1 March 2005

SR 520 Bridge Replacement and HOV Project Draft EIS

Appendix L

Navigable Waterways

Discipline Report

Washington State Department of Transportation

SoundTransit

U.S. Department of Transportation Federal Highway Administration

SR 520 Bridge Replacement and HOV Project Draft EIS

Navigable Waterways
Discipline Report

Prepared for

Washington State Department of Transportation
Federal Highway Administration
Sound Transit

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Acronyms and Abbreviations

Coast Guard	U.S. Coast Guard
Corps of Engineers	U.S. Army Corps of Engineers
Draft EIS	Draft Environmental Impact Statement
FHWA	Federal Highway Administration
HOV	high-occupancy vehicle
LOA	length overall
MLLW	Mean Lower Low Water
mph	miles per hour
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
WSDOT	Washington State Department of Transportation

Introduction

Why are navigable waterways considered in the EIS?

Federal regulations define navigable waterways as those waters that are subject to the ebb and flow of the tide and/or are used for the transport of interstate or foreign commerce either historically, currently, or in the future (33 CFR Part 329). This definition interprets interstate and foreign commerce very broadly—it is only necessary that goods transported on these waterways be brought from or eventually destined for another state or country. The kinds of goods involved in interstate or foreign commerce are very diverse, typically reflecting the region where the navigable waterway is located. An historical example of interstate commerce in the project area is the barging of coal dug in Newcastle around 1860 to 1880. Coal was shipped from the Newcastle area across Lake Washington to Elliott Bay, and then on to San Francisco, California, and other destinations.

Once a waterway becomes a designated navigable waterway (meaning it is either wide enough, deep enough, or free from obstructions, allowing travel by vessels), this designation cannot be changed due to current or future actions or events that interfere with or prevent vessel movement. A designation of navigability covers the entire surface extent of the water body. The movement of goods via boat and barge, as well as widespread recreational use of Lake Washington, depends on the navigational channels under the Evergreen Point Bridge to provide passage to commercial and recreational ship traffic.

The construction or alteration of bridges crossing navigable waterways must first be approved by the U.S. Coast Guard (Coast Guard) (FHWA 1994, Coast Guard 1999). The Coast Guard approves the location and clearances of bridges by issuing bridge permits under the authority of the General Bridge Act of 1946, which superseded Section 9 of the Rivers and Harbors Act of 1899 (Coast Guard 1999, 2004b). Bridge permits are written approval of the location and plans for proposed bridges or the alteration of existing bridges (Coast Guard 1999). These permits include all temporary bridges that would be used for construction access or traffic detours.

Changes or modifications to an existing bridge affecting the future navigational use of a waterway requires approval and issuance of a

permit by the Coast Guard. In addition, agreements between the Coast Guard and the Federal Highway Administration require that the potential effects of bridge projects on navigable waterways be evaluated through the National Environmental Policy Act (NEPA) process (FHWA 1983).

What are the key points of this report?

Two scenarios for the No Build Alternative were evaluated to determine the long-term effects of not replacing the Portage Bay and Evergreen Point bridges. The Continued Operation Scenario assumes normal operation of the current Evergreen Point and Portage Bay bridges between now and 2030. The Catastrophic Failure Scenario addresses the aging nature of these bridges and their vulnerability to storms and earthquakes. This scenario assumes damage to both the Evergreen Point Bridge and the Portage Bay Bridge before 2030. There would be no effect on navigation from the Continued Operation Scenario. Depending on the nature of the damage in the Catastrophic Failure Scenario, navigational access to the south end of Lake Washington could be lost. For example, damage to the highrises from an earthquake could completely block the path used by vessels to cross under the bridge. Loss of the pontoons from sinking or being torn loose by wind or waves, however, would leave a gap through which vessels could pass.

Operation of the 4-Lane and 6-Lane Alternatives would permanently change the routes that larger recreational and commercial vessels travel to get to Lake Washington south of the Evergreen Point Bridge (smaller boats would still be able to pass under the bridge in several places). Elimination of the drawspan opening would shift vessels traveling south to either of the east or west navigational channels. Each channel would remain in its current location, changing in height and width but not depth. Under the 4-Lane and 6-Lane Alternatives, the new east navigational channel would have 200 feet horizontal clearance, 70 feet (minimum) vertical clearance above high water, and a minimum depth of 30 feet. Vessels passing under the west highrise would have 165 feet horizontal clearance, a minimum vertical clearance of 25 feet, and a depth of 30 feet.

Under the 4-Lane and the 6-Lane Alternatives, navigational access would be maintained during construction by ensuring that at least one navigational channel under the Evergreen Point Bridge was available at all times. During construction of the east highrise, the navigational

channel under it would be reduced to a horizontal clearance of 75 feet for a maximum of 1 ½ years and a minimum of 1 year; the current 65 feet vertical clearance would be maintained.

What are the project alternatives?

The SR 520 Bridge Replacement and HOV Project area comprises neighborhoods in Seattle from I-5 to the Lake Washington shore, Lake Washington, and Eastside communities and neighborhoods from the Lake Washington shore to 124th Avenue Northeast just east of I-405. Exhibit 1 shows the general location of the project. Neighborhoods and communities in the project area are:

- Seattle neighborhoods—Portage Bay/Roanoke, North Capitol Hill, Montlake, University District, Laurelhurst, and Madison Park
- Eastside communities and neighborhoods—Medina, Hunts Point, Clyde Hill, Yarrow Point, Kirkland (the Lakeview neighborhood), and Bellevue (the North Bellevue, Bridle Trails, and Bel-Red/Northup neighborhoods).

Exhibit 1. Project Vicinity Map

The SR 520 Bridge Replacement and HOV Project Draft EIS evaluates the following three alternatives and one option:

- No Build Alternative
- 4-Lane Alternative
  - Option with pontoons without capacity to carry future high capacity transit
- 6-Lane Alternative

Each of these alternatives is described below. For more information, see the *Description of Alternatives and Construction Techniques Report* contained in Appendix A of this EIS.

What is the No Build Alternative?

All EISs provide an alternative to assess what would happen to the environment in the future if nothing were done to

solve the project's identified problem. This alternative, called the No Build Alternative, means that the existing highway would remain the same as it is today (Exhibit 2). The No Build Alternative provides the basis for measuring and comparing the effects of all of the project's build alternatives.

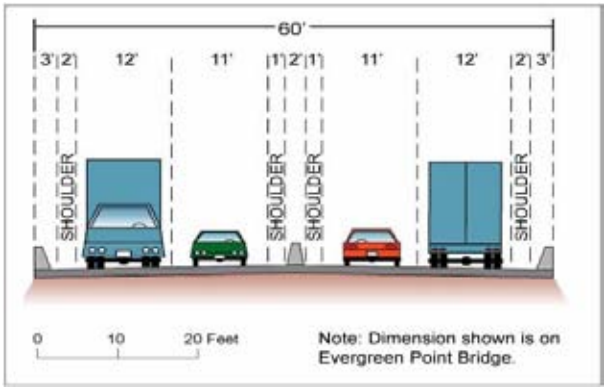


Exhibit 2. No Build Alternative

This project is unique because the existing SR 520 bridges may not remain intact through 2030, the project's design year. The fixed spans of the Portage Bay and Evergreen Point bridges are aging and are vulnerable to earthquakes; the floating portion of the Evergreen Point Bridge is vulnerable to wind and waves.

In 1999, the Washington State Department of Transportation (WSDOT) estimated the remaining service life of the Evergreen Point Bridge to be 20 to 25 years based on the existing structural integrity and the likelihood of severe windstorms. The floating portion of the Evergreen Point Bridge was originally designed for a sustained wind speed of 57.5 miles per hour (mph), and was rehabilitated in 1999 to withstand sustained winds of up to 77 mph. The current WSDOT design standard for bridges is to withstand a sustained wind speed of 92 mph. In order to bring the Evergreen Point Bridge up to current design standards to withstand at least 92 mph winds, the floating portion must be completely replaced.

The fixed structures of the Portage Bay and Evergreen Point bridges do not meet current seismic design standards because the bridge is supported on hollow-core piles. These hollow-core piles were not designed to withstand a large earthquake. They are difficult and cost prohibitive to retrofit to current seismic standards.

If nothing is done to replace the Portage Bay and Evergreen Point bridges, there is a high probability that both structures could fail and become unusable to the public before 2030. WSDOT cannot predict when or how these structures would fail, so it is difficult to determine the actual consequences of doing nothing. To illustrate what could happen, two scenarios representing the extremes of what is possible are evaluated as part of the No Build Alternative. These are the Continued Operation and Catastrophic Failure scenarios.

Under the Continued Operation Scenario, SR 520 would continue to operate as it does today as a 4-lane highway with nonstandard shoulders and without a bicycle/pedestrian path. No new facilities would be added and no existing facilities (including the unused R.H. Thompson Expressway Ramps near the Arboretum) would be removed. WSDOT would continue to maintain SR 520 as it does today. This scenario assumes the Portage Bay and Evergreen Point bridges would remain standing and functional through 2030. No catastrophic events (such as earthquakes or high winds) would be severe enough to cause major damage to the SR 520 bridges. This scenario is the baseline the EIS team used to compare the other alternatives.

In the Catastrophic Failure Scenario, both the Portage Bay and Evergreen Point bridges would be lost due to some type of catastrophic event. Although in a catastrophic event, one bridge might fail while the other stands, this Draft EIS assumes the worst-case scenario—that both bridges would fail. This scenario assumes that both bridges would be seriously damaged and would be unavailable for use by the public for an unspecified length of time.

What is the 4-Lane Alternative?

The 4-Lane Alternative would have four lanes (two general purpose lanes in each direction), the same number of lanes as today (Exhibit 3). SR 520 would be rebuilt from I-5 to Bellevue Way. Both the Portage Bay and Evergreen Point bridges would be replaced. The bridges over SR 520 would also be rebuilt. Roadway shoulders would meet current standards (4-foot inside shoulder and 10-foot outside shoulder). A 14-foot-wide bicycle/pedestrian path would be built along the north side of SR 520 through Montlake, across the Evergreen Point Bridge,

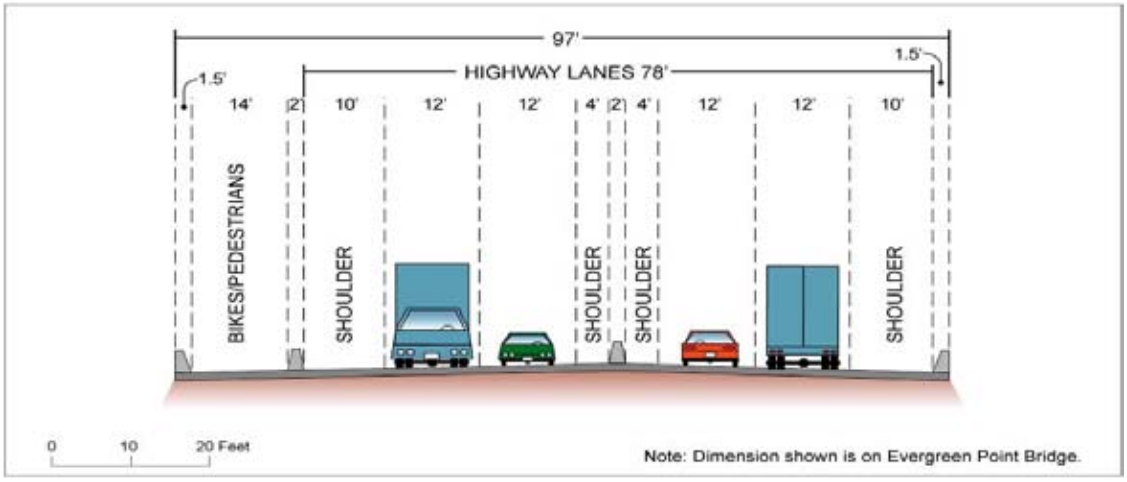


Exhibit 3. 4-Lane Alternative

and along the south side of SR 520 through Medina, Hunts Point, Clyde Hill, and Yarrow Point to 96th Avenue Northeast, connecting to Northeast Points Drive. Sound walls would be built along much of SR 520 in Seattle and the Eastside. This alternative also includes stormwater treatment and electronic toll collection.

The floating bridge pontoons of the Evergreen Point Bridge would be sized to carry future high-capacity transit. An option with smaller pontoons that could not carry future high-capacity transit is also analyzed. The alternative does not include high-capacity transit.

A bridge operations facility would be built underground beneath the east roadway approach to the bridge as part of the new bridge abutment. A dock to moor two boats for maintenance of the Evergreen Point Bridge would be located under the bridge on the east shore of Lake Washington.

A flexible transportation plan would promote alternative modes of travel and increase the efficiency of the system. Programs include intelligent transportation and technology, traffic systems management, vanpools and transit, education and promotion, and land use as demand management.

What is the 6-Lane Alternative?

The 6-Lane Alternative would include six lanes (two outer general purpose lanes and one inside HOV lane in each direction; Exhibit 4). SR 520 would be rebuilt from I-5 to 108th Avenue Northeast in Bellevue, with an auxiliary lane added on SR 520 eastbound east of I-405 to 124th Avenue Northeast. Both the Portage Bay and Evergreen Point bridges would be replaced. Bridges over SR 520 would also be rebuilt. Roadway shoulders would meet current standards (10-foot-

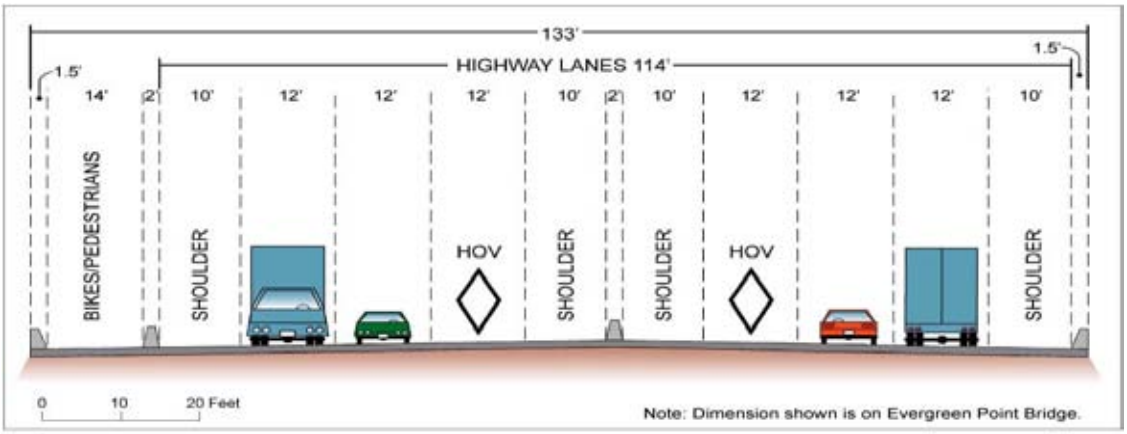


Exhibit 4. 6-Lane Alternative

wide inside shoulder and 10-foot-wide outside shoulder). A 14-foot-wide bicycle/pedestrian path would be built along the north side of SR 520 through Montlake, across the Evergreen Point Bridge, and along the south side of SR 520 through the Eastside to 96th Avenue Northeast, connecting to Northeast Points Drive. Sound walls would be built along much of SR 520 in Seattle and the Eastside. This alternative would also include stormwater treatment and electronic toll collection.

This alternative would also add five 500-foot-long landscaped lids to be built across SR 520 to help reconnect communities. These communities are Roanoke, North Capitol Hill, Portage Bay, Montlake, Medina, Hunts Point, Clyde Hill, and Yarrow Point. The lids are located at 10th Avenue East and Delmar Drive East, Montlake Boulevard, Evergreen Point Road, 84th Avenue Northeast, and 92nd Avenue Northeast.

The floating bridge pontoons of the Evergreen Point Bridge would be sized to carry future high-capacity transit. The alternative does not include high-capacity transit.

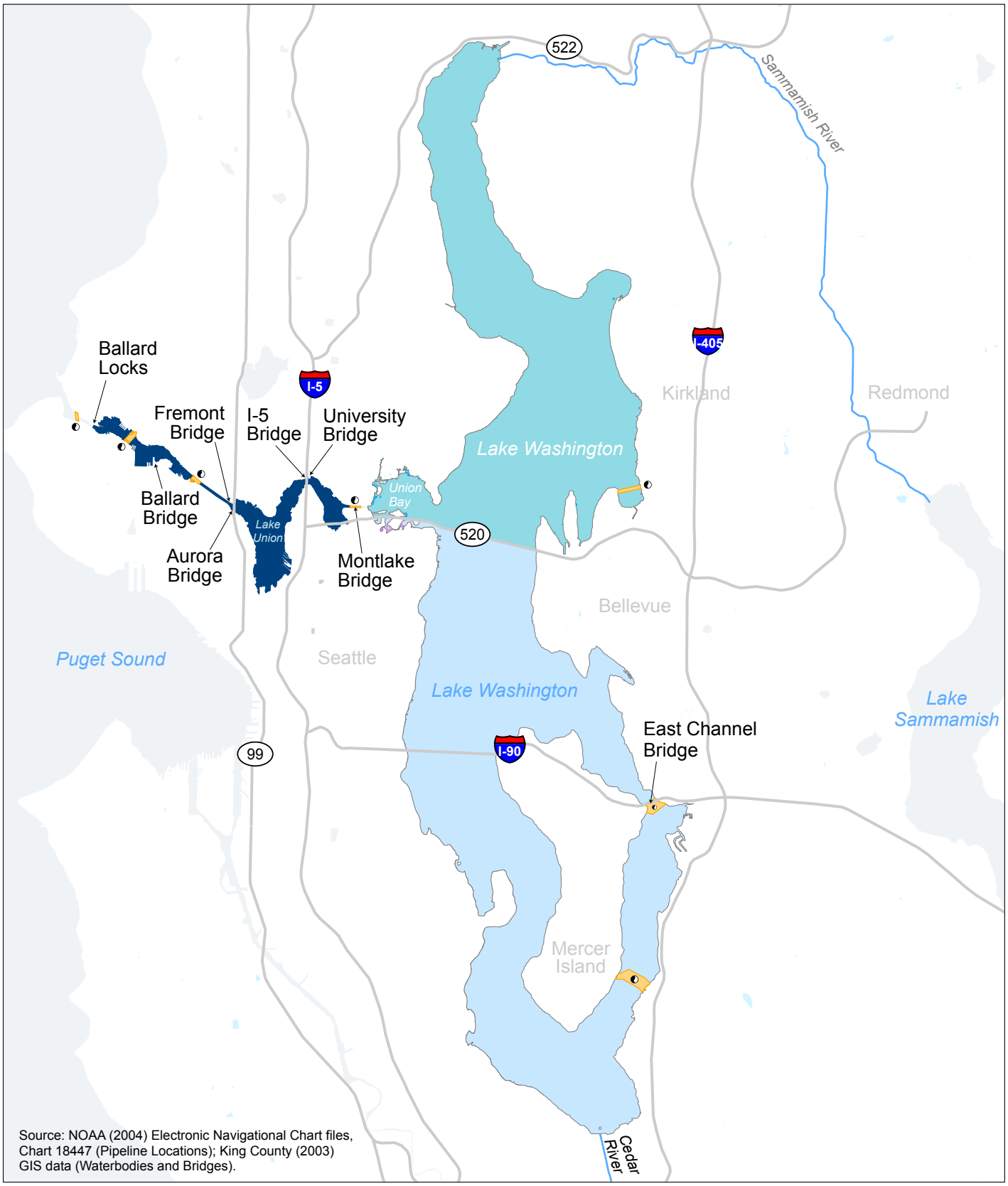
A bridge operations facility would be built underground beneath the east roadway approach to the bridge as part of the new bridge abutment. A dock to moor two boats and maintain the Evergreen Point Bridge would be located under the bridge on the east shore of Lake Washington.

A flexible transportation plan would promote alternative modes of travel and increase the efficiency of the system. Programs would include intelligent transportation and technology, traffic systems management, vanpools and transit, education and promotion, and land use as demand management.

Affected Environment

The Coast Guard (2004c) has determined that the navigable waterways in the project area (Exhibit 5) are:

- Lake Washington Ship Canal
- Lake Union
- Lake Washington
- Sammamish River
- Lake Sammamish
- Cedar River (navigable to mile 1.3)



Ship Canal to Union Bay

Lake Washington North of Evergreen Point Bridge

Lake Washington South of Evergreen Point Bridge

Pipeline Locations

N

0 5,000 10,000 Feet

Exhibit 5. **Navigable Waterways**

SR 520 Bridge Replacement and HOV Project

Operation of the Ballard Locks by the U.S. Army Corps of Engineers (Corps of Engineers) provides a navigable waterway between Puget Sound and Lakes Union and Washington (Corps of Engineers 2004b). An important part of maintaining the project area navigable waterways involves controlling lake levels during periods of high and low flow of the Cedar and Sammamish rivers and their tributaries, along with the flows of a number of smaller streams draining directly to Lake Washington (e.g., Thornton Creek and Mercer Slough). Since the completion of the Ballard Locks in 1917, the Corps of Engineers has been authorized by Congress to regulate Lake Washington water levels between 20 and 22 feet above the plane of Mean Lower Low Water in Puget Sound (abbreviated MLLW, this is the lower of the two daily low tides in the Sound). Between 1979 and 1999, lake levels have varied between a minimum of 19.5 feet and a maximum of 22.0 feet (Exhibit 6; Corps of Engineers 2004a). Predictable lake levels are an important part of the affected environment of navigable waterways because they establish the height restrictions vessels encounter at bridges crossing these waterways. Lake levels also establish the minimum depth of water for vessel traffic through the navigational channels of these waterways.

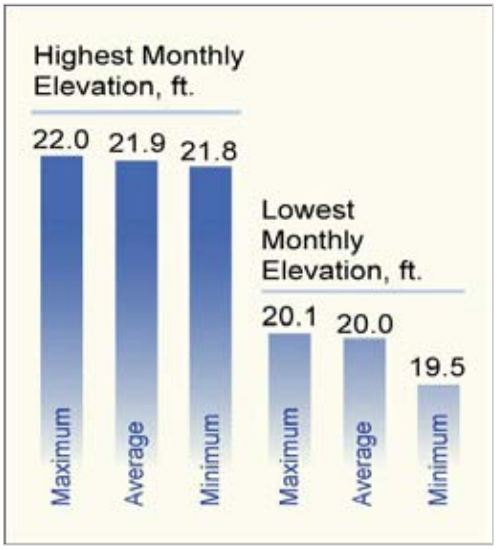


Exhibit 6. Lake Washington Elevations Between 1979 and 1999

How was the information collected?

The discipline team identified the navigable waterways in the project area through discussions with local Coast Guard personnel. Commander Austin Pratt of the 13th Coast Guard District Bridge Administration office participated in meetings to consider various alternatives for replacing the Evergreen Point Bridge and assisted with issues regarding the navigational needs of the project area. The team contacted people involved in commercial shipping and recreational boating to characterize waterways use. We interviewed local tugboat companies and their clients, construction and crane companies, and private marinas on Lake Washington by phone or in person to identify the kinds and amounts of vessel traffic on these waterways.

We contacted the Renton Department of Transportation and the Department of Economic Development, the Bellevue Department of Planning and Community Development, the Kenmore Department of Community Development, the Kirkland Public Works Department, and

the Lake Forest Park Director of Public Services to learn about current and future plans for use of these navigable waterways for either commerce or development. Seattle's comprehensive plan (City of Seattle 2003) was also reviewed for information on future development plans along the Seattle shorelines of the Ship Canal and Lake Washington.

The Seattle Department of Transportation provided information about bridge openings for the University Bridge and WSDOT provided information for the Montlake and Evergreen Point bridges. Individuals providing information are listed in Exhibit 7. Information gathered from personal contacts was supplemented with field inspections of various marinas along the shores of Lake Washington, and a review of Nautical Chart No. 18447, published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA 1997).

What are the existing characteristics of the navigable waterways?

This report focuses on waterways in the project area where commercial ships and recreational boats travel, including the waters of the Lake Washington Ship Canal, Lake Union, Portage Bay, Union Bay, Lake Washington, and the Sammamish River. The project area waterways shown in Exhibit 5 were further subdivided where appropriate for the purposes of this discussion into: the Ship Canal out to Union Bay (Exhibits 8 and 9), Lake Washington north of the I-90 Bridge (Exhibit 10), and Lake Washington south of the I-90 Bridge (Exhibit 10). These subdivisions were selected based on specific navigational patterns and restrictions discussed below. To characterize the navigable waterways of these three areas, the discipline team asked the following four questions:

- What are the existing navigational channels?
- What are the current limits on ship passage?
- What is the current vessel traffic?
- What are the future development plans for these navigable waters?

Exhibit 7. Contact List for Identifying Navigation Uses in the Project Area

Company/Organization	Contact Name
Recreational	
Coulon Park	Receptionist
Leschi Marina	Vance Alles
Mount Baker Sailing and Rowing Club	Receptionist
Newport Yacht Club	Linda Hogan
Meydenbauer Yacht Club	Receptionist
Parkshore Marina	David Jordan
Queen City Yacht Club	Scott Grim
Rainier Yacht Club	Bob Brown
Seattle Yacht Club	John Bramstedt
Commercial/Industrial	
Argosy Cruise Line	Don Wickland
Barbee Mill	Art Hall
Foss	Steve Spencer
Island Tug and Barge Co.	David Zanzig
Lynden Tug	Receptionist
Madden Construction	Dale Madden
Manson Construction	Pat McGerry
SeaCoast Towing	Francis Lee
Spirit of Puget Sound	Receptionist
University of Washington	Dan Schwartz
Waterfront Construction	Dean Simmons
Western Towboat Inc.	Jeff Schlesinger
Government	
Ship Canal	Lynne Melder
Renton Department of Economic Development	Shawna Mullhall
Bellevue Department of Planning and Community Development	Kathleen Burgess
Kenmore Department of Community Development	Bob Sokol
Kirkland Public Works Department	Rob Jammerman
Lake Forest Park Director of Public Service	Frank Zenk
National Oceanic and Atmospheric Administration (NOAA)	Larry Mordock
Seattle Department of Transportation	JoAnne McGovern
U.S. Navy	Commander Karen Sellers
WSDOT	Archie Allen

What are the existing navigational channels?

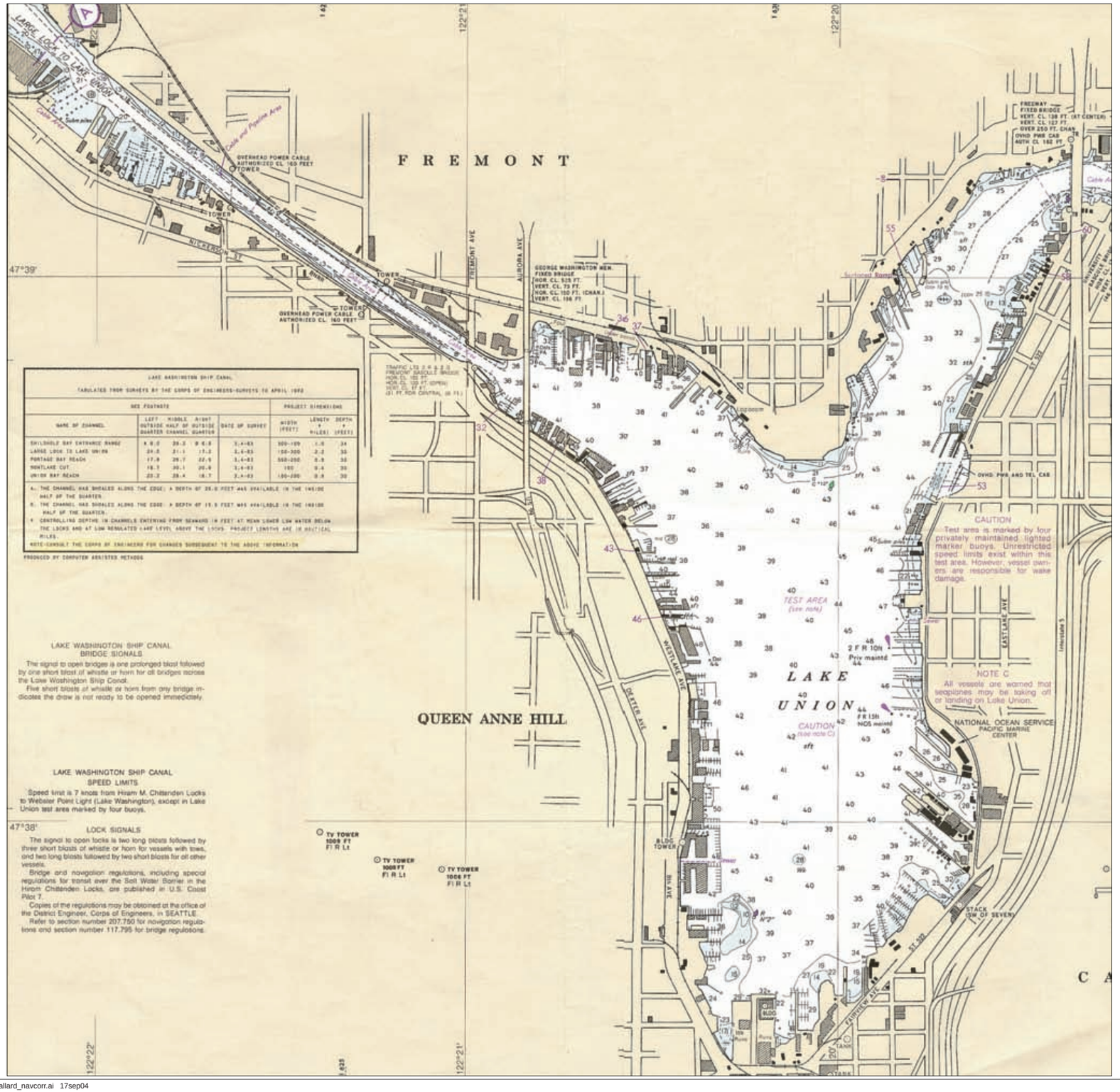
Construction of the Lake Washington Ship Canal in 1917 established a series of dredged navigational channels linking Lake Washington with the marine waters of Puget Sound (Chrzatowski 1983). It also lowered the lake level 8.8 feet to its current mean elevation of 21.0 feet above the MLLW of Puget Sound. Before then, water levels on Lake Washington varied seasonally up to 7 feet between the wet and dry seasons. Construction of the Ship Canal, and most importantly the Ballard Locks, allowed the Corps of Engineers to maintain a predictable lake level (Corps of Engineers 2004a,b).

There are three navigational channels associated with the existing Evergreen Point Bridge—the west highrise, the midspan, and the east highrise. There are also three navigational channels associated with the I-90 bridge. Two of these channels lie west of Mercer Island under the I-90 west and east approaches to the Homer M. Hadley and Lacey V. Murrow floating bridges, respectively. One navigational channel lies east of Mercer Island under the I-90 East Channel Bridge.

The following sections further detail the characteristics of the navigational channels in three parts of the project area navigable waterways—the Ship Canal to Union Bay, Lake Washington North of Evergreen Point Bridge, and Lake Washington South of Evergreen Point Bridge.

Navigational Channels in the Ship Canal to Union Bay Project Area

The Ship Canal is about 8 miles long and has a minimum depth of 30 feet (Chrzatowski 1983). The canal consists of a series of dredged navigational channels connecting the natural existing basins of Lake Union and Salmon Bay. A dredged navigational channel exists between the Ballard Locks to a point just short of the Aurora Bridge (Exhibit 8). The depth of Lake Union is generally more than 30 feet (with the deepest point being 50 feet). Active maintenance of the navigational channel (referred to as the Portage Bay Reach) begins west of the I-5 Bridge (Exhibit 9) and continues through Union Bay (the Union Bay Reach) to Webster Point.

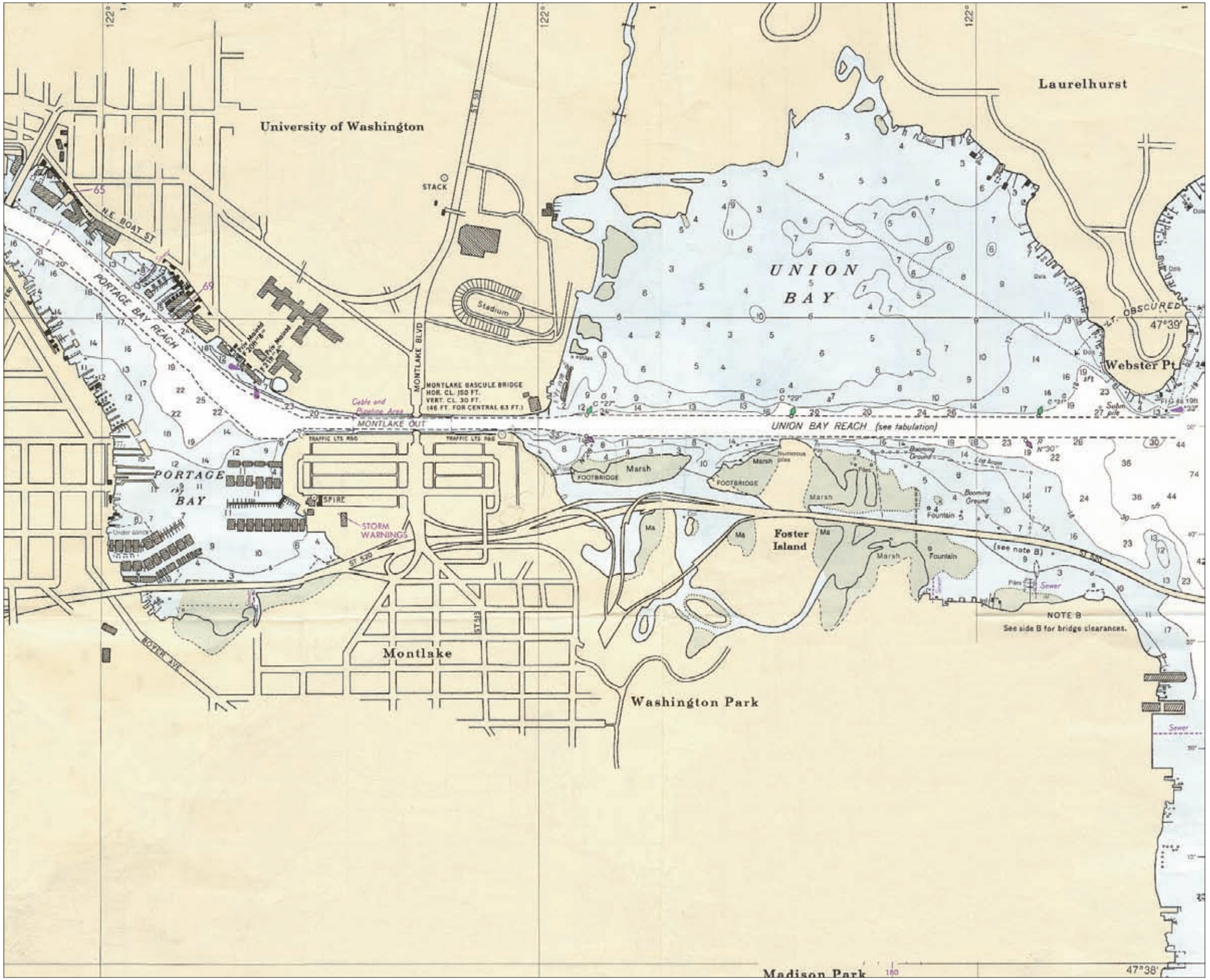


Note: This exhibit is included to show the locations of the navigable waterways in the vicinity of the proposed project. Because this exhibit was taken directly from the source cited below, it includes some navigational information that is not related to the discussion in this discipline report.

Source: NOAA (1997), Nautical Chart 18447, Lake Washington Ship Canal and Lake Washington.

Exhibit 8. **Ballard Bridge to University Bridge Navigational Corridor**

SR 520 Bridge Replacement and HOV Project



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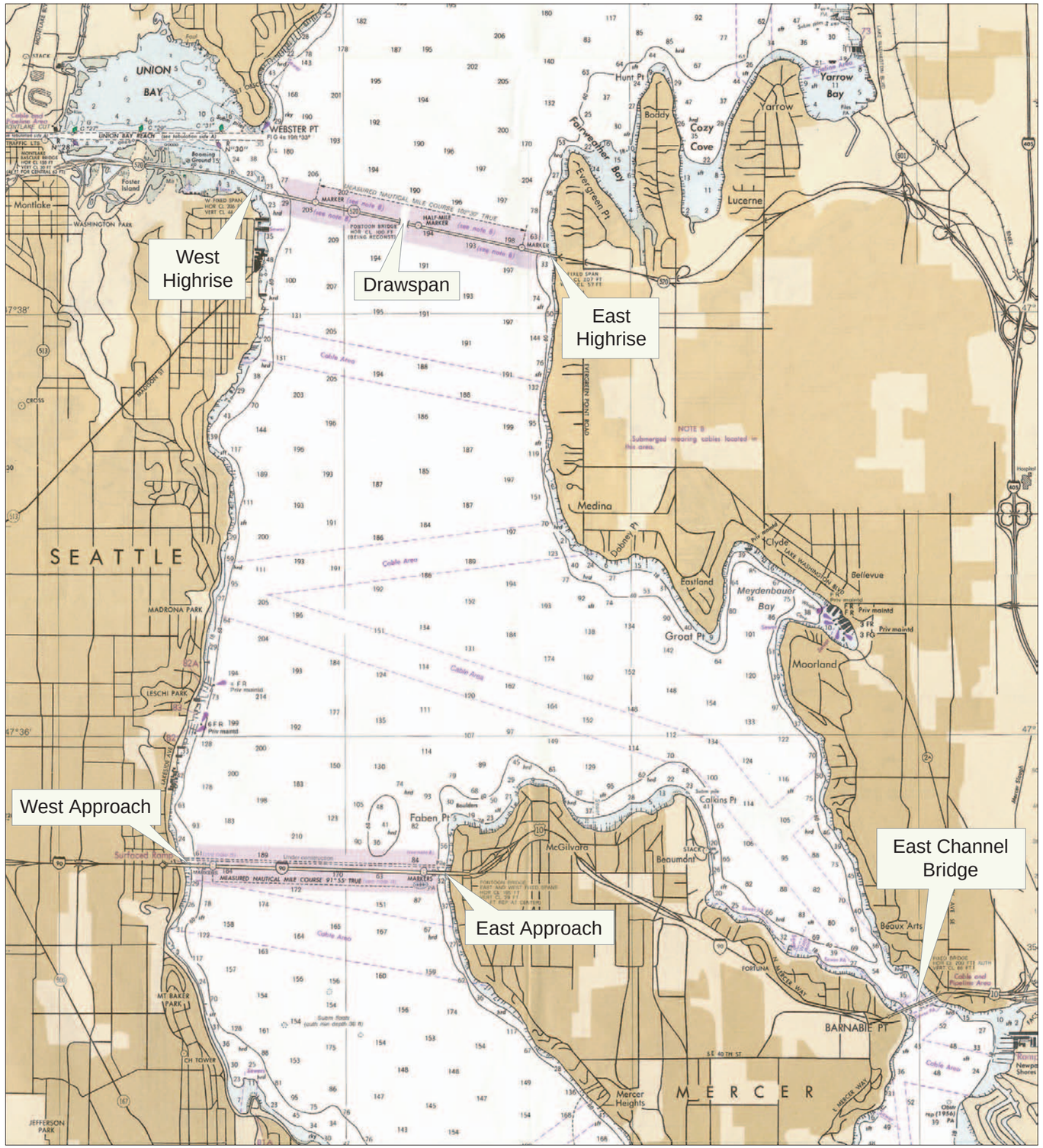
Source: NOAA (1997), Nautical Chart 18447, Lake Washington Ship Canal and Lake Washington.

Exhibit 9. **University Bridge to Union Bay Navigational Corridor**

SR 520 Bridge Replacement and HOV Project



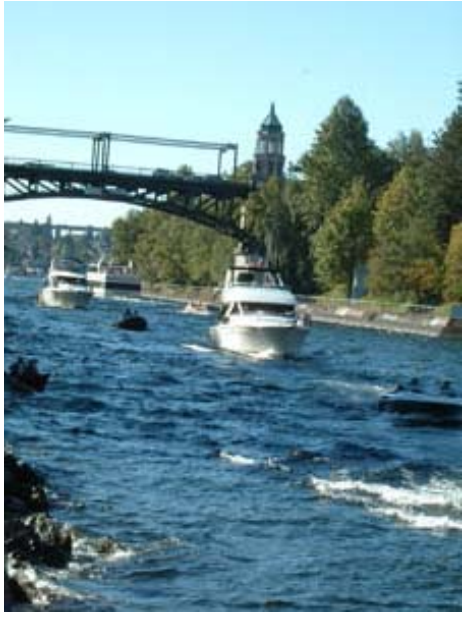
Note: This exhibit is included to show the locations of the navigable waterways in the vicinity of the proposed project. Because this exhibit was taken directly from the source cited below, it includes some navigational information that is not related to the discussion in this discipline report.

Source: NOAA (1997), Nautical Chart 18447, Lake Washington Ship Canal and Lake Washington.

Exhibit 10. **SR 520 and I-90 Navigational Corridor**

SR 520 Bridge Replacement and HOV Project

The Ballard Locks are the initial entry point for any vessel entering the project area. The large lock limits the size of a vessel's beam (width), length, and draft (the depth of a vessel's keel below the surface, especially when loaded) to a maximum of 80 feet, 760 feet and 30 feet, respectively. The small lock limits the size of a vessel's beam, length, and draft to 25 feet, 100 feet, and 30 feet (Graesser pers. com. 2004). The Ballard and Fremont bridges do not further restrict the size of vessels because they are wider than 80 feet and, as drawspan bridges, they impose no height limit. Moving west to east, the next major restrictions are the Aurora Bridge at 136 feet high and the I-5 Bridge at 127 feet high. Commercial or recreational vessels traveling east through the University and Montlake bridges do not encounter additional structural limitations on width, height, or draft in the Lake Washington Ship Canal (Exhibit 11) until reaching the Evergreen Point Bridge. Overall, the limiting navigational width in the passage from the Ship Canal to Lake Washington is the Montlake Cut, which is only 100 feet wide at full depth. Surveys of commercial vessel operators indicated that most vessels do not proceed farther east than Lake Union.

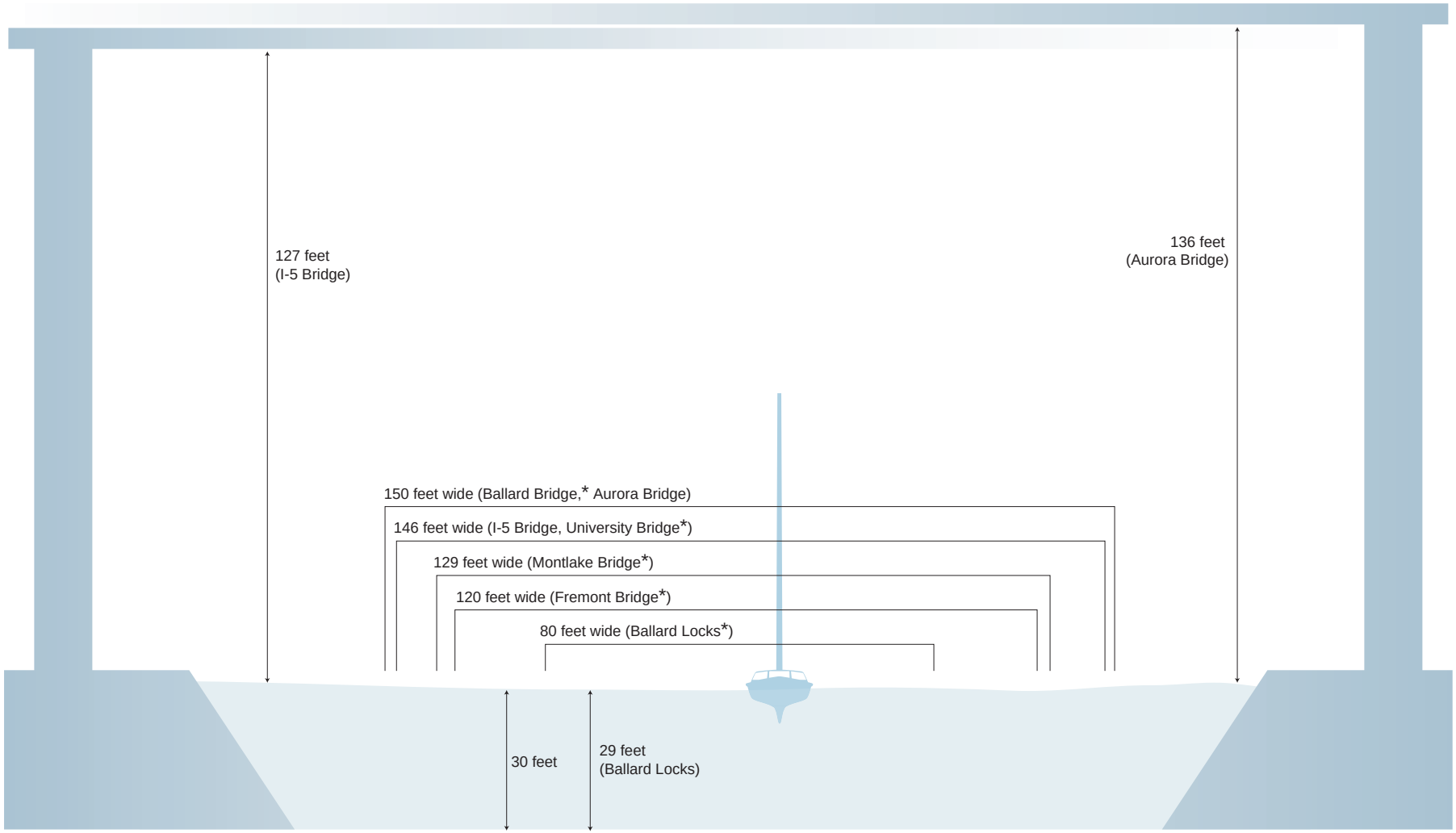


Montlake Bridge

Navigational Channels in Lake Washington North of the Evergreen Point Bridge

The part of Lake Washington that is north of the Evergreen Point Bridge is approximately 8.2 miles long, 2.8 miles wide just north of the bridge, and approximately 0.8 mile wide at its northernmost extent, with a maintained navigational channel that connects Lake Washington to the Sammamish River. Depths in the navigable part of the lake range from 206 feet to 27 feet at the north end. The western and eastern shorelines are primarily residential or park land. Shoreline commercial properties are more common in the Kenmore and Lake Forest Park areas at the northern end of the lake.

The navigational channel becomes shallower as it approaches the opening of the Sammamish River in the northeast section of Lake Washington. This 14-mile river connects Lake Washington with Lake Sammamish and is approximately 10.5 feet deep in the main river channel (King County 1993). Vessel passage from the Sammamish River onto Lake Sammamish is constrained by the presence of a weir (a low dam built across a stream or lake to raise its level or divert flow) at the



Note: The dimensions shown here represent a 45-foot sailboat with a 60-foot mast height and a 7-foot draft. Width and depth not to scale.

*No height restrictions.

Exhibit 11. **Navigation Restrictions Imposed between Puget Sound and Lake Washington**

SR 520 Bridge Replacement and HOV Project

outlet of Lake Sammamish (Corps of Engineers 2004c). The weir was originally installed to maintain lake elevations. A renovation of the weir in 1998 to enhance salmon migration narrowed the opening from 12 to 4 feet (Corps of Engineers 2004c). Consequently, only vessels narrower than 4 feet wide can pass through the weir from the Sammamish River into Lake Sammamish.

Navigational Channels in Lake Washington South of the Evergreen Point Bridge

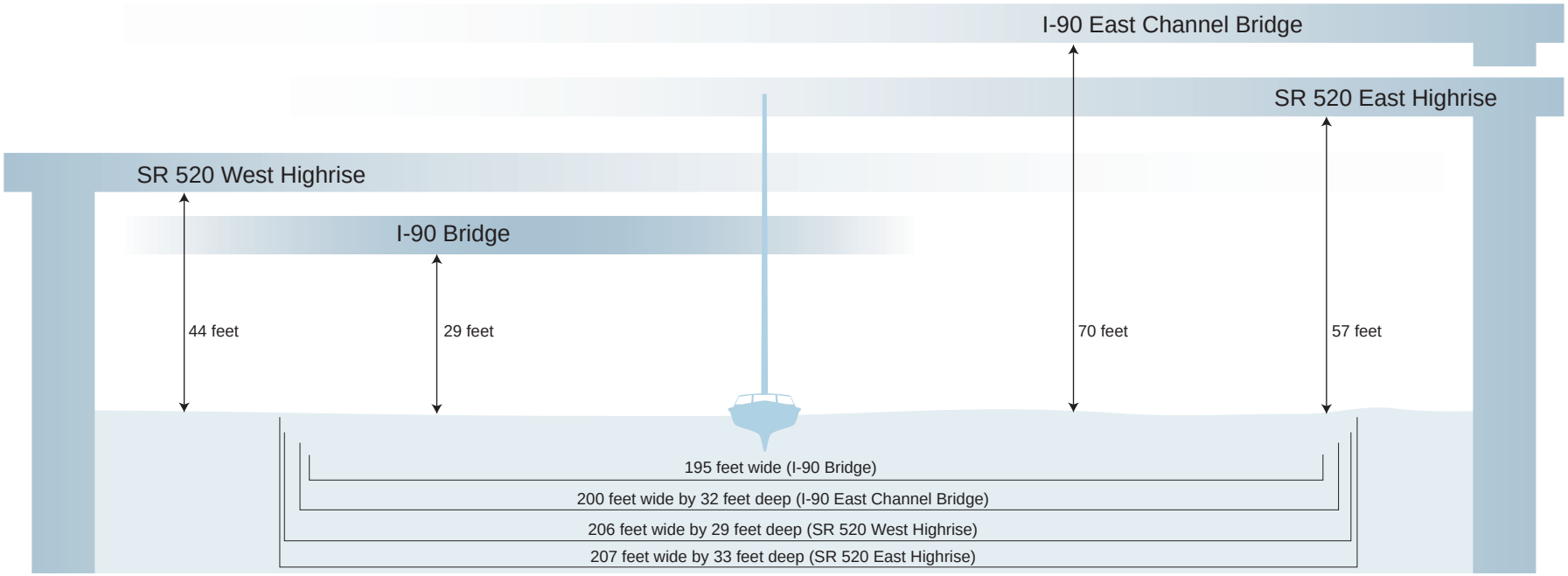
Three designated navigational channels are available to commercial and recreational vessels traveling south of the Evergreen Point Bridge. These are the west highrise, the open drawspan, and the east highrise (Exhibit 12). Vessels going farther south past the I-90 Bridge also have three navigational channels. Two channels lie west of Mercer Island under the I-90 west and east approaches to the Homer M. Hadley and Lacey V. Murrow floating bridges, respectively. One navigational channel lies east of Mercer Island under the I-90 East Channel Bridge.

Argosy *MV Kirkland* Passing through SR 520 East Highrise Navigational Channel

Lake Washington stretches approximately 10.7 miles south of the Evergreen Point Bridge to the mouth of the Cedar River, varying in width from 0.6 to 2.2 miles. Depths in this part of the lake are mostly over 100 feet, with a maximum depth of 214 feet near Leschi Park on the western shoreline and only 35 feet at the East Channel Bridge crossing.

Vessel traffic emerging from Lake Union and traveling to the south part of Lake Washington must pass under both the Evergreen Point and I-90 bridges. The east highrise of the Evergreen Point Bridge rises 57 feet above the water and is 207 feet wide. The SR 520 west highrise has a vertical clearance of 44 feet and is 206 feet wide. The SR 520 drawspan has no height limitation and is 200 feet wide when open. The existing SR 520 east highrise is high enough to accommodate all vessels currently using the lake, eliminating the need to open the drawspan.

Vessels passing through the I-90 Bridge have a height restriction of 70 feet and a width restriction of 200 feet at the I-90 East Channel Bridge, and a height restriction of 29 feet and a width restriction of 195 feet at the west and east approaches of the Homer M. Hadley and Lacey V. Murrow floating bridges.



Note: The dimensions shown here represent a 45-foot sailboat with a 60-foot mast height and a 7-foot draft. Width and depth not to scale.

Exhibit 12. **Navigation Restrictions Imposed by Lake Washington Bridges**

SR 520 Bridge Replacement and HOV Project

What is the current vessel traffic?

The following sections describe current vessel traffic based on the intended use. All types of current vessel traffic extend over the three areas of the navigable waterways discussed above.

Bridge Opening Activities

WSDOT maintains bridge logs that record the total number of the Evergreen Point Bridge openings per year (Exhibit 13). In general, the number of openings of the drawspan of the Evergreen Point Bridge required for vessel passage has decreased (Exhibit 14). In the last 3 years, more than 94 percent of all bridge openings have been for maintenance purposes (76 out of 81 openings in 2001, 89 out of 93 openings in 2002, and 109 out of 109 openings in 2003; Allen, pers. comm. 2004).

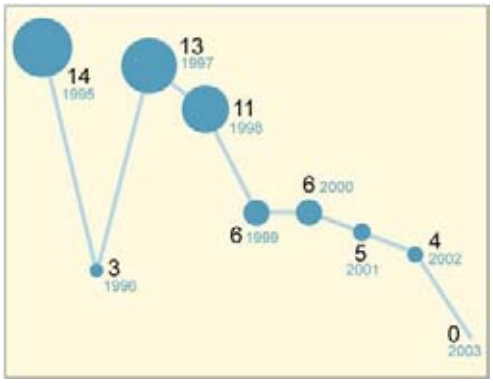


Exhibit 13. Number of Annual Openings of Evergreen Point Bridge for Vessel Passage

Exhibit 14. Summary of Bridge Openings for Vessel Passage

	Total Number of Bridge Openings		
Year	SR 520	Montlake	University
2003	0	2,756	3,608
2002	4	2,702	3,551
2001	5	2,793	3,343
2000	6	2,223	2,726
1999	6	2,544	3,371
1998	11	3,153	3,765
1997	13	3,046	3,734
1996	3	3,340	4,172
1995	14	3,404	4,088

Source: McGovern pers. comm. (2004), Allen pers. comm. (2004).

The Seattle Department of Transportation records the number of openings of the University Bridge. WSDOT operates and keeps records of the Montlake Bridge. Both of these bridges are opened more frequently than the Evergreen Point Bridge (Exhibit 14). The number of openings is an indicator of the number of sailboats that pass back and forth between Lake Washington and Lake Union or through the Ship Canal to Puget Sound.

Recreational Use

Recreational traffic on Lake Washington is the largest component of navigation uses in the project area, but it is the most difficult to assess because of the lack of detailed information. Marinas do not record the height or width of the vessels they moor, although many were able to report maximum vessel dimensions (Exhibit 15). There are also many private docks and vessels in the project area for which records are not available. This discipline report focuses on recreational vessels using the Ship Canal and Lake Washington that must use the Coast Guard-designated navigational channels to move through the project area (in contrast to small boats such as canoes and kayaks that can pass under the bridge in a number of places).

Interviews with local marina operators have established that there are probably no recreational vessels permanently moored on Lake Washington that require opening the Evergreen Point Bridge. The *Ninna OoTaki*, a tall-masted sailboat that once required two openings yearly of the Evergreen Point Bridge, is no longer moored in Lake Washington. Marina operators did say, however, that occasional "rogue" vessels enter the lake. Those vessels with clearance requirements greater than 64 feet could require opening the existing Evergreen Point Bridge drawspan.

Boats in Union Bay

Commercial/Industrial Use

Over the last 9 years, commercial and industrial uses of Lake Washington that require opening the Evergreen Point Bridge have decreased (Allen pers. comm. 2004). Future development is not anticipated to require additional navigational clearance.

The primary commercial uses of Lake Washington are cruises/tours and construction (Exhibit 16). No large commercial or industrial uses of the lake were identified south of SR 520. Glacier Sand and Gravel operates a gravel mine in Kenmore that uses barges seven times a week to ship materials; this was the only industrial use identified on Lake Washington north of SR 520.

Argosy is the main cruise line on Lake Washington, providing up to six scheduled daily trips during the peak season, with additional trips

Exhibit 15. Recreational Vessel Use in the Project Area

Marina	Max. Vessel Dimensions (feet)			Notes
	Height	Length	Draft	
Carrillon Point Marina [a]				
Coulon Park				No permanent moorage, no large boats observed.
Harbor Village Marina	30	53		Recreational boats operating primarily on Lake Washington.
Kirkland Yacht Club [a]				No information about vessel size or passage requirements.
Lake Forest Park Civic Club		25		Boat ramp only.
Leschi Marina	65		6	East highrise passes most boats, an estimated 193 boats require opening Montlake Bridge.
Meydenbauer Bay Yacht Club [a]				No information about vessel size or passage requirements.
Mount Baker Sailing and Rowing Club [a]				Observed small (1- and 2- person) sailboats.
Newport Yacht Club	40	60		Approximately 12 boats require opening Montlake Bridge.
Parkshore Marina	70	64	7	
Queen City Yacht Club				Typical vessels are 15 to 16 feet tall; maximum height not stated.
Rainier Yacht Club [a]				All boats can pass under the I-90 East Channel Bridge. No additional information provided.
Sand Point Sail Club [a]				Small sailboats operating within sight of Sand Point.
Seattle Yacht Club[a]				Most use Ship Canal to get to Puget Sound; do not usually go to Lake Washington.
Yarrow Bay Marina		57		Services boats up to 57 feet in length.

[a] No information on vessel size available.

Exhibit 16. Summary of Commercial and Industrial Vessel Use

Marina	Trips on Lake Washington	Height (feet)	Beam (feet)	Length (feet)	Draft (feet)	Notes
Argosy Cruises						
Champagne Lady	2-3 trips/peak day 1 trip/non-peak day		18	77		Peak is from April to October. Additional trips for private parties. Estimates are for round trips.
MV Kirkland	3-4 trips/peak day 1 trip/non-peak day	35	40	110		
Spirit of Seattle		38	32	115		One recorded trip through Evergreen Point Bridge; may have followed another vessel; not opened for *Spirit of Seattle*.
Royal Argosy	Tallest Argosy boat on Lake Washington	45	42	180	8	Uses I-90 East Channel Bridge.
Barbee Mill	None					They have not used log rafts or barges for 50 years; they ship only via trucks.
Foss/General Construction	3-4 round trips/year (south of SR 520)	144 to boom	60	117	6	Floating crane, which can modify boom for 8 feet of clearance on I-90 East Channel Bridge.
General Construction Co.	Infrequent, project-specific	70	75	210		Floating crane, which clears the I-90 East Channel Bridge.
Island Tug and Barge Co.	7 round trips/week	46		85-90 feet (350 with barge)	16	Route from Kenmore to Shilshole, Glacier Sand and Gravel (10-year contract)
Lynden Tug						Only in Puget Sound
Madden Construction	Multiple	38	65		15	Currently moored in Renton; needs passage for work on Puget Sound. Able to pass under the I-90 East Channel Bridge after modifying barge.
	1-2 times/year for work on Mercer Island (4 trips) Smaller vessels go to Kennydale Mill	110 to boom	78	200		Can be modified to clear the I-90 East Channel Bridge.
Seacoast Towing	None south of SR 520					Kenmore–Glacier Sand and Gravel
Spirit of Puget Sound	Almost never	50	35	175	6	
University of Washington	8-9 trips/year	31	19	65	6.8	*The Barnes*
	Seldom or never	110	52.5	274	19	*Thomas G. Thompson*
Waterfront Construction	20 trips/month	N/A	50	100		Six barges are currently moored in Lake Union. Height can be adjusted by lowering boom to pass under SR 520 east highrise.

Exhibit 16. Summary of Commercial and Industrial Vessel Use

Marina	Trips on Lake Washington	Height (feet)	Beam (feet)	Length (feet)	Draft (feet)	Notes
Waterways Cruises and Events	5 trips/peak day 2 trips/off-peak day					Peak is from April to October. Business is mostly private charter, but includes public cruises.
Emerald Star			36	110	20	Largest ship in fleet.
Western Towboat, Inc.						Towboats push materials (e.g., log-booms, buoys, docks) under the Evergreen Point Bridge for hydroplane races and dock construction.
135th St. Limited Partnership *The Protector*	Towed to its current location, the protector is incapable of independent travel		52	303	19.7	*The Protector* has had its engines removed and is docked at the Kirkland Yacht Club

added for private parties. None of the Argosy vessels regularly scheduled for tours on Lake Washington require opening the Evergreen Point Bridge.

Foss runs a crane derrick on Lake Washington and makes approximately three to four trips south of SR 520 each year. The derrick is 144 feet to the boom, 117 feet long, 60 feet wide, and drafts 6 feet; this vessel can be modified to clear the I-90 East Channel Bridge.

Another use identified by barge operators and contractors is emergency construction. There are two sewer lines under Lake Washington between Mercer Island and Bellevue (see Exhibit 10). One line follows the I-90 East Channel Bridge; the other is located at the southern end of Mercer Island and ties into the main sewer line just north of Renton. If these lines rupture, large cranes could be required for emergency repair work. Emergency construction could also be required for repair work on the floating bridge pontoons. In our surveys, Madden Construction expressed concern about navigational passage for emergency bridge construction. For example, construction of the current I-90 Bridge was hampered because equipment could not quickly access the area.

NOAA currently docks its vessels on Lake Union and trucks over provisions stored at Sand Point (located on the western shore of Lake Washington northeast of the University of Washington). NOAA does not use Sand Point for marine traffic often and they have no current plans for expanded use (Mordock pers. comm. 2004). The 135th Lake

Street Limited Partnership maintains a large vessel, *The Protector*, at the Kirkland Yacht Club Marina. The vessel has no engines and was towed to its current moorage (Brastad pers. comm. 2004). When the Kirkland Yacht Club Marina carries out its current plans for expansion, possibly sometime in the fall of 2005, this vessel will likely be sold and moved out of the project area (Brastad pers. comm. 2004).

Military Use

The last Navy ship to pass through the Evergreen Point Bridge drawspan was in 1993. The Navy does not use Lake Washington and does not need access to the south end of the lake (Sellers pers. comm. 2004). The Sand Point Naval Base was closed in 1995 and is now owned by Seattle.

What are the future development plans for navigable waters?

The discipline team contacted the cities of Renton, Bellevue, Kirkland, Kenmore, Lake Forest Park, and Seattle and the Boeing Company to determine if they plan future development south of the SR 520 corridor that would require barge or large vessel traffic.

Ship Canal to Union Bay

Seattle's Comprehensive Plan does not list any major expansion plans for commercial or recreational boating facilities in the Ship Canal or Lake Union that would modify the navigable waters (City of Seattle 2003). The comprehensive plan commits the city's support for the efficient use of Fisherman's Terminal, maintenance of existing facilities, and diversification of ongoing uses of the Ship Canal, Lake Union, and Portage Bay.

Lake Washington North of Evergreen Point Bridge

Seattle's Comprehensive Plan seeks to preserve natural areas and maintain the residential and recreational uses currently existing on Lake Washington. The comprehensive plan does not forecast any major developments in this area.

Kenmore does not have any planned public works or development projects along the shoreline that would require barges or large vessels. The city has no plans to pursue dredging operations at the mouth of the Sammamish River to ease navigation (Sokol pers. comm. 2004). Shoreline property in Lake Forest Park is privately owned, except for

one small parcel belonging to the city. Lake Forest Park does not have any planned projects that would require barges (Zenk pers. comm. 2004).

Kirkland uses a dredge to remove sediment from a stormwater outfall close to Marina Park approximately every 5 years. The city does not currently have any plans for development that would require additional barge or large vessel traffic (Jammerman pers. comm. 2004).

Lake Washington South of Evergreen Point Bridge

Seattle's Comprehensive Plan seeks to preserve natural areas and maintain the residential and recreational uses currently existing on Lake Washington shorelines. The comprehensive plan does not forecast any major developments in this area.

Bellevue does not have any plans for development along the shoreline that would require barges; they also said that the shoreline is reserved for private marinas (Burgess pers. comm. 2001).

Renton said that they use barges to dredge the Cedar River about every 10 years. They anticipate that barges may be needed to clean up the Port Quendall site, if and when redevelopment plans are proposed and approved (Mullhall pers. comm. 2004). There have been some discussions of establishing a commercially operated ferry system from Renton to the University of Washington area (Mullhall pers. comm. 2004), but no definite plans exist at this time.

Potential Effects

How were potential effects of the project evaluated?

The discipline team evaluated potential effects of the proposed project by comparing current restrictions on navigation (height, width, and draft) to future restrictions resulting from construction and operation of the No Build, 4-Lane and 6-Lane Alternatives. These changes were further evaluated against the current and projected record of vessel traffic and development plans of lakeside communities to identify any construction-related or permanent effects. The 4-Lane and 6-Lane Alternatives would have the same navigational clearances and are discussed together in the sections below.

Would the project permanently affect navigation?

No Build Alternative

The fixed and floating spans of the Evergreen Point Bridge and Portage Bay Bridge are aging and vulnerable to storms and earthquakes. Because it is not possible to predict the occurrence of such events, the discipline team evaluated two scenarios:

- Continued Operation Scenario, which would involve continued maintenance and normal operation between now and 2030
- Catastrophic Failure Scenario, which would involve a catastrophic failure of both the Evergreen Point Bridge and the Portage Bay Bridge before 2030

The Continued Operation Scenario would not change the navigational restrictions in the project area between now and 2030. The Catastrophic Failure Scenario could block vessel movement into and out of south Lake Washington for an unforeseeable period of time if the east and west highrises of the Evergreen Point Bridge both collapsed in an earthquake. Alternatively, loss of the pontoon section of the Evergreen Point Bridge would likely open a large gap through which boat traffic could pass.

4-Lane and 6-Lane Alternatives – Ship Canal to the Evergreen Point Bridge

The 4-Lane and 6-Lane Alternatives would not affect navigable waterways from the Ship Canal to Lake Washington north of the Evergreen Point Bridge. Operation and maintenance of either alternative would not change any of the current restrictions to navigation in this part of the project area.

4-Lane and 6-Lane Alternatives – Lake Washington South of the Evergreen Point Bridge

The 4-Lane and 6-Lane Alternatives would both eliminate the drawspan opening on the Evergreen Point Bridge, permanently prohibiting the passage of any vessel with a mast taller than 70 feet, the vertical clearance on the east highrise. However, during the last few years, no vessels that tall have passed through the drawspan, so the effect may be of no consequence.

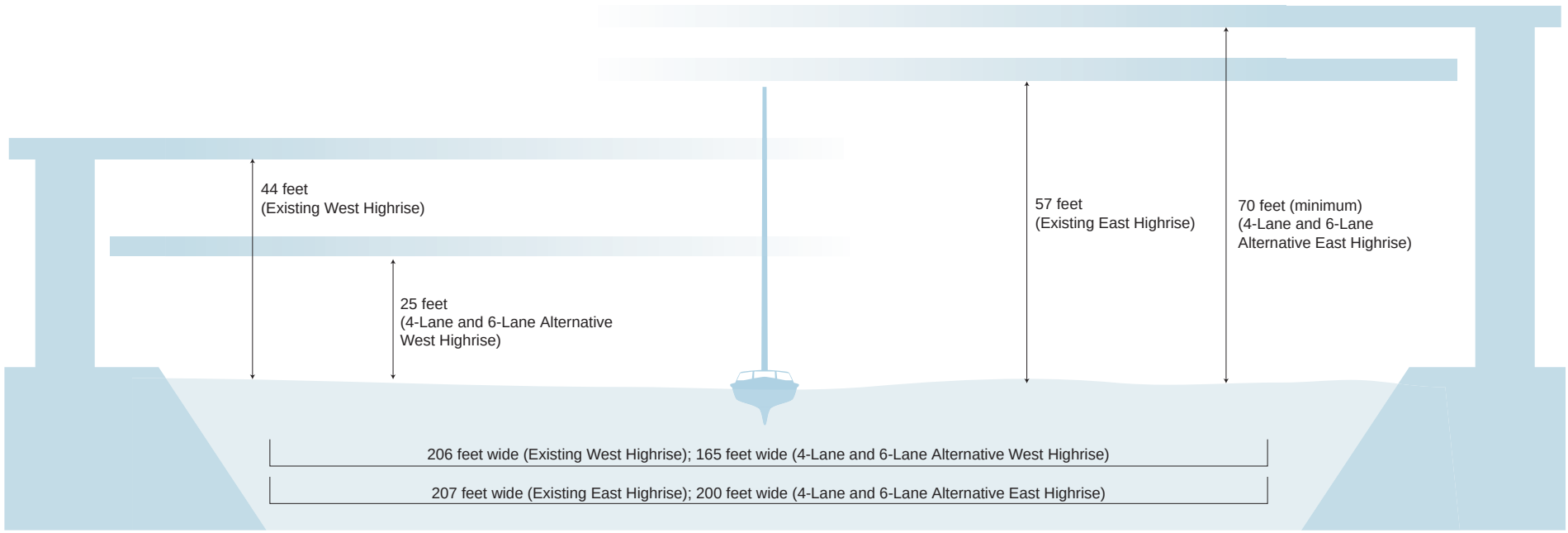
The new east and west navigational channels would remain in approximately the same locations as the current channels. Under the

4-Lane and 6-Lane Alternatives, the new east navigational channel would have 70 feet (minimum) vertical clearance above high water, 200 feet horizontal clearance, and a minimum depth of 30 feet. The new west navigational channel would have a minimum of 25 feet vertical clearance above high water, 165 feet horizontal clearance, and a minimum depth of 30 feet (Exhibit 17). The east navigational channel clearance would be higher and wider than the current channel; the west navigational channel clearance would be lower and narrower.

To determine the effect that lowering the west highrise vertical clearance would have on project area boat traffic, it is necessary to know the types and number of boats traveling under the existing west and east highrises. No data of this kind were available. However, it is possible to characterize the makeup of recreational vessels in Washington from new and used boat sales recorded by the Washington State Department of Licensing. A survey of new boats sold in Washington between July 1, 2002, and June 30, 2003 (as reported by the Northwest Marine Trade Association [2004]), found that 98 percent of all new boats sold during this time period were motorboats, 1 percent were sailboats, and the remainder were unidentified (Exhibit 18). The same survey also found that 88 percent of used boats sold in 2002–2003 were motorboats, 5 percent were sailboats, and the remaining boats were unidentified (Exhibit 19). The Department of Licensing has currently registered 66,409 recreational vessels in King County, of which 95 percent are powered by gas, engine, diesel, or electric engines (Exhibit 20; Brown 2004). Based on this information, we conservatively estimated that 95 percent of the recreational vehicles in the project area are powerboats.

With such a large proportion of project area boats being motorboats, the primary effect of lowering the west highrise vertical clearance would be on motorboats with a maximum bridge clearance greater than 25 feet but less than 44 feet.

Vessels requiring up to 25 feet vertical clearance would be able to continue using the future west highrise for passage, while vessels requiring more than 44 feet vertical clearance would be unaffected by the lowering of the highrise because they cannot currently use the west highrise. Consequently, only vessels with vertical clearance requirements between 25 and 44 feet would be affected by lowering the west highrise of the future replacement bridge.



Note: The dimensions shown here represent a 45-foot sailboat with a 60-foot mast height and a 7-foot draft. Depth and width not to scale.

Exhibit 17. **Existing, 4-Lane, and 6-Lane Alternative Navigation Restrictions for the Evergreen Point Bridge**

SR 520 Bridge Replacement and HOV Project

Exhibit 18. New Boats Sold between July 1, 2002, and June 30, 2003, in Washington State

Length	Total Sold	Sail	Power	Unknown
<= 10	1,752	2	1,720	30
11' - 14'	1,037	5	994	38
15' - 18'	2,558	16	2,494	48
19' -22'	2,286	13	2,268	5
23' - 26'	505	28	475	2
27' - 30'	143	1	140	2
31' - 34'	68	3	64	1
35' - 38'	60	2	58	0
39' - 42'	45	2	43	0
43' - 46'	19	0	19	0
47' - 50'	20	1	19	0
51' - 54'	8	0	8	0
55' - 58'	11	0	11	0
59' - 62'	2	0	2	0
63' - 66'	3	0	3	0
67' - 70'	2	0	2	0
>50'	6	0	6	0
	8,525	**73**	**8,326**	**126**
Percent of Total Sales		**0.9%**	**97.7%**	**1.5%**

Source: Northwest Marine Trade Association (2004).

Exhibit 19. Used Boats Sold between July 1, 2002, and June 30, 2003, in Washington State

Boat Type	Number	Percent of Sales
Cabin Cruiser	5,413	12.2%
Houseboat	89	0.2%
Personal Water Craft (PWC)	4,703	10.6%
Runabout	28,704	64.7%
Sail	2,173	4.9%
Unknown	3,283	7.4%
Total Boats	44,365	

Source: Northwest Marine Trade Association (2004).

Exhibit 20. Types of Recreational Vessels Registered in King County as of June 30, 2004

Type of Vessel	Number of Vehicles Registered	Percent Registered by Type
Number of Sailboats Registered in King County	2,993	5%
Number of Recreational Boats (powered by gas, diesel, electric, or other) Registered in King County	63,416	95%
Total Number of Registered Recreational Vessels	66,409	-

Source: Brown, pers. comm. (2004).

The maximum bridge clearance requirements of sailboats and motorboats sold and operated in Washington state were estimated using data gathered by contacting local yacht and sailboat dealers (Exhibits 18 and 19). Salesman at these boat dealerships reported that essentially all motorboats sold in the Seattle area are capable of passing under a 25-foot vertical clearance. A further survey of boat websites found that the longest motorboat listed on the San Diego Olympic Boat Center website was the Meridian 580 Pilothouse. At 59.5 feet length overall (LOA), this boat has a maximum bridge clearance of 19 feet 7 inches (Olympic Boat Center 2004). The Sea Ray 680, at 65.1 feet LOA, has a maximum bridge clearance of 13 feet 6 inches (Falvey 2000). In contrast, essentially all sailboats sold (other than trailerable day-sailors) require greater than 25 feet vertical clearance (Exhibit 21).

Exhibit 21. Reported Vertical Clearances of Boats Sold by Seattle Area Boat Dealers

Yacht Center	Less than 25 Feet Clearance Needed	More than 25 Feet Clearance Needed	Total Sales per Year	
			Power Boats	Sailboats
Admiralty Yachts	0%	100%	0	100
Olympic Boat Center	100%	0%	3,000	0
Elliott Bay Yachts	50%	50%	~25	~25
Lake Union Sea Ray	100%	0%	1,000	0

Source: Olympic Boat Center (2004).

Based on the above data, lowering the vertical clearance for the west highrise from 44 to 25 feet would likely affect only sailboats, most of which already must use the east highrise to sail south of the bridge. Consequently, lowering the west highrise vertical clearance would not appreciably affect boat traffic currently using this highrise, nor send more boat traffic to the east highrise.

How would project construction temporarily affect navigation?

4-Lane and 6-Lane Alternatives – the Ship Canal to Lake Washington North of the Evergreen Point Bridge

Construction of the 4-Lane and 6-Lane Alternatives would not create any new restrictions to vessel movement in the Ship Canal or Lake Washington north of the Evergreen Point Bridge. Recreational and commercial vessels using the Ballard Locks could be temporarily delayed by increased barge traffic and floating the new bridge pontoons from Puget Sound to the bridge construction site. Bridge pontoons would be moved into the Ship Canal via the large locks; the small locks would still be available for vessel passage during that time. For safety's sake, WSDOT prohibits any work on its floating bridges between October 1 and March 31. This means that there would be no pontoon movement during this time period. Drawspan bridges in the Ship Canal—Ballard, Fremont, University, and Montlake—would likely require opening to accommodate the movement of at least some construction barges. Overall, construction-related barge trips would not interfere with the movement of commercial or recreational vessels. Barge and pontoon movement could possibly delay or interfere with the movement of Muckleshoot tribal fishing vessels.

4-Lane and 6-Lane Alternatives – Lake Washington South of the Evergreen Point Bridge

Identifying and evaluating the effects of construction on navigation in Lake Washington south of the Evergreen Point Bridge requires an understanding of the basic structural components of the proposed 4-Lane and 6-Lane Alternative bridges. Each alternative comprises:

- West and east fixed approach structures that would be supported by permanently installed pilings
- A floating portion in the middle of the new bridge that rests on pontoons
- West and east transition spans that establish what is essentially a "flexible joint" between the fixed structures and the floating portion of the new bridge. These transition spans would accommodate the raising and lowering of the floating portion of the bridge as the lake elevation changes over the course of a year.

The floating bridge and fixed structures would be built first, followed by placing prefabricated transition spans between the floating and fixed sections of the bridge, and demolition of the existing structure (Parametrix et al. 2004). Both the west and east navigational clearances would be lower during various stages of construction and closed for specific periods of time. Each navigational channel would likely be closed three times for one day during placement of the new transition spans and removal of the existing transition spans (Parametrix et al. 2004).

How would construction of the 4-Lane and 6-Lane Alternatives affect the west navigational channel?

A temporary 60-foot-wide detour bridge would be installed on the south side of the existing bridge section approaching the west highrise (Parametrix et al. 2004) to carry cars during construction of the new bridge. The temporary detour bridge would connect with the existing bridge just north of 42nd Avenue (just to the north of the western lake shoreline of Madison Park). The temporary bridge would not block the Coast Guard-designated west navigational channel located east of where the temporary and existing bridges would join. Recreational vessels would still have access to the docks on the northern shore of Madison Park. Floating and anchoring the pontoons on the west end of the floating portion of the bridge may require a 1-day closure of the west navigational channel.

The west transition span would link the newly constructed west approach section with the floating portion of the new bridge. Construction would require 1- or 2-day closures of the west navigational channel (Parametrix et al. 2004). Other openings of varying heights would still be available for vessels to pass under the bridge during closures of the Coast Guard-designated west navigational channel. Channel clearance would be 25 feet over the water during construction of the transition span (Parametrix et al. 2004). Lastly, demolishing the existing structure would close the west navigational channel for 1 to 2 days at different times.

How would construction of the 4-Lane and 6-Lane Alternatives affect the drawspan?

Constructing the 4-Lane and 6-Lane Alternatives would block the drawspan once the final pontoons are floated into place. This action would occur only once, after the east and west highrises have been completed and the pontoons anchored in place. At that time, the final pontoons would be set in place, completing the floating portion of the

new bridge and permanently blocking the existing drawspan (Parametrix et al. 2004).

How would construction of the 4-Lane and 6-Lane Alternatives affect the east navigational channel?

The east fixed span of the 4-Lane and 6-Lane Alternatives would be constructed using cast-in-place/post-tensioned box girders. Traffic would remain on the current east fixed span during construction of the new fixed span under both alternatives. The new bridge would open to traffic after completion of the east and west fixed spans, final placement of the pontoons, and construction of the east and west transition spans. During construction of the east highrise, the navigational channel under it would be reduced to a horizontal clearance of 75 feet for a maximum of 1 ½ years and a minimum of 1 year; the current 65 feet vertical clearance would be maintained.

Mitigation

As presented above, operation of the replacement Evergreen Point Bridge would permanently affect navigation through the loss of the drawspan opening in the existing bridge and the establishment of a 25-foot vertical restriction in the west navigational channel under this bridge. As discussed below, efforts to avoid or minimize these effects have been included in plans for the construction and operation of the replacement bridge. Constructing the replacement Evergreen Point Bridge would temporarily affect navigation through a series of 1- to 3-day closures of the west and east navigational channels under the bridge

- Creating a 75-foot horizontal restriction on the east channel for a minimum of 1 year
- Increasing the amount of traffic through the large lock at the Ballard Locks.

What has been done to avoid or minimize negative effects?

The permanent effect of a height restriction for the Evergreen Point Bridge has been minimized by matching the east highrise vertical clearance with that of the I-90 East Channel Bridge. Consequently, any vessel that can currently pass under the I-90 Bridge would also be able to pass under the Evergreen Point Bridge. Note that no vessels

requiring greater vertical clearance were identified during our survey of commercial and recreational boating communities.

The planned construction staging of the replacement bridge would prevent closures of the west and east channels on the same days, minimizing and avoiding temporary negative effects. A single 3-day weekend closure of the east channel could occur at the same time as the closure of the mid-lake drawspan; however, at least one navigational channel under or through the existing bridge would be maintained at all times. In addition, the loss of the drawspan opening would be delayed as long as possible in the construction staging to minimize this effect.

The temporary effect of a short closure could be addressed in the Local Notice to Mariners distributed electronically by the Coast Guard (Coast Guard 2004a) to alert local commercial and recreational boating communities. The notice would allow all potentially affected vessels time to relocate temporarily to prevent being blocked during the closure period. Lastly, other efforts to avoid or minimize negative effects could involve scheduling barge traffic through the Ship Canal to reduce or prevent interruption of recreational and commercial traffic through the Ballard Locks (such as off-peak hours or at night).

How could the project compensate for unavoidable negative effects?

An unavoidable negative effect of replacing the existing Evergreen Point Bridge would be the permanent elimination of the drawspan and establishment of a height restriction under the new bridge. This would likely have no discernable effect on navigation based on the recorded decreasing use of the drawspan for vessel passage between 1995 and 2003, and the absence of any major development plans by Seattle, Bellevue, or Renton along the shorelines south of the Evergreen Point Bridge. Therefore, there is no need to further compensate effects on navigation; the design of each alternative adequately provides for the navigational needs of the commercial and recreational boating communities.

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