

As with past WSDOT floating bridge projects, all pontoons, including the elevated superstructure in the existing floating bridge, could be made available for purchase. All existing pontoons, including the elevated superstructure, that were removed as part of the recent Hood Canal Bridge project were sold to private parties. Pontoons could be reused for a wide variety of waterfront functions such as docks, breakwaters, and dolphins. If pontoons are not sold, they would be towed to an approved site, such as a graving dock or floating dry dock, and demolished. WSDOT would not sink any pontoons in any water body as a disposal method.

3.2 What are the construction activities and sequencing for the Preferred Alternative?

The following subsections describe the general nature and sequence of construction activities in each area of the SR 520 corridor. Because the project is at a preliminary level of design, project details and construction methods have not been fully defined and may change somewhat as the design evolves. In addition, construction contractors typically have many choices about construction methods to be used. However, the descriptions below provide a reasonable assessment of how the project would be constructed and provide a baseline for understanding the types of effects that would result from construction activities.

Site Preparation

The first step in construction would be preparation of staging and construction areas. As part of this work, temporary erosion and sediment control (TESC) measures and temporary drainage structures would be installed to prevent run-off of untreated stormwater and sediment from entering city stormwater or sewer facilities, nearby water bodies, or adjacent properties. A variety of temporary construction BMPs could be used, including silt fences, berms, storm drain inlet protection, straw bale barriers, and detention or siltation ponds.

Specialized BMPs are needed around concrete-handling areas to prevent water contaminated by uncured cement from entering water bodies or stormwater treatment facilities. Conveyance systems for the movement of stormwater from a collection point to an outfall can consist of drainage pipes and retention facilities (such as ponds, vaults, and catch basins) and can use gravity or pumps to move the stormwater. Staging areas are often equipped with wheel washes that clean truck tires to reduce tracking of dirt and dust offsite.

Temporary fencing would be installed around construction areas to prevent machinery and equipment, materials storage, and construction activity from intruding into adjacent properties, wetland and stream buffers, and shoreline areas. Staging and right-of-way construction areas would be cleared of any unneeded structures and vegetation to provide adequate



Temporary Fencing

Example of fencing to protect a wetland during construction.

work space. Remaining vegetation would be clearly marked to protect it from harm during clearing and use of the site. Staging area sites that are uneven are usually graded flat to facilitate parking, storing materials and equipment, and setting up a construction trailer if needed.

I-5 Area

Construction activities and durations in the I-5 area would occur over approximately 26-month period (Table 3-5), and would be similar for the Preferred Alternative and the SDEIS options. Activities in this area would include roadway reconstruction, excavation and embankment grading, retaining wall and abutment construction, and paving. Potential staging areas would be located within the expanded and existing right-of-way. The areas affected by construction and demolition and the duration and sequence of activities are described below and shown in Exhibit 3-7.

Table 3-5. I-5 Area – Construction Elements and Truck Trips

	Preferred Alternative	Options A, K, and L
Construction duration	approx. 26 months	26 months
Excavation (cubic yards)	54,000	76,000
Daily truck trips typical (average)	6 to 25	6 to 25
Daily truck trips (during peak activity)	60 to 240	60 to 240

Note: Construction duration does not include mobilization and project closeout.

I-5/Roanoke Crossing (Preferred Alternative)

The Preferred Alternative includes a new bicycle/pedestrian path located on the south side of the existing East Roanoke Street undercrossing. Construction of the bicycle/pedestrian path would take approximately 9 months. The new bicycle/pedestrian crossing would be built as an expansion of the existing undercrossing and would require some limited demolition of the existing structure in order to build the new path onto it. Abutments and support walls for the path would be constructed in the median and on both sides of I-5. The support walls would be constructed on footings.

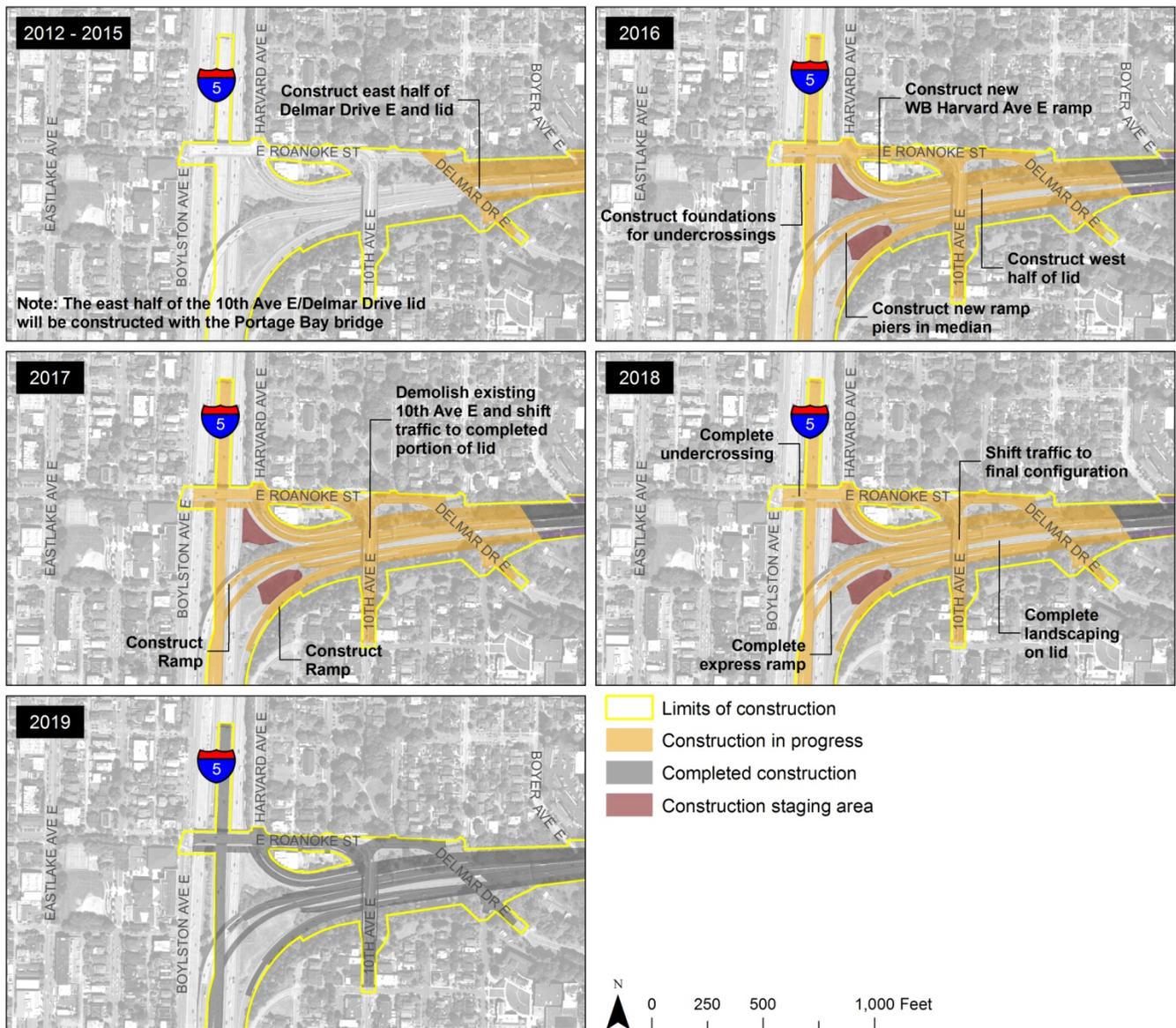
During construction of the support walls, the I-5 northbound and southbound lane widths would be temporarily reduced, and the lanes would be shifted to the center. Once the walls are completed, the new crossing superstructure would be constructed with girders that would span over I-5. For safety reasons, I-5 traffic would be shifted to lanes not under construction when girders are being placed. Any landscaping identified as part of the new crossing would influence the design of the structure, and landscaping would be included during the final phases of construction.

DEFINITION

Undercrossing

In the state of Washington, bridges that span over top of a highway or interstate are called "undercrossings." This term reflects the fact that the highway crosses under the bridge. In the case of bridges along the SR 520 corridor, all bridges crossing the highway are undercrossings because SR 520 passes underneath them.

Exhibit 3-7. I-5 Area - Construction Sequence for the Preferred Alternative



I-5/Roanoke Lid (Options A, K, and L)

Options A, K, and L included reconstruction of the Roanoke Street undercrossing on I-5 to be included as part of a new large lid over I-5. The construction duration in this area would remain the same as the Preferred Alternative, approximately 26 months. However, construction activities would be heavier in this area because of the additional construction required for the new Roanoke bridge over I-5 and the lid and associated landscaping.

Construction of the I-5/Roanoke lid would start at the north end of the new lid. When completed, this portion of the lid would be used as a

temporary detour for Roanoke Street when the Roanoke Street bridge is demolished and replaced. Abutments and support walls for the new lid would be constructed in the median and on both sides of I-5. The support walls would be constructed on footings, which are concrete pads that provide a large area to distribute the weight of the lid. The walls would provide continuous support for the girders that span the roadways underneath. Construction activities taking place over I-5 would proceed as described above for the Preferred Alternative, but would be more intense because the lid for the SDEIS options is substantially larger than the bicycle/pedestrian crossing. In addition, more landscaping would be installed in a soil layer on top of the lid structure. The adjacent surface streets, Harvard Avenue East and East Roanoke Street, would be reconstructed to match the final lid configuration.

10th Avenue East/Delmar Drive East Lid

The Preferred Alternative and Options A, K, and L would include a lid over SR 520 at 10th Avenue East and Delmar Drive East, and the lid would be constructed concurrently with I-5 area and Portage Bay area elements. While construction activities for the Preferred Alternative design would be similar to those described for Options A, K, and L, the construction sequence for the 10th Avenue East/Delmar Drive East lid differs from that presented in the SDEIS. The Final EIS analysis assumes that the east half of the lid would be built first, allowing traffic to be detoured from Delmar Drive East onto the lid for demolition of the existing Delmar Drive East undercrossing. This staging avoids the long term closure and temporary detour bridge on Delmar Drive East that was described for the options in the SDEIS. Traffic would also be diverted onto the new lid structure as a detour for 10th Avenue East to allow maintenance of traffic while demolishing the existing 10th Avenue East structure. Once the demolitions are complete, the new undercrossings would be constructed and integrated with the new lid, and traffic would be shifted back into the original alignment.

Construction of the lid would use the same methods and sequencing as described above for the I-5/Roanoke lid and crossing. Retaining walls and support walls for the new lid would be constructed in the median and on both sides of SR 520. 10th Avenue East and Delmar Drive East would be reconstructed in the vicinity of the lid to match the final lid configuration. The construction activities and sequence would be the same for the Preferred Alternative and SDEIS Options A, K, and L.

SR 520 Main Line and Ramps

The SR 520 main line and ramps in this area would be reconstructed in generally the same location as today. The lanes would be reconstructed from the I-5 interchange (including ramps) to the 10th Avenue East/Delmar Drive East lid. The Harvard off-ramp retaining walls and

westbound lanes would be reconstructed first, followed by the eastbound lanes. Activities would include roadway excavation, embankment construction, grading, and temporary and permanent paving. Cast-in-place retaining walls would be constructed to support the south end of the reversible high-occupancy vehicle (HOV) ramp and the on- and off-ramps at the I-5 interchange.

Portage Bay Bridge Area

Construction of the Preferred Alternative and Option A in the Portage Bay Bridge area would occur over a 64-month period (Table 3-6) and construction for Options K and L would take place over approximately 72 months. Construction for Options K and L would require additional time due to construction staging and scheduling associated with the single-point urban interchange designs. Activities in the Portage Bay Bridge area would include work bridge and falsework installation, bridge demolition, and permanent bridge construction. Construction staging in this area would occur on both existing and expanded WSDOT right-of-way (see Exhibit 3-7). The areas affected by construction and demolition and the duration and sequence of activities are described below.



Roadway Excavation

Roadway excavation, also called “cuts,” involves removing ground surface or other material to the depth and width necessary to achieve a desired grade and slope for a roadway or structure. Heavy equipment is used to remove soil and dozers usually push the material into piles, which are then loaded into haul trucks for transportation. A dump-truck and trailer can typically carry 20 to 30 cubic yards of soil. The photo above shows crews working in the median between westbound I-90 and the center roadway to excavate and install water lines.

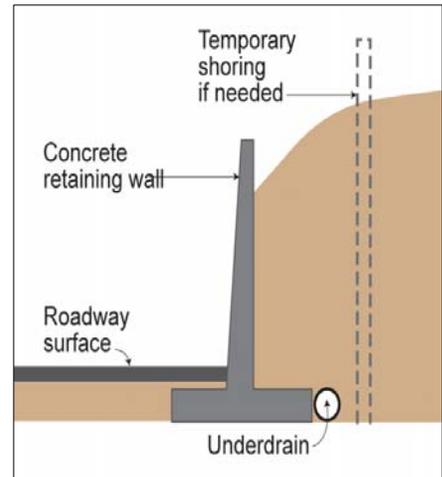
Table 3-6. Portage Bay Area – Construction Elements and Truck Trips

	Preferred Alternative	Option A	Options K and L
Construction duration	64 months	64 months	72 months
Excavation (cubic yards)	33,200	33,200	33,200
Permanent columns	71	72	62
Temporary support piles ^a	850	740 to 750	700 to 710
Falsework piles ^a	400	400	400
Daily truck trips (average)/ Daily truck trips (during peak activity) ^a	15-20/ 120-230	15-20/ 120-230	15-20/ 120-230

Note: Construction duration does not include mobilization and project closeout.

^aThe Final EIS analysis includes refined estimates since publication of the SDEIS.

Exhibit 3-8 illustrates the construction sequence by year for the Portage Bay Bridge. In general the construction sequence would be the same for the Preferred Alternative and SDEIS Options A, K, and L.

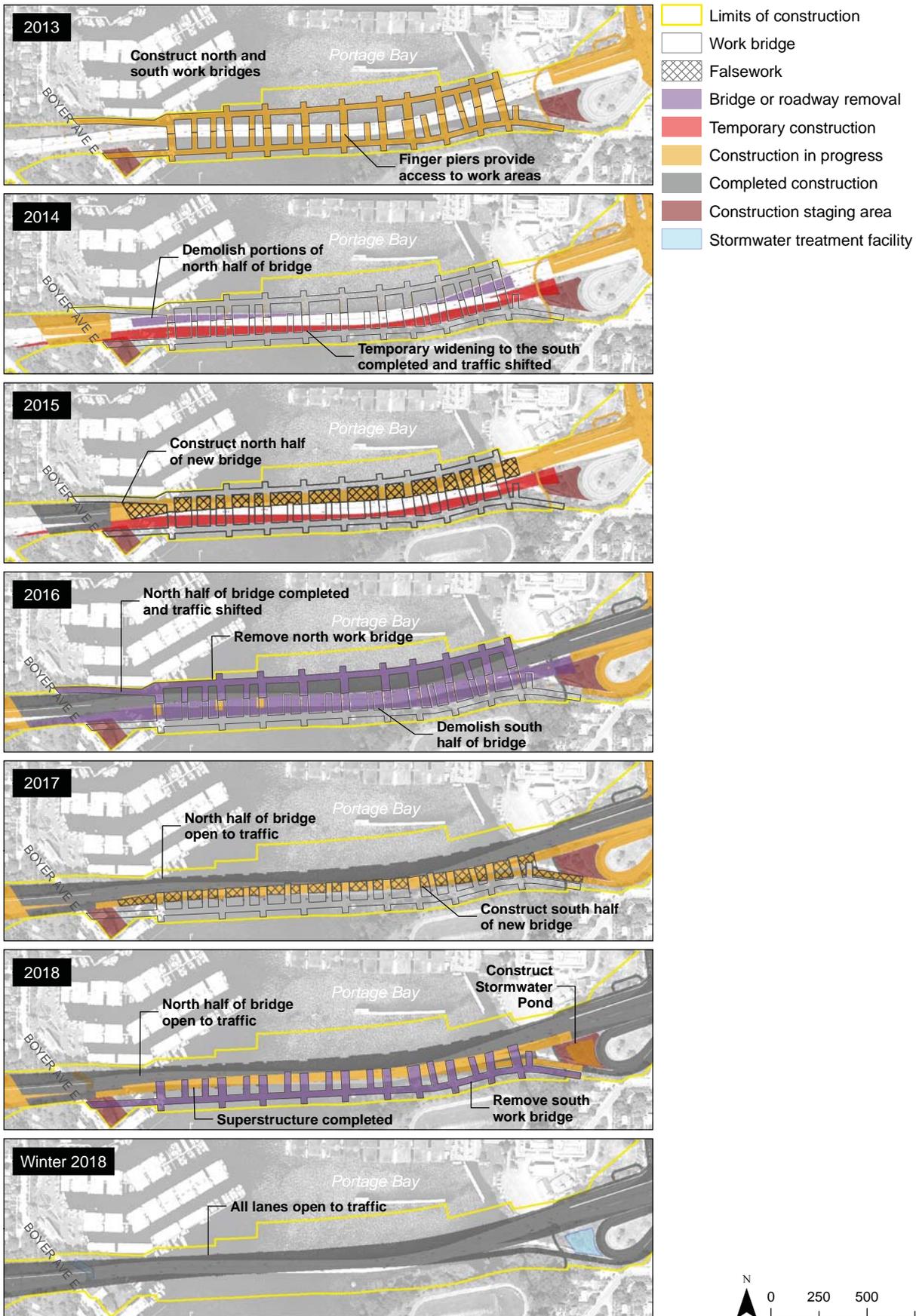


DEFINITION

Cast-in-place Retaining Walls

The schematic above shows a cast-in-place wall with spread footings. Excavation is generally needed to set the footing of the wall beneath the ground surface. Forms made of metal or wood are set in place to hold the wet concrete. Concrete is delivered in mixer trucks and poured into the forms. The concrete is poured in stages from the bottom base up. If the wall will be used to retain a cut slope, temporary shoring may be needed to support the slope until the permanent wall can be backfilled.

Exhibit 3-8. Portage Bay Area - Construction Sequence for the Preferred Alternative



Work Bridge Installation

During the first construction year, work bridges would be constructed along both the south and north sides of the existing Portage Bay Bridge. The work bridges would be approximately 30 feet wide and approximately 5 to 10 feet above the high water elevation. During this phase of work bridge construction, up to 900 total piles could be driven, with as many as 16 piles per day. Construction schedule estimates include an assumption that each pile would require approximately 30 minutes to be driven. Pile-driving activities for work bridge installation are expected to occur during the first year of construction, within permitted in-water work windows.

Pile-driving activities for temporary bridge widening are expected to occur during the first year of construction, between November and April. A majority of the total pile-driving activities in this area would occur during the first few months of initial construction, though pile-driving could occur in the Portage Bay Bridge area in up to 14 nonconsecutive months during the full duration of construction.

The new Portage Bay Bridge footprint substantially overlaps the existing Portage Bay Bridge. In order to keep the existing bridge open with four lanes of traffic during construction, the existing Portage Bay Bridge would be temporarily widened to the south during the first year of construction. Widening the existing bridge will allow the north half of the existing bridge to be demolished and make way for construction the north half of the new bridge, all while maintaining traffic across Portage Bay and through the corridor.

Temporary Widening

Also during the first year of construction, the existing Portage Bay Bridge would be temporarily widened to the south so that four lanes of traffic can be maintained while the new bridge is built. Traffic would be diverted to this expanded southern half of the bridge to allow the northern half of the existing bridge to be demolished and the northern half of the new bridge to be constructed.

The temporary widening of the existing bridge to the south would require temporary in-water foundations, additional columns, and superstructure placed in line with the existing bridge piers. Construction of this temporary widening structure would consist of installing in-water drilled shaft casings to build the support columns and the addition of girders, bridge deck, and barriers. Pile-driving activities associated with the temporary widening are expected to overlap somewhat with work bridge installation.

Permanent Bridge Construction

Generally, the new Portage Bay Bridge would be constructed in halves; the north half would be constructed first, followed by construction of the south

half. In-water work would include construction and installation of temporary cofferdams to create dry work areas below the water level for bridge foundation construction. The foundations for the north half of the new bridge would be installed over the first two years of construction. Foundations for the south half of the new bridge would be constructed during the third and fourth years of construction.

After traffic is shifted to the southern portion of the existing Portage Bay Bridge, the northern portion of the existing structure can be demolished and the north half of the new bridge constructed. Demolition activities would begin with removal of the superstructure, and the in-water vibratory removal (or cutting) of roughly half the existing columns. Demolition would typically be conducted from the construction work bridges.

As elements of the substructure are completed, construction of the superstructure can begin. The Portage Bay Bridge superstructure would have two main parts: the girders that span between the bridge columns and the roadway slab (bridge deck). If false arches are identified for aesthetic treatments, they would also be constructed during this stage. See the previous sections in this chapter entitled “Work Bridges and Falsework” and “Permanent Bridge Construction” for detailed information about bridge construction activities that would take place in Portage Bay.

As described in Chapter 2, the Portage Bay Bridge design could include “faux” (false) arches underneath the bridge deck, which would likely be completed last. This architectural treatment would also require the use of falsework, and additional temporary piles would be needed. Falsework would be necessary to support construction for both the north and south sides of the new bridge. Falsework would be built from the work bridge and would be removed before dismantling the work bridge.

Once the northern portion of the proposed bridge is completed, traffic would be shifted to the new north half of the Portage Bay Bridge to allow demolition of the remaining existing bridge, and for construction of the southern half of the new bridge (columns and superstructure). Construction staging estimates for the Preferred Alternative indicate that the remaining 44 to 45 columns of the existing substructure would be removed during this time. The temporary widening of Portage Bay Bridge that occurred at the beginning of construction would also be removed.

Other construction activities taking place throughout the duration would also include stormwater routing and facility construction, bridge lighting, and roadway striping. After all traffic is shifted to the new bridge and all existing bridge demolition is complete, the north and south work bridges and falsework would be dismantled, including the removal of the remaining piles. Landscaping, site cleanup and demobilization would conclude construction activities in the Portage Bay area.

Montlake Interchange Area

Construction activities and durations in this area would differ substantially among the options. Construction in this area would take approximately 56 months for the Preferred Alternative and Option A, 66 to 70 months for Option K, and 60 to 66 months for Option L. Activities in this area would include roadway reconstruction, excavation, retaining wall and abutment construction, concrete reinforced lid work and paving. Table 3-7 shows the estimated construction durations and quantities for the Preferred Alternative and SDEIS Options A, K, and L in the Montlake area.

Table 3-7. Montlake Interchange Area – Construction Elements and Truck Trips

	Preferred Alternative	Option A	Option K	Option L
Construction duration ^a	56 months	56 months	66 to 70 months	60 to 66 months
Excavation (cubic yards)	181,000	92,000	580,000	164,000
Daily truck trips typical (average)	10 to 30	10 to 30	70	10 to 30
Daily truck trips (peak activity) ^{b, c}	100 to 290	100 to 290	120 to 320	100 to 290

^aConstruction duration does not include mobilization and project closeout.

^bEstimates for haul truck activity at the SR 520 on-ramps

^cThe Final EIS includes refined estimates since publication of the SDEIS.

Potential staging areas for construction in the Montlake area would be similar to those previously described in the SDEIS. The staging areas would include portions of the green Open Space on the University of Washington campus, the East McCurdy Park/Museum of History and Industry (MOHAI) area (acquired as right-of-way for the project), the unused R.H. Thomson Expressway ramps, the closed Lake Washington Boulevard ramps, and unused WSDOT right-of-way adjacent to SR 520. The following discussion describes the anticipated construction staging for the Preferred Alternative and Option A. Chapter 3 of the SDEIS described in detail the construction activities specific to Options K and L. Those activities are summarized below.

Preferred Alternative and Option A

Under the Preferred Alternative and Option A, the Montlake interchange would be rebuilt at its current location. New bridges over SR 520 at Montlake Boulevard and 24th Avenue East would be constructed and integrated into a new lid that would extend from Montlake Boulevard to just west of the Union Bay shoreline. A new bascule bridge would be built parallel to the existing bascule bridge over the Montlake Cut. Construction activities for the Montlake interchange are expected to last approximately 56 months (not including bascule bridge construction), which is described at the end of this section. Table 3-7 summarizes the major construction quantities for the Montlake Area.

Construction staging in this area is likely to be complex, but generally the interchange will be reconstructed at the same time as lid construction takes

place. The north half of the lid would be built first, followed by the south half of the lid. SR 520 mainline improvements would be made throughout the duration of construction. Exhibit 3-9 shows the estimated construction sequence at the Montlake interchange area for the Preferred Alternative, and Exhibit 3-10 shows the sequence for the Montlake Cut and bascule bridge area for the Preferred Alternative and Option A.

Montlake Lid (North Half)

The north half of the new lid would be constructed first. A temporary westbound off-ramp would be constructed so that the existing ramp could be demolished and make room for lid construction. The new lid structure would be constructed on reinforced concrete walls with spread footings located within the widened SR 520 footprint. The walls would support the girders and cast-in-place decks that span over the SR 520 corridor. For safety reasons, SR 520 traffic would be shifted to lanes not under construction when girders are being placed.

Montlake Boulevard and 24th Avenue East Undercrossings

Construction on the Montlake Boulevard and 24th Avenue East undercrossings would be ongoing for the duration of construction, and would be closely coordinated with construction of the lid. During the first year of construction, the existing Montlake undercrossing would be widened, and Montlake Boulevard north and south of the crossing over SR 520 would be temporarily widened to accommodate traffic detours and construction.

As lid construction advances, the Montlake Boulevard undercrossing would be incorporated into the new lid. In order to replace the existing crossing, traffic would be detoured onto portions of the new lid as it is constructed in order to demolish and replace the existing structure.

The 24th Avenue East crossing would be demolished during the first year of construction, and the abutment for the new crossing on the north side of SR 520 would be constructed. Construction staging for this undercrossing would result in a temporary long-term closure of up to 2 years.

Construction of the new undercrossing would follow north lid construction activities, and 24th Avenue East would reopen to traffic during the third year of construction.

Main Line and Ramps (Westbound)

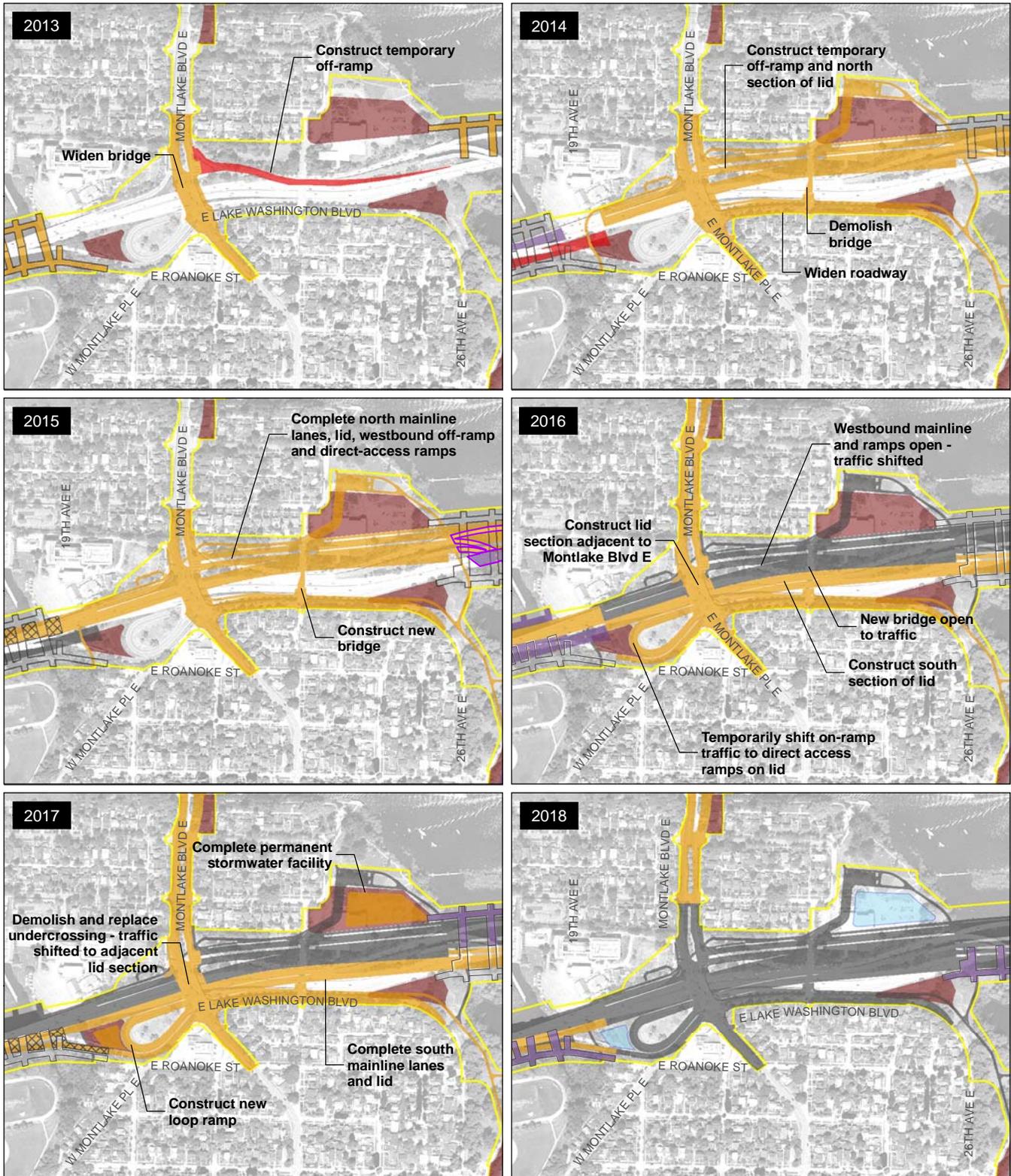
Construction of the new westbound mainline lanes and off-ramp would take place concurrently while the north section of the lid structure is completed. Roadway reconstruction would occur in the areas underneath the lid outside of the existing travel lanes between Montlake Boulevard and the eastern shoreline for the westbound lanes and for portions of the westbound off-ramp.



Construction of an Undercrossing

The photos above show the construction sequence of the NE 10th Street crossing above I-405 in Bellevue. The support walls were constructed first within the median and on either side of the main line. The second and third photos depict construction of the superstructure and the roadway slab.

Exhibit 3-9. Montlake Interchange - Construction Sequence for the Preferred Alternative



- | | | |
|------------------------|---------------------------|-------------------------------|
| Limits of construction | Bridge or roadway removal | Stormwater treatment facility |
| Work bridge | Construction in progress | Completed construction |
| Falsework | Temporary construction | Construction staging area |

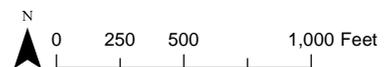
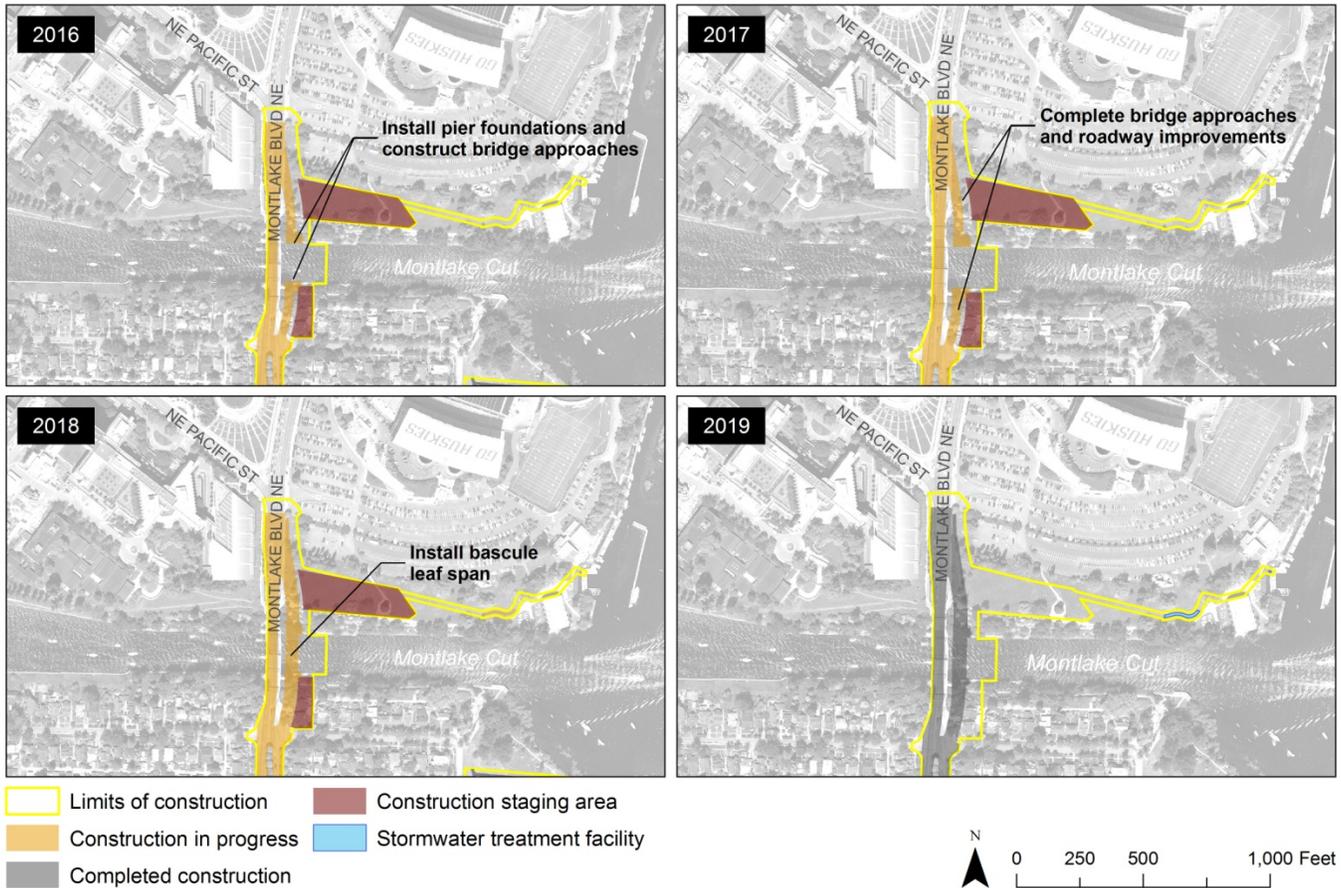


Exhibit 3-10. Bascule Bridge - Construction Sequence for the Preferred Alternative



Traffic would continue to use the temporary westbound off-ramp until the new off-ramp on the lid is completed. Once completed, traffic would be shifted onto the new off-ramp and the Lake Washington Boulevard ramps would be closed. Traffic would be able to access Lake Washington Boulevard via 24th Avenue East, which intersects with the westbound off-ramp to Montlake Boulevard.

Construction of the SR 520 main line under the Preferred Alternative in the Montlake area would progress similar to Option A.

Montlake Lid (South Half)

Once the north half of the main line and lid is completed and SR 520 traffic is shifted, construction of the south half of the Montlake lid would begin. Construction would occur in a similar manner as described for the north half.

Main Line and Ramps (Eastbound)

Construction of the new eastbound lanes and on-ramps would begin at the same time as the south portion of the new lid is constructed. Roadway reconstruction would occur in the areas underneath the lid south of the newly completed travel lanes between Montlake Boulevard and the eastern shoreline.

The eastbound on-ramp would be temporarily widened to add a temporary HOV lane and add capacity. The on-ramp would remain functional until the Montlake lid is almost complete and the new ramps on the lid are ready to accommodate traffic. Montlake Boulevard traffic accessing eastbound SR 520 would be temporarily detoured to the new direct-access ramp on the lid, and the existing eastbound loop ramp would be closed, demolished, and reconstructed in the same location as today.

Bascule Bridge

Construction for the new bascule bridge across the Montlake Cut for the Preferred Alternative and for Option A would take approximately 29 months.

Most construction activities would be staged from the shoreline; however, barges would also be temporarily positioned in the Montlake Cut and stabilized using spud anchors at the corners of the barge, or with the assistance of tug boats. Construction would begin by first installing cofferdams around the area for the new bridge foundations in order to protect the slopes of the Montlake Cut. The cofferdams would be sealed and dewatered, and then the drilled foundations for the piers would be installed. Following shaft construction, the new bridge piers, control towers, and mechanical mechanisms would be constructed. At this time, the new north and south approaches along Montlake Boulevard would be constructed north and south of the Montlake Cut.

The bascule leaf structural steel spans (bridge deck) would either be assembled piece by piece onsite or the entire leaf may be assembled offsite, barged to the project, and installed using barge-mounted cranes. In either case, a barge-mounted crane would lift the bridge sections into position while they are attached to the bridge support structures. As described above, these activities would likely require temporarily closing the Montlake Cut to boat traffic.

If a concrete deck is part of the final design, the deck would be poured after the bascule leaf spans were installed. The new bridge would undergo testing, and then illumination, roadway signing, and striping would be installed along Montlake Boulevard before opening the bridge to traffic.

Option K

Under Option K, the Montlake interchange on- and off-ramps would be removed, and the existing Montlake Boulevard and 24th Avenue East undercrossings would be demolished and replaced with a lid structure. A new single-point urban interchange would be constructed near the MOHAI. The northern ramps of the interchange would tunnel under the Montlake Cut, and the southern ramps would travel through the Arboretum. Because it would be located entirely below the existing grade, this interchange is referred to as a “depressed” single-point urban interchange.

The depressed interchange would be located at the south entrance to the Montlake Cut tunnel, approximately 50 feet below the existing ground surface. The interchange would be contained within a concrete base slab connected to exterior retaining walls. Due to its large size (approximately 800 feet long by 400 feet wide) and depth, it would require extensive excavation. Because the elevation of the interchange would be below the water table, constant dewatering would be needed to prevent water from entering the construction area. A portion of the interchange would extend east of the existing Montlake shoreline and would require placement of about 2.7 acres of fill material in Union Bay.

The extensive excavation and in-water work associated with constructing the depressed interchange would require that traffic on SR 520 be maintained using a temporary detour bridge placed around the excavation area. The 60-foot-wide temporary detour bridge would carry the SR 520 mainline lanes around the work areas and would be supported on hollow steel piles, similar to those used to construct the temporary work bridges. The temporary detour bridge would require approximately 231 temporary piles. This temporary over-water structure would be in place for approximately 4 years.

Two tunnels under the Montlake Cut would connect the interchange to a reconstructed Pacific Street/Montlake Boulevard intersection. Tunnel construction would take place from both ends of the tunnel and would meet at approximately the middle of the cut. Two types of tunnel construction would be employed: cut-and-cover method and sequential excavation method (SEM), a tunnel excavation technique that takes place underground without the use of a tunnel boring machine. Because the soils beneath the Montlake Cut are soft and high in water content, SEM tunnel construction would require freezing the ground to stabilize the soil prior to tunneling.

The NE Pacific Street/Montlake Boulevard East intersection would be lowered as part of Option K. A temporary sheet-pile wall would be constructed through the center of the intersection so that excavation could occur on one half, while traffic continued to use the other half. Once the



DEFINITION

Sequential Excavation Method

SEM is a tunnel excavation technique that takes place underground without the use of a tunnel boring machine. The photo above is an example of SEM tunnel construction.

first half is completed, traffic would be shifted and excavation would occur on the second half. After the intersection is complete, the lid superstructure would be constructed on top of the retaining walls. As noted above, the portion of Pacific Street from Montlake Boulevard to just west of the University of Washington Medical Center access driveway would be closed for 9 to 12 months to accommodate the lowering of the Pacific Street/Montlake Boulevard intersection.

Option L

Under Option L, the existing Montlake interchange would be replaced with an elevated single-point urban interchange (i.e., one in which the ramps pass above the SR 520 main line). The Montlake interchange on- and off-ramps would be removed, and the Montlake Boulevard and 24th Avenue East undercrossings would be demolished and replaced with a lid structure. The new interchange would be constructed near the current location of MOHAI with northern ramps that bridge over the Montlake Cut on a new bascule bridge, and elevated southern ramps that travel through the Arboretum.

Activities for construction of the new lid, undercrossings, and mainline lanes between Montlake Boulevard and the east shoreline would be similar to those described for the Preferred Alternative and Options A and K.

The elevated interchange would be a six-span lid-like structure consisting of concrete superstructure elements, support walls, and spread footings. The structure would connect to the north ramps (crossing the new bascule bridge), the west approach, and the south ramps to Lake Washington Boulevard. It would be approximately 340 feet long from east to west and approximately 350 feet long from north to south. The structure would be supported on spread footings.

Because SR 520 currently occupies the southern portion of the area where the interchange would be built, the northern portion of the structure would be built first. Once this portion is completed, traffic would be shifted before the existing main line is demolished and the southern portion of the interchange constructed.

The new bascule bridge across the Montlake Cut would be constructed by methods similar to those for the new bridge for the Preferred Alternative and Option A. The bascule bridge approaches would be supported by piers on drilled-shaft foundations. The approaches to the bascule bridge would be a two-span bridge structure that would carry the roadway from the bascule bridge to the interchange and to the intersection at Pacific Street. The structure would be located southwest of Husky Stadium in the existing parking lot.

Like Option K, the NE Pacific Street/Montlake Boulevard East intersection would be lowered as part of Option L. Construction of the

lowered Pacific Street/Montlake Boulevard intersection would use methods similar to those described for Option K.

West Approach Area

The west approach bridge would travel through Union Bay, across Foster Island, and out into Lake Washington to the beginning of the floating bridge (the west transition span). For the Preferred Alternative and SDEIS options, the new west approach as a whole would be wider than the existing bridge and would be made up of two distinct structures. Westbound traffic and the new bicycle/pedestrian path would be located on the north structure, and eastbound traffic would be located on the south structure. The spans of the new bridges would be longer than those of the existing bridge (i.e., the columns would be farther apart). The increase in span length would result in fewer piers and foundations in the water east of Foster Island. For the Preferred Alternative and all SDEIS options, construction of the new west approach bridge would take between 60 and 70 months. Construction of the new west approach would be closely coordinated with improvements made to the Montlake interchange. Table 3-8 summarizes construction elements and truck trips expected for the west approach area.

Table 3-8. West Approach Area – Construction Elements and Truck Trips

	Preferred Alternative	Option A	Option K	Option L
Construction duration (years) ^b	59 months	59 months	70 months	59 months
Excavation (cubic yards)	55,000	50,000	531,000	77,000
Permanent columns	254	208	993 ^a	227
Temporary support piles	2,300	1,990 to 2,040	2,800	1,980
Daily truck trips (average)	30	30	30	30
Daily truck trips (peak activity) ^{c, d}	290	290	290	290

^aTotal number of columns does not include the micropiles that would be used to support Option K single-point urban interchange.

^bConstruction duration does not include mobilization and project closeout.

^cEstimates for haul truck activity are for Lake Washington Boulevard segment of haul routes.

^dThe Final EIS includes refined estimates since publication of the SDEIS.

Like the Portage Bay Bridge, the new west approach area bridges would require construction of work bridges adjacent to the existing bridge. The work bridges would allow the new bridges to be built in halves so that traffic flow would not be interrupted. Traffic would use the existing bridge until the north half of the new bridge is built, then shift to the new north structure while the existing bridge is demolished and the new south structure is built.

In-water construction would occur from work bridges installed between Montlake and Foster Island, as well as eastward for several thousand feet from Foster Island to a point where water depths would allow construction staging from barges. Work bridges would be constructed on both the north and south sides of the existing west approach structures and along the existing Lake Washington Boulevard ramps. Exhibit 3-11 illustrates the construction sequence for the west approach by year for the Preferred Alternative and Option A. In general, the construction sequence for the Preferred Alternative is similar to the sequence for Option A described in the SDEIS.

Work Bridges (North)

Within the first year of construction, work bridges and finger piers would be constructed along the north sides of the existing west approach through Union Bay and Lake Washington. The first phase of work bridge construction would involve pile-driving in Union Bay and in Lake Washington. These pile-driving activities are expected to occur during a 7-month period. The work bridges would be constructed in a manner similar to those in the Portage Bay area and would be in place for approximately 58 months. Construction barges may also be temporarily anchored in the deeper-water areas to support construction along the west approach.

Permanent Bridges (North)

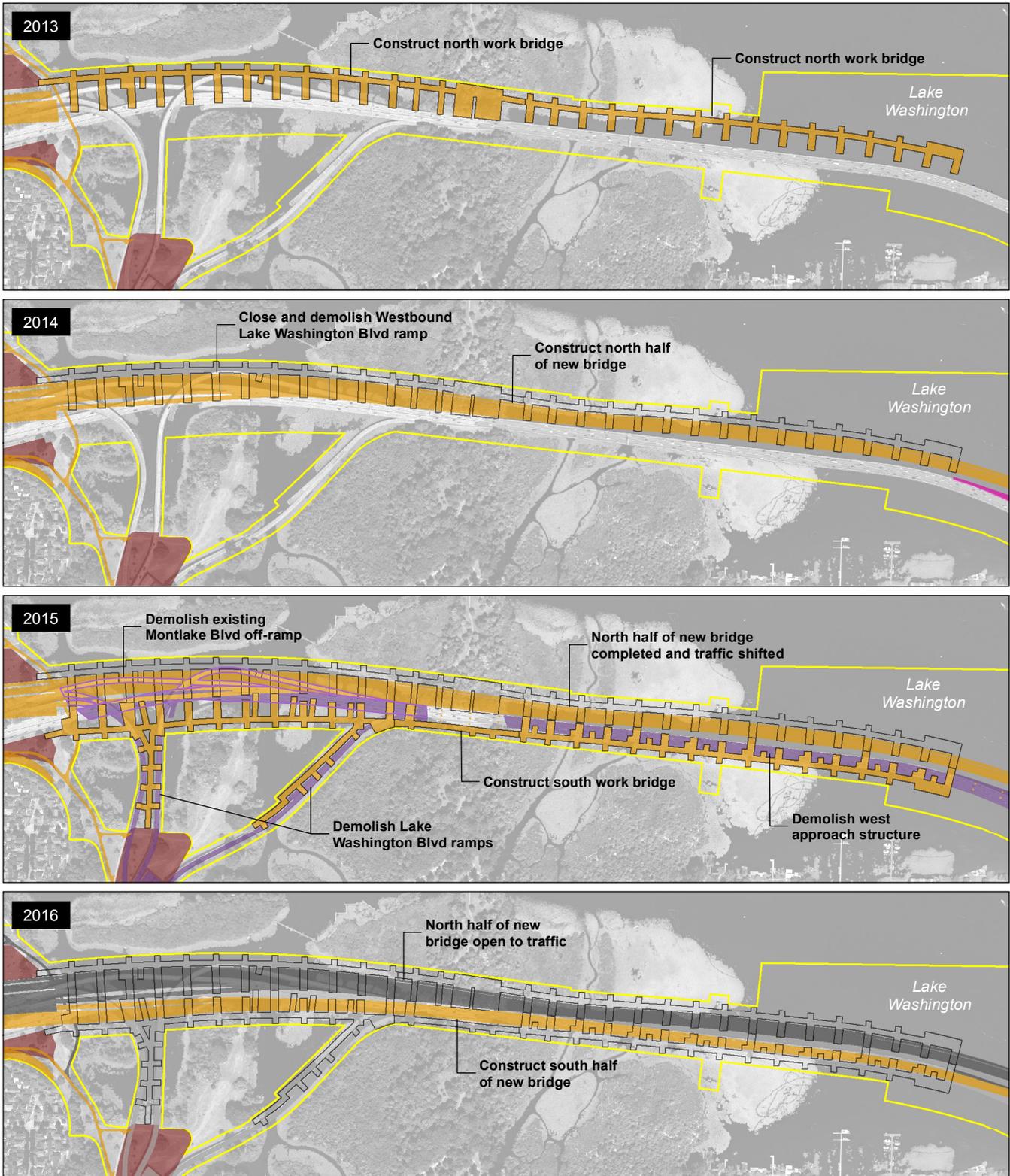
Once the north work bridges are in place, construction on the northern half of the permanent bridge would begin. The northern half of the west approach in Union Bay and Lake Washington would be constructed from the work bridges. The permanent bridges would have a foundation with drilled shafts and a superstructure with girders and a cast-in-place deck slab. This type of superstructure would minimize the number of piers in the water. See the previous sections entitled *Permanent Bridge Construction* for detailed description of the types of bridge construction activities taking place in the west approach area.

Once the north bridge is completed, both eastbound and westbound SR 520 traffic would be shifted onto the new structure. To maximize roadway width, a portion of the bicycle/pedestrian path would be used temporarily for traffic until the south structure is complete.

Work Bridges (South)

Following construction of the north portion of the new west approach bridge, the south work bridges would be installed. Construction of the south work bridges in Union Bay, and Lake Washington would also include pile-driving activities that would take place over approximately 9 non-consecutive months. Work bridges would also be constructed adjacent to the Lake Washington Boulevard on- and off-ramps to facilitate demolition of the existing ramps.

Exhibit 3-11. West Approach Area - Construction Sequence for the Preferred Alternative



- Limits of construction
- Construction in progress
- Work bridge
- Completed construction
- Bridge or roadway removal
- Construction staging area
- Interim connection
- Stormwater treatment facility

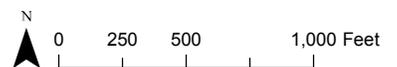
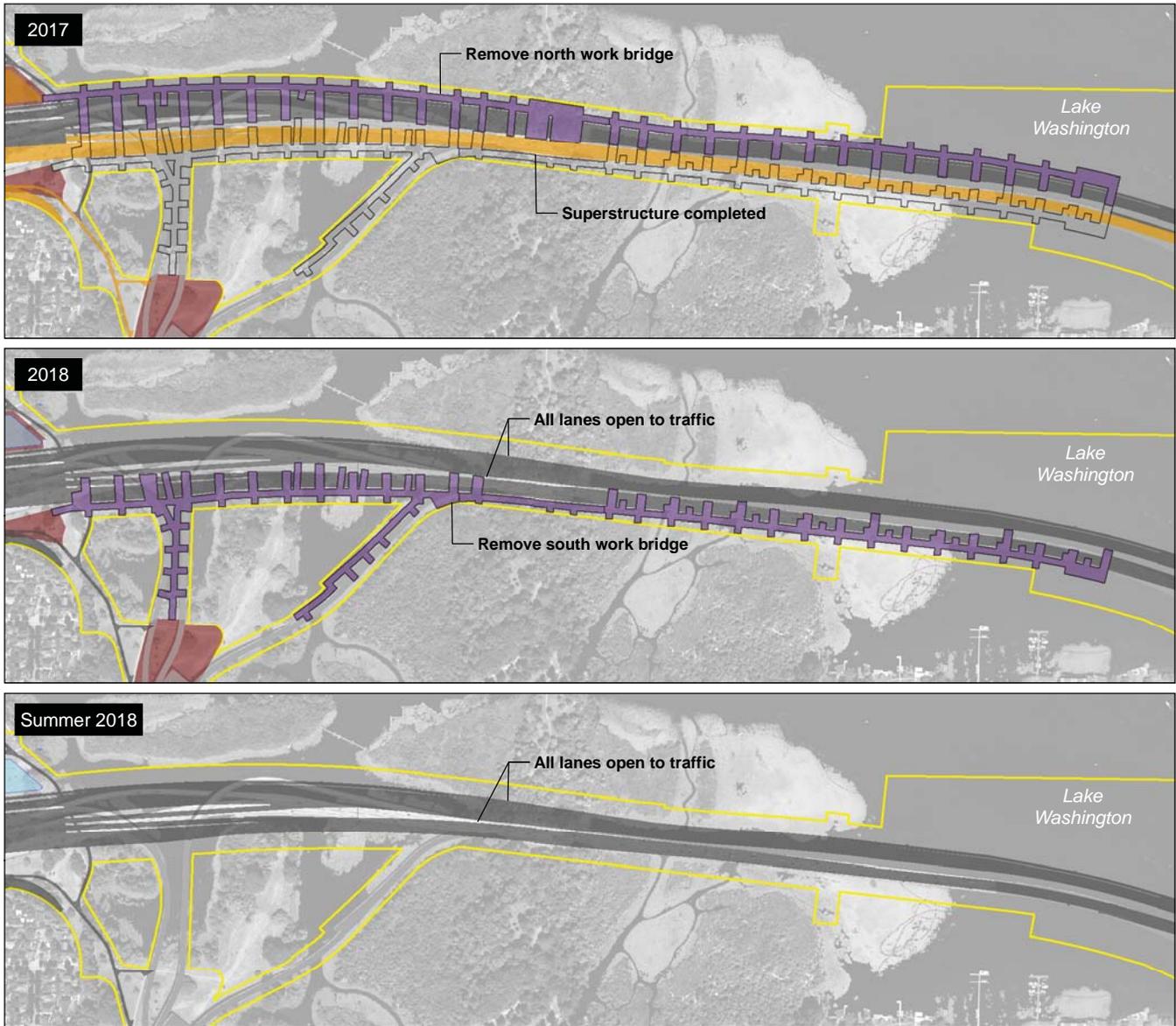
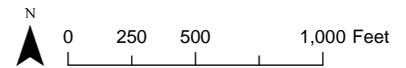


Exhibit 3-11. West Approach Area - Construction Sequence for the Preferred Alternative



- | | |
|---|---|
|  Limits of construction |  Completed construction |
|  Work bridge |  Construction staging area |
|  Bridge or roadway removal |  Stormwater treatment facility |
|  Construction in progress | |



Existing Bridge Demolition

Following construction of the north portion of the new west approach bridge, the south work bridges would be installed and the existing bridge would be demolished (see previous section Bridge Demolition and Disposal).

Permanent Bridges (South)

Construction of the southern half of the superstructure would progress into the fourth and fifth construction years. The north work bridges in Union Bay and Lake Washington would be dismantled during this period. Once the southern half is completed, the remaining work bridges would be dismantled and removed. The final stage of construction would consist of site cleanup and demobilization.

Floating Bridge Area

Construction of the floating bridge would be the same for the Preferred Alternative as described for the Options evaluated in the SDEIS.

Pontoons

As described in Chapter 1, WSDOT recognized the urgent need to prepare for catastrophic failure of the Evergreen Point Bridge, and initiated the SR 520 Pontoon Construction Project under an independent NEPA process in January 2008. Construction of 21 longitudinal pontoons, two cross pontoons, and 10 supplemental stability pontoons (33 total pontoons) necessary to replace the existing 4-lane capacity of the bridge in the event of a catastrophic failure was evaluated in the EIS for the SR 520 Pontoon Construction Project. The Final EIS for the SR 520 Pontoon Construction Project was published in December 2010, and the Record of Decision (ROD) was published in January 2011. A pontoon construction facility as described in the Final EIS and Record of Decision is currently under construction in Aberdeen, Washington.

If the floating portion of the Evergreen Point Bridge does not fail before its planned replacement, WSDOT would use the pontoons constructed and stored as part of the SR 520 Pontoon Construction Project for use in the SR 520, I-5 to Medina: Bridge Replacement and HOV Project. The design for the new 6-lane floating bridge would require 21 longitudinal pontoons, two cross pontoons, and 54 supplemental stability pontoons (77 total pontoons). As shown in Table 3-9, the SR 520, I-5 to Medina project would require an additional 44 supplemental stability pontoons beyond those constructed for the SR 520 Pontoon Construction Project. The additional pontoons would be needed to provide buoyancy and stability for the new 6-lane floating bridge. Exhibit 3-12 shows the new pontoon configuration, pontoon dimensions, and floating bridge cross section for the project.

Other Pontoon Size Considerations

If pontoons were smaller, there would need to be more of them to attain the necessary buoyancy and stability to support the bridge superstructure. Using more small pontoons would make the new bridge heavier and deeper than currently designed and would compromise the stability of the bridge. Bridge engineers have sized the pontoons to enable them to fit through the locks in Ballard. The 75-foot pontoon width was set, not as an ideal width for the bridge, but because it is the maximum width pontoon that will fit through the large lock.

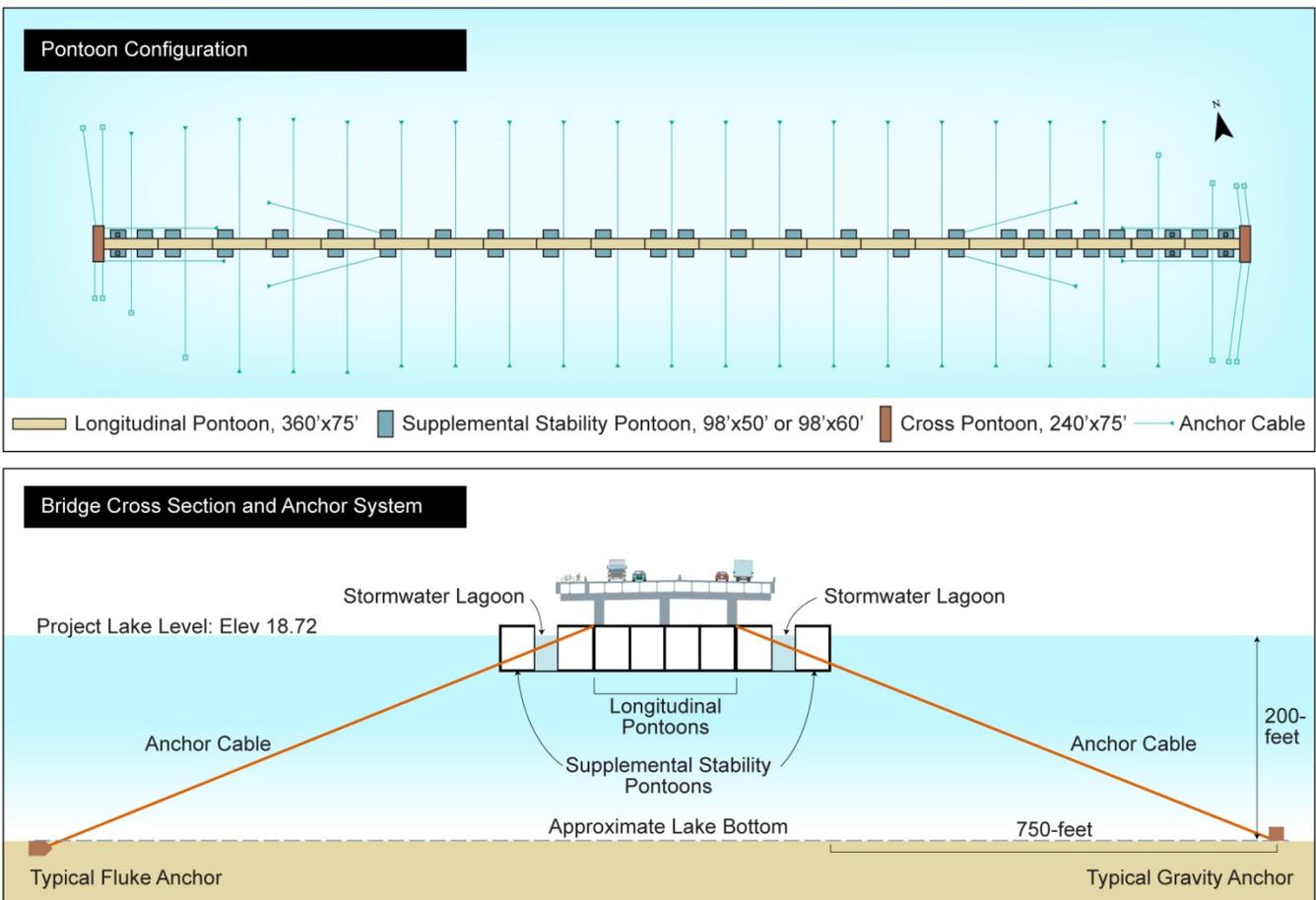
Why are the new pontoons so big?

The existing cross pontoons for the floating bridge are 110 feet wide by 60 feet long. The existing longitudinal pontoons are approximately 60 feet wide by 360 feet long. Any replacement bridge design would need to accommodate increased lane width and added shoulders to meet current safety standards. In addition, to eliminate the need for a costly drawspan, improve roadway safety, and facilitate construction and maintenance, the roadway on a new bridge would also be higher (farther above the lake surface) than the current roadway, which is located directly on the surface of the pontoons. The increased width, and height of the roadway, no matter how many lanes, would require larger pontoons to support it.

Table 3-9. pontoons to be Constructed for Evergreen Point Bridge

	SR 520 Pontoon Construction Project	SR 520, I-5 to Medina Project	Total
Longitudinal pontoons (360-foot-long by 75-foot-wide by 28.5-foot-deep)	21	0	21
Cross pontoons (240-foot-long by 75-foot-wide by 34.5-foot-deep)	2	0	2
Supplemental stability pontoons (98-foot-long by 50- or 60-foot-wide by 28.5-foot-deep)	10	44	54

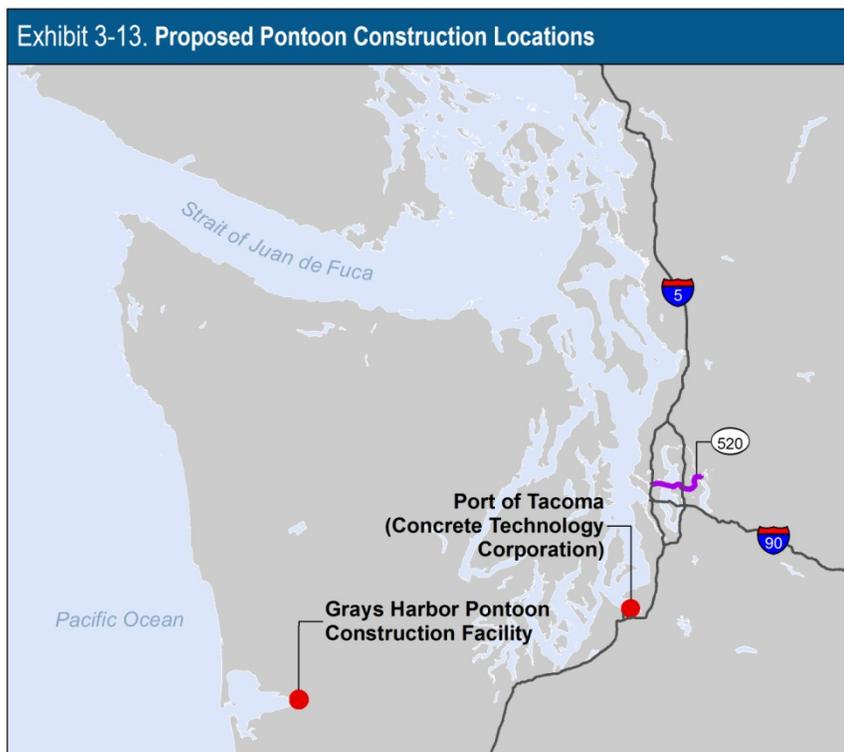
Exhibit 3-12. Pontoon and Anchor Configuration



Pontoon Construction and Construction Locations

Pontoons are reinforced concrete structures. To build them, concrete would be poured around steel rebar cages surrounded by wooden or steel forms. When the concrete is set, the forms would be removed and the pontoons would be cured in place. After curing, the pontoons would be launched into open water and towed to Lake Washington for inclusion in the new floating bridge.

The 44 supplemental stability pontoons would be constructed in a casting basin. Construction locations for supplemental stability pontoons include the casting basin at Concrete Technology Corporation (CTC) in Tacoma. If available, the new casting basin facility located in Aberdeen could also be used for supplemental stability pontoon construction. Once the SR 520 Pontoon Construction Project has completed site construction and pontoon production, the casting basin would be available for construction of additional supplemental stability pontoons needed for the SR 520, I-5 to Medina project. Exhibit 3-13 shows the approximate locations of the potential pontoon construction sites.



Casting Basin Operation

A casting basin is a large concrete construction area adjacent to a navigable waterway. The interior of the casting basin provides a flat, dry work space where several pontoons can be constructed at the same time. After the pontoons are complete, the basin is flooded in a controlled manner to allow

the pontoons to float. When the pontoons are floating, a gate to the basin is opened, allowing tug boats to pull the pontoons out of the basin into the navigable waterway.

The CTC casting basin is located on the Blair Waterway on the eastern edge of Commencement Bay. WSDOT used this facility to construct pontoons for the Hood Canal Bridge Project. The 6.5-acre CTC facility is fully constructed and operating and is routinely used for industrial activities that require a casting basin. The CTC casting basin is located adjacent to an existing concrete batch plant that could serve pontoon-building operations at the CTC and nearby facilities. WSDOT would lease an additional 22 acres at several nearby properties for additional upland construction areas, construction laydown areas, parking areas, and office space to support pontoon construction at the Port of Tacoma.

The casting basin facility at Grays Harbor would have a concrete batch plant, large laydown areas, and water treatment and stormwater systems that would be used and maintained during pontoon construction activities. WSDOT anticipates providing basic water quality treatment for all stormwater runoff at this location, in accordance with WSDOT's *Highway Runoff Manual* (WSDOT 2008).

A permanent dewatering system would be in place during operation of the Grays Harbor facility in order to keep the casting basin dry during pontoon construction. All groundwater leaving the site would be monitored and treated as needed to meet applicable water quality standards before being discharged into the harbor or an approved offsite facility.

The launch channel for the casting basin in Grays Harbor may need periodic maintenance in the form of dredging. This activity would take place within the boundaries of the previously established launch channel, and WSDOT would coordinate with resource agencies to obtain all necessary approvals and permits prior to any in-water maintenance activities. All appropriate BMPs would be employed to minimize effects on the aquatic environment.

Pontoon Towing

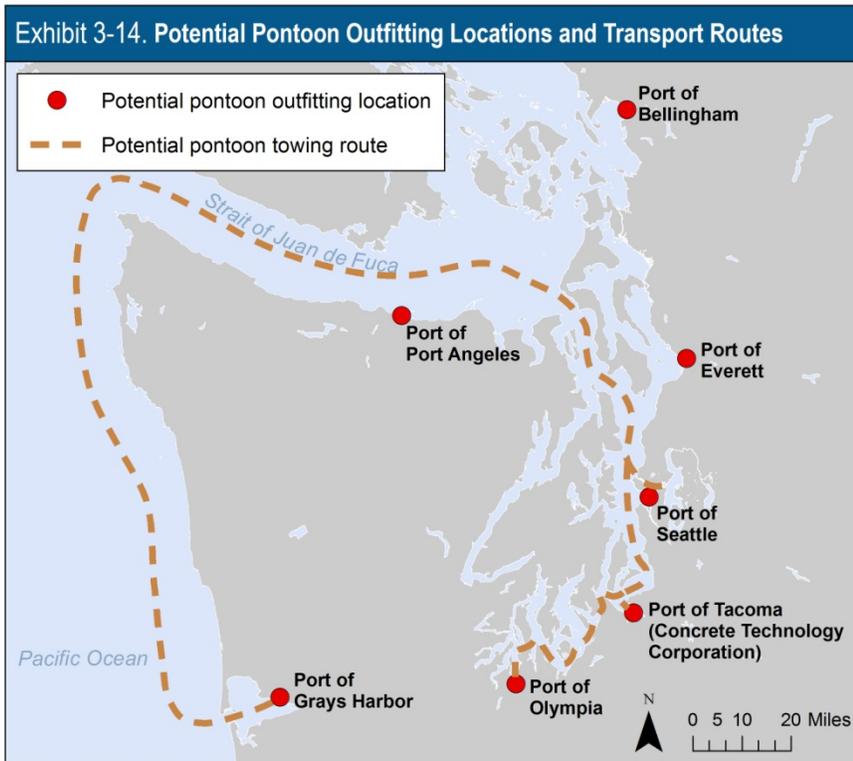
Pontoons would be towed by tug boats from Grays Harbor to outfitting or moorage locations and towing would likely be limited to times when the ocean has a maximum wave height of 7 feet. Pontoons would be towed at approximately 4 knots and could take up to two days to travel from Grays Harbor into the calmer Strait of Juan de Fuca.

Following outfitting or moorage, pontoons would be towed from the construction or moorage location to the final destination in Lake Washington. Pontoons arriving from Grays Harbor would travel through the Strait of Juan de Fuca into Puget Sound, and enter the Lake Washington Ship Canal at the Ballard Locks. Ocean-going tugs moving pontoons from

What is outfitting?

Pontoon outfitting is a process by which the columns and elevated roadway of the bridge are built directly on the surface of the pontoon. This activity will take place at several possible outfitting locations within Puget Sound, as well as in Lake Washington during construction and placement of the floating bridge.

Grays Harbor north to Puget Sound would follow international rules of right-of-way. Pontoons being towed from CTC would follow typical shipping lanes from the Port of Tacoma to the Port of Seattle, and would also enter Lake Washington via the Ship Canal at the Ballard Locks. Exhibit 3-14 shows the approximate coastal towing route from Grays Harbor, the location of CTC in Commencement Bay, and potential port locations that may be used to outfit the pontoons.



All pontoons would enter Lake Washington through the Lake Washington Ship Canal at the Ballard Locks. The Lake Washington Ship Canal includes Salmon Bay, the Fremont Cut, Lake Union, Portage Bay, and the Montlake Cut. Tug boat(s) could escort one pair of longitudinal pontoons through the Ballard Locks at a time. After passing through the Lake Washington Ship Canal, pontoons would be towed into Lake Washington and placed in the alignment of the new floating bridge.

As many as 23 pontoons may be outfitted at available port locations in Puget Sound. These outfitting locations would be at existing commercial shipping or mooring facilities regularly used by large vessels or barges. Potential port locations include the Port of Bellingham, Port of Everett, Port of Seattle, Port of Tacoma, Port of Olympia, and Port of Grays Harbor. Outfitting of pontoons could take up to 4 months in these port locations and would be consistent with the typical operation of the existing

facilities. Once outfitting construction is complete, pontoons would be towed from the port location through the Ballard Locks and into Lake Washington for incorporation in the floating bridge.

Pontoon Installation and Construction on Lake Washington

The new alignment of the floating span would be approximately 190 feet north of the existing bridge at the west end and 160 feet north at the east end. A single row of longitudinal pontoons would support the floating bridge. Floating bridge construction would start from each end of the bridge and progress toward the middle. Pontoon installation and floating bridge construction are described below and shown on Exhibits 3-15 and 3-16. The sequence is based on an estimated schedule.

Construction would begin by first installing the new permanent bridge anchors. Anchors are reinforced concrete structures that would be built offsite (outside of Lake Washington) at an existing industrial facility and transported to Lake Washington using barges. Fifty-eight anchors would be used to secure the new floating bridge pontoons in place. As with the existing bridge, the two main anchor types used would be gravity anchors for harder lake bed materials and sloped areas (approximately 13, near the shores), and fluke anchors for soft bottom sediments and flat areas (approximately 45, middle of the lake).

Gravity anchors would consist of large concrete blocks stacked on top of one another to provide the necessary weight to hold the pontoons in place. The number of stacked segments that make up each gravity anchor would vary depending on each anchor location. Gravity anchors could be as large as 30 feet long by 30 feet wide by 20 feet tall.

A fluke anchor is a large concrete structure shaped like a broad triangle. These anchors could be as large as 40 feet long by 20 feet wide by 20 feet tall.

Fluke anchors are constructed out of concrete and rebar using forms, in the same manner that pontoons are constructed. They can be constructed in a casting basin, or in a large industrial yard, and then loaded by crane onto barges for transport to Lake Washington. The anchors are installed using a combination of their own weight and water-jetting to set them below the lakebed surface. Water would be pumped through hoses and jetted through pipes cast into the concrete anchors. As the high-pressure water exits the bottom of the anchor, it liquefies the soft lakebed substrate and allows the anchor to settle into the lakebed sediment.

Both types of anchors would be installed using barge-mounted cranes, and anchors would be connected to the floating pontoons with high-strength steel cables. In addition to these two primary anchor types, shaft anchors would be used in portions of the lake where gravity anchors would present a navigation hazard, or in areas with steep or unstable underwater slopes.

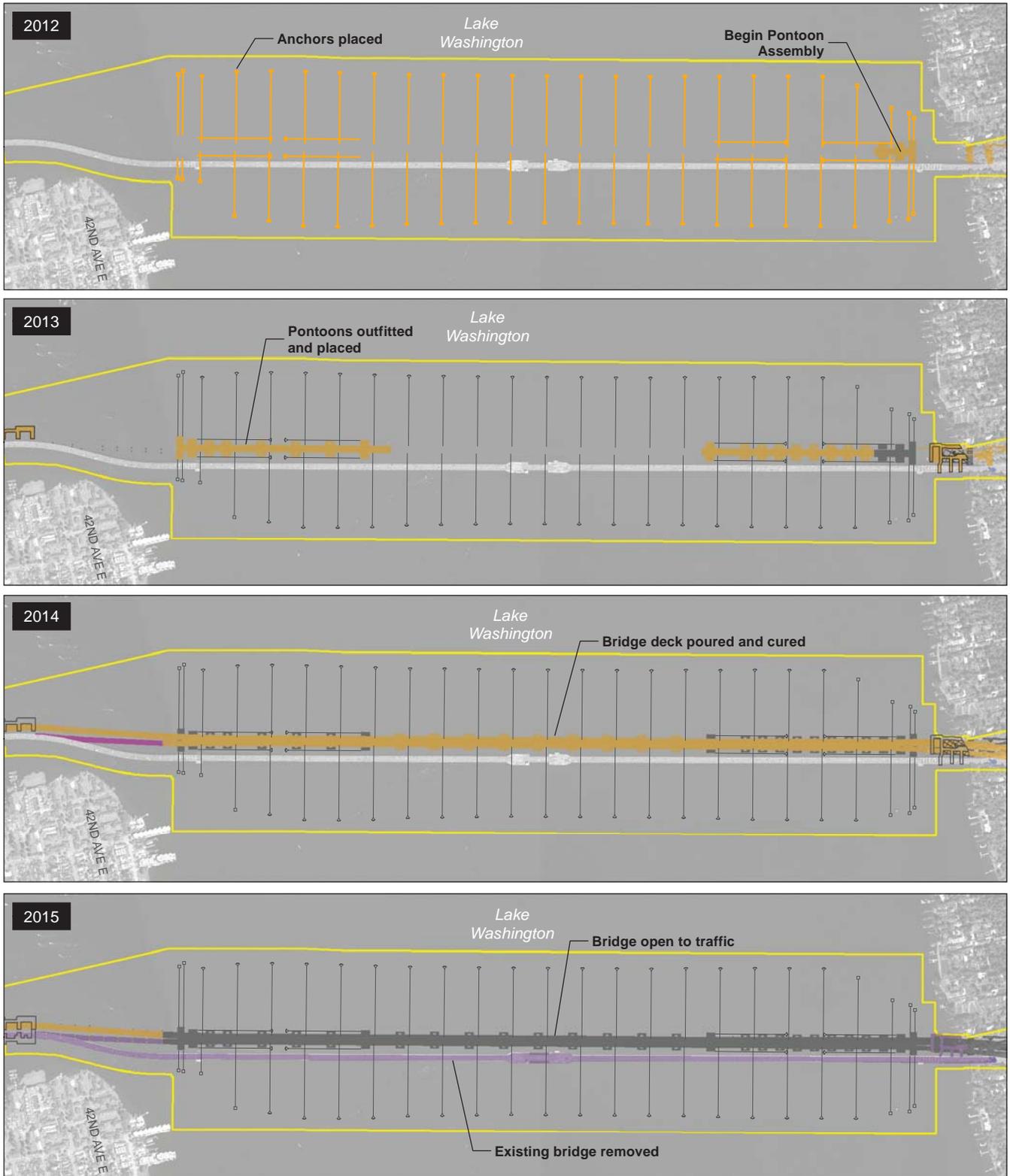


Fluke anchor with water jets to help embed the anchor into lake bottom.



Fluke anchor

Exhibit 3-15. Evergreen Point Floating Bridge Construction Sequence for the Preferred Alternative and Options A, K, and L



- Anchor and cable
- Retaining wall
- ▭ Limits of construction
- ▭ Work bridge
- ▨ Falsework
- ▭ Bridge or roadway removal
- ▭ Interim connection
- ▭ Construction in progress
- ▭ Completed construction

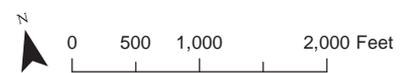
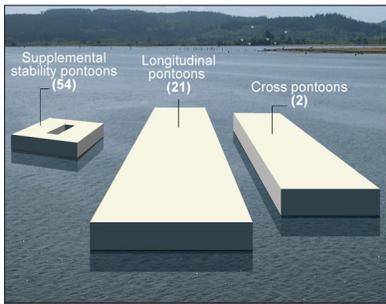


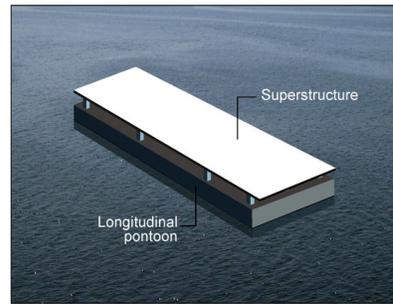
Exhibit 3-16. Floating Bridge Assembly



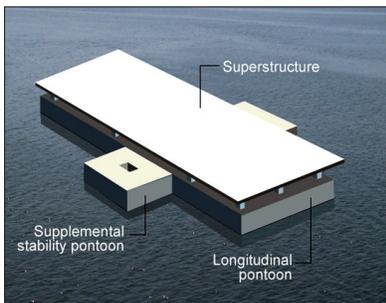
Step 1: Build the necessary pontoons and anchor cables.



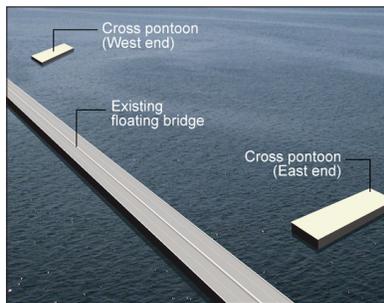
Step 2: Tow pontoons from construction facilities to the Lake Washington area.



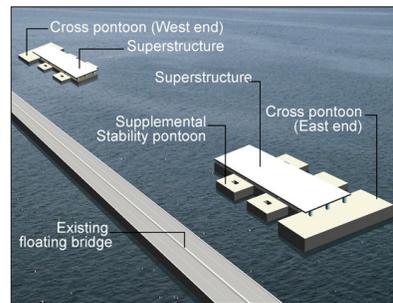
Step 3: Outfit pontoons with a new roadway superstructure on top of each pontoon.



Step 4: Connect supplemental stability pontoons to longitudinal pontoons.



Step 5: Anchor cross pontoons to create the east and west ends of the new floating bridge.



Step 6: Connect pontoons across Lake Washington and secure them with anchors.



Step 7: Complete roadway lanes, shoulders, barriers, and the bicycle/pedestrian path.



Step 8: Connect new floating bridge to east and west approach bridges.



Step 9: Open new floating bridge to drivers.

Shaft anchors are similar to drilled shaft foundations used for bridge substructure, except that they are used to anchor the pontoons in shallow waters. Shaft anchors would be constructed in the same manner as drilled shaft foundation elements as described earlier in this chapter in the section entitled *Drilled Shafts* (under *Permanent Bridge Construction*).

Some pontoons would arrive at the lake with some bridge structure already in place. The remaining pontoons would need bridge structure constructed on the pontoon once it was placed in the new floating bridge alignment. After the pontoon is outfitted with the bridge substructure and superstructure, the bridge deck would be poured and cured.

Once traffic shifts to the new floating bridge, the existing floating bridge would be dismantled and pontoon sections towed away. Pontoons could be sold for use elsewhere, disposed of, or recycled in accordance with all applicable federal, state, and local requirements. The existing fluke and gravity anchors would be abandoned in place on the lake bed. If practicable, the existing pile anchors could be removed; otherwise, they would also be abandoned in place.

Discussion of the potential effects associated with pontoon construction, transport, and installation is included in Chapter 6 of this Final EIS.

East Approach

The new east approach of the Evergreen Point Bridge would be located north of the existing bridge. Construction would take place from work bridges and barges, and the westbound (north) side of the east approach structure would be constructed first (Exhibit 3-17). The east approach substructure would consist of drilled shafts, mudline footings (shaft caps), and concrete support columns. The superstructure would also consist of cast-in-place concrete girders and the roadway deck.

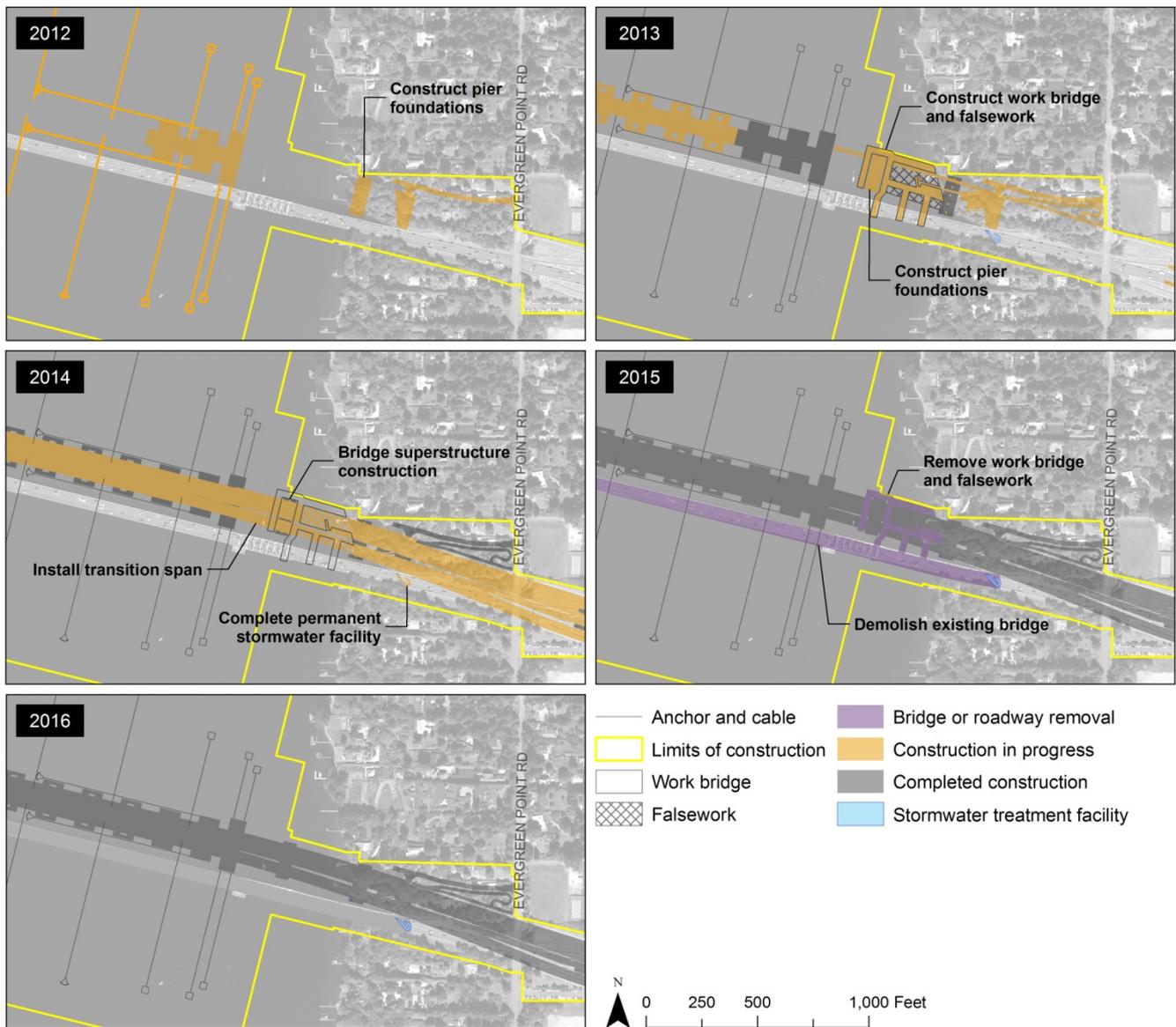
Work bridge construction would involve driving up to 165 piles in Lake Washington. These pile-driving activities are expected to occur during a 3- to 4-month period. Once the work bridge is completed, the foundation of the east approach and the maintenance facility dock would be installed.

The foundation of the east approach would consist of two piers. The first pier would be approximately 350 feet out in the water from the shoreline and the second pier would be onshore, several feet from the shoreline. Each pier foundation would consist of approximately ten 10-foot-diameter drilled shafts and two (mudline) footings to support the five bridge columns. Construction of the in-water pier would take place within a cofferdam.

During the third year of construction, the bridge superstructure would be completed from the work bridges, barges, and land access. The westbound transition span between the floating portion and the Eastside transition area

would be installed. Both the north and south structures would be completed prior to shifting traffic onto the bridge. The new east approach and floating bridge are expected to be open to traffic in December of 2014.

Exhibit 3-17. East Approach Area Construction Sequence for the Preferred Alternative and Options A, K, and L



Demolition of the existing east approach bridge would occur during the final year of construction. With the completion of the new superstructure and demolition of the existing structure, the work bridges and falsework would be dismantled and the 165 piles removed. The final stage of construction would consist of site cleanup and demobilization.

Table 3-10 shows estimated details for different construction elements associated with the east approach.

Table 3-10. East Approach Area Construction Elements including Bridge Maintenance Facility

East Approach	Preferred Alternative and Options A, K, and L
Construction duration	41 months
Excavation (cubic yards)	44,200
Peak barge activity (square feet of barge coverage during peak construction)	2,880
Daily truck trips (typical average)	2 to 20
Daily truck trips (peak)	10 to 100

Bridge Maintenance Facility

The project would also include construction of a bridge maintenance facility under the proposed east approach structure. It would consist of an upland facility constructed in the hillside under the proposed approach structure, as well as a working dock (see Exhibit 2-24). The new bridge maintenance facility would be built at the same time as the east approach structure. Permanent and temporary access roads, retaining walls, and the dock substructure would be constructed while the westbound portion of the east approach structure is being built.

The maintenance dock would be located underneath the new east approach to the Evergreen Point Bridge. The proposed maintenance dock would allow WSDOT workboats to support emergency preparedness and essential proactive maintenance activities on a daily basis. The dock would extend no more than 100 feet from the shoreline, with a width of approximately 10 feet. The new dock design would include a moorage berth at the end of the dock. The dock deck may be constructed out of textured concrete and/or include metal grating, allowing sunlight to penetrate underneath the deck.

Eastside Transition Area

Once the east approach, transition span, and floating portions of the Evergreen Point Bridge have been replaced, the SR 520, I-5 to Medina project would grade and pave the section of roadway between the east approach and Evergreen Point Road to transition into the SR 520, Medina to SR 202: Eastside Transit and HOV Project. The Evergreen Point Road Freeway Transit Station would be located to the Evergreen Point lid.

In order to make ramps and lanes connect for proper traffic operations, the SR 520 main line would be restriped beginning at the physical improvements completed near Evergreen Point Road and extending east to 92nd Avenue NE. Restriping efforts may include sand-blasting to remove existing paint lines.

