DRAFT ENVIRONMENTAL IMPACT STATEMENT
SR 520 BRIDGE REPLACEMENT AND HOV PROGRAM

MAY 2010

SR 520 Pontoon Construction Project

Description of Alternatives and Construction Techniques Discipline Report

Washington State Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

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

SR 520 Pontoon Construction Project Draft 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

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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	Mount 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	Chitosan is a fiber-like product made from ground shrimp shells that can be used as an additive in the filtration process to remove phosphorus, heavy minerals, and oils from water.
Cross pontoon	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.
Supplemental stability pontoons	The smallest pontoons (approximately 90 feet long and 50 feet wide) that attach on either side of a longitudinal pontoon at key points along the bridge to provide stability to the floating structure.
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	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.
MLLW	The average of the lowest 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 against erosion.
Silica fume	A very fine form of silica, which 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.

1. Range of Alternatives

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

What alternatives are WSDOT evaluating in the Draft EIS?

The Draft EIS evaluates the following three alternatives:

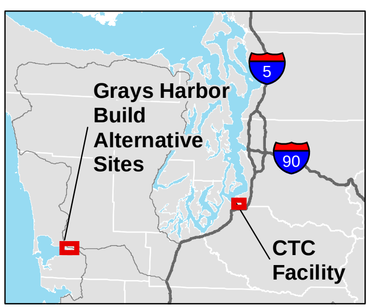
- Construction of a casting basin and pontoons at the Anderson & Middleton Alternative site in Hoquiam, Washington (Exhibit 1)
- Construction of a casting basin and pontoons at the Aberdeen Log Yard Alternative site in Aberdeen, Washington (Exhibit 1)
- No Build Alternative

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 to construct some of the 33 pontoons (Exhibit 2)
- Storing and/or mooring the 33 pontoons built by this project
- Maintaining the Grays Harbor casting basin facility while it is owned and operated by the Washington State Department of Transportation (WSDOT)

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

- Constructing additional pontoons needed for the I-5 to Medina: Bridge Replacement and High-Occupancy Vehicle (HOV) Project
- Transporting pontoons built at the CTC facility to Lake Washington
- Transporting pontoons built at the Grays Harbor facility out of Grays Harbor
- Outfitting pontoons with roadway structure



- Proposed project haul route common to all project sites
- Proposed project haul route: Aberdeen Log Yard
- Proposed project haul route: Anderson & Middleton
- Build Alternative Site
- CTC facility limits
- City limits

N 0 2,000 4,000 Feet

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

Pontoon Construction Project

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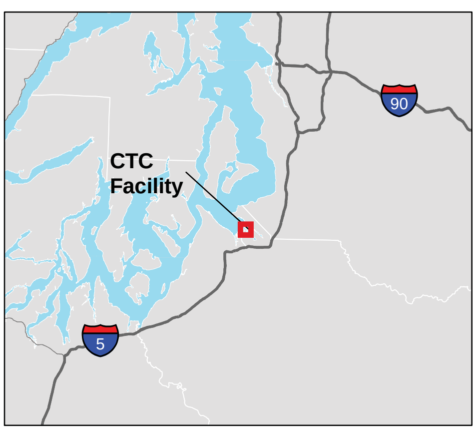

CTC facility

Laydown area

Office space

Parking lot

Parking, office, and laydown areas

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.

N

0 0.125 0.25 Miles

Exhibit 2. **CTC Facility Overview**

Pontoon Construction Project

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- Constructing the emergency replacement of the Evergreen Point Bridge
- Using the Grays Harbor casting basin facility for unforeseen uses

As noted above, WSDOT might elect to use the existing CTC casting basin facility in Tacoma under either of the build alternatives for pontoon construction during the life of the 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 is being constructed. At the new casting basin facility, WSDOT would launch most of the completed pontoons into Grays Harbor and tow them to an approved moorage location in the harbor until needed, and some pontoons could be stored in the casting basin.

What is the No Build Alternative?

An EIS provides a No Build Alternative in order 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.

Under the No Build Alternative for the Pontoon Construction Project Draft EIS, 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 (at the new site and at the CTC site) would not occur.

For the purposes of this Draft EIS, WSDOT assumes that, if unused by this project, the build alternative sites would continue to be used as they are today: Aberdeen Log Yard would remain an active log yard, the Anderson & Middleton site would remain largely inactive, and the CTC site 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 Pontoon Construction Project not occur, the use of these properties has remained unchanged since the 1990s and there are no known plans for development of either of these sites. 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?

Anderson & Middleton Alternative

The privately owned Anderson & Middleton site is located 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 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 95 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, burners, and a sawmill on this site, but by the late 1960s all mill structures were gone. The site was used for timber storage until the late 1980s and has been mostly unused since.

Aberdeen Log Yard Alternative

The 51-acre Aberdeen Log Yard site lies on the north shore of Grays Harbor in Aberdeen near the mouth of the Chehalis River. Weyerhaeuser Corporation owns and uses this generally flat site for log storage. The site is undeveloped except for unpaved access roads. A Port of Grays Harbor industrial terminal property bounds the site on the west, a wastewater treatment plant on the east, and railroad tracks along the northern boundary. 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.

Aberdeen Log Yard property in November 2008 (view looking south)

A sawmill was built on the site in the early 1900s. All mill structures were removed before 1971, and the site has been used mostly to store logs since then. Between 1971 and 1981, the shoreline was extended southward through backfilling with sediments dredged from the Chehalis River, accumulated wood waste, and other fill material.

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 and located within the industrial zone of the Port of Tacoma, an active deepwater Port facility. Establishment of the Port of Tacoma led to the dredge and fill of intertidal mudflats and wetlands to develop usable land that would support the burgeoning timber industry around the turn of the 19th century. The CTC site is nearly fully built out. WSDOT used the small casting basin at this site to construct pontoons for the Hood Canal Bridge Project.

The CTC casting basin facility

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

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 decision of whether or not to use the CTC facility would likely be driven by the opportunity to deliver pontoons faster or more economically. The CTC casting basin is not large enough to construct the two deepest pontoons (that is, cross pontoons) and is too small to accommodate the timely construction of the many large (that is, longitudinal) pontoons required for the 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.

The pontoons manufactured at the CTC facility 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 the section *Types of Pontoons to be Constructed* on page 2-14 for more information about the types of pontoons that would be constructed for this project.

How would WSDOT maintain the casting basin facility for the long term?

After all pontoons needed for the Pontoon Construction Project are built and towed out of the casting basin, WSDOT would maintain the facility in a manner compliant with all permits and approvals issued for this project until the basin is needed for the I-5 to Medina: Bridge Replacement and HOV Project or other currently unforeseen floating bridge projects. Using the casting basin for anything other than building pontoons for the Evergreen Point Bridge would require all applicable environmental regulatory and permitting processes to be reinitiated as appropriate.

During periods of nonuse—and while under WSDOT's ownership—the casting basin would be kept dry, allowing for easier maintenance and inspection activities. In addition, the casting basin gate is not currently designed to withstand water pressure from the inside when the tide is out.

2. Alternatives Development

This chapter describes how WSDOT determined the range of alternatives to be fully analyzed in the Draft 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 is analyzing the casting basin method of building pontoons in the Draft EIS as opposed to other potential methods, which are briefly described in Section 2, Proposed Actions.

How did WSDOT identify candidate sites?

During the 4-year period of 2004 through 2008, WSDOT identified potential pontoon construction sites, according to the following timetable:

- 2004: Solicited for potential locations.
- 2006: Reviewed recommendations from an expert review panel.
- 2005 to 2006: Received private proposals.
- 2008: Received new site recommendations and conducted an independent real estate search for properties.
- 2008: Completed final screening of 38 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 State Route (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 Web page (http://wsdot.wa.gov/biz/contaa/ WSDOTPRO/default.htm) for two 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 tugs in combination with barges and pontoons

The solicitation stated 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 project
- Availability of the site for the 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, etc.)

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.

The real estate search team identified sites in three phases in 2008. 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.

A second phase was conducted to double-check that no suitable sites in the Puget Sound area were missed during phase one. During this second effort, the team conducted an intensive GIS search of Snohomish, Whatcom, King, Kitsap, Skagit, Jefferson, and Clallam counties, filtering the data to produce a list of potential sites that fit the deep water access, utility access, and size criteria. 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 925 sites, 20 acres or larger, within 320 feet of open water in the Washington counties studied and seven sites in Canada. The seven sites in Canada were in remote areas, inaccessible by road, and were dropped from further study. The team further examined the 925 sites by applying the following methods:

- Using on-line parcel viewing tools, where available, and assessing terrain using U.S. Geological Survey topographic maps
- Researching ownership information from county Websites
- Conducting a search of the Northwest Multiple Listing Service and the Commercial Broker Association Multiple Listing Service
- Making contact with four local brokers specializing in commercial and industrial properties
- Reviewing port authority Websites for location availability and parcel information

No sites were identified as suitable in this second effort that were not already under consideration by WSDOT. In the third phase, the team searched for suitable parcels in Grays Harbor County, a county identified as having relatively large, undeveloped waterfront parcels.

Where were candidate sites located?

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. Two proponents made additional applications to WSDOT suggesting two more sites (one in Everett and one in Tacoma) after their initial 2005 proposals, for a total of 20 sites.

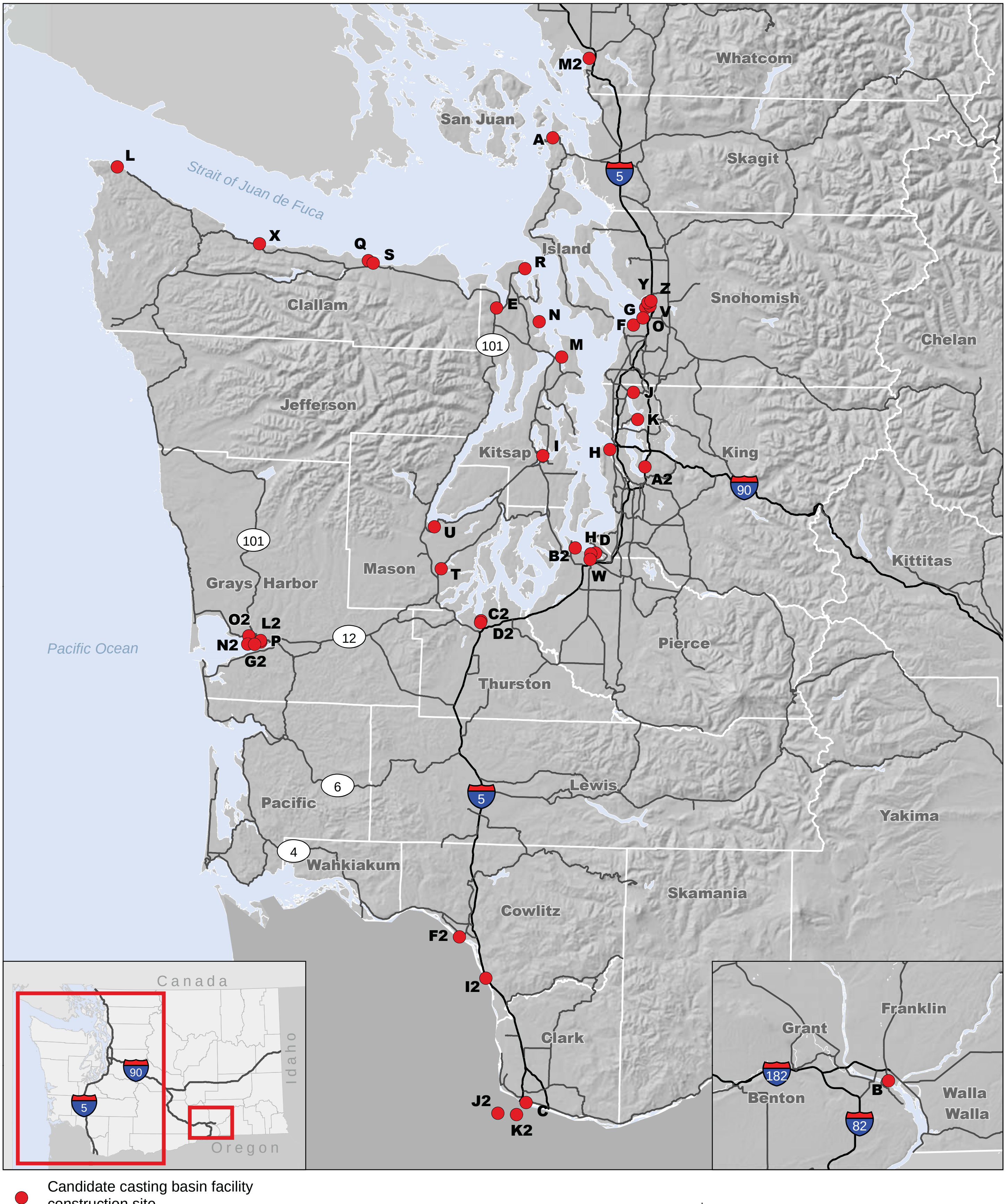
The first expert review panel, which met March 13 to 16, 2006, did not identify any additional sites for WSDOT to consider (WSDOT 2006). The second panel, which first met in October 2006, recommended that WSDOT consider four sites in addition to the responses it received to the 2004 solicitation (WSDOT 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 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. This brought the total number of sites identified to 39; these 39 sites are shown on Exhibit 3 and listed in Exhibit 4.

How were screening criteria applied to candidate sites?

To determine which sites would comprise the range of alternatives to be analyzed in the Draft EIS, 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 impacts and constraints.

WSDOT collected information on the 39 candidate sites and used these criteria for each. If a site failed on any criterion, then it was eliminated from further consideration and data collection on that site stopped. Of the 39 sites, 36 were eliminated because they did not meet one or more of the criteria. Three sites—Port of Grays Harbor Industrial Development District #1 (IDD #1), Anderson & Middleton, and Aberdeen Log Yard—passed the screening process and were retained for further analysis.



Source: WSDOT (2007) GIS Data (Potential Site), WSDOT (2004) GIS Data (State Route),WDNR (1997) GIS Data (Shaded Relief), Ecology (2001) GIS Data (Waterbody). Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

Note: Site H includes locations in Seattle and Tacoma.

N

0 10 20 Miles

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

Pontoon Construction Project

Washington State Department of Transportation

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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) dismissed from consideration
J	Glacier Northwest Kenmore Premix Plant, Kenmore, WA	Size, required construction method (segmental match-casting) dismissed from consideration
K	Lake Washington (in-lake), Seattle, WA	Required construction method (vertical casting) dismissed from consideration
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	Noncompliance with environmental regulations
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

EXHIBIT 4
Casting Basin Facility Sites Considered and Dismissed

ID	Site	Eliminating Criteria
Z	Cedar Grove Composting, Snohomish County, WA	Sufficient draft
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 Draft EIS; the CTC facility site considered in the Draft 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 float-outs. Maintaining the needed 22-foot draft during active construction must be logistically and economically achievable after considering dredging volume, frequency, area, 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 area, 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 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.

EXHIBIT 5
Screening Criteria for Casting Basin Facility Construction Site

Criteria	Rationale
Logistical constraints	
4. Towing feasibility	There must be established navigable water routes between the site and Lake Washington. The costs and risks associated with the tow must be acceptable.
5. Domestic location	Purchase of materials, long-term leasing strategies, foreign environmental processes, overseeing construction in another country, and challenging interagency coordination, exclude foreign sites from consideration for this project.
Unacceptable adverse effects	
6. Unacceptable adverse effects to 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 to natural resources that could not be mitigated would likely lead to permit or approval denials.
7. Cultural resources	Site development must not require direct effects to significant archaeological resource for which effects could not be mitigated or direct effects to historic structures or sites that must be preserved in place.
Unacceptable constraints	
8. Cultural resources	Known large-scale or complicated recovery work cannot begin until NEPA completion and would delay schedule and prevent expedited construction. The extent and significance of resources might not be fully understood until excavation is under way, presenting unanticipated costs and schedule risks.
9. Hazardous materials: MTCA or federal or state superfund site.	Hazardous materials cleanup cannot begin until NEPA completion and would delay schedule and prevent expedited construction. Extent of contamination might not be fully understood until cleanup actions are under way, presenting unanticipated costs and schedule risks.
10. Compatibility with zoning and land use regulations	Rezoning or major land use action process cannot begin until NEPA completion and would delay schedule and prevent expedited construction. 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 buildout of the 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

In February 2009, WSDOT removed IDD #1 from further consideration as a potential build alternative site due to the level of adverse effects on federally protected wetlands that would be associated with developing the property. Approximately 30 acres of wetlands would be eliminated by developing the IDD #1 site, and obtaining a permit for such an activity would present substantial challenges to WSDOT. Exhibit 4 lists all of the sites considered and dismissed from further consideration.

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

Several construction methods were considered throughout the conceptual phase of the Pontoon Construction Project site design process. Currently, 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, for the purpose of this Draft EIS, the casting basin method was analyzed.

> 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 high concrete 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 flood water, 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 risk 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

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 float 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. Following are some of the reasons 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 transporting by barge 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 require 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

This 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. Following are some of the reasons this 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 are particularly difficult deep under water.
- As described under floating drydocks, 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

This 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. Following are some reasons this method was dismissed:

- Each incremental movement of the pontoon into the lake presents 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 pontoons.

- This method requires approximately ten flooding and dewatering cycles per pontoon to facilitate incremental launching, which presents higher risks of environmental effects due to the increased 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 has a pier that extends from shore to the underwater grid located in deep water. The barge slip 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. Following are some of the reasons these two methods were dismissed:

- 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.
- 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 12,000 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 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 its hull, while 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 damaged pontoon be demolished in place. This would be a costly loss and would also prevent other completed pontoons from being launched, which would significantly delay schedule.

3. Proposed Actions

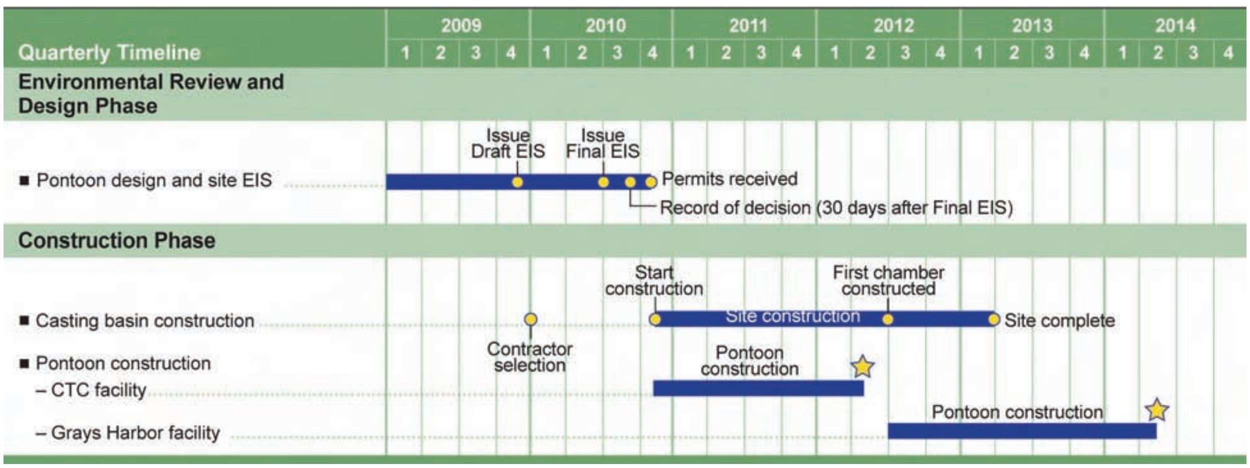
This chapter presents details about what WSDOT proposes to build at the build alternative sites, and generally how these project elements would be constructed. Project effects of the alternatives are not discussed here. Project effects are discussed in the discipline reports and technical memoranda produced in support of the Draft EIS.

The Pontoon Construction Project would be implemented in two phases. The first phase would span the time required to build the casting basin, and the second phase would span the time it would take to build the pontoons needed for catastrophic failure response.

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

The new casting basin facility would take approximately 2 years to construct. As shown in Exhibit 6, the current project schedule shows that construction of the new casting basin would begin in November 2010. Pontoon construction at the new facility would begin as soon as one chamber is ready—likely in April 2012.

EXHIBIT 6
Proposed Pontoon Construction Project Schedule



Pontoon construction at the existing CTC facility would occur over a 3-year period, and pontoon construction at the new casting basin facility would take more than 2 years. Construction of all pontoons would take about 4 years, with production at the two facilities overlapping for 1 year.

WSDOT anticipates that approximately 6 to 9 months would be needed to complete each pontoon-construction cycle. The new casting basin facility at Grays Harbor could produce 20 pontoons in two and a half pontoon construction cycles of eight pontoons each. The existing CTC facility could produce five small supplemental stability pontoons in each of the first two pontoon construction cycles (for a total of ten), and one longitudinal pontoon each in three more cycles.

What would the casting basin facility look like?

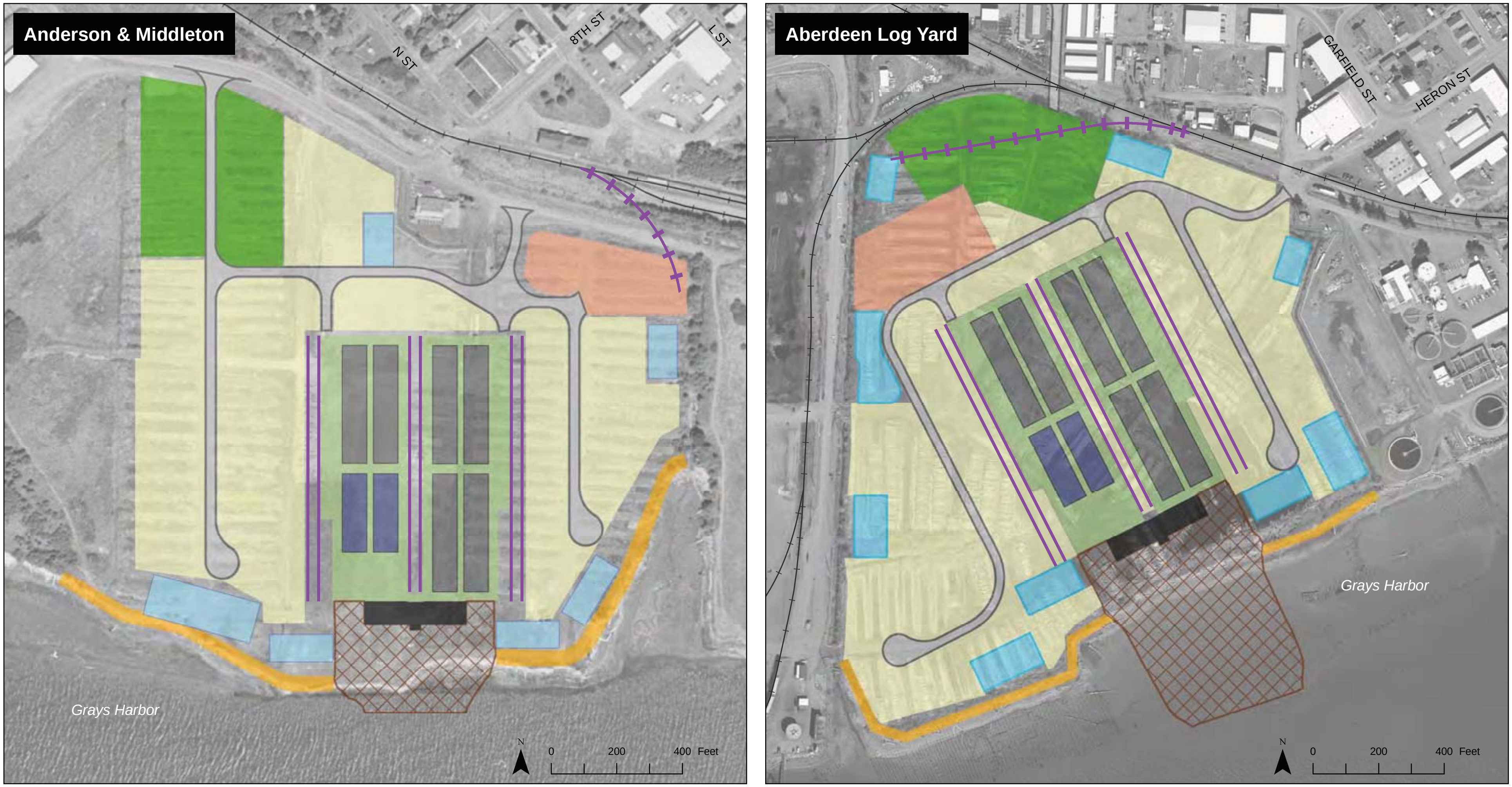
WSDOT engineers have prepared conceptual designs for the new casting basin facility in Grays Harbor, which would be basically the same at both build alternative sites, with variations depending on site-specific characteristics. Exhibit 7 shows the conceptual site design layout of the two proposed build alternative sites, and Exhibit 8 presents a conceptual three-dimensional model of how the casting basin facility could look.

The casting basin would be positioned a few hundred feet from the shoreline and partitioned into two separate work areas connected to the water by a single launch channel. The launch channel would consist of an onshore portion excavated between the casting basin and shoreline, a breach in the shoreline berm, and a dredged channel extending offshore to the federal navigation channel in Grays Harbor.

Current design shows the casting basin partitioned into two chambers, separated by a concrete wall. WSDOT proposes to make one chamber of the casting basin deeper than the other to accommodate the construction of the two largest pontoons (that is, the cross pontoons) required for the bridge replacement. With one chamber tailored to accommodate the largest pontoons, rather than making both chambers deeper, this casting basin would be designed efficiently for construction of the types of pontoons needed for this project.

How would WSDOT construct the new casting basin facility?

The Pontoon Construction Project is at a preliminary design level, so the details here generally describe the process by which a casting basin facility would be constructed at either proposed build alternative site, and then how the pontoons would be constructed during facility operation. The selected contractor will ultimately decide specific means and methods of casting basin and pontoon construction.



- Crane rail
- Proposed rail spur
- Existing railroad
- CTC facility limits
- Cross pontoon
- Longitudinal pontoon
- Water treatment area
- Access road
- Batch plant
- Berm
- Casting basin
- Dry storage and laydown area
- Gate
- Launch channel
- Office and parking

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

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

Pontoon Construction Project

Washington State Department of Transportation

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EXHIBIT 8
Casting Basin Three-Dimensional Overview

During construction and operation of the casting basin facility, WSDOT would monitor construction and operation activities to ensure that they comply with project permits and applicable environmental regulations and guidelines. Construction techniques are typically not determined at the environmental documentation phase. The following descriptions are a reasonable estimate of how the project could be constructed.

Project Site Preparation

WSDOT would prepare the casting basin facility site by first installing silt fencing and other temporary erosion and sediment control facilities. 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 heavy equipment needed for facility construction activities.

WSDOT would then proceed with site construction by installing temporary construction dewatering wells to keep working areas reasonably dry and initiate excavation for the casting basin. Either proposed build alternative site would require a temporary dewatering system to dewater the excavation during casting basin construction. The system, which would require using pumps to operate, would dewater the bottom of the excavation to prevent heaving (that is, hydrostatic uplift) on the excavation floor. WSDOT expects that, at a minimum, groundwater would need to be treated for total suspended solids during initial startup of the temporary dewatering system. Although not expected, if WSDOT encounters contamination, then supplemental treatment would be required and designed for the specific contaminant or contaminants encountered. For total suspended solids, chitosan-enhanced sand filtration is one possible treatment method that could be selected; chitosan is a biodegradable, nontoxic extract from shellfish shells used in water purification systems.

Activities necessary for adding other essential site features, such as access roads, utilities, parking, and laydown areas, would also occur during casting basin construction; WSDOT would complete these activities after the area behind the casting basin walls was backfilled so that the site could be graded.

Casting Basin Construction

WSDOT proposes to excavate the casting basin and launch channel to a depth of approximately 20 feet below mean lower low water (MLLW); this means that the average depth of the casting basin excavation would be about 34 feet below ground level. The top of the casting basin would be set at this elevation to allow the pontoons to float out of the casting basin at a reasonable and frequently occurring tide level. Building the casting basin below MLLW would allow the casting basin to flood with water from Grays Harbor when the time comes to float the completed pontoons out into Grays Harbor for storage or transport.

The casting basin excavation effort would be substantial and require a combination of backhoes, loaders, excavators, and dump trucks to haul the material away. The amount of material removed from the ground could range

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).

Example excavator to be would be used during casting basin facility construction from 740,000 cubic yards to 830,000 cubic yards, depending on which build alternative is chosen.

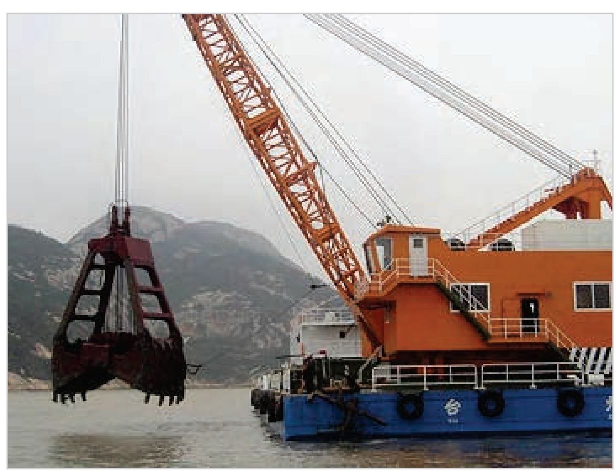
The casting basin concrete slab floor would be constructed of pile-supported, reinforced concrete. To construct the casting basin floor, pile-driving would be started (or seated) from the bottom of the excavated area using a vibratory hammer until resistance is encountered, after which an impact hammer would be used. The impact hammer would drive the piles to the bearing (that is, stable) layer, ensuring each pile is firmly in place. After driving the piles to the required depth and capacity, the casting basin floor would be constructed on top of them. The floor would be constructed by placing reinforced steel (that is, rebar) inside plywood formwork. 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.

Once the floor is constructed, the formwork for the casting basin walls would be erected. The formwork would be composed of rebar and plywood. Like the process for creating the casting basin floor, concrete would be poured into the wall forms, after which the formwork would be removed and the walls cured. A temporary construction dewatering system would pump groundwater from the basin's perimeter to maintain reasonably dry conditions while the casting basin is being constructed.

Drainage material (for example, gravel, geosynthetic fabric, and piping) would be placed behind the casting basin walls and under the floor as these portions of the casting basin are being constructed. Once the walls and floor are built, the drainage material would passively collect groundwater and deposit it into underground reservoirs, which would then be pumped to treatment areas or discharged to the bay during facility operation. The completed casting basin (see Exhibit 9) would measure approximately 565 feet wide and 810 feet long, with 30-foot-high walls on each side.

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.

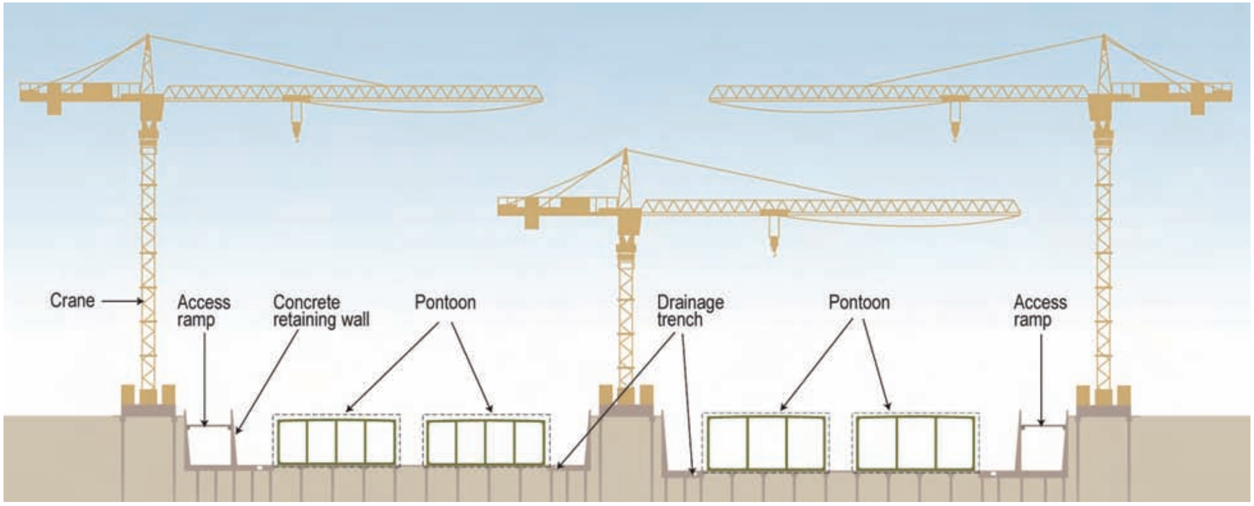


Clamshell dredging

Launch Channel Construction

The upland portion of the launch channel—the area between the berm and the casting basin—would be excavated

EXHIBIT 9
Casting Basin with Pontoons Conceptual Cross-Section Design



first, allowing the excavation to occur with the berm intact, keeping the excavation area dry. Temporary 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 the estimated required depth of 20 feet below MLLW (about 34 to 36 feet deep, depending on the site). The side slopes would be lined with heavy rock—called riprap—to hold the soil in place. Once the upland portion of the launch channel is excavated, WSDOT would breach the berm to extend the launch channel into the water. The in-water portion of the launch channel would be dredged using a clamshell or dragline operation to the same depth of 20 feet below MLLW. Clamshell and dragline operations would be done from a barge.

Once the launch channel is constructed, crews would install approximately ten dolphins—each comprising three or more piles and tied together with a steel or reinforced concrete cap—in the launch channel and along the site shoreline. The dolphins would aid in maneuvering pontoons out of the casting basin and provide tugboats, barges, and pontoons with places to temporarily moor.

Berm Construction

The existing rock berm along the build alternative sites' shorelines would be modified to accommodate the launch channel for the pontoons. About 300 linear feet of the existing rock berm would be removed for the launch channel, connecting the casting basin to Grays Harbor. WSDOT does not intend to completely remove and replace the rock berm at either alternative site. Rather, WSDOT would repair the berm, as needed, to restore it to a uniform thickness and elevation. Reinforcing the berm is necessary to prevent degradation during normal storm events that could lead to water overtopping and damage to the front part of the site. The berm's currently eroded portions would be repaired to their original shape. 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. The berm height would be raised to prevent waves from overtopping it, and the bottom of the berm would be reinforced against wave action. The top of the berm would be lined with crushed rock to accommodate an access road for vehicles and equipment.

Cofferdams

Cofferdams are temporary structures that would be used during the construction of the launch channel, portions of the casting basin, and casting-basin gates. Cofferdams isolate in-water construction areas so that the water can be pumped out and construction can occur in reasonably dry conditions. WSDOT would install cofferdams at the entrance of the to-be-constructed launch channel and then subsequently remove them when the launch channel and gates are completed.

Material Exported from and Imported to the Project Site

Importing and exporting materials to and from the project site during casting basin construction would require between 190,000 to 220,000 loaded and unload truck trips. Construction of the casting basin would require the excavation of approximately 740,000 and 887,000 cubic yards of material, depending on the site. Exhibit 10 identifies preliminary estimates of total imported materials for the construction of the proposed casting basin. WSDOT might also elect to import and export some material by barge or rail, which would reduce the truck trip estimates.

Differences among the build alternatives would primarily be construction-related. In other words, each build alternative would require construction and design modifications tailored to the physical characteristics of the site. Exhibit 11 presents estimates of these potential differences based on the 30 percent complete design for each alternative.

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

EXHIBIT 10
Estimated Exported and Imported Material Quantities during Casting Basin Construction [a]

Item	Import Quantity
Concrete	55,200 cubic yards
Piles	249,500 feet [b]
Steel rebar	11,330,200 pounds
Gravel backfill for walls and drains	81,970 cubic yards [b]
Heavy riprap (channel and berm)	29,950 tons [b]
Select borrow materials	320,185 tons [b]
Crushed surfacing base course material	187,500 tons [b]

[a] All quantities shown in this table are estimated from the 30 percent design.
[b] Estimate based on average quantity needed at either alternative.

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

Component	Anderson & Middleton Alternative	Aberdeen Log Yard Alternative
Casting basin		
Approximate volume material excavated from casting basin	740,000 cubic yards	887,000 cubic yards
Approximate depth of casting basin	40 feet	40 feet
Average pile length	130 feet	100 feet
Launch channel		
Approximate launch channel size	Onshore: 240 feet x 300 feet = 72,000 square feet Offshore: 110 feet x 300 feet = 33,000 square feet	Onshore: 220 feet x 300 feet = 66,000 square feet Offshore: 440 feet x 300 feet = 133,000 square feet
Approximate volume material excavated for launch channel	Onshore: 100,000 cubic yards Offshore: 23,000 cubic yards	Onshore: 112,000 cubic yards Offshore: 111,000 cubic yards

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 the square feet each would require at each of the Grays Harbor build alternative sites.

Concrete Batch Plant

A concrete batch plant would be constructed onsite as part of the proposed project unless the contractor chooses to use an offsite concrete provider.

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.

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

Feature	Anderson & Middleton (square feet)	Aberdeen Log Yard (square feet)
Casting basin	470,000	470,000
Concrete batch plant	100,000	100,000
Laydown and dry storage areas	900,000	900,000
Office space and parking	180,000	180,000
Water treatment area	121,000[a]	161,000
Access roads	170,000	114,000

[a] Water treatment ponds at the Anderson & Middleton site would be deeper than at the Aberdeen Log Yard site, and although they cover less area, they would accommodate a larger volume of water than the Aberdeen Log Yard ponds.

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 would be used to supply concrete for the casting basin and pontoon construction. 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 or combination of locations on the site that can 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 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 below), because laydown areas often consist of several layers of compacted gravel and rock to accommodate heavy vehicles, such as bulldozers and loaders. Most, if not all, of the laydown areas would not require a hot mix asphalt surface, which would help avoid creating water runoff problems often associated with impervious surfaces such as hot mix asphalt. However, the contractor may elect to pave the laydown areas to allow for better year-round access, to keep materials out of the mud, and to limit offsite tracking and other water quality issues.

Office Facilities

Office space would be required to provide indoor work space for coordinating and managing casting basin construction and operation activities. Temporary work trailers would be installed as offices for approximately 80 construction officials and supervisors. The temporary work trailers would be placed and anchored within or adjacent to the paved parking area. One or more trailers would be connected to potable water and sanitary sewer, as needed. All trailers would be connected to electrical and communications lines

Access Roads and Parking Area

After site grading is complete and meets necessary inspection requirements, essential access roads and parking would be constructed. The access roads would allow construction vehicles and employees to navigate the construction site safely, and the parking areas would serve people traveling to the facility for work. Parking areas would be located onsite.

Materials used in constructing access roads would likely include a combination of a bottom layer of sand or gravel, a middle base layer of crushed rock, and a final layer of hot mix asphalt. Paving the access roads and parking areas with hot mix asphalt would result in a smooth, durable surface on which to move equipment and vehicles for the project’s duration. The access roads would be finished with final compaction, smoothing, and striping.

Stormwater and Water Treatment Areas

A water handling and treatment system would be designed to address the separate needs of typical stormwater runoff, casting basin process water, and dewatering water from groundwater handling systems. For typical stormwater runoff, the project would likely use basic water quality treatment best management practices in accordance with either the WSDOT *Highway Runoff Manual* (WSDOT 2008) or the Washington State Department of Ecology (Ecology) *Stormwater Design Manual* (Ecology 2005), as applicable. Enhanced treatment options, such as a media filter ditch, would be used where possible; however, such opportunities would vary from site to site, as well as across an individual site. Typical basic treatment best management practices include biofiltration swales, cartridge vault systems, and wet ponds.

Process water from the casting basin would be handled independently from the stormwater originating from the parking lots and laydown areas due to potential pH and total suspended solids concerns. All process water would be pumped from the casting basin to holding ponds before discharge, and the water would be tested and treated if appropriate. Treatment options are residence time in ponds or chitosan-enhanced filtration. Such systems can be adapted for pH balancing by applying carbon dioxide sparging to the effluent from the systems.

Temporary erosion and sediment control facilities used to develop the site would be according to either the Ecology Stormwater Design Manual (Ecology 2005) or the WSDOT Highway Runoff Manual (WSDOT 2008), as appropriate. 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, daily cover, silt fencing, and temporary chitosan treatment systems dispersed across the site.

Other potential best management practices include raw materials containment, temporary sediment ponds, covering fueling and materials transfer areas, and collecting and handling water that is pumped to lower the groundwater table during initial site development. All best management practices would be designed to meet the Ecology National Pollutant Discharge Elimination System permit issued for the site, which is anticipated to be a General Sand and Gravel Permit.

What is dewatering and why is it necessary?

Dewatering is the removal of water from the soil surrounding the casting basin. To maintain reasonable working conditions during site construction, water would be extracted from the soil with vacuum pumps that would continuously pump groundwater from wells installed across the site to approved outfalls until the casting basin is built. The bottom of the finished casting basin would be lower than the normal in-ground water level at each alternative site. Therefore, the soils surrounding the constructed casting basin must be dewatered in order to reduce pressure on the casting basin walls and to keep the casting basin from floating off of its foundation. This dewatering would be achieved by installing buried channels of coarse gravel around the casting basin. These channels would collect groundwater by gravity and carry it to underground reservoirs beneath the casting basin. As the water level rises in the storage reservoirs, pumps would switch on and discharge the water to treatment areas or to the bay. Rainfall that collects in the casting basin would be routinely pumped out, directly from the casting basin to treatment areas or to the bay.

Operation Dewatering System

The casting basin would require a permanent operation dewatering system to lower the groundwater level, thereby reducing the buoyant uplift pressures that could destabilize the casting basin structure. The conceptual design calls for groundwater to be passively captured within granular drainage layers placed beneath the casting basin floor and behind the casting basin walls, then collected and delivered via a system of perforated pipes placed at the bottom of the granular drainage layer. The groundwater would be delivered to either the casting basin (via passive pressure relief wells) or to vaults prior to discharge.

Although pumps would not be required to collect groundwater, they would be needed to facilitate discharge from the collection system. All water discharged to the bay 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 permanent operation dewatering system. Although not expected, if WSDOT does encounter contaminated groundwater during pontoon construction, supplemental treatment designed for the specific contaminant or contaminants encountered would occur. For total suspended solids, chitosan-enhanced sand filtration is one possible treatment option.

Onsite Utilities

Domestic water, sanitary sewer, communications, and electrical service would be extended to serve the project site as needed, and service would be provided by local utility providers. Water and sewer would serve the offices and batch plant, while electrical service would be provided across the site to accommodate lighting and equipment. A fire suppression water line would also be installed to provide fire suppression 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 Line	Required Excavation Depth (feet)
Water	3 to 5
Sewer	5 to 8
Electrical and communications	2 to 4

Once the trench is excavated, it would be backfilled with bedding material (for example, crushed rock and gravel) and then compacted and smoothed to prepare for placing the utility lines. The utility lines would be placed on the bedding material, and the remainder of the trench would be filled with bedding material and then compacted. Once the trench is completely backfilled, the sewer lines would be cleaned and tested for deflections and air and water tightness. Water utility lines would be cleaned, disinfected, and pressure tested.

Rock Berm and Shoreline Improvements

The existing rock berms along the property shorelines for both build alternative sites would be modified to accommodate the launch channel for the pontoons. At either site, about 300 linear feet of the existing rock berm would be removed to accommodate the launch channel, which would be excavated to connect the casting basin with Grays Harbor.

WSDOT would not likely completely remove and replace the rock berms at either site. Existing berms might need to be reinforced to shore up vulnerable areas where the rock has eroded over the years. WSDOT would need to repair portions of the existing berm that have been damaged by past storms, increase the berm's height to prevent waves from overtopping it, and armor the bottom of the berm against wave action. To aid in maneuvering completed pontoons out of the casting basin and to provide nearshore, temporary moorage options, WSDOT plans to install approximately ten dolphins within the launch channel and along the site's shoreline. These dolphins would be composed of three or more steel piles held together with a steel or reinforced concrete cap (Exhibit 14). The dolphins would rise approximately 16 feet above the surface of the water, give or take a few feet depending on tide levels.

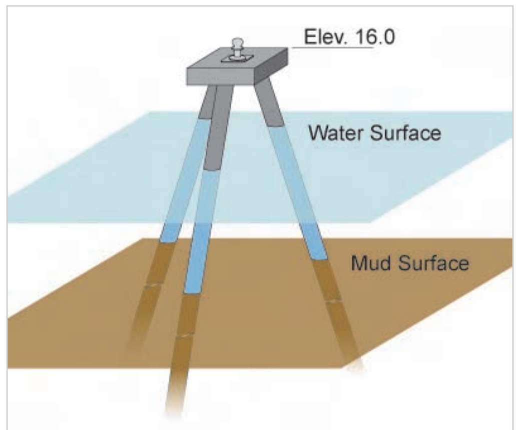


Exhibit 14. Typical Dolphin Construction

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

> 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.

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 15.

What types of pontoons would WSDOT construct?

For this project, WSDOT would construct the three types of pontoons needed for a 4-lane replacement of the Evergreen Point Bridge if the bridge failed. Exhibit 16 lists the types of pontoons to be built, how many of each would be built, and their approximate dimensions. A total of 33 pontoons would be built by this project. Exhibit 17 illustrates how these pontoons would be configured to replace the Evergreen Point Bridge in the event of catastrophic failure.

EXHIBIT 15
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

EXHIBIT 16
Pontoon Types, Quantities, and Approximate Dimensions

Pontoon Type	Quantity	Width (feet)	Length (feet)	Depth (feet)	Weigh (tons)
West cross	1	75	240	31	10,100
East cross	1	75	240	34	10,550
Longitudinal	21	75	360	28	11,100
Supplemental stability	10	60	98	28	2,650 to 3,000 (depending on if an anchor cable is attached to it)

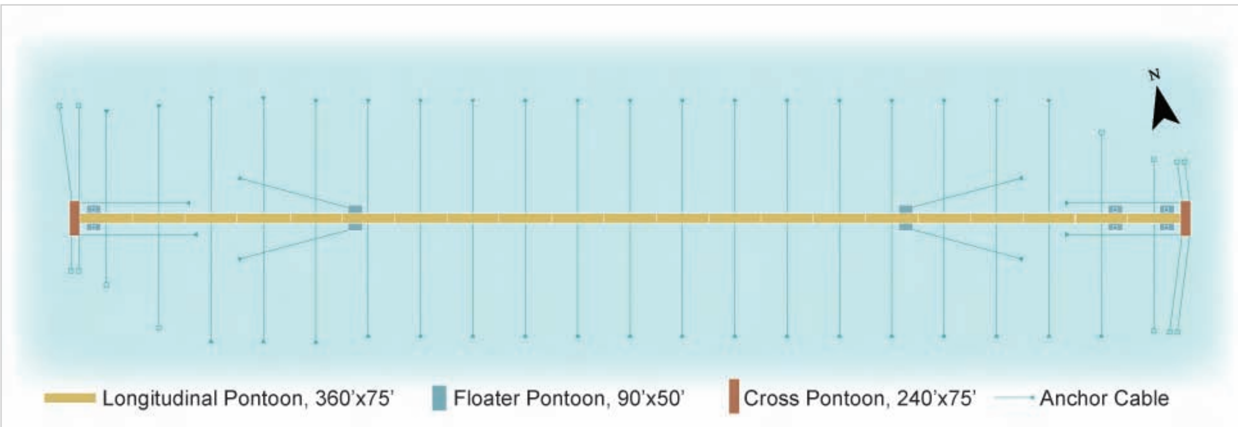


Exhibit 17. Pontoon Configuration for Catastrophic Failure Bridge Replacement

How would WSDOT construct pontoons?

Some of the pontoons could be constructed at the existing CTC facility, but pontoon construction would occur primarily at the new casting basin facility in Grays Harbor. Up to four large concrete pontoons could be cast and cured in each of the two chambers of the partitioned Grays Harbor casting basin. In addition to allowing different sized pontoons to be constructed in the same casting basin, the two chambers would allow pontoon construction to be phased so that the workforce is efficiently employed. For instance, while the second chamber of the casting basin is under construction, pontoon construction could begin in the first chamber as soon it is completed. A separate, reinforced concrete floating gate would lead to each partitioned chamber. The independent gates would allow each chamber to be flooded separately in order to float pontoons out of the facility. The floating gates would also control access to the launch channel from each chamber.

During the pontoon construction phase, the following are some notable activities that would occur:

- Delivering materials
- Forming pontoon components
- Preparing steel reinforcing bars for the pontoons
- Manufacturing concrete
- Placing concrete in formwork
- Curing concrete
- Performing water quality treatment activities
- Flooding and draining the casting basin
- Opening and closing the casting basin gate
- Towing and mooring pontoons

Pontoons are reinforced and post-tensioned concrete structures. Pontoon construction follows the same steps typical for reinforced concrete structures. The general steps for each construction element of the pontoon are as follows:

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)

Pontoons floating in flooded casting basin ready to be towed out

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

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

Once a cycle of pontoons is complete, the work area would be thoroughly cleaned and pressure-washed, and the wash water would be collected and treated before being discharged. Then, the casting basin would be flooded in a controlled manner to allow the pontoons to safely float within the casting basin. After the water level inside the basin matches the water level in Grays Harbor, the casting basin access gates would be opened and the pontoons towed out of the basin by a tug boat.

Trenches would run along the perimeter of the casting basin floor to collect and convey rainwater and construction process water during the facility operation phase. These trenches would also provide channels to allow any fish that entered the basin during gate openings to be collected and released back into Grays Harbor once the gate is closed and the facility is drained. Exhibit 18 identifies preliminary estimates of the quantities of some of the materials that would need to be imported for pontoon construction.

EXHIBIT 18
Estimated Imported Material Quantities during Casting Basin Operation[a]

Item	Quantity (pounds)
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 using the equipment listed in Exhibit 15 to operate the facility and build pontoons.

How long would it take WSDOT to construct the pontoons?

Pontoon construction at the existing CTC facility would begin while the new Grays Harbor casting basin facility is being built, giving WSDOT the ability to start pontoon construction sooner. Pontoon construction at the existing CTC facility would occur over a 3-year period (for two of these years the new casting basin would be under construction). Pontoon construction at the new casting basin facility would take more than 2 years. Total pontoon construction would take about 4 years, with production at the two facilities overlapping for 1 year.

Flatbed truck delivering materials to a project site

At the existing CTC facility, a single pontoon construction cycle would be 6 to 9 months long and could produce one longitudinal pontoon or five smaller supplemental stability pontoons. The new casting basin facility would produce between 20 and 23 large pontoons in two and a half to three 8-pontoon construction cycles. These pontoon construction cycles would also last 6 to 9 months.

How would WSDOT store completed pontoons?

If not needed immediately, WSDOT would store the pontoons as they are completed. At the end of each construction cycle, the completed pontoons would be towed out of the casting basin and moored until needed for either catastrophic failure response or the planned replacement of the Evergreen Point Bridge. Based on the current schedule for the planned bridge replacement, pontoons built at the new proposed casting basin would be stored in Grays Harbor for up to 1.5 years. Pontoons built at the CTC facility in Tacoma would be stored at existing marine berths in Puget Sound for up to 4 years. If catastrophic failure were to precede planned replacement, the storage periods would be shorter. If the schedule for the planned bridge replacement were delayed, the storage periods would likely be longer.

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 Puget Sound and Grays Harbor as part of normal port operations.

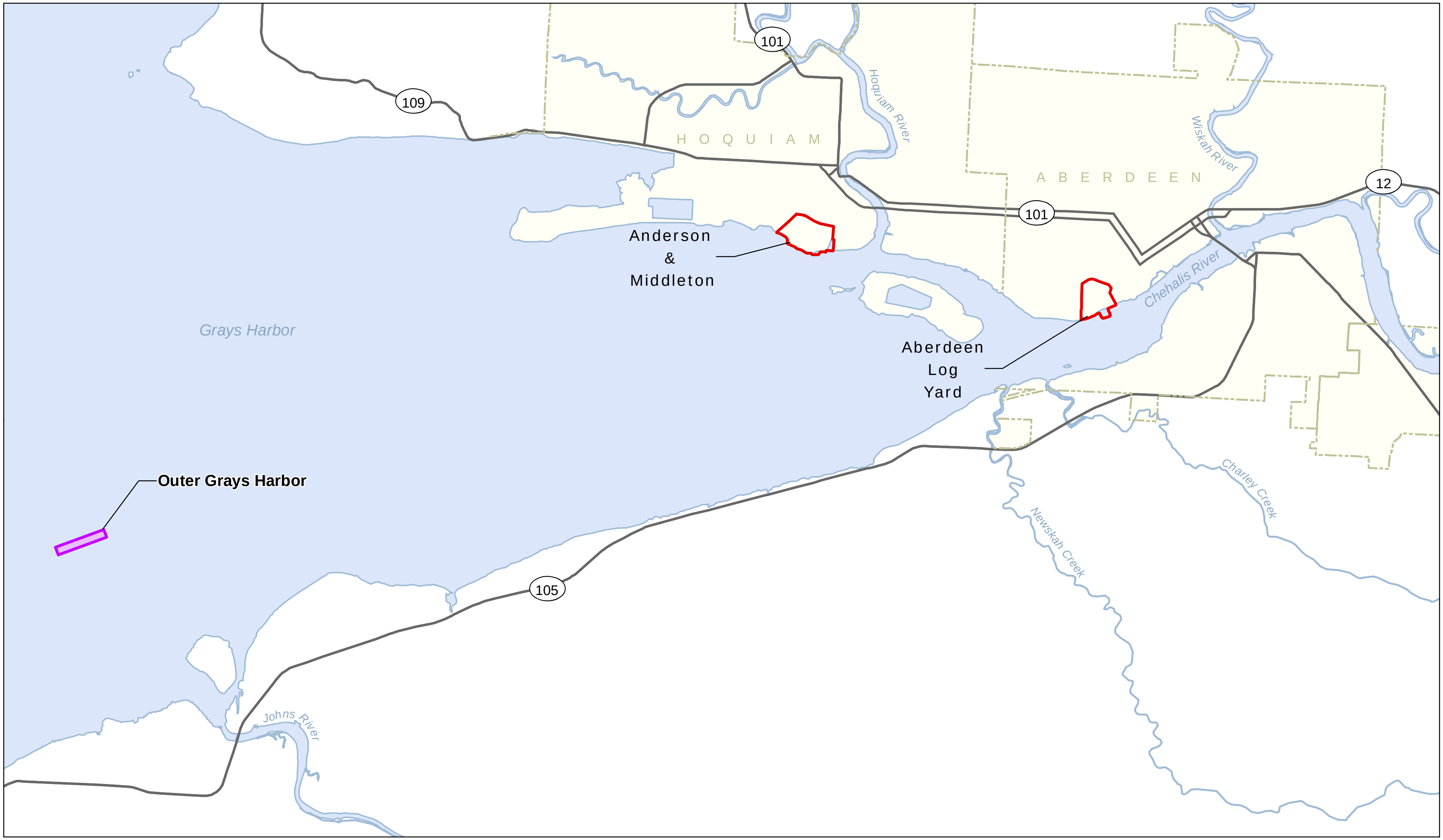
WSDOT would moor pontoons built at the CTC facility in Tacoma at existing available marine berths within Puget Sound. Based on a 2009 preliminary assessment of available marine berth space, WSDOT has concluded that there would be ample available space among the major ports in Puget Sound suitable for securing pontoons. These pontoons would be anchored in at least 30 feet of water outside of maintained and marked navigation channels and identified with navigation lighting in compliance with U.S. Coast Guard requirements.

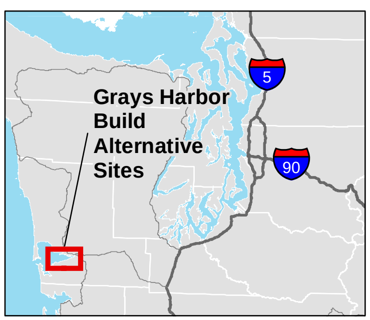
Existing marine berths in Grays Harbor, on the other hand, are limited and could not moor pontoons built for this project. Therefore, WSDOT is analyzing a new pontoon moorage site in the Grays Harbor area (Exhibit 19) as part of the proposed project.

A new moorage site could be constructed in Grays Harbor by installing mooring dolphins that would allow pontoons to be moored parallel to and just outside of the navigation channel. These dolphins would consist of a group of driven piles tied together (see Exhibit 14 above). Each pontoon would require at least two dolphins.

An open water spread moorage arrangement would require the pontoons to be joined together in rafts of four, as illustrated in Exhibit 20, and anchored in at least 30 feet of water. 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 navigation channels and identified with navigation lighting in compliance with U.S. Coast Guard requirements.

WSDOT anticipates that the last cycle of pontoons (up to eight pontoons) would be stored in the casting basin until needed for emergency response, or until the casting basin is needed for the I-5 to Medina: Bridge Replacement and HOV Project or another unforeseeable floating bridge project. While pontoons are stored in the casting basin, WSDOT would keep the basin dry, with pontoons resting on stable supports that located on the floor of the basin. To achieve this, WSDOT would maintain the passive dewatering system and periodically pump stormwater from the basin. WSDOT anticipates routine monitoring and maintenance would be required to make sure that these systems continue to function properly.





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 19. **Grays Harbor Proposed Pontoon Moorage Location**

Pontoon Construction Project

Washington State Department of Transportation

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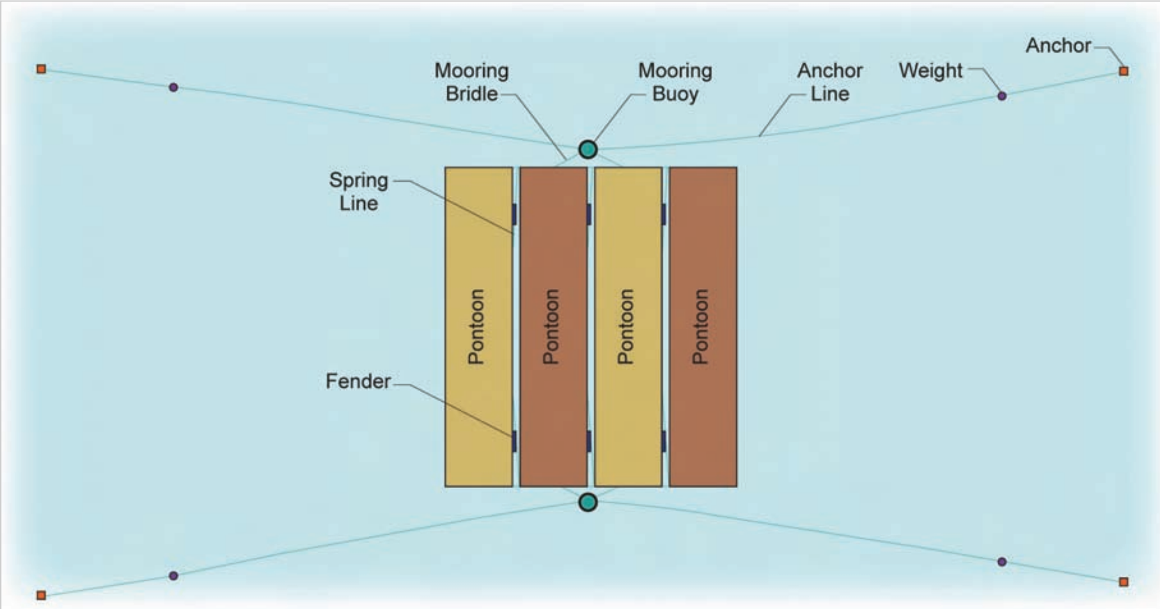

Exhibit 20. Arrangement of Pontoons during Open Water Moorage

The proposed new Grays Harbor moorage site (Exhibit 19), which is about 2 nautical miles from the Grays Harbor shoreline near the Johns River, could be used to store pontoons built at the Grays Harbor casting basin facility. This area would provide good shelter from wind and waves and is sufficiently set back from the navigational channel. No submerged aquatic vegetation or shipwrecks were identified by sonar scanning 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 four. The pontoon rafts would be attached to removable anchors (see Exhibit 19). As an alternative configuration, rafts of four pontoons could instead be secured to mooring dolphins (Exhibit 20).

The underside of the pontoons would extend about 15 feet below the water surface. There would always be at least 10 feet of water between the bottom of the pontoons and the floor of the harbor, and the pontoons would never rest on the harbor bottom, even during the lowest tides. WSDOT would equip all moored pontoons with transmitters and remotely monitor them for spatial location and proper position in the water, as well as to check whether water intrudes inside them. WSDOT would keep the pontoons out of maintained and marked navigation channels and identify the pontoons with navigation lighting in compliance with U.S. Coast Guard requirements.

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