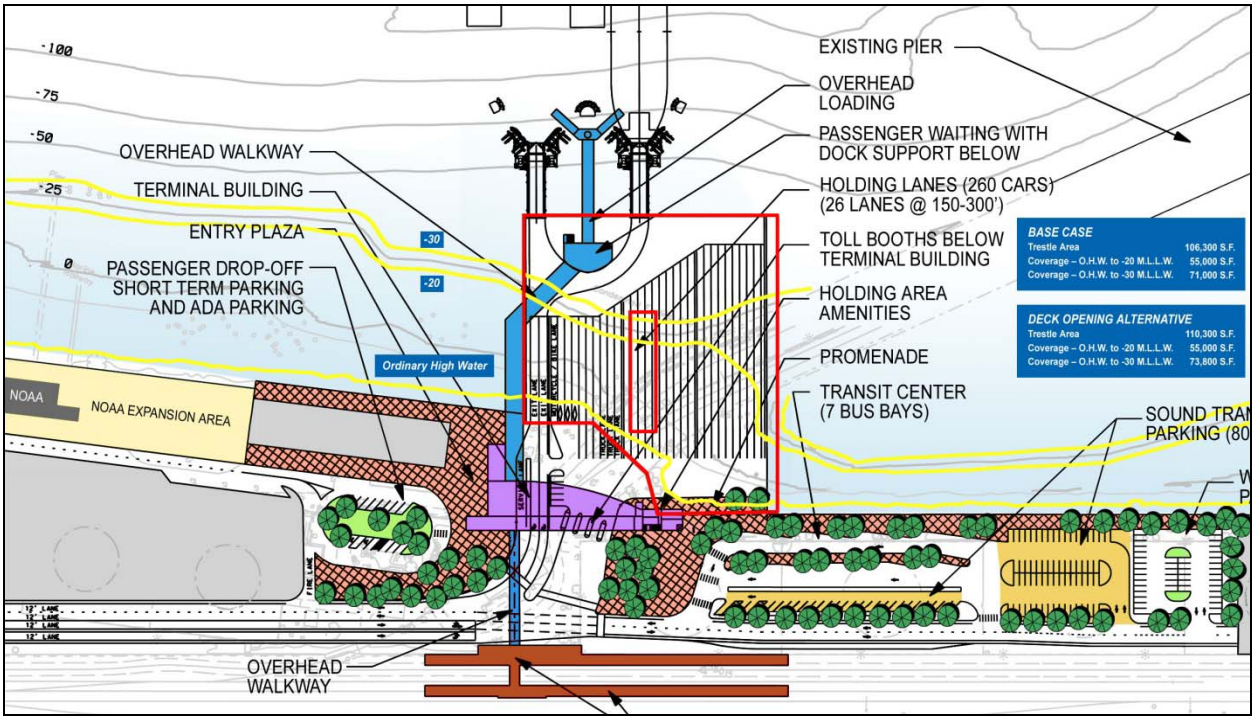
4.4.2.1 Slot Alternative (Compact Terminal Alternative with Slot)

Comments from the public, agencies, and Tribal governments led the project team to investigate ways to reduce the effect of the over-water vehicle holding area on nearshore habitat. By adding a slot design into the vehicle holding area, daylight could penetrate the trestle (Exhibit 23). However, the benefits of the slot design were offset by the need to maneuver traffic on the holding area deck around the slot. The red line in Exhibit 23 shows the footprint that would have been required. While the slot alternative was not carried forward, it did lead the project team to consider other options, such as the notch design, to minimize impacts from the proposed new trestle on nearshore habitat.

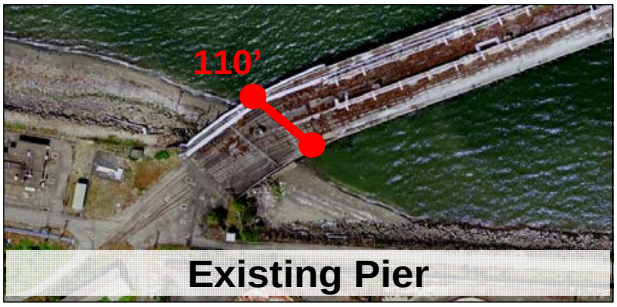
Exhibit 23
Slot Alternative

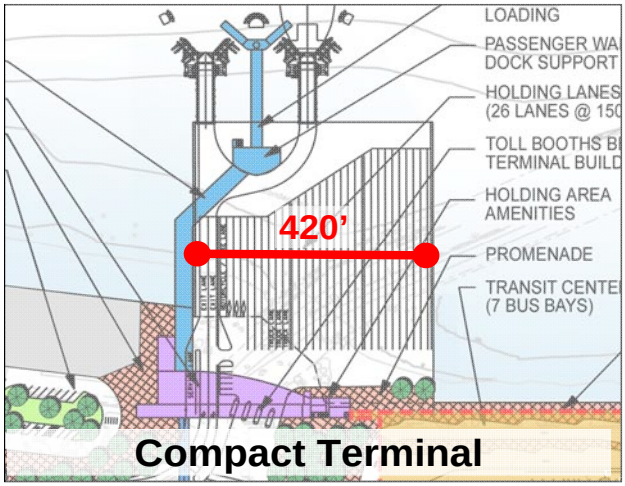


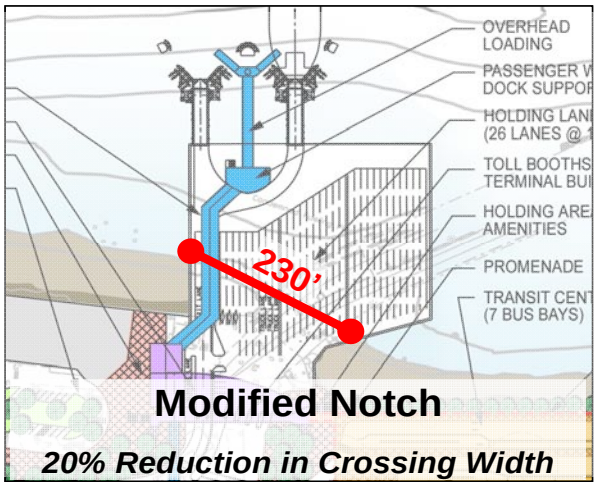
4.4.2.2 Notch Alternative (Compact Terminal Alternative with notch)

The Compact Terminal Alternative was then modified to minimize nearshore effects by narrowing the trestle to only those lanes required to drive onto the vehicle holding area platform (Exhibit 24). This pushed more over-water cover from the platform into deeper water to minimize impacts to juvenile salmonids. The notch reduced the nearshore dock width by 190 feet to improve conditions for fish passage. The existing Tank Farm pier is 110 feet wide, and the new trestle proposed by the Compact Terminal Alternative with notch would be 120 feet wider than the existing pier in the nearshore. It should be noted that the new trestle would be built of concrete and/or steel materials with wider pile spacing, which would increase ambient light beneath the structure significantly. Additionally, all concrete rubble, debris, and creosote-treated timber pilings from the old Tank Farm pier would be removed, also improving the nearshore habitat.

Exhibit 24
Incorporation of Notch Design into Compact Terminal Alternative







Migration Through the Site

Existing Pier	**110'**
Compact Terminal	**420'**
Compact Terminal with Modified Notch	**230'**

4.4.2.3 No Action Alternative

The No Action Alternative was a proposal that described the minimal requirements necessary to maintain existing function of the existing terminal (Exhibit 25). This alternative became the No Action Alternative in the FTA/WSF NEPA/SEPA EA. It involved the following maintenance and upgrade activities between 2010 and 2030:

- Replace the timber dock.
- Replace the timber fixed pile dolphins with steel pile dolphins.
- Replace the timber floating dolphin with a concrete floating dolphin.
- Replace the transfer span, which would trigger replacement of the towers and bridge seat foundation.
- Add a third boat to the schedule per the draft WSF Long Range Plan.
- If required by the US Coast Guard (USCG) or other federal agencies, provide security improvements such as security fencing, video monitoring, and electronic access controls around the holding area. The level of security improvements possible at the existing site is limited, and it is possible that mandated security improvements would impact operations severely.

Demolition and removal of the existing ferry slip and accompanying structural components would be conducted after ferry operations are diverted to the replacement slip.

Exhibit 25
No Action Alternative

Source: USDOT FTA/WSDOT WSF 2007

5 MUKILTEO MULTIMODAL FERRY TERMINAL FTA/WSF NEPA/SEPA EIS

The NEPA EIS scoping process included the Upland, Compact, and No Action alternatives as developed for the NEPA EA and described in the sections above. Agency and public scoping meetings were held March 21 and 22, 2006, in Mukilteo and Clinton. FTA and WSF invited all interested parties to submit comments orally or in writing during the meetings, or in writing sent directly to WSF.

During the scoping process, concerns were raised regarding features of the alternatives, construction effects, cumulative and indirect impacts, public participation, environmental justice, and proposed mitigation. Other issues raised included physical and visual access to and within the waterfront area and to the local street network; possible effects to in-water, shoreline, and terrestrial habitats, including potential effects to endangered species and habitats; noise; and potential effects to water quality and stormwater (FTA/WSF, 2007).

Following scoping, potential impacts associated with the two build alternatives and the no build were evaluated by FTA and WSF. A preliminary draft of the EIS was never finalized. Table 6 summarizes the advantages and disadvantages of the alternatives considered in the preliminary DEIS. While analyzing the effects of the project alternatives, potential high risks were identified due to seismic conditions, cultural resources associated with the shoreline at Mukilteo, and the large amount of in-water work for the Compact Terminal Alternative. FTA and WSF determined that the range of alternatives needed to be reassessed in light of the additional information, and placed the EIS process on hold while additional work was completed. Results of this effort and the identification of new alternatives are discussed below.

Table 6. Revised Alternatives Analyzed in FTA/WSF NEPA/SEPA DEIS

Advantages	Disadvantages
No Action Alternative	
• Does not require relocation of the existing ferry terminal • Minimal increase in over-water cover • Limited construction impacts	• Does not meet purpose and need • Location too small to handle growing demand for service • Increases traffic congestion in downtown area • Involves acquisition of adjacent park property • Not convenient to Mukilteo Commuter Rail Station • Does not promote HOV and non-motorized transportation modes • Does not include overhead loading necessary to meet 20-minute schedule [1] • No second slip would increase operating inefficiencies and reduce schedule reliability because of unplanned and planned closures of the slip for regular and emergency maintenance • No second slip would increase negative impacts on local communities, which absorb added vehicle and pedestrian traffic during service reroutes, and on reliable shipping, emergency access/evacuation, and disaster relief • Accommodates a third boat only poorly (planned for next 10 years, but funding not yet allocated) • Does not allow adequate circulation and safety improvements • Poor multimodal elements (e.g., longer distance between ferry-rail-bus than both build alternatives) • Provides none of environmental benefits from removing portion of the Tank Farm pier
Upland Terminal Alternative	

• Meets purpose and need
• Less over-water cover than Compact Terminal Alternative
• Longer overflow holding lane along the access road
• Good multimodal elements (e.g., shorter distance between ferry-rail-bus)
• Provided mitigation opportunities that improved the existing marine environment[2]
• Second slip would improve operating efficiencies such as:
  o Schedule reliability due to unplanned or planned closures of vessel slips for regular and emergency maintenance needs
• Second slip would eliminate negative impacts on:
  o Local communities that absorb added vehicle and pedestrian traffic during service re-routes
  o Reliable shipment of freight/goods
  o Reliable emergency access/evacuation & disaster relief
• Would accommodate a third boat if brought on in the future (currently planned to be brought on in next 10 years, funding not yet allocated)
	• Requires terminal to be moved east of the existing terminal (requiring property acquisition)
	• Large shoreline footprint would conflict with the City Shoreline Master Plan and comprehensive plan
	• Consumes large amount of upland, including valuable downtown property
	• Longer holding lane configuration would increase operational inefficiencies[3]
	• Creates broad visual exposure of holding lanes to shoreline, providing less visually appealing landscape
	• Requires bus circulation and parking garage access from Front Street[4]
	• Requires more staff than Compact Terminal Alternative
	• More land disturbance could be more disruptive of 4(f) cultural resources than the Compact Terminal Alternative

Advantages	Disadvantages
Compact Terminal Alternative	
• Meets purpose and need • Maximizes downtown development potential • "Front door" of terminal faces emerging downtown • Allows for better waterfront access and views • Consumes smaller amount of valuable upland (more compact and passenger drop off area no longer along waterfront property) • Bus access and egress does not cross ferry egress lanes[5] • Creates an operationally efficient terminal (short holding lanes[3]) • Requires less staff than the Upland Terminal Alternative • The notch design minimizes nearshore cover • Fewer visual impacts (narrower visual exposure to the shoreline) • Does not require bus access along Front Street[4] • Moderate overflow holding lane along access road • Allows access to extension of Paine Field Boulevard should that occur • Good multimodal elements (e.g., shorter distance between ferry-rail-bus) • Provides mitigation opportunities to improve existing marine environment[2] • Second slip would improve operating efficiencies (e.g., schedule reliability affected by planned/unplanned ordinary and emergency maintenance) • Second slip would eliminate negative impacts on local communities, which absorb added vehicle and pedestrian traffic during service reroutes, and improve reliability of shipping, emergency access/evacuation, and disaster relief • Would accommodate a third boat (planned for next 10 years, but funding not yet allocated) • Potentially least disruptive of 4(f) cultural sites than other tank farm locations	• Requires new terminal to be located east of existing terminal (requiring property acquisition) • Greater amount of over-water cover compared to the Upland Terminal Alternative (increases environmental impacts and mitigation costs) • Higher costs for design and construction of larger over-water structures

[1]The existing terminal does not segregate vehicles from walk-ons, and overhead loading for pedestrians would improve safety as well as operating efficiencies, resulting in fewer loading interruptions.

[2]By building the new terminal within the structural footprint of the Tank Farm pier, the opportunity to remove a significant number of creosote-treated timber pilings and replace them with fewer steel or concrete pilings would be a possibility).

[3]More, shorter holding lanes is more efficient than fewer but longer holding lanes. With a larger number of shorter holding lanes, transit vehicles, HOVs, trucks, and other vehicles can be sorted into separate lanes without leaving a large part of the vehicle holding area empty.

[4]Avoiding Front Street helps to reduce the potential for delays in ferry loading and unloading, thereby minimizing downtown congestion.

[5]Traffic and pedestrian congestion in the Mukilteo downtown area could be reduced by minimizing cross-over of ferry traffic and bus access and egress lanes, which makes access to downtown businesses more difficult.

5.1 Revised Concepts Based on Updated Site Information and Screening Criteria

Following the identification of the potential high risks associated with the alternatives selected for analysis in the initial FTA/WSF NEPA/SEPA process (EA through preliminary DEIS) and authorization from the legislature in 2007 to conduct additional investigation, WSF undertook additional studies to increase the available knowledge about the site. These studies looked at geotechnical and cultural resources at the project vicinity. In addition, the legislature adopted legislation that required terminal improvement projects to adhere to certain standards. Utilizing the new information and the legislative directive, the project team identified screening criteria and developed new alternatives for further evaluation. Because of the significant geotechnical issues and the potential impacts to cultural resources and effects of in-water construction, additional alternatives beyond those analyzed in the preliminary DEIS have been identified.

5.1.1 Estimated Costs

Budget estimates were completed based on 30% design completed for the identified preferred alternative, the Compact Alternative. These estimates indicated that soil conditions and the amount of over-water structures drove up the cost estimate from the budgeted $156 million to an estimated range of $259 to $311 million. These costs exceeded funding available for the project.

Also there was concern that the future growth projections used to screen out improvements at the existing terminal may be overstated.

5.2 Value Engineering Roundtable

To review the problems associated with the Compact and Upland alternatives and the increased costs with constructing these alternatives, WSF conducted a one-day Value Engineering roundtable in August 2007. Over a single day, the WSF project team, construction experts, and consultants reviewed the alternatives and developed potential solutions to the problems. Primary results of this effort indicated that project changes, to reduce over-water structures and explore different locations that may have better soil conditions, could reduce costs and the high risks associated with the alternatives. Following the roundtable, WSF initiated the additional geotechnical and archaeological investigations to provide additional data on site conditions. WSF also developed design criteria establishing the probable minimum and maximum requirements for the terminal based on the draft WSF Long Range Plan (Table 7). The criteria do not reflect the final Long Range Plan published on June 30, 2009.

Table 7. 2007 Design Criteria for Cost Estimating Purposes

	Minimal Requirements	Maximum Requirements
Vehicle Holding:		
Vehicle holding capacity	1.5 boat loads (216 cars)	2 boat loads (288 cars)
Priority holding lanes	2	2
Bike holding lane width	5ft	5ft
Holding lane width	10ft	10ft
Exit lane width	12ft	12ft
Shoulder width (Bike lane)	per hwy standards (for First Street/SR525 only)	per hwy standards (for First Street/SR525 only)
Screening Vehicle spaces	0	5 (provided after tollbooths)
Pet area	0	15ft x 20ft
Overhead Loading:	**No overhead loading**	**Needed for third boat**
Moveable length	N/A	135ft
Clear distance per direction traveled	N/A	8ft (to transfer span) 12ft (to boat)
Loading type	N/A	Bow loading
Operating Slips:	1	2
Transfer Span:		
Number of lanes	2, 10ft lanes 2, 2ft shoulders	2, 10ft lanes 2, 2ft shoulders
Type of transfer span	hydraulic (not accommodating bow loading)	hydraulic (accommodating bow loading)
Overwater Coverage:	Minimize	Minimize
Access to Terminal:		
Tollbooths	4 (1, 7ft x 9ft and 3, 6ft x 8ft)	4 (1, 7ft x 9ft and 3, 6ft x 8ft)
Space prior to tollbooth	20 vehicles outside of holding area need to be free to access tollbooths without signal interruption	20 vehicles outside of holding area need to be free to access tollbooths without signal interruption
Lanes approaching terminal	12ft priority 10ft holding lane	12ft priority 10ft holding lane

5.3 Geotechnical Investigations

The soils within the Tank Farm area and at the existing terminal site were analyzed in November 2004 and January 2005 to determine the potential impacts of liquefaction and lateral spreading. The analysis concluded that soil susceptible to liquefaction is a high risk. The thickness of the soil layers susceptible to liquefaction ranges from 10 feet to 80 feet (GeoEngineers, 2008). (Liquefaction refers to a condition where vibration or shaking, usually from earthquake forces, results in a loss of soil strength that can lead to significant foundation settlement and loss of lateral support.)

An ideal ferry terminal location will have a sufficiently steep offshore slope so that docking facilities (slip, transfer span, wingwalls, and dolphins) can accommodate the Issaquah-class ferry with limited impacts to the sea bed due to propwash. However, the slope of the site combined

with soils susceptible to liquefaction can lead to slope instability and lateral spreading (a condition where soils flow sideways) during an earthquake.

Ground improvement methods can be considered to reduce the potential for liquefaction. Vibro-compaction is a method that improves the resistance to liquefaction using specially designed probe-type vibrators to increase the soil's density. Another method reinforces potentially liquefiable soil layers with inclusions of stronger non-liquefiable material such as gravel. Both methods can be used on-shore and off-shore to depths of about 60 feet. However, because they use vibrating probes, both methods can cause damage to nearby structures.

Two geotechnical field investigations were conducted to provide additional information to support the development of new concepts. These efforts identified two locations that had better soils (still with some liquefaction potential) and would allow development of the marine structures in shallower waters (GeoEngineers 2008).

5.4 Archaeological Considerations

To investigate the potential and significance of archaeological and cultural resources that could be present in the project area, additional archaeological investigations were conducted in 2007 and 2008 (Northwest Archaeological Associates, Inc., 2008). These additional investigations verified and provided new data on the extent and significance of the archaeological and historical resources within the project area. Based on this new information, sites identified within the project area were determined to be eligible for listing on the National Register of Historic Places. Project elements would have the potential to impact these resources. Methods for avoidance, minimization, and possible mitigation were included in the identification and evaluation of new alternatives.

5.5 Concept Development

The project team used the screening criteria and new information on geotechnical conditions and cultural resources to identify modified alternatives that could potentially be feasible future build alternatives in 2008. Concepts at the existing terminal and within the Tank Farm, along with a No Action Alternative, were developed for additional consideration. These are included as Exhibits 20 through 26.

To determine the location of the concepts, potential sites within the project area were reviewed that could minimize the size and cost of the marine structures (trestle, dolphins, and wingwalls). The ideal location would allow access to water deeper than -30 ft MLLW at the wingwalls in the shortest distance possible. To minimize cost and result in constructable elements, fixed dolphins could be located in water no deeper than -55 ft MLLW and floating dolphins in water no deeper than -120 ft MLLW. The geotechnical investigations conducted in 2008 identified soil conditions with high liquefaction and lateral spreading potential throughout the project area (GeoEngineers 2008). These conditions, combined with structures that extend into deep water which preclude the use of common soil amendment techniques, resulted in the need to reconsider the specific location of the in-water elements. Investigations identified the soils with the highest potential for liquefaction and lateral spreading were located at the center of the Upland and Compact

alternatives and that there was a slight improvement to the soils both left and right of the proposed alternative trestles. The two new locations were focused on these areas.

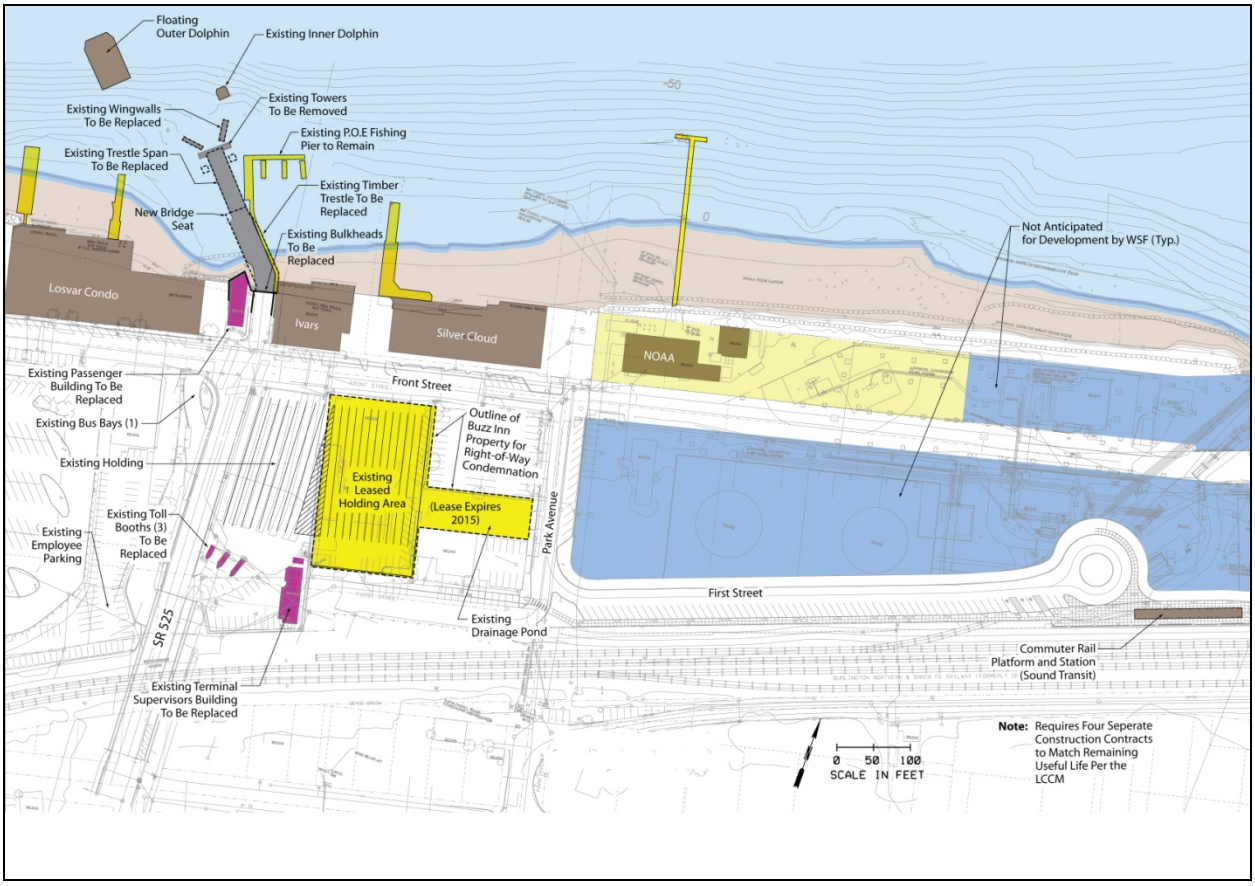
The project team also considered potential archaeological resources in the alternative development process. Project elements that required extensive soil disturbance (subsurface work) were located outside of areas where archaeological resources had been identified, where possible.

5.6 2008 Concepts

5.6.1 Existing Site, Minimal Build

The No Build / Expanded Holding concept could continue to use the existing temporary vehicle holding area located on the former Buzz Inn property (Exhibit 26). In addition, improvements to the existing facility could be made to extend its usability into the future. The improvements could include replacement of the existing wingwalls, trestle, transfer span, towers, bulkhead, passenger building, toll booths, and terminal supervisor building.

Exhibit 26
Existing Site, Minimal Build



5.6.2 Tank Farm Site 1 (east site), Single Slip

The Tank Farm Site 1 concept could locate a new terminal to the east of the present Tank Farm pier (Exhibit 27). This site is further east than most of the previous alternatives that were located on the Tank Farm site. This concept could include a single slip that could require removal of a portion of the Tank Farm pier. The passenger building could be located overhead and allow for overhead passenger loading. The tollbooths and holding lanes could be located west of the terminal and passenger building. Passenger drop-off area, bus bays, short-term parking, and parking for Sound Transit could be located east of the terminal but maintain adequate setbacks from Japanese Creek. Employee parking could be provided east of the terminal and north of the tollbooths and be accessible from Front Street.

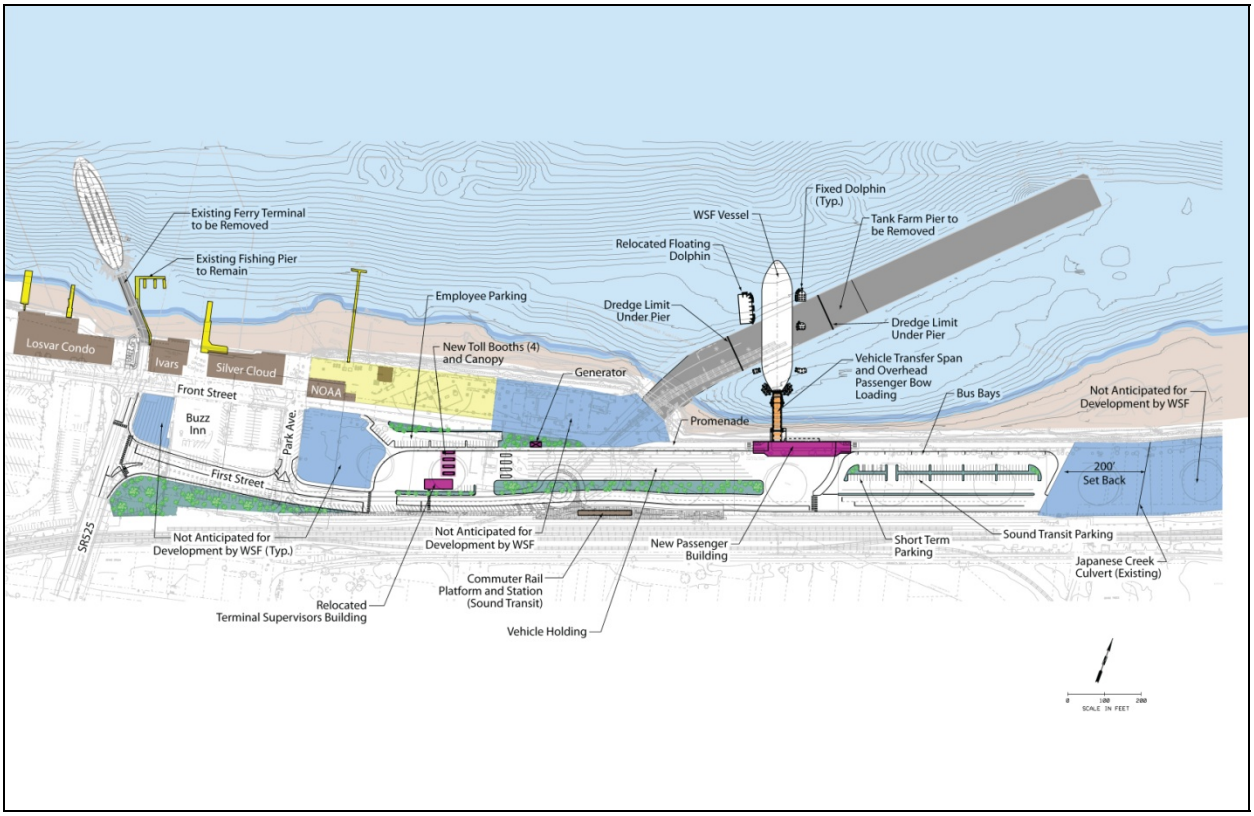



Exhibit 27
Tank Farm Site 1 (east site), Single Slip