, drydocks, slips, and tugboat operators
- Proximity of local rail service
- Access to adequate aggregate supplies
- Towing distance to the Hood Canal Bridge
- Proximity and size of commercial concrete plants
- Utilities, such as electrical and water service, on or adjacent to the site
- Tides and currents in the harbor or channel
- Site exposure to wind and waves
- Availability of applicable trades people and travel distance from their union halls
- Local community support for the proposed project
- Availability of the site for the proposed SR 520, I-5 to Medina: Bridge Replacement and HOV Project
- Current and historic use of the site
- Existing site data (for example, geotechnical borings or reports, permits, aerial photos, and so forth)

Expert Review Panels

In 2006, WSDOT convened two expert review panels and asked panel members to review project team work conducted to date and assess options for pontoon construction locations. WSDOT also asked the second panel to assess options for project delivery (alternative contracting methods, for example).

Real Estate Searches

In 2008, WSDOT engaged the services of real estate experts to locate additional waterfront properties not found in previous searches and to identify landowners who might not have been aware of WSDOT's search. Working with commercial real estate brokers, WSDOT's real estate team searched Washington, northern Oregon, and southwestern British Columbia for suitable properties.

In 2008, the real estate search team identified sites in the following three phases:

- In the first phase, the team looked at satellite images of the search area and recorded the latitude and longitude of locations or properties that met WSDOT's solicitation criteria (HDR Engineering, Inc. 2008). From this list, the team used geographic information system (GIS) data to produce a comprehensive list and interactive map of potential sites.

- In the second phase, to double-check that no suitable sites in the Puget Sound area were missed during phase one, the team conducted an intensive GIS search of Snohomish, Whatcom, King, Kitsap, Skagit, Jefferson, and Clallam counties. They filtered the data to produce a list of potential sites that fit the deep-water access, utility access, and size criteria. In addition, for the Canadian search, the team enlisted the help of a right-of-way and management company in Victoria, B.C. (HDR Engineering, Inc. 2008).

  This combined search yielded a list of sites that were 20 acres or larger within 320 feet of open water—925 sites in the Washington counties studied and 7 sites in Canada. Because the seven sites in Canada were in remote areas inaccessible by road, they were dropped from further study. The team applied the following methods to further examine the remaining 925 sites:

  - Used on-line parcel viewing tools, where available, and assessed terrain using U.S. Geological Survey topographic maps

  - Researched ownership information from county Websites

  - Conducted a search of the Northwest Multiple Listing Service and the Commercial Broker Association Multiple Listing Service

  - Contacted four local brokers who specialized in commercial and industrial properties

  - Reviewed port authority Websites for location availability and parcel information

  In this second phase, no sites were identified as suitable that WSDOT was not already considering.

- In the third phase, the team searched for suitable parcels in Grays Harbor County, a county identified as having relatively large, undeveloped waterfront parcels.

What candidate sites were identified?

WSDOT received 18 proposals in response to the 2004 solicitation. The proposals identified sites on Puget Sound, the Strait of Juan de Fuca, Hood Canal, Fidalgo Bay, near the mouths of the Chehalis and Skokomish rivers, and near the Port of Shelton Airport. After their initial 2005 proposals, two proponents made additional applications to WSDOT suggesting two more sites (one in Everett and one in Tacoma). Therefore, 20 candidate sites were identified in proposals.

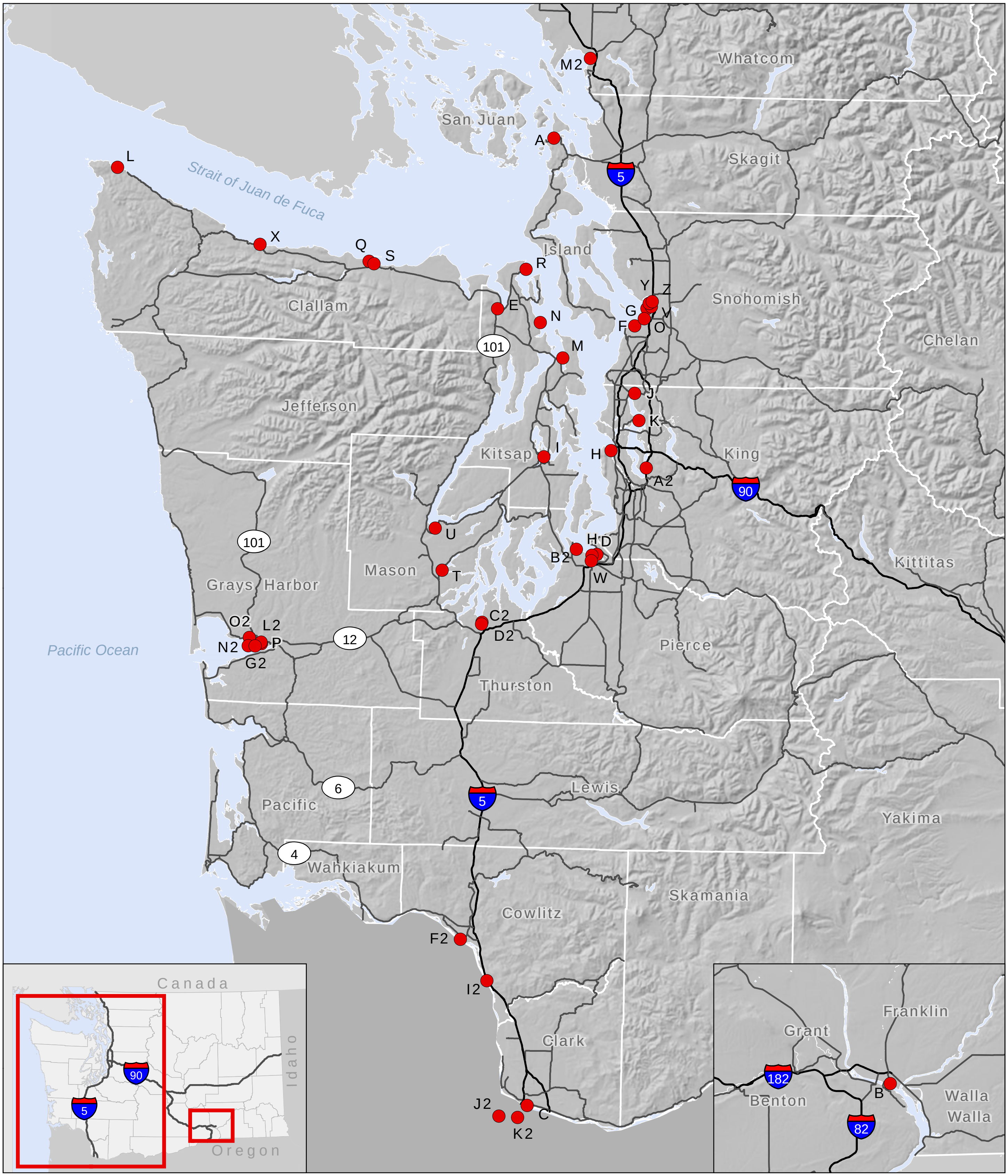
The first expert review panel, which met March 13 to 16, 2006, did not identify any additional sites for WSDOT to consider (WSDOT 2006). The second panel, which first met in October 2006, recommended that WSDOT consider four sites in addition to the responses it received to the 2004 solicitation (WSDOT 2007). Two of these four sites are on the Columbia River and two are on Lake Washington (WSDOT 2007). These four sites brought the number of candidate sites identified to 24.

The real estate search team identified 15 possible new sites on Puget Sound, Lake Washington, and the Chehalis, Columbia, and Willamette rivers. Therefore, WSDOT's search efforts yielded 39 candidate sites, which are shown on Exhibit 3. Exhibit 4 lists all but the build alternatives.

How were screening criteria applied to candidate sites?

WSDOT used a set of criteria developed in conjunction with an advisory environmental review panel and regulatory agencies to screen the candidate sites. The criteria, shown in Exhibit 5, included physical characteristics of the site, logistical constraints, and consideration of unacceptable adverse effects and constraints.

WSDOT collected information on the 39 candidate sites and applied these criteria to each. If a site failed on any criterion, it was eliminated from further consideration and data collection related to that site stopped. Of the



- Candidate casting basin facility site
- County boundary

Note: Site H includes locations in Seattle and Tacoma.
Site M is the same as site E2 listed in Exhibit 4.
Site A is the same as site H2 listed in Exhibit 4.

Exhibit 3. **Candidate Casting Basin Facility Construction Sites**

SR 520 Pontoon Construction Project

Washington State Department of Transportation

Source: WSDOT (1995) GIS Data (County). Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

N 0 10 20 Miles

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EXHIBIT 4
Casting Basin Facility Sites Considered and Dismissed

ID	Site	Eliminating Criteria
A	MJB Properties, Anacortes, WA	Size
B	Big Pasco Industrial Center, Pasco, WA	Sufficient draft, towing feasibility
C	Columbia Industrial Park, Vancouver, WA	Towing feasibility
D	Concrete Technology Corporation, Hylebos Waterway, Tacoma, WA[a]	Hazardous materials
E	Discovery Bay, Jefferson County, WA	Compatibility with zoning and land use regulations
F	KLB Construction property, Everett, WA	Sufficient draft, size
G	Snohomish Delta Partners, Everett, WA	Proposal withdrawn by the proponent and resubmitted as Site V
H	FCB Facilities Team (various sites), Seattle and Tacoma, WA	Size
I	Puget Sound Naval Shipyard drydock or other floating drydocks, Bremerton, WA	Drydocks unavailable or in disrepair, required construction method (floating drydock)
J	Glacier Northwest Kenmore Premix Plant, Kenmore, WA	Size, required construction method (segmental match-casting)
K	Lake Washington (in-lake), Seattle, WA	Required construction method (vertical casting)
L	Makah Reservation, Neah Bay, WA	Sufficient draft, appropriate shoreline characteristics, cultural resources
M	Port Gamble Mill Site, Port Gamble, WA	Hazardous materials
N	Port Ludlow Quarry, Jefferson County, WA	Compatibility with zoning and land use regulations
O	Port of Everett South Terminal, Everett, WA	Site availability
P	Port of Grays Harbor IDD #1, Hoquiam, WA	Unlikelihood of being able to demonstrate compliance with U.S. Army Corps of Engineers Section 404 requirements
Q	Port of Port Angeles Terminal 7, Port Angeles, WA	Size, cultural resources
R	Port of Port Townsend, Port Townsend, WA	Size
S	Rayonier Properties, Port Angeles, WA	Cultural resources, hazardous materials
T	Sanderson Field Industrial Park, Shelton, WA	Sufficient draft, appropriate shoreline characteristics, towing feasibility
U	Skokomish River, Mason County, WA	Sufficient draft
V	Snohomish Delta Partners (Miller Shingle Mill), Everett, WA	Sufficient draft
W	Thea Foss Waterway, Tacoma, WA	Size
X	Twin River Clay Quarry, Clallam County, WA	Sufficient draft, appropriate shoreline characteristics
Y	Port of Everett Riverside Business Park, Everett, WA	Sufficient draft
Z	Cedar Grove Composting, Snohomish County, WA	Sufficient draft

EXHIBIT 4
Casting Basin Facility Sites Considered and Dismissed

ID	Site	Eliminating Criteria
A2	Lake Washington, Renton, WA	Hazardous materials, compatibility with zoning and land use regulations
B2	Port of Tacoma, Tacoma, WA	Hazardous materials, compatibility with zoning and land use regulations
C2	Washington Department of Natural Resources tidelands, Olympia, WA	Sufficient draft
D2	Port of Olympia, Olympia, WA	Hazardous materials, site availability
E2	Port Gamble, Port Gamble, WA	Hazardous materials
F2	Port of Longview, Longview, WA	Towing feasibility
G2	Weyerhaeuser (Cosmopolis), Aberdeen, WA	Site availability
H2	Port of Anacortes, Anacortes, WA	Size
I2	Port of Kalama, Kalama, WA	Towing feasibility
J2	Northwest Industrial Center, Multnomah County, OR	Towing feasibility, hazardous materials
K2	Hayden Island, Multnomah County, OR	Towing feasibility
M2	Whatcom Waterway, Bellingham, WA	Hazardous materials
O2	Port of Grays Harbor Terminal 3, Hoquiam, WA	Sufficient draft

[a] This is not the same CTC site considered in this Final EIS; the CTC facility site considered in the Final EIS is on the Blair—not Hylebos—Waterway.

EXHIBIT 5
Screening Criteria for Casting Basin Facility Construction Site

Criteria	Rationale
Physical site characteristics	
1. Sufficient draft achievable and appropriate channel characteristics	The site must have 22 feet of draft logistically and economically achievable with the initial dredging effort to accommodate pontoon floatouts. Maintaining the needed 22-foot draft during active construction must be logistically and economically achievable after considering dredging volume, frequency, area, and environmentally sensitive areas. There must be reliable access between the casting basin and deep water.
2. Size	A minimum of 30 contiguous acres is needed to accommodate a single pontoon construction and/or storage facility, critical onsite infrastructure, laydown areas, and stormwater treatment facilities.
3. Appropriate shoreline characteristics	The site must have direct water access with at least 150 feet of shoreline length to accommodate an entrance channel for the casting basin. The site must have an elevation between mean higher high water (MHHW) levels and 10 feet above MHHW. The site must have a nearshore protected area for temporary pontoon moorage to ensure that pontoons do not sustain damage while in holding before transport.
Logistical constraints	
4. Towing feasibility	There must be established navigable water routes between the site and Lake Washington.

EXHIBIT 5
Screening Criteria for Casting Basin Facility Construction Site

Criteria	Rationale
	The costs and risks associated with the tow must be acceptable. Waves of sufficient height can cause a pontoon to bend enough to crack and leak. This damage can be extensive and irreparable. Pontoons on a longer ocean tow are at greater risk of encountering waves sufficient to cause structural damage than those on shorter ocean tows. WSDOT's position on towing is documented in the SR 520 Bridge Pontoon Open-ocean Transportation Memorandum (WSDOT 2009) and in two technical study reports prepared by The Glosten Associates in 2005 and 2007.
5. Domestic location	The purchasing of materials, long-term leasing strategies, foreign environmental processes, potential problems related to overseeing construction in another country, and challenging interagency coordination exclude foreign sites from consideration for this proposed project.
Unacceptable adverse effects	
6. Unacceptable adverse effects on natural resources and noncompliance with environmental regulations	Developing and operating the facility must comply with all environmental regulations; developing and operating the facility must not result in unacceptable adverse effects that could not be mitigated. Unacceptable effects on natural resources that could not be mitigated would likely lead to the denial of permits or approvals.
7. Cultural resources	Site development must not require direct effects on a significant archaeological resource for which effects could not be mitigated or on historic structures or sites that must be preserved in place.
Unacceptable constraints	
8. Cultural resources	Known large-scale or complicated cultural resources recovery work cannot begin until National Environmental Policy Act (NEPA) processes are completed, which would delay the schedule and prevent expedited construction. The extent and significance of cultural resources might not be fully understood until excavation was underway, which would present unanticipated costs and schedule risks.
9. Hazardous materials: Model Toxics Control Act (MTCA) or federal or state superfund site	Hazardous materials cleanup cannot begin until NEPA processes are completed, which would delay the schedule and prevent expedited construction. The extent of contamination might not be fully understood until cleanup actions were underway, which would present unanticipated costs and schedule risks.
10. Compatibility with zoning and land use regulations	Rezoning or major land-use-action processes cannot begin until NEPA processes are completed, which would delay the schedule and prevent expedited construction. The site must not require a significant zoning change or land use action that would undermine the intent of local comprehensive plans or result in unacceptable degradation of the surrounding area and its current character.
11. Site availability and term of availability	The site cannot require condemnation; the owner must be a willing seller or leaser. The site must be available to WSDOT for construction of additional floating bridge structures supporting the full build out of the proposed SR 520 Evergreen Point Bridge.

MHHW mean higher high water
MTCA Model Toxics Control Act
NEPA National Environmental Policy Act
SR State Route
WSDOT Washington State Department of Transportation

39 candidate sites, 36 sites were eliminated because they did not meet one or more of the criteria. Exhibit 4 lists all of the sites considered and subsequently dismissed from further consideration. Three sites—Port of Grays Harbor Industrial Development District #1 (IDD #1), Anderson & Middleton, and Aberdeen Log Yard (on Exhibit 3, Sites P, L2, and N2, respectively)—passed the screening process and were retained for further analysis.

In February 2009, WSDOT removed IDD #1 from further consideration as a potential build alternative site because of the level of adverse effects on federally protected wetlands that would have been associated with this site. Developing the IDD #1 site would have eliminated approximately 30 acres of wetlands, and obtaining a permit for such an activity would have presented WSDOT with substantial challenges.

Why is WSDOT analyzing the casting basin method for building pontoons?

Several construction methods were considered throughout the conceptual phase of the proposed SR 520 Pontoon Construction Project design process. A casting basin is the preferred construction method because WSDOT has substantial experience with this method, which has been successfully used to build pontoons for all of WSDOT's floating bridges (that is, Hood Canal, I-90, and Evergreen Point). WSDOT has a high level of confidence that constructing pontoons using the casting basin method would proceed smoothly with low risk of delays or unanticipated costs. Therefore, the casting basin method was analyzed in the Final EIS.

What is a casting basin?

A casting basin is a construction facility built next to a navigable waterway that consists of a concrete slab built deep below ground level and surrounded by walls. The interior area of the casting basin provides a flat dry space where several pontoons can be constructed side by side at the same time. After the pontoons are completed, the basin is flooded. The basin walls contain the floodwater, allowing the pontoons to float. When the pontoons are floating, a gate is opened and the pontoons are towed from the casting basin into navigable waters.

Other methods present unacceptable constraints and higher risks of unknown challenges, possible delays, and unanticipated costs. The following sections discuss the construction methods that were considered and dismissed:

- Floating drydock or building on barges
- Vertical casting in Lake Washington
- Segmental match casting on Lake Washington
- Barge launch and barge slip
- At-grade superflooded casting basin facility
- Enclosed, at-grade casting building with elevator-lift platform

Floating Drydock or Building on Barges

A floating drydock is a type of U-shaped barge that can be ballasted down so that the bottom portion of the U is submerged to allow a vessel to be floated in. The drydock can then be deballasted, or floated, thereby allowing the load to come to rest on a dry platform at the bottom of the U. The process is repeated to floatout or launch the vessel from the drydock. Floating drydocks are typically used to haul or dock vessels and to facilitate vessel maintenance to areas of the vessel that are below the waterline and that cannot be done while the vessel is in the water. Floating drydocks require all work to be performed over water and are best used for work that does not require large laydown areas for construction materials. The following are some of the reasons why the floating-drydock method was dismissed:

- Working over water is more expensive than working on land for several reasons, including transporting labor to the casting site daily and routinely using barges to transport construction materials from an on-land staging area to the casting site.
- This method would require constructing several dedicated drydocks and/or barges that would take substantially more time to construct than a single on-land casting basin.
- Over-water construction presents higher risks for environmental effects than land-based construction techniques.
- With this method, it is difficult to achieve the tight geometric tolerances required in pontoon construction.

Vertical Casting in Lake Washington

The vertical-casting method involves working from barges to construct pontoons vertically, section-by-section, while sinking the completed portion of the pontoon vertically into the lake, then rotating the finished pontoon to a horizontal position. The following are some of the reasons why the vertical-casting method was dismissed:

- To WSDOT's knowledge, this method has never been attempted for constructing large concrete floating structures.
- This method has higher risks of pontoon damage during construction. Rotating the pontoons would result in bending stresses that would be much greater than the pontoons would experience under normal service and would, therefore, result in a costlier design.

- Constant and accurate ballasting—which would be difficult and impractical—would be required to meet the tight geometric tolerances required.
- Inspecting and repairing cracks and leaks would be particularly difficult deep underwater.
- As described under the floating-drydock method, working over the water is inherently more expensive and presents higher risks of environmental effects than land-based construction techniques.

Segmental Match Casting on Lake Washington

The segmental-match-casting method—proposed as a way to make a smaller site on Lake Washington viable for pontoon construction—involves building each pontoon incrementally and pushing it out into the lake as it is built. The following are some of the reasons why this method was dismissed:

- Each incremental movement of the pontoon into the lake would present a risk of damage to the pontoons and additional potential environmental impact.
- Complex mechanical systems, which are costly and prone to failure, would be required to launch the pontoons.
- This method would require approximately 10 flooding and dewatering cycles per pontoon to facilitate incremental launching. These cycles would present higher risks of environmental effects because of the increased number of flooding events, particularly to fish. The proposed eight-pontoon basin, however, would require only one flooding and dewatering cycle per four pontoons.

Barge Launch and Barge Slip

Both the barge-launch and barge-slip methods have a casting slab at ground level with a system to transfer a finished pontoon onto a grounded barge. The barge rests on an underwater support grid located offshore or in an excavated slip notched into the shoreline. Once the pontoon is built and loaded onto the barge, it is launched in the following manner:

- The barge is floated and moved to deeper water.
- The barge is submerged, allowing the pontoon to float off the barge.
- The pontoon is towed away.
- The barge is refloated.

- The barge is regrounded on the support grid, and the process starts over.

The difference between the barge-launch and the barge-slip methods is the location of the underwater grid. The barge-launch method has a pier that extends from shore to the underwater grid located in deep water. The barge-slip method has an upland-dredged channel that abuts the casting slab with the underwater grid located in the dredged channel, creating a slip notched into the shoreline. The following are some of the reasons why these two methods were dismissed:

- The lead time to acquire or build a barge with the necessary characteristics is a concern. Submersible barges of the type or size needed are not readily available.
- The potential loss of the submersible launch barge through significant damage or sinking could severely delay the delivery of pontoons.
- The largest pontoon would weigh about 11,000 tons, twice as much as WSDOT's largest ferry boat. Unlike boats with hulls made of steel, which have some tolerance for flexing, concrete pontoons are rigid structures that are much more vulnerable to stress that could cause cracking and leaks. Both of these construction methods rely on a complex lifting system and/or rollers for moving pontoons over dry ground. Pontoons floating in water are uniformly supported along their hulls. Moving pontoons over rollers causes the pontoons to bear uneven pressure as they move over the point of contact with the roller. This presents a higher risk for cracks to develop. Should the lifting system fail, severe structural damage to a pontoon could result that could require the demolishment of the damaged pontoon in place. This would be a costly loss. In addition, other completed pontoons could not be launched, which would significantly delay the schedule.

At-Grade Superflooded Casting Basin Facility

The at-grade-superflooded-casting-basin-facility method would move pontoons in a way similar to Seattle's Hiram M. Chittenden Locks in Ballard, with water lowered and raised to different levels. Pontoons would be built on an at-grade concrete slab next to a permanently flooded, deep launching slot in the middle of the basin. Temporary walls would be erected around the completed pontoons, the slot gate would be closed, and that portion of the basin would be superflooded using a pumping system. The pontoons would be floated and moved into the launching slot, then water within the temporary walls would be drained, the slot gate would be opened, the temporary walls would be removed, and the pontoons would be towed into the launch channel.

This method was not advanced for further analysis because it did not offer substantial environmental or cost advantages over WSDOT's casting-basin-facility concept.

Enclosed, At-Grade Casting Building with Elevator-lift Platform

The enclosed-at-grade-casting-building-with-elevator-lift-platform method involves building pontoons in an enclosed, at-grade building, then using a transport system to move the finished pontoons to an offshore "elevator-lift" lowering system to launch the pontoons into deep water.

This method was not advanced for further analysis because it did not offer substantial environmental or cost advantages over WSDOT's casting-basin-facility concept.

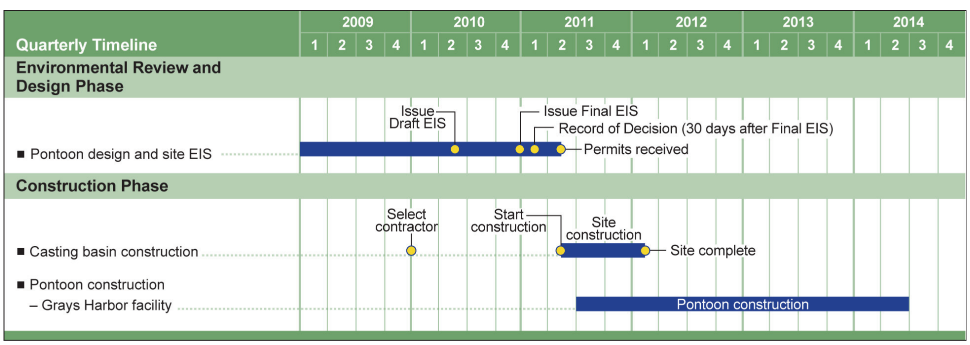
3. Proposed Actions

This chapter presents details about the proposed casting basin facility and, in general, how the facility would be constructed. Project effects of the build alternatives are not discussed in this discipline report. Such effects are discussed in the other discipline reports and technical memoranda produced in support of the Draft EIS and the Final EIS.

How long would it take to build the new facility and pontoons?

The new casting basin facility would take approximately 1 year to construct. As shown in Exhibit 6, the current proposed project schedule shows that construction of the new casting basin would begin in spring 2011. Pontoon construction at the new facility would begin as soon as the site was ready to fabricate the steel rebar and wooden frames necessary to shape the pontoons—likely in summer 2011.

EXHIBIT 6
Proposed SR 520 Pontoon Construction Project Schedule



WSDOT anticipates that approximately 5 months would be needed to complete each pontoon construction cycle. At about 6 pontoons per cycle, it would take approximately 2.5 years to build all 33 pontoons for this proposed project at the new casting basin facility. If used, the CTC facility could produce either five small supplemental stability pontoons or one large longitudinal pontoon per construction cycle.

What would the casting basin facility look like?

WSDOT engineers have prepared conceptual designs for the new casting basin facility in Grays Harbor. These designs have the same general appearance at both build alternative sites, with variations depending on site-specific characteristics. For instance, each build alternative would require construction and design modifications tailored to the unique physical characteristics of the selected site. The casting basin facility would consist of a single-chamber casting basin with a gate, a launch channel, and support facilities (such as a concrete batch plant, laydown areas, access roads, water treatment ponds, and employee parking). Exhibit 7 shows the conceptual site design layout for the two proposed build alternative sites and Exhibit 8 presents a conceptual three-dimensional model of how the casting basin facility could look.

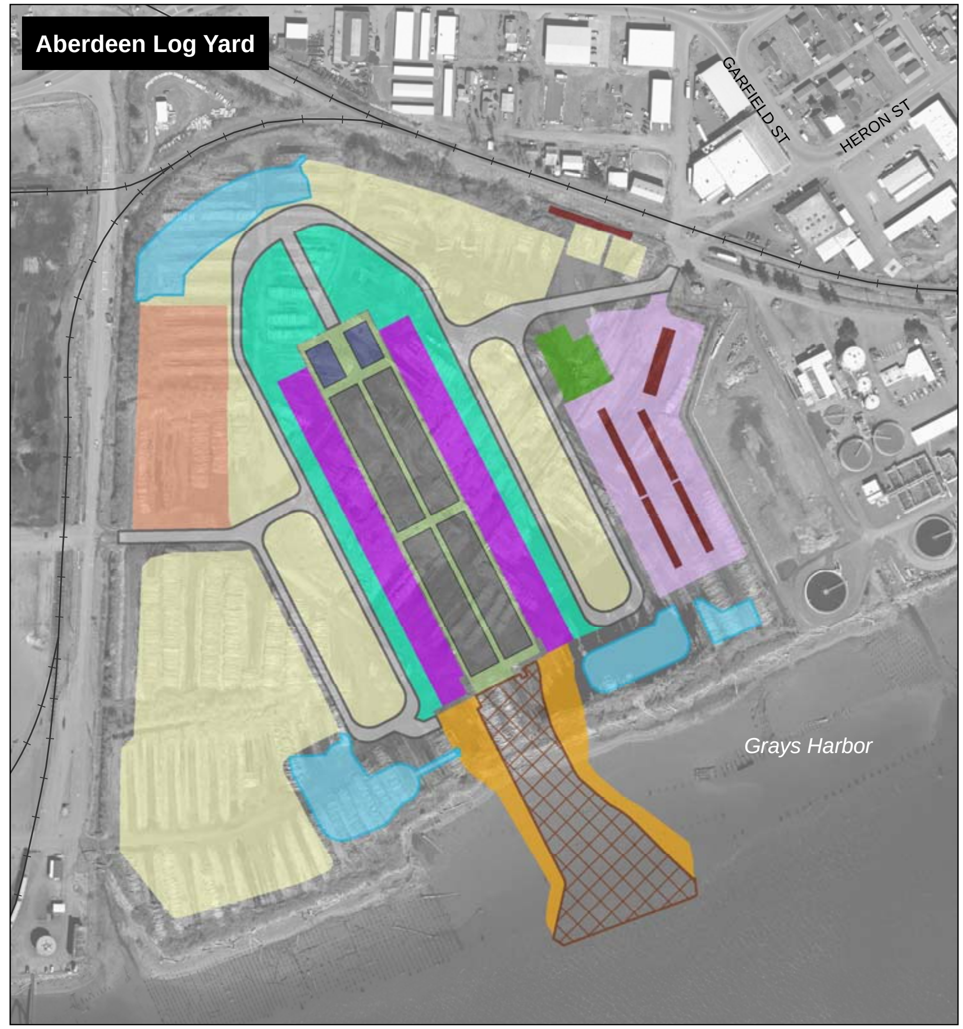
How would WSDOT construct the new casting basin facility?

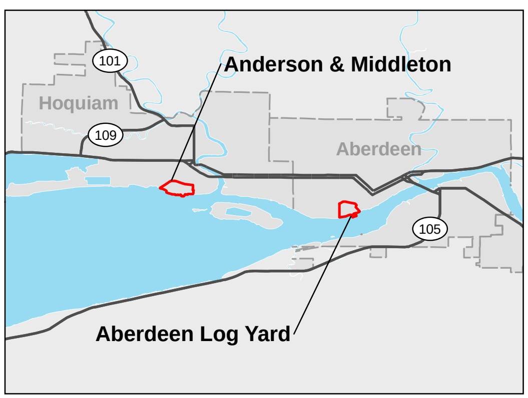
Construction techniques are typically not determined until after the environmental review process, so the following descriptions are a reasonable estimate of how the proposed project could be constructed at either build alternative site. The selected contractor would ultimately decide the specific means and methods of constructing the casting basin.

WSDOT would monitor construction and operation activities to ensure that they complied with project permits and applicable environmental regulations and guidelines. WSDOT anticipates a 16-hour workday (over two shifts), 6 days per week, for casting basin construction, with the possibility of multiple shifts working 24 hours a day, 7 days a week.

Project Site Preparation

WSDOT would initially install silt fencing and other temporary erosion and sediment control measures to prepare the casting basin facility site. WSDOT would then remove vegetation and any remnants of previous site development, such as old pavement, building foundations, and utility poles. Next, WSDOT would grade the site to remove the top 1 to 2 feet of soil and debris across the site, install temporary utilities to serve construction needs, and place gravel on the site to accommodate the heavy equipment needed for facility construction activities.





- Existing railroad
- Crane rail area
- Infiltration trench
- Access road
- Launch channel
- Rock side slope
- Concrete batch plant
- Supplemental stability pontoon
- Longitudinal pontoon
- Water treatment area
- Casting basin
- Casting basin side slope
- Dry storage and laydown area
- Office
- Parking

N

0 125 250 500 Feet

Source: WSDOT (2005, 2006) aerial photograph, USDA-FSA (2006) aerial photograph, Grays Harbor County (2006) GIS Data (Road), Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for base layers is NAVD88; vertical datum for design layers is MLLW.

Exhibit 7. **Conceptual Layouts for Grays Harbor Build Alternative Sites**

SR 520 Pontoon Construction Project

Washington State Department of Transportation

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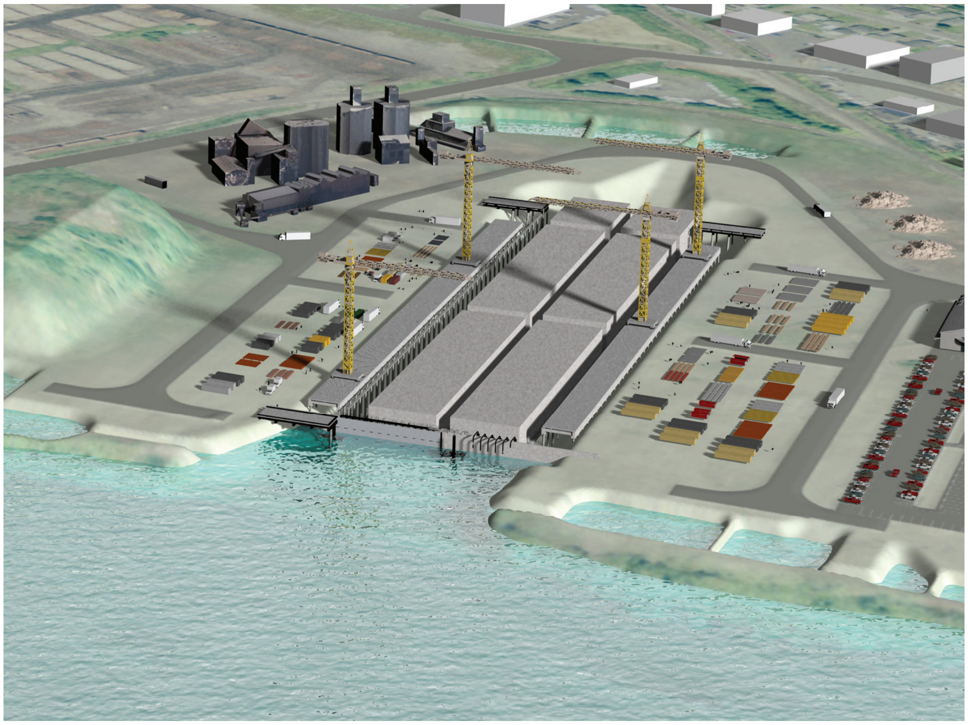
EXHIBIT 8
Casting Basin Three-Dimensional Overview



To proceed with site construction, WSDOT would install a temporary construction dewatering system, which would keep working areas reasonably dry. Excavation for the casting basin could then begin.

Activities necessary for adding other essential site features, such as access roads, utilities, parking, and laydown areas, would occur while the casting basin was being constructed. At this time, WSDOT would likely place the required utilities (water, sewer, electrical, and communication lines) underground and install water treatment (wet) ponds. It is likely that the batch plant used to supply concrete for the casting basin and pontoons, and loading and storage areas, would be the last support facilities built onsite. The support facilities necessary for casting basin operations are discussed later in this chapter, under the heading *What facilities would WSDOT build to support casting basin operation?*

Construction (Temporary) Dewatering System

Either proposed build alternative site would require a construction dewatering system to dewater the excavation areas during casting basin construction. Construction dewatering wells and underground drains installed along the perimeter of the casting basin excavation would dewater the bottom of the excavation. The groundwater collected from this dewatering system would be pumped into a water treatment pond to remove any solids and then reinfiltrated through trenches near the perimeter of the site (Exhibit 7). Reinfiltrating the groundwater would help to maintain an appropriate water table to minimize the potential for settlement of adjacent off-property structures.

Casting Basin Construction

WSDOT proposes to excavate the casting basin and launch channel to a depth of approximately 13 feet below mean lower low water (MLLW). This means that the average depth of the casting basin excavation would be about 25 to 30 feet below ground level. Building the casting basin below MLLW would allow the casting basin to flood with water from Grays Harbor when the time comes to floatout the completed pontoons into Grays Harbor at a reasonable and frequently occurring tide level.

What is the mean lower low water?

The height of mean lower low water (MLLW) is the mean of the lower of the daily low-tide levels over a long period of time (that is, 19-year intervals).

Piles to support the casting basin floor would be driven from the existing ground surface prior to excavating the casting basin. The piles would be driven using a hydraulic pile-driving hammer until resistance was encountered, after which an impact hammer would be used until the right capacity was reached. The impact hammer would drive the piles to the bearing (stable) layer, ensuring that each pile was firmly in place.

Example excavator that could be used during casting basin facility construction.

The casting basin excavation effort would be substantial, and would require a combination of backhoes, loaders, excavators, and dump trucks to haul the material away and/or stockpile it onsite in a manner that complied with applicable regulations. Once the casting basin was excavated, WSDOT would stabilize the sloped-back sidewalls by covering them with a layer of riprap. Then WSDOT would cut off and remove the excess pile lengths. The casting basin concrete slab floor would be constructed on top of the embedded piles. Reinforced steel (rebar) would be placed inside plywood formwork to construct the floor. Concrete would be poured inside the formwork and around the rebar and then leveled. The formwork would be removed and the floor would be cured for the required duration. A construction dewatering system would pump groundwater from the basin's perimeter to maintain dry conditions while the casting basin was being constructed.

What is riprap?

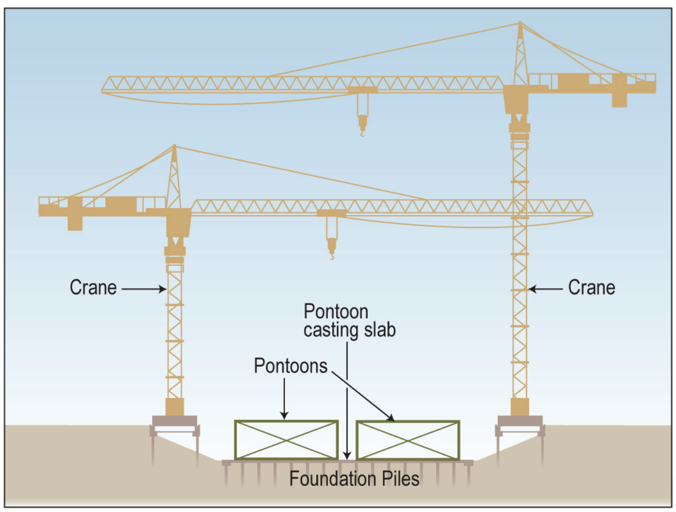
Riprap is rocks, broken stone, cut stone blocks, or rubble that is placed on slopes to stabilize and protect them from erosion.

Drainage material (for example, gravel, geosynthetic fabric, and piping) would be placed around the casting basin side-sloped walls and under the floor as these portions of the casting basin were being constructed. Once the floor was built, the drainage material would passively collect groundwater and direct it to a collection point. The collected groundwater would be monitored and reinfiltrated through trenches at the perimeter of the site in accordance with the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit and Sand and Gravel General Permit to be issued by the Washington State Department of Ecology (Ecology). The completed casting basin (Exhibit 9) would measure approximately 25 to 30 feet deep, 200 feet wide, and 1,200 feet long, although these dimensions could change slightly as proposed project design is finalized.

The Concrete Curing Process

Concrete solidifies and hardens in a chemical reaction after being mixed with water. Concrete is cured to achieve the best strength and hardness, and the curing process involves keeping the concrete moist while it hardens. Sprinklers or soaking hoses might be used to keep the concrete moist, or plastic or wet tarps might be used to wrap the wet concrete. Proper curing can take about a week for the concrete to reach design strength.

EXHIBIT 9
Casting Basin with Pontoons Conceptual Cross-Section Design



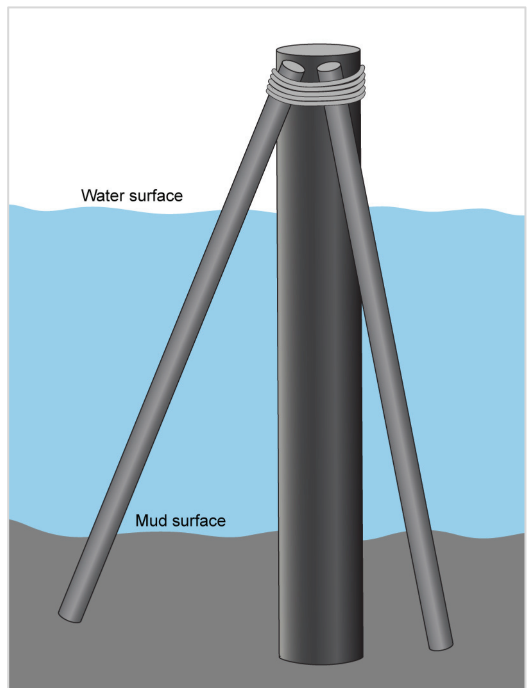
Launch Channel Construction

The upland portion of the launch channel—the area between the shoreline berm and the casting basin—would be excavated first, allowing the excavation to occur with the berm intact, keeping the excavation area dry. Temporary metal sheet pile walls might be necessary to help keep the excavation area reasonably dry, because the excavation would take place so close to the berm. Backhoes and excavators likely would be used to excavate the channel to 15 feet below MLLW to achieve a safe operating depth of 13 feet below MLLW (about 25 to 30 feet deep). The side slopes would be lined with riprap to hold the soil in place. The removable casting basin gate would also be constructed at this time.

Once the upland portion of the launch channel was excavated, WSDOT would begin to dredge the in-water portion of the launch channel. The in-water portion of the launch channel would be dredged using a clamshell to the same depth of 15 feet below MLLW to achieve a safe operating depth of 13 feet below MLLW. Clamshell operations would be done from a barge. As with excavation of the upland portion of the launch channel, WSDOT would reinforce the shoreline berm with temporary metal sheet pile. After the launch channel was excavated and dredged on both sides of the berm, and the basin gate was installed, the metal sheet pile would be removed and WSDOT would breach the berm to connect the upland and in-water portions of the launch channel.

Clamshell dredging.

Once the launch channel was constructed, WSDOT would install a row of piles (also called pilings) connected by a steel rail on both sides of the launch channel. There would be about 70 piles in the launch channel for the Aberdeen Log Yard Alternative and about 23 piles for the Anderson & Middleton Alternative. This structure would aid in maneuvering pontoons out of the casting basin. WSDOT would also place two turning dolphins at the mouth of the launch channel to help maneuver the pontoons into the navigation channel. The dolphins would rise approximately 16 feet above the surface of the water, give or take a few feet, depending on tide levels.



Example of turning dolphin construction.

Berm Modification

WSDOT would modify the existing berm along the shoreline of the build alternative site to accommodate the launch channel. About 300 linear feet of the existing berm would be removed for the launch channel to connect the casting basin to Grays Harbor. WSDOT does not intend to completely remove and replace the berm at either alternative site. Rather, WSDOT would repair the berm at the chosen alternative site, as needed, to protect the site from wave erosion. Reinforcing the berm might be necessary to prevent degradation during normal storm events that could lead to water overtopping and damage to the front part of either site. However, it is more likely that repairing or reinforcing the berm would be necessary for the Anderson & Middleton site rather than for the Aberdeen Log Yard site. Riprap could be used for this, but less invasive techniques might also be possible (such as plantings and large woody debris), depending upon the site selected. If berm reinforcement were necessary, it is likely that less invasive techniques would be possible at the Aberdeen Log Yard site more so than at the Anderson & Middleton site. If necessary, the berm height would be raised to prevent waves from overtopping it, and the bottom of the berm would be reinforced against wave action.

Material Exported from and Imported to the Project Site

Importing and exporting materials to and from the proposed project site during casting basin construction would require between 104,000 to 115,000 loaded and unloaded (total) truck trips. WSDOT might also elect to import and export some material by barge or rail, which would reduce the truck-trip estimates. The determination of whether barge or rail was used would depend on whether cost, schedule, and logistics favored the use of these alternate methods of transport. Exhibit 10 presents estimates of the types and quantities of materials that would be imported to the site for construction of the proposed casting basin.

Differences between the build alternatives in terms of material import and export quantities would be related primarily to variations needed to design around the physical characteristics of the site. Exhibit 11 presents estimates of these potential differences for each build alternative.

EXHIBIT 10
Estimated Imported Material Quantities during Casting Basin Construction

Item	Import Quantity
Concrete	14,000 cubic yards
Piles	96,000 to 330,000 feet
Steel rebar	1,750 tons
Rock	430,000 tons

EXHIBIT 11
Examples of Potential Construction Differences between the Grays Harbor Build Alternatives

Component	Aberdeen Log Yard Alternative	Anderson & Middleton Alternative
Casting basin		
Approximate volume of material excavated from casting basin	475,000 cubic yards	423,000 cubic yards
Average pile length	100 to 120 feet	135 to 150 feet
Launch channel		
Approximate launch channel size	Onshore: 200 feet long,[a] 63,000 square feet Offshore: 470 feet long,[a] 125,000 square feet	Onshore: 150 feet long,[a] 58,000 square feet Offshore: 120 feet long,[a] 16,000 square feet
Approximate volume of material excavated for launch channel	Onshore: 63,000 cubic yards Offshore: 87,000 cubic yards	Onshore: 43,900 cubic yards Offshore: 6,900 cubic yards

[a] The launch channel width is not indicated because it would vary. At the base of the channel excavation, its width would be approximately 140 feet, but at the shoreline surface its width would be approximately 300 feet. The square footage provided in this table would accommodate these variations.

What facilities would WSDOT build to support casting basin operation?

To support pontoon construction activities at the casting basin, the build alternatives would require several support facilities, such as access roads; a concrete batch plant (where concrete for the casting basin and pontoons would be produced); large laydown areas; stormwater handling and water treatment areas; office space; a rail spur; and a designated parking area for workers. Exhibit 12 presents the basic support facilities of the casting basin and estimates of the area each would require at the Grays Harbor build alternative sites.

EXHIBIT 12
Approximate Areas of the Casting Basin and Support Facilities Common to the Grays Harbor Build Alternatives

Feature	Area (square feet)
Casting basin	430,000 to 448,000[a]
Concrete batch plant	100,000
Laydown and dry storage areas	379,000
Office space and parking	164,000
Access roads	150,000
Water treatment area	135,000

[a] This square footage represents the total footprint of the casting basin with sloped-back walls (depending on the site). The internal work area (slab floor of the basin) would be 227,000 square feet. The basin walls would be sloped back to the top of the basin and lined with riprap.

Concrete Batch Plant

A concrete batch plant would be constructed onsite as part of the proposed project. The batch plant would produce as much as 1,000 cubic yards of concrete per day, a rate necessary to adequately support casting basin and pontoon construction.

The batch plant would likely be a large metal structure of mixers, pipes, and conveyors sitting on a concrete pad and constructed onsite. To prepare for the batch plant construction, the area would be graded and a concrete pad would be poured. Storage areas around the batch plant machinery would be created to store the aggregate for the concrete and other necessary materials. There would also be parking and loading areas for the cement trucks. The batch plant facility would require substantial utilities, such as power and water.

Example of a concrete batch plant.

Laydown Areas

A laydown area is a location on the site that could be used for loading and unloading materials off of and onto trucks; moving and storing large equipment; and storing concrete formwork or other structures needed during construction. Laydown areas might also be used for staging the construction of pontoons. Gravel-surfaced laydown areas surrounding the casting basin would be used to store pontoon construction materials, such as steel rebar and forms composed of wood or metal. The laydown areas would also provide room to move materials around and fabricate items (such as precast concrete elements and rebar cages that form the internal reinforcing skeleton of concrete pontoons).

Constructing the laydown areas would be similar to constructing access roads (described subsequently), because laydown areas often consist of several layers of compacted gravel and rock to accommodate heavy vehicles, such as bulldozers and loaders.

Office Facilities

Indoor work space would be required for coordinating and managing casting basin construction and operation activities. Temporary work trailers would be installed as offices for construction officials and supervisors. The temporary work trailers would be placed and anchored within or adjacent to the paved parking area. All trailers would be connected to potable water, sanitary sewer, electrical, and communications lines.

Access Roads and Parking Areas

Access roads would allow construction vehicles and employees to navigate the construction site safely, and parking areas would provide spaces for the vehicles of those people who travel to the facility for work. Parking areas would be located onsite. After site grading was complete, the access roads and parking areas would be constructed. Materials used in constructing access roads would likely include a combination of a bottom layer of sand or gravel, and a final layer of crushed rock.

Stormwater and Water Treatment Areas

WSDOT would construct a water-handling and treatment system to address the separate needs of typical stormwater runoff, casting-basin process water, and groundwater from the dewatering systems. For typical stormwater runoff, the proposed project would use basic water-quality treatment best management practices in accordance with the WSDOT *Highway Runoff Manual* (WSDOT 2008), as applicable. Typical basic treatment best management practices include biofiltration swales and wet ponds.

What is dewatering?

Dewatering is the removal of groundwater from a work area during site construction and operation and is necessary to maintain reasonably dry working conditions. During construction of the new casting basin facility, vacuum pumps would extract groundwater from wells installed across the work area and carry the water to a collection system. Once the casting basin is built, the soils surrounding it would be passively dewatered (via gravity) to keep the basin dry.

Process water from the casting basin would be handled independently from the stormwater originating from the parking lots and laydown areas because of potential pH and total suspended solids concerns. All process water would be pumped from the casting basin to a collection of water treatment ponds. At the ponds, the water would be monitored and treated in accordance with the NPDES Sand and Gravel General Permit to be issued by Ecology for the proposed project before being discharged into an approved offsite facility or Grays Harbor.

WSDOT would install temporary erosion and sediment control best management practices in accordance with the WSDOT *Highway Runoff Manual* (WSDOT 2008), as appropriate, as well as the NPDES Construction Stormwater General Permit conditions. Selecting best management practices for temporary erosion and sediment control would be at the contractor's discretion. However, the best management practices would likely include temporary erosion and sediment control ponds, silt fencing, and other temporary sediment-control best management practices dispersed across the site, as appropriate.

Operation (Permanent) Dewatering System

The casting basin would require a permanent operation dewatering system to keep groundwater from entering the casting basin. WSDOT would construct the operation dewatering system during site development. This system would include a passive (gravity-driven) collection system of perforated pipes placed around the side slopes and casting basin floor to intercept groundwater as gravity moved it towards the basin, to collect it, and to convey it to a collection point. At the collection point, the groundwater would be monitored and reinfiltrated through trenches at the site perimeter.

Any water discharged to Grays Harbor would meet Ecology water-quality requirements. WSDOT expects that, at a minimum, groundwater would need to be treated for total suspended solids during initial startup of the operation dewatering system. Although not expected, if WSDOT did encounter contaminated groundwater during pontoon construction, supplemental treatment designed for the specific contaminant or contaminants encountered would occur.

Onsite Utilities

Domestic water, sanitary sewer, communications, and electrical service lines would be extended to serve the proposed project site, as needed. Local utility providers would provide these services. Water and sewer would serve the offices, batch plant, and casting basin, while electrical service would be provided across the site to accommodate lighting and equipment. In addition, a fire suppression waterline would be installed to provide fire suppression capabilities across the site. Utility lines would likely be installed underground, which would require excavating a trench to the required depth (Exhibit 13).

EXHIBIT 13
Required Excavation Depths for Utility Service Lines

Utility Service Lines	Required Excavation Depth (feet)
Water	3 to 5
Sewer	5 to 8
Electrical and communications	2 to 4

What type of equipment would WSDOT use to build the casting basin facility?

Construction equipment required to build the casting basin facility would include equipment typically used for large-scale excavation and construction activities, as shown in Exhibit 14.

EXHIBIT 14
Typical Equipment and Use for Casting Basin Construction and Operations Phases

Equipment	Project Phase	Expected Project Use
Air compressor	Casting basin construction and operations	Handheld tools power
Backhoe	Casting basin construction	Excavation and rock berm reinforcement
Bulldozer	Casting basin construction	Site clearing, material moving, and rock berm reinforcement
Compactors (self-propelled)	Casting basin construction	Material compacting
Concrete pump	Casting basin construction and operations	Concrete pumping into forms
Crane (mobile and tower)	Casting basin operations	Pontoon construction
Crane (track-mounted)	Casting basin construction	Casting basin floor and walls construction
Drum roller	Casting basin construction	Surface compaction for access roads
Dump truck with pup trailer	Casting basin construction	Material hauling
Excavator	Casting basin construction	Excavation
Flatbed truck	Casting basin construction and operations	Material delivery
Generator	Casting basin construction and operations	On standby, ready for use for power outages
Grader	Casting basin construction	Final project site grading
Handheld tool	Casting basin construction and operations	Various construction tasks
Light standards	Casting basin operations	Work area illumination
Mixer (truck)	Casting basin construction and operations	Concrete delivery
Piezometer monitoring equipment	Casting basin operations	Permanent construction dewatering
Pile-driving hammer	Casting basin construction	Driving piles or pile casings
Track-mounted drill rig	Casting basin construction	Dewatering wells installation

What types of pontoons would WSDOT construct?

For this proposed project, WSDOT would construct the three types of pontoons needed for a four-lane replacement of the Evergreen Point Bridge if the bridge needed to be rebuilt after catastrophic failure. A total of 33 pontoons would be constructed. Exhibit 15 lists the types and quantities of pontoons that would be built, and their approximate dimensions and weight. Exhibit 16 illustrates how these pontoons would be configured to replace the Evergreen Point Bridge.

How big are the longest pontoons?

Each of the longest pontoons—longitudinal pontoons—would stretch from goal post to goal post on a football field and weigh twice as much as WSDOT's largest ferry.

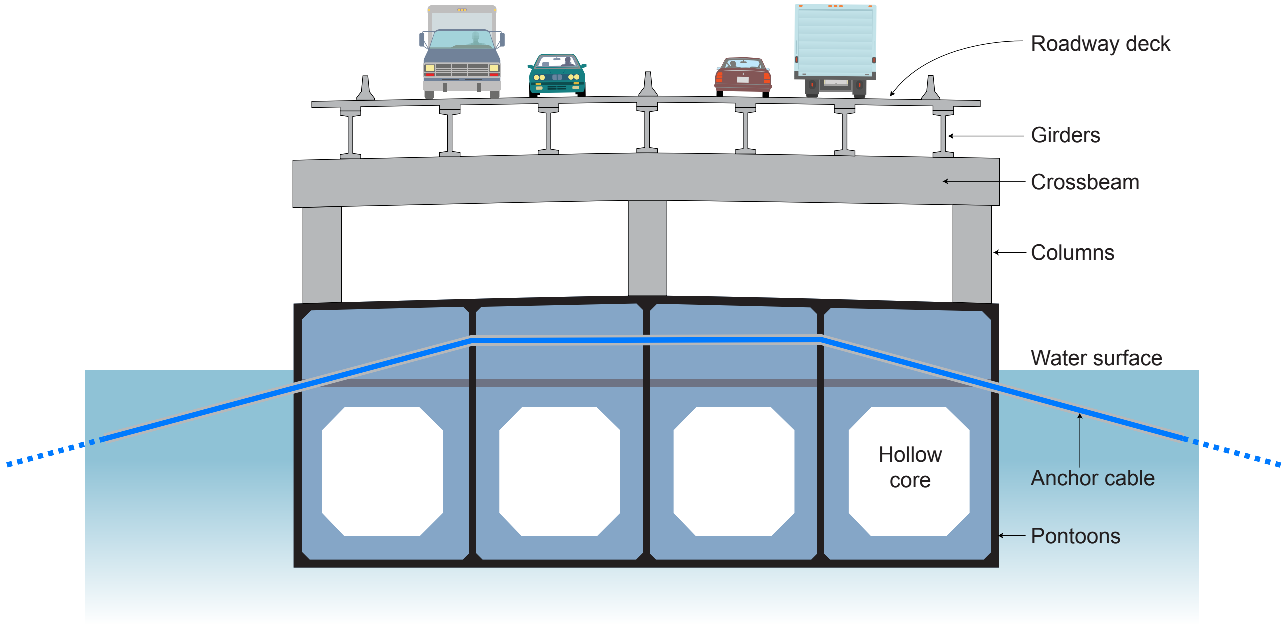
EXHIBIT 15
Pontoon Types, Quantities, Approximate Dimensions, and Weight

Pontoon Type	Quantity	Width (feet)	Length (feet)	Height (feet)	Weight (tons)
Cross (western side of bridge)	1	75	240	34	10,100
Cross (eastern side of bridge)	1	75	240	35	10,550
Longitudinal	21	75	360	29	11,100
Supplemental stability	10	60	98	29	2,650 to 3,000 (depending on whether it is set up so that an anchor cable could be attached)

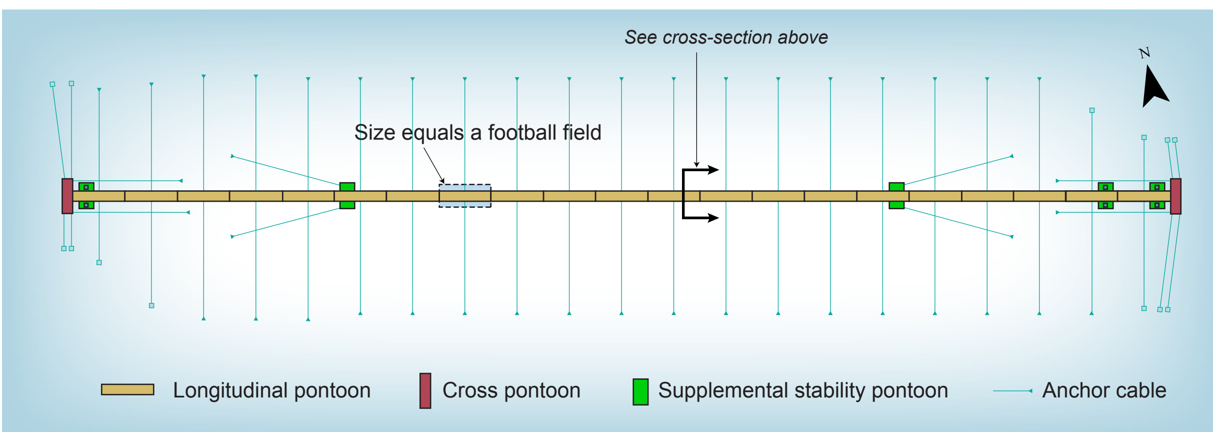
How would WSDOT construct pontoons?

During the pontoon construction phase, WSDOT would perform the following pontoon-building tasks:

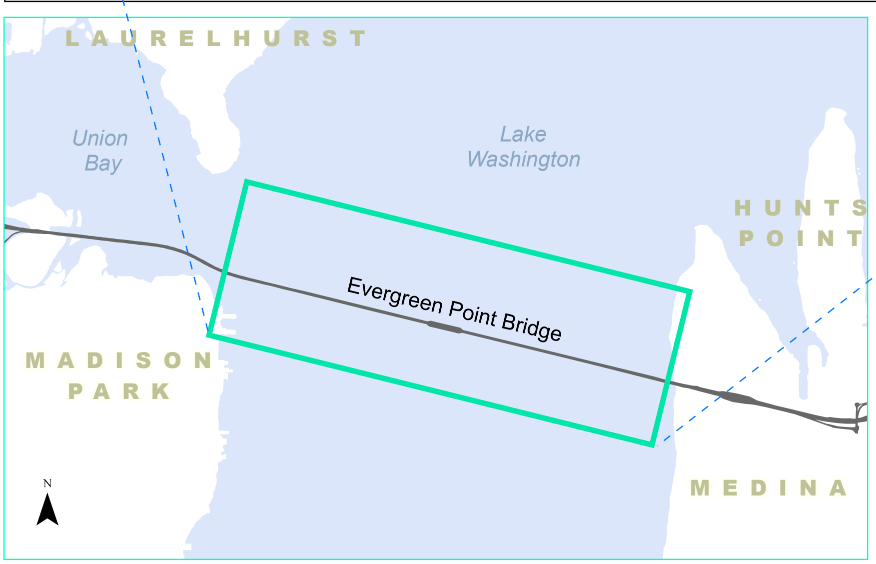
- Deliver materials to the site
- Form pontoon components
- Prepare steel reinforcing bars for the pontoons
- Manufacture concrete
- Place concrete in formwork
- Cure concrete
- Perform water-quality treatment activities
- Flood casting basin and open gate
- Tow pontoons out and moor them
- Close gate and drain casting basin



Bridge and Pontoon Cross-Section



Aerial View of Pontoon Configuration



Area of Detail

Exhibit 16. **Pontoon Configuration to Replace the Existing Evergreen Point Bridge**

Pontoon Construction Project

Washington State Department of Transportation

Pontoons are reinforced and post-tensioned concrete structures. Pontoon construction would follow the same construction steps typical for reinforced concrete structures. Each pontoon element would be constructed according to the following steps:

1. Place formwork
2. Place steel reinforcing bar (rebar)
3. Place concrete
4. Cure concrete
5. Remove formwork (and keep concrete surface wet if not fully cured)

The general order in which the pontoon elements would be built is keel slab (bottom slab), exterior walls, interior walls, anchor gallery (the point at which the anchor cables are attached to the pontoons), then deck slab (top slab). Once the required elements were finished, the pontoons would be outfitted with hatches, ladders, railings, and other miscellaneous hardware, which would be attached to the inside and top of the pontoon.

The pontoons would require a specific type of reinforcement called post-tensioning, which would involve placing hollow ducts in the concrete that would be filled with steel tendons or strands. This would be done during the rebar placement. The strands would be tensioned after all the concrete had been placed and then cured. This process would create compression in the concrete, which would make the structure stronger. After the strands were tensioned, the ducts would be filled with grout and the ends would be covered with concrete and cured. After the post-tensioning process was complete, the pontoons would be ready to be floated out into Grays Harbor and stored.

Pontoons floating in flooded casting basin ready to be towed out.

Once a pontoon construction cycle was complete, the work area would be thoroughly cleaned and any washwater would be collected and treated before being discharged into Grays Harbor. Then, the casting basin would be flooded in a controlled manner. Sluice gates would control the flow of water to allow the pontoons to float safely within the casting basin. After the water level inside the basin matched the water level in Grays Harbor (or the Blair Waterway at the CTC facility, if it were used), the casting basin access gate would be lifted open and a tugboat would tow the pontoons out of the basin. After pontoon floatout, the gate would be lowered back into place at low tide to minimize the amount of water to be pumped out of the basin in preparation for the next pontoon construction cycle. Any fish that might have entered the basin while the gate was open would be collected and released back to Grays Harbor by following a fish-handling protocol to be developed in coordination with Washington Department of Fish and Wildlife, U.S. Department of Fish and Wildlife, National Marine Fisheries Service, and Quinault Indian Nation fisheries specialists.

Exhibit 17 identifies preliminary estimates of the quantities of some of the materials that would need to be imported for pontoon construction. WSDOT anticipates that approximately 40,000 unloaded and loaded (total) truck trips would be required to import the materials needed to build the pontoons.

EXHIBIT 17
Estimated Imported Material Quantities during Pontoon-Building Operations

Item	Quantity (pounds)[a]
Coarse aggregate	177,797,000
Fine aggregate	130,083,000
Portland cement	62,681,000
Silica fume	5,023,000
Fly ash	10,045,000
Steel rebar	40,220,000
Total	425,849,000

[a] Quantities estimated from the 30 percent design.

What type of equipment would WSDOT use during pontoon construction?

WSDOT anticipates that it would use the equipment listed in Exhibit 14 to operate the facility and build pontoons.

How would WSDOT store completed pontoons?

If not needed immediately, WSDOT would store the pontoons in Grays Harbor at the approved moorage location as they are completed. The completed pontoons would be towed out of the casting basin and moored in Grays Harbor until needed for catastrophic failure response or planned replacement of the Evergreen Point Bridge. Towing each pontoon from the casting basin to its moorage location would require up to two tugboats and would be similar to moving a barge or other large vessel. This type of activity regularly occurs throughout Grays Harbor and Puget Sound as part of normal port operations.

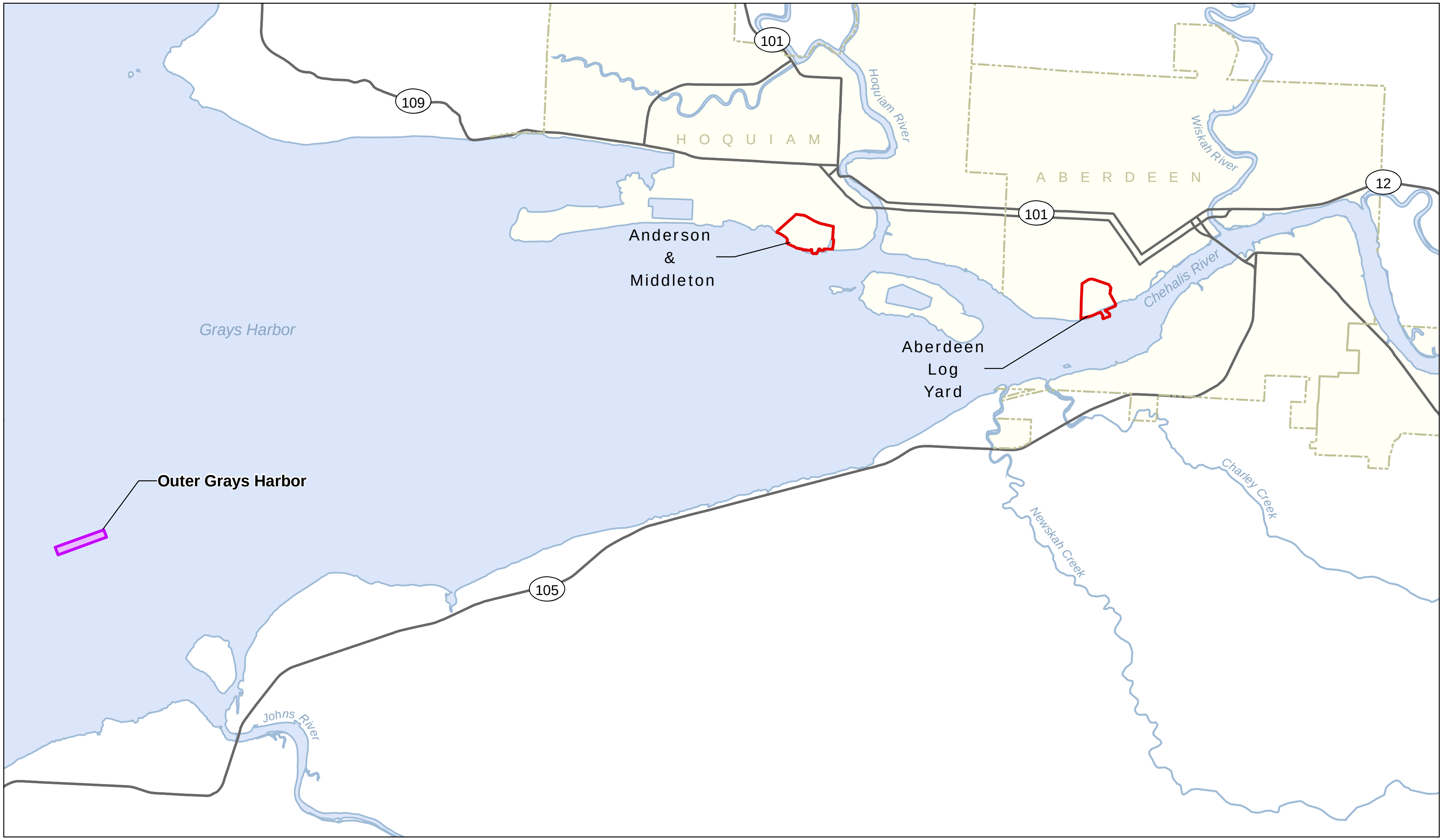
The number of existing marine berths in Grays Harbor is limited and could not accommodate moorage of all the pontoons built for this proposed project for the anticipated moorage duration. Therefore, WSDOT is analyzing a new pontoon moorage site in the Grays Harbor area (Exhibit 18) as part of the proposed project. This new moorage site, which is about 1.5 nautical miles from the Grays Harbor shoreline near Johns River, could be used to store pontoons built at the Grays Harbor casting basin facility. This area would provide adequate shelter from wind and waves and is outside the designated deep-water navigational channel. Sonar scanning did not identify any submerged aquatic vegetation or shipwrecks at this proposed location. This area is between 30 and 60 feet deep (relative to MLLW), with a featureless bottom characterized by sand waves.

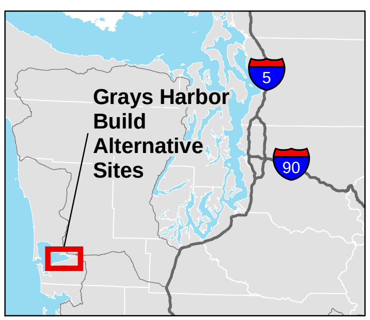
The proposed Grays Harbor moorage location could store up to 33 pontoons by rafting them in groups of three. These rafts would be attached to removable anchors in at least 30 feet of water (Exhibit 19). The underside of the pontoons would extend about 15 feet below the water surface. The pontoons would never rest on the harbor bottom, even during the lowest tides; there would always be at least 10 feet of water between the bottom of the pontoons and the floor of the harbor.

WSDOT would equip each pontoon with transmitters and remotely monitor their spatial location, proper position in the water, and bilge-water level. These pontoons would be anchored outside of maintained and marked deep-water navigation channels and identified with navigation lighting in compliance with U.S. Coast Guard requirements.

If the CTC facility in Tacoma is used, WSDOT would moor pontoons built at that facility at existing available marine berths within Puget Sound. Based on a 2009 preliminary assessment of available marine berth space, WSDOT has concluded that ample available space suitable for securing pontoons exists among the major ports in Puget Sound. These pontoons would be identified with navigation lighting in compliance with U.S. Coast Guard requirements.

Should catastrophic failure of the Evergreen Point Bridge occur before the planned bridge replacement, pontoons would be towed out of Grays Harbor as soon as seasonal towing windows allowed. However, if there was no catastrophic failure before the planned bridge replacement, pontoons could be stored in Grays Harbor for up to 1.5 years, based on the current proposed bridge replacement schedule. If pontoons were built at





Proposed pontoon moorage location

Build Alternative Site

N

0 0.5 1 2 Miles

Source: Grays Harbor County (2006) GIS data (Waterbody and Street). Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

Exhibit 18. **Grays Harbor Proposed Pontoon Moorage Location**

SR 520 Pontoon Construction Project

Washington State Department of Transportation

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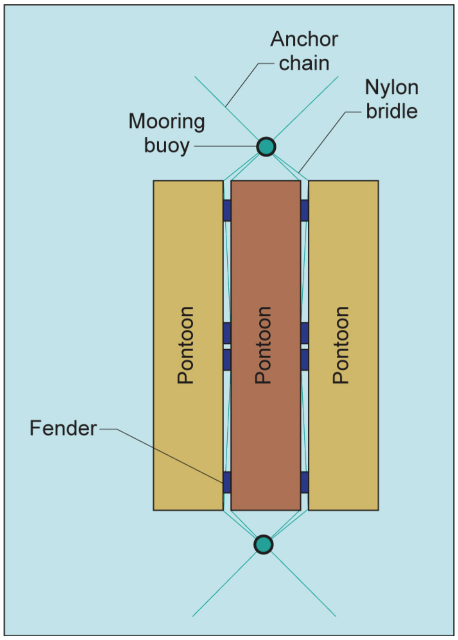
EXHIBIT 19
Arrangement of Pontoons during Open Water Moorage



the CTC facility in Tacoma, they would be stored at existing marine berths in Puget Sound for up to 1.5 years. If catastrophic failure did not occur and the schedule for the planned bridge replacement was delayed, it is likely that the storage periods would be longer in Grays Harbor and, if the CTC facility was used, Puget Sound.

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