

Chapter 2

Project Alternatives

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2 Project Alternatives

2.1 Introduction

This Supplemental Draft EIS (SDEIS) evaluates potential design refinements to the Replacement Long-span Alternative that was identified as the Preferred Alternative in the EQRB Draft EIS. The potential refinements to the Long-span Alternative are intended to meet the Project's purpose and need while reducing construction costs.

The potential Preferred Alternative refinements, which include a narrowed bridge and one less traffic lane as well as other changes, are collectively referred to as the "Refined Long-span Alternative (Four-lane Version)" or the "Refined Long-span" for short. The EQRB Draft EIS (issued on February 5, 2021) provides information on the No-Build and the four build alternatives evaluated, as well as a summary of the process followed to narrow and identify the Draft EIS range of alternatives. The information is incorporated by reference into this SDEIS. A brief description of the Draft EIS Long-span Alternative and the other build alternatives evaluated in the Draft EIS can be found in the Summary chapter at the beginning of this SDEIS.

This SDEIS also describes how the Refined Long-span Alternative compares with similarly refined versions of the other bridge replacement alternatives (the Short-span Alternative and the Couch Extension Alternative) that were evaluated in the Draft EIS. This comparison demonstrates that when applying the potential cost-reduction and other refinements equally to all of the bridge replacement alternatives, the Long-span Alternative maintains the same performance, cost, and impact advantages over the other bridge replacement alternatives that led to the Long-span Alternative's selection as the Preferred Alternative.

2.2 Summary of the Project Refinements

The following summarizes the potential project refinements that are evaluated in this SDEIS. Section 2.4 provides more information including visual simulations and illustrations of these refinements.

The Refined Long-span Alternative is a narrower, four-lane variation of the five-lane Long-span Alternative that was identified as the Preferred Alternative in the Draft EIS. As noted, narrowing the bridge and eliminating one traffic lane, as well as other cost-saving measures, substantially reduces the cost of the Long-span Alternative while still retaining many of its advantages relative to the other build alternatives.

2.2.1 Bridge Width

The total width of the bridge over the river would be approximately 82 to 93 feet (the range varies depending on the bridge type and segment). For comparison, the Draft EIS Replacement Alternatives were approximately 110 to 120 feet wide over the river. The refined bridge width would accommodate approximately 78 feet for vehicle lanes, bike lanes, and pedestrians, which is comparable to the existing bridge.

The refined bridge design would accommodate four vehicle lanes (rather than five as evaluated in the Draft EIS). The following lane configuration options are being evaluated:

- Lane Option 1 (Balanced) – Two westbound lanes (general-purpose) plus two eastbound lanes (one general-purpose and one bus-only lane)

- Lane Option 2 (Eastbound Focus) – One westbound lane (general-purpose) plus three eastbound lanes (two general purpose and one bus only)
- Lane Option 3 (Reversible Lane) – One westbound lane (general-purpose) plus two eastbound lanes (one general-purpose and one bus-only) plus one reversible lane (westbound AM peak and eastbound PM peak)
- Lane Option 4 (General-Purpose with Bus Priority) – Two westbound general-purpose lanes plus two eastbound general-purpose lanes, plus bus priority access (e.g., queue bypass) at each end of the bridge.

The width of the vehicle lanes would be, at minimum, 10 feet and could vary depending on how the total bridge width is allocated between the different modes. Figure 2.4-7 and Figure 2.4-8 show the Refined Long-span approach compared to existing conditions and to the Draft EIS Long-span Alternative.

- The total clear width of the bicycle lanes and pedestrian sidewalks would be approximately 28 to 34 feet when summing both directions. This is wider than the existing bridge but narrower than what is proposed in the Draft EIS for the replacement alternatives. Physical barriers between vehicle lanes and the bicycle lanes are proposed and are in addition to the above dimensions.
- The refined bridge would allow narrower in-water piers, due to less weight needing to be transferred to the in-water supports.

2.2.2 Other Design Refinements Being Evaluated

West Approach

The Refined Long-span Alternative includes a refined girder bridge type for the approach over the west channel of the river, Gov. Tom McCall Waterfront Park, and Naito Parkway. Compared to the cable-stayed and tied-arch options evaluated in the Draft EIS, this option would not only reduce costs but also avoid an adverse effect to the Skidmore/Old Town National Historic Landmark District. It would have two sets of columns in Waterfront Park compared to just one with the Draft EIS tied-arch option and five with the existing bridge.

East Approach

The Refined Long-span Alternative includes a potential span length change for the east approach tied-arch option that would minimize the risks and reduce costs associated with placing a pier and foundation in the geologic hazard zone that extends from the river to about E 2nd Avenue. The refined tied-arch option would place the eastern pier of the tied-arch span farther east. Increasing the length of the tied-arch span would reduce the length and depth of the subsequent girder span to the east, which would reduce its cost. Two options were analyzed, one that terminates on the east side of 2nd Avenue (Option 1) and one slightly shorter, terminating just west of 2nd Avenue (Option 2). Option 1 was ultimately dropped from further consideration because it would severely impact freight access to the adjacent businesses.

2.2.3 Enhanced Americans with Disabilities Act, Pedestrian, and Bicyclist Connections

A City of Portland–owned staircase currently connects the south side of the bridge to the Vera Katz Eastbank Esplanade located about 50 feet below the bridge. While it is feasible for the City’s existing stairway to be preserved during bridge demolition and then reconnected to the new bridge, the Draft

EIS evaluated multiple options for upgrading the connection with either ramp or elevator/stair options to provide improved bicycle, pedestrian, and Americans with Disabilities Act (ADA) access. This SDEIS further evaluates a combined elevator/stair option and discusses the possibility that the City could build an upgraded connection as a separate project.

The Draft EIS also evaluated ramp/stair options to provide bicycle, pedestrian, and ADA access to W 1st Avenue near the bridge's west end; these options would replace the existing stairs that provide access between an existing bus stop on the bridge and the Skidmore Fountain MAX station beneath the bridge on W 1st Avenue. This SDEIS expands the range of options for supporting ADA, pedestrian, and bicycle connections between the bridge and W 1st Avenue by evaluating the following:

- A combination of stairs and elevators
- A network of sidewalk improvements

2.2.4 Comparison to Refined Short-Span and Refined Couch Extension Alternatives

The Refined Long-span Alternative was evaluated in detail for this SDEIS because it is a lower-cost version of the Draft EIS Preferred Alternative that provides many of the Preferred Alternative's advantages over the other build alternatives evaluated in the Draft EIS. For comparison purposes, the project team also evaluated how refined versions of the other Draft EIS replacement bridge alternatives – the Short-span and the Couch Extension Alternatives – compare with the Refined Long-span Alternative. The refinements include the same cost-cutting measures that were applied to create the Refined Long-span Alternative. This evaluation demonstrated that the Long-span Alternative, whether with four or five lanes, has less seismic risk, reduces impacts, and costs less than the other build alternatives.

The differences in impacts among the refined versions of the three replacement alternatives are discussed in Chapter 3 and summarized below.

- Traffic, Transit, Freight and Active Transportation – The impacts of the Refined Short-span Alternative would be identical to the impacts of the Refined Long-span for all of the lane configuration options. For a refined version of the Couch Extension Alternative, there would be some variation in travel times or operations in the westbound direction (due to elimination of the westbound S-curve) that would depend on the lane configuration option as described in the EQRB Transportation Supplemental Memorandum (Multnomah County 2022I) and summarized in Section 3.1 of this SDEIS. Active transportation would be identical for all of the refined alternatives.
- Geology and Seismicity – The largest geologic impact from the build alternatives would be the beneficial creation of an earthquake ready bridge for the Burnside crossing. The Long-span Alternative (both the Draft EIS and the refined versions) is unique among the alternatives in that it would place only one bridge support in the geologic hazard zones. All the other build alternatives would place multiple bridge supports in the geologic hazard zones, thus requiring deep and extensive soil grouting or cementation.
- Hydraulics – All of the refined (four-lane) versions of the replacement alternatives would have a similar amount of permanent fill below ordinary high water. However, the Refined Short-span and Couch Extension Alternatives would have about 10 percent more lateral surface area in the floodway and would have three to six times more temporary fill below ordinary high water compared with the Refined Long-span Alternative. Increasing the lateral surface area and/or the volume of the bridge piers in the river can cause a rise in future peak flood levels.

- **Vegetation and Wildlife** – All of the refined (four-lane) versions of the replacement alternatives would permanently displace a similar amount of aquatic habitat due to the placement of piers. However, the refined Couch Extension Alternative would displace about 10 percent more shallow water habitat than the other two. Both the Refined Short-span and Couch Extension Alternatives would require soil grouting or cementation below ordinary high water as well as within shallow water habitat, whereas the Refined Long-span would require none in either area. They would also have three to six times more temporary fill below ordinary high water compared with the Refined Long-span Alternative.
- **Parks and Recreation** – All of the replacement bridge alternatives (four-lane or five-lane versions) would avoid long-term adverse impacts to public parks. Most of the short-term impacts would be the same as well except that the Vera Katz Eastbank Esplanade would be closed approximately one year longer with the Short-span and Couch Extension Alternatives (four- or five-lane versions) than with both the four-lane and five-lane versions of the Long-span Alternative.
- **Historic Resources** – Temporary and long-term impacts to historic resources would be the same for all the replacement alternatives, with the exception of bridge type options associated only with the Draft EIS Long-span. The Draft EIS Long-span includes cable-stayed and tied-arch options for the west approach that would likely result in an adverse effect on a National Landmark Historic District; the Refined Long-span and the other replacement alternatives would avoid that impact.
- **Visual and Aesthetics** – The highest potential to impact (adversely as well as beneficially) views and visual experiences would be with bridge types that have above-deck superstructures (for example, cable-stayed, tied-arch, through-truss, and vertical lift bridge types). The Draft EIS Long-span includes all of these options, the Short-span and Couch Extension Alternatives include the center vertical lift, and the Refined Long-span has a cable-stayed or tied-arch option on the east approach. The west approach and the center span are the most sensitive to visual changes resulting from tall above-deck structures.
- **Acquisitions and Displacements** – The impacts would be very similar for the Refined Long-span and Refined Short-span, except that the Short-span with more piers would require more property easements. The Refined Couch Extension Alternative, with its unique alignment of westbound lanes on the east approach, would require more right-of-way and more temporary and permanent acquisitions and easements than the other two refined alternatives.

The impacts would be the same or very similar among the refined versions of the three replacement alternatives for the following environmental issues and are therefore not discussed in Chapter 3.

- **Land Use, Economics, and Neighborhoods** – Indirect economic effects would be slightly different among the refined versions of the replacement alternatives only because of the difference in construction costs. Other land use, economic, and neighborhood impacts would also be very similar or the same across the replacement alternatives.
- **Water quality** – The differences in impacts among the build alternatives would be minor. All of the build alternatives would treat more stormwater runoff (from the new bridge and from some areas around the bridge) than is treated under existing conditions. In-water construction with all build alternatives is likely to have temporary adverse impacts to water quality that could affect fish.
- **Wetlands and Waters** – All of the refined (four-lane) versions of the replacement alternatives would permanently place a similar amount of fill below the ordinary high water mark. However, both the Refined Short-span and Couch Extension Alternatives would place three to six times more temporary fill below ordinary high water compared with the Refined Long-span Alternative.

Because the difference is in temporary impacts, the ramifications are mainly relevant to hydraulics/flooding and fish and wildlife and are discussed further in those sections of Chapter 3.

- Noise and Vibration – The main existing and projected future source of traffic noise in the area is Interstate 5 and related ramps, not the Burnside Bridge traffic. Construction noise would be similar for all build alternatives, and none of the alternatives would increase long-term noise impacts.
- Air quality – None of the build alternatives would have long-term impacts on air quality, and all of them would similarly generate emissions and dust during construction.
- Hazardous Materials – The risk of construction-related accidental spills or contact with existing contamination would be essentially the same for all alternatives, and the best management practices mitigation would be the same.
- Social Services and Environmental Justice – The largest potential adverse impact to social service providers and their clients would be from the Retrofit Alternative which would require a 2- to 3-month closure of the Portland Rescue Mission during construction. All of the replacement alternatives, including the four-lane and five-lane versions, would avoid that closure. The improved pedestrian, bicycle, and safety features with any of the replacement bridges (four-lane and five-lane versions) would be a substantial benefit to environmental justice¹ populations.
- Public Services and Utilities – Impacts would be very similar for all three of the refined alternatives, although the Couch Extension Alternative, with its unique alignment for westbound traffic on the east approach, would affect additional utilities, as described in the Draft EIS.
- Climate change – Eliminating a traffic lane (as with the refined four-lane versions of the Long-span, Short-span, and Couch Extension Alternatives) is likely to cause minor traffic diversion and increased congestion during peak periods, which would increase greenhouse gas emissions compared with the five-lane versions of the alternatives.

The cost estimates for the refined versions of all three replacement bridge alternatives are detailed in the SDEIS Attachment N and are summarized below:

- Refined Long-span estimated cost range – \$830 to \$915 million, with a mid-point cost of \$880 million.
- Refined Short-span estimated cost range – \$885 to \$980 million, with a midpoint cost of \$940 million.
- Refined Couch Extension estimated cost range – \$970 million to \$1.07 billion, with a midpoint cost of \$1.02 billion.

2.3 Construction Approach

The construction approach would be very similar to that described in the Draft EIS for the Long-span Alternative. Key assumptions are summarized below, and differences from the Draft EIS description are noted.

- Construction Duration – The expected duration of project construction is 4.5 to 5.5 years, dependent upon the design option. See Table 2.3-2 for more information regarding construction impact extent and closure timeframes.

¹ Environmental justice populations, as used in this document, refers to low-income and minority populations, as defined by the Executive Order on Environmental Justice.

- **Construction Area** –Compared to the Draft EIS Long-span Alternative, the construction area would be smaller for the west approach south of the bridge within Gov. Tom McCall Waterfront Park. Additionally at the west end, the construction area is expanded compared to the Draft EIS to include proposed sidewalk improvements (for ADA accessibility) extending a block north and south of the bridge (this change would apply to all build alternatives) (see Figure 2.4-23). The construction area on the eastern shoreline south of the bridge is also smaller compared to the Draft EIS Long-span Alternative.
- **Construction Access and Staging** – The construction access and staging is expected to be the same as that described in the Draft EIS.
- **Vegetation** – The Refined Long-span Alternative, with its smaller footprint, would remove slightly fewer trees and vegetation than the Draft EIS Long-span Alternative, primarily within Gov. Tom McCall Waterfront Park south of the bridge.
- **In-Water Work Activity** – The in-water work would be similar to that described in the Draft EIS, except that the replacement bridge in-water foundations would be raised, thereby limiting the need for cofferdams to an elevation about mid-height of the river. Additionally, the existing piers would be fully removed, and the existing in-water piles would be removed, subject to the design option advanced.
- **Temporary Freeway, Rail, Street and Trail Closures** – Temporary closures are expected to be the same as that described in the Draft EIS.
- **Access for Pedestrians and Vehicles to Businesses, Residences and Public Services** – Access is expected to be the same as that described in the Draft EIS.
- **On-Street Parking Impacts** – On-street parking impacts are expected to be the same as that described in the Draft EIS.
- **Property Acquisitions and Relocations** – Displacements would be the same and property acquisitions are very similar to those listed in the Draft EIS; they have been slightly modified to reflect the reduced right-of-way needs of a narrower bridge and to eliminate a small partial acquisition that would have benefitted future streetcar operations (the acquisition could still occur in the future if and when streetcar is extended across the bridge).
- **Temporary use of Gov. Tom McCall Waterfront Park** – The park area that would be temporarily closed for construction has changed since the Draft EIS. On the north side of the bridge, the closure area has been reduced to avoid removing 10 cherry trees and a berm that are part of the Japanese American Historical Plaza; this change would apply to all of the build alternatives. On the south side of the bridge, the park closure area has also been reduced to include only the area north of the Waterfront Park trellis; this change applies only to the Refined Long-span Alternative.

Table 2.3-1. Major Bridge Elements by Alternative

Element	Draft EIS Long-Span Alternative	Refined Long-Span Alternative
Piers and bents	<p>Replace all piers on deep foundations; Bent on both approaches supported by columns on drilled shafts.</p> <p>Stabilize soils surrounding one bent located in GHZ in east approach.</p>	<p>Replace all piers on deep foundations; Bent on both approaches supported by columns on drilled shafts.</p> <p>Cable-stayed and short tied-arch options: Stabilize soils surrounding one bent located in GHZ in east approach.</p> <p>Long tied-arch option: May not require geotechnical stabilization.</p>

Element	Draft EIS Long-Span Alternative	Refined Long-Span Alternative
West approach	Four bents west of Naito Pkwy and one in Waterfront Park. Bridge type over Waterfront Park and Naito Parkway: cable-stayed, tied-arch, through truss, or girder.	Three bents west of Naito Parkway and two bents, each with two columns, in Waterfront Park. Bridge type over Waterfront Park and Naito Parkway: Refined girder
East approach	Three bents on land and none in the river.	Same.
Movable bridge span	Bridge type: bascule span or vertical lift bridge.	Same.

GHZ = geologic hazard zone

Table 2.3-2. Construction Impacts, Closure Extents, and Timeframes by Build Alternative

Facility Impacted	Draft EIS Long-Span Alternative with No Temp. Bridge	Refined Long-Span Alternative with No Temp. Bridge
Gov. Tom McCall Waterfront Park	4.5-year closure within boundary of potential construction impacts	Same; Smaller closure area south of the bridge
Willamette River Greenway Trail	Portion of trail within Waterfront Park closed for same duration as park; detours in place for construction duration	Same
Japanese American Historical Plaza	Southern portion of plaza would be closed for same duration as Waterfront Park	Same
Ankeny Plaza Structure	Closure for duration of construction but no impacts to Ankeny Plaza structure	Plaza structure would not be closed during construction or impacted
Bill Naito Legacy Fountain	No closure of fountain and associated hardscape	Same
Vera Katz Eastbank Esplanade	18 months (this could extend to 3.5 to 4.5 years if the Project builds ramps rather than the other connection options); detours in place for construction duration	Same
Burnside Skatepark	4-month full closure	Same
River Crossing on Burnside Street	4- to 5-year closure	Same
Saturday Market Location	4.5-year closure or use of alternative location	Same
Skidmore Fountain MAX station	Approximately 5 weeks	Same
Navigation Channel/Willamette River Water Trail	Intermittent closures; 2 to 10 closures; each closure up to 3 weeks	Same
Overall Construction Duration	4.5 to 5.5 years	Same

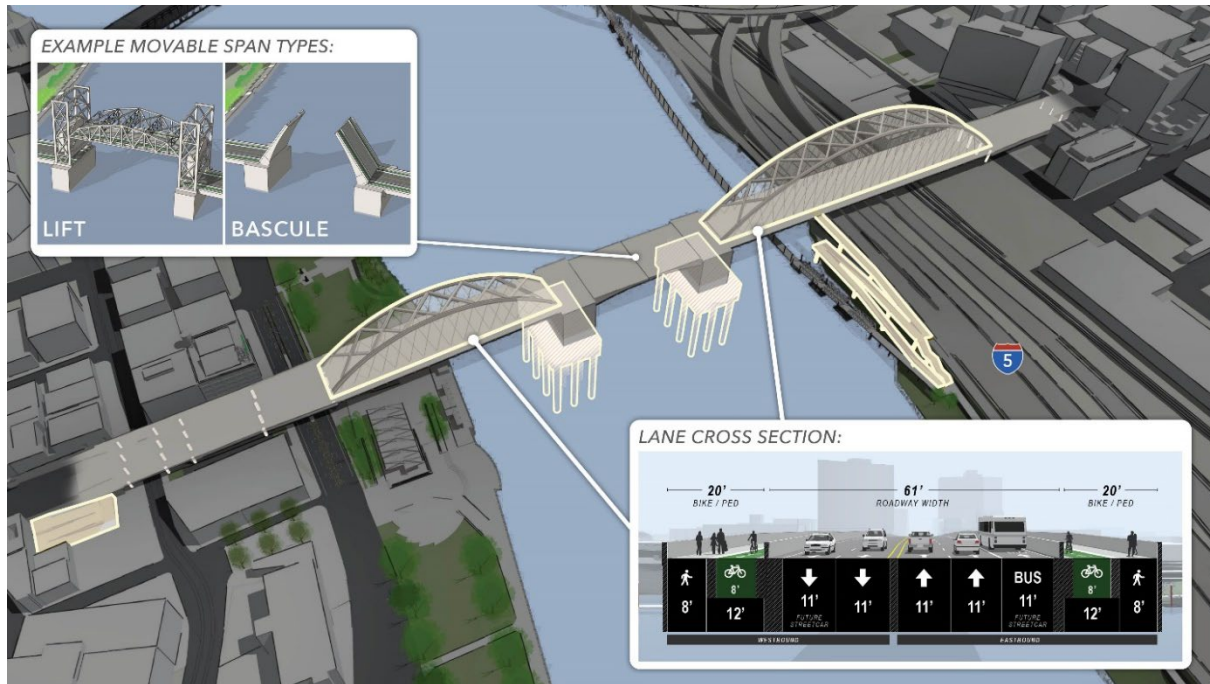
Temp. = temporary

The figures below show the potential refinements that are evaluated in this SDEIS including selected comparisons to the Draft EIS Long-span Alternative and in some cases to existing conditions.

2.4 Description of the Refined Long-Span Alternative

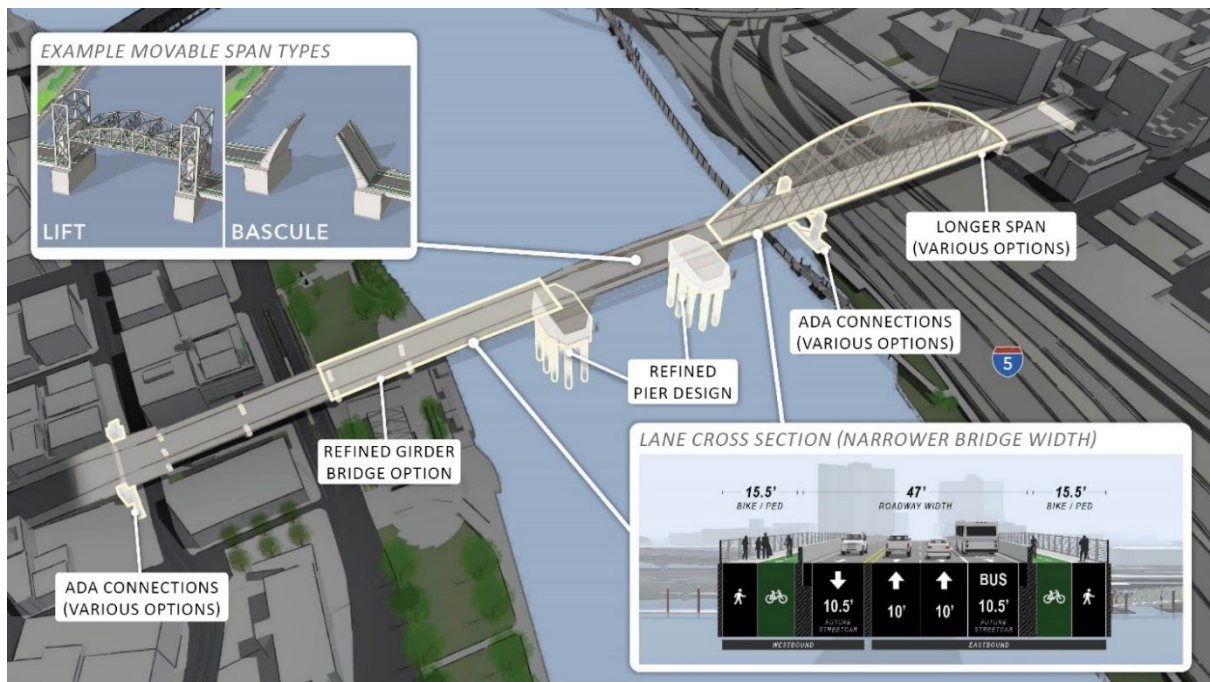
Figure 2.4-1 highlights which elements of the Draft EIS Long-span Alternative have been refined to create the refinements and new options studied in this SDEIS (see Figure 2.4-2). The collection of refinements and new options is referred to as the Refined Long-span Alternative.

Figure 2.4-1. Draft EIS Long-Span Alternative



Note: The Draft EIS Long-span Alternative includes multiple bridge types for both the east and west approach. This figure shows only the tied-arch option.

Figure 2.4-2. Refined Long-Span Alternative



Notes: The Refined Long-span Alternative evaluated in this SDEIS includes both cable-stayed and tied-arch options for the east span. Figure 2.4-2 shows only the tied-arch option. The Draft EIS studied, and this SDEIS further studies, a bascule option and vertical lift option for the center movable span. The inset shows both options but the main figure shows the bascule option. This figure also shows just one of the lane configuration options considered in this SDEIS. All four lane configuration options are shown in Figure 2.4-8.

2.4.1 Bridge Types and In-River Piers

West Approach – The Draft EIS Long-span includes tied-arch and cable-stayed options (see Figure 2.4-3 and Figure 2.4-5) as well as a through-truss and a girder option for the west approach. The Refined Long-span includes only a refined girder bridge (see Figure 2.4-4 and Figure 2.4-6) for the west approach.

East Approach – The Draft EIS Long-span includes tied-arch and cable-stayed options (Figure 2.4-3 and Figure 2.4-5) as well as a through-truss option for the east approach. The Refined Long-span also evaluates a cable-stayed option as well as a tied-arch option that is longer than what was evaluated in the Draft EIS. The added length moves the eastern pier of this span nearer to the upper edge of the geological hazard zone located on the east side of the river, thus reducing the mitigation cost and risk associated with building piers in this area of highly liquefiable soil (see Figure 2.4-4 and Figure 2.4-6, as well as Figure 2.4-16 and Figure 2.4-17).

In-River Piers – The design and construction approach for the in-river piers has been revised for the Refined Long-span, for both the bascule and the vertical lift movable span options.

Figure 2.4-3. Draft EIS Long-Span with Bascule Movable Span (Tied-Arch Approaches)



Figure 2.4-4. Refined Long-Span with Bascule Movable Span (Tied-Arch East Approach)



Figure 2.4-5. Draft EIS Long-Span Vertical Lift Movable Span (Cable-Stayed Approaches)



Figure 2.4-6. Refined Long-Span Cable with Bascule Lift Movable Span (Cable-Stayed East Approach)

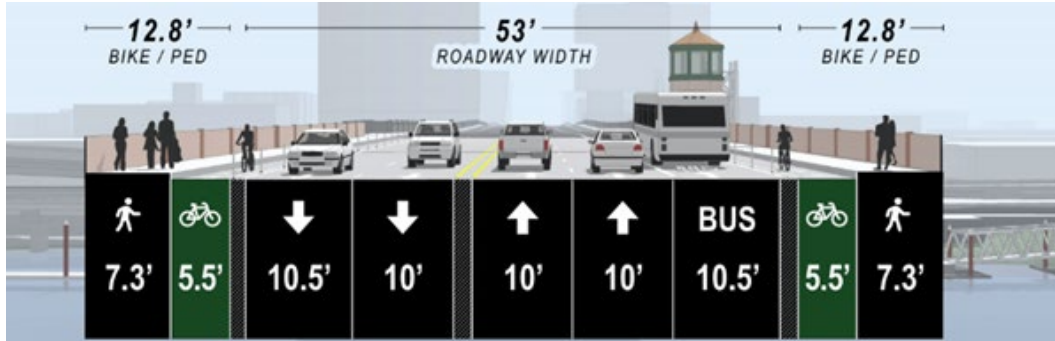


Note: The Refined Long-span Alternative was studied with both vertical lift and bascule bridge options for the center span. The bascule option would have lower impacts and costs.

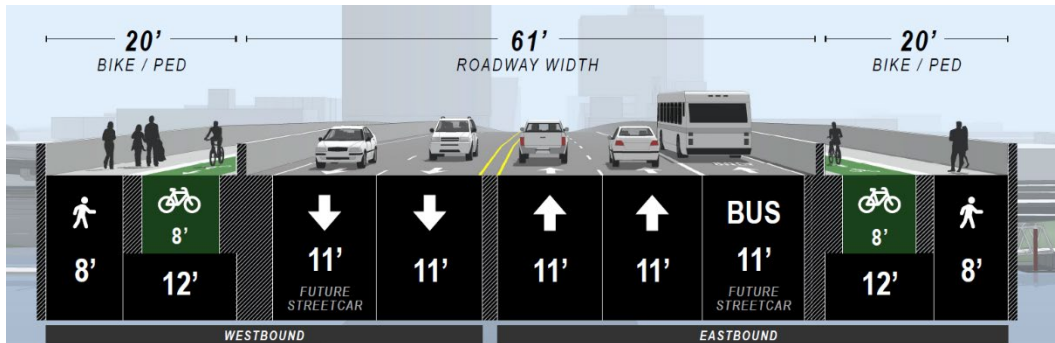
2.4.2 Cross Sections

The Refined Long-span Alternative would have one less lane for motor vehicles than the Draft EIS alternatives and the existing bridge. It would dedicate more of the cross section (28 to 34 feet) to bicyclists and pedestrians than the existing bridge (25.6 feet), but less than proposed for the Draft EIS Long-span Alternative (40 feet). While the Project is studying a range of potential sidewalk/bicycle lane widths (14 to 17 feet in each direction, for a total of 28 to 34 feet), the graphics show only the middle of that range (15.5 feet in each direction). Various vehicle lane widths, shy distances, and shoulder widths are also being considered. The width ranges being considered do not have significant differences in impacts.

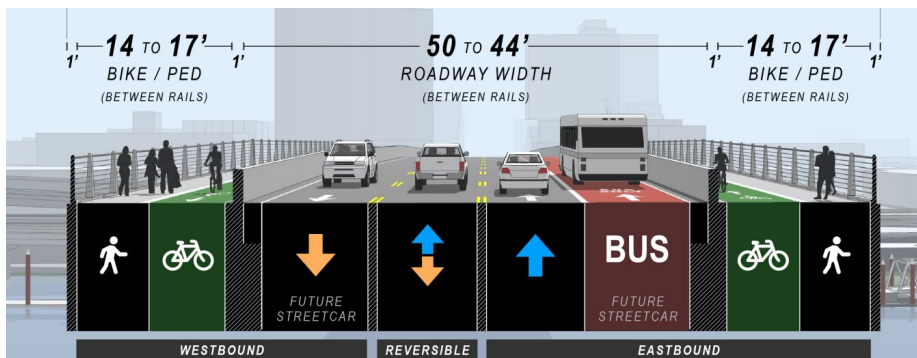
Figure 2.4-7. Bridge Width – Cross Section over River



Existing Bridge Width



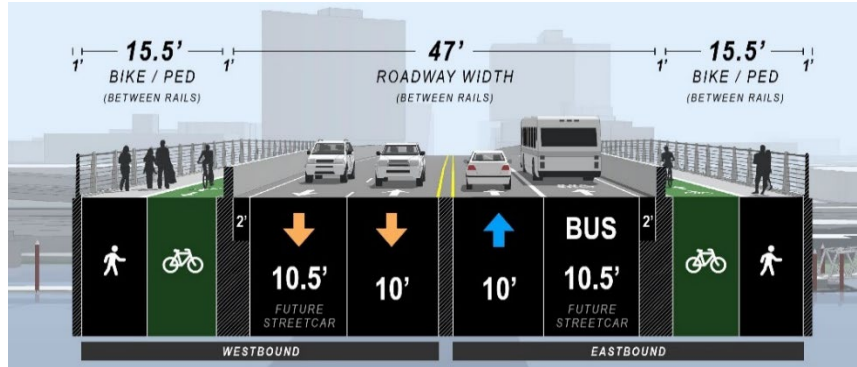
Draft EIS Long-Span Bridge Width



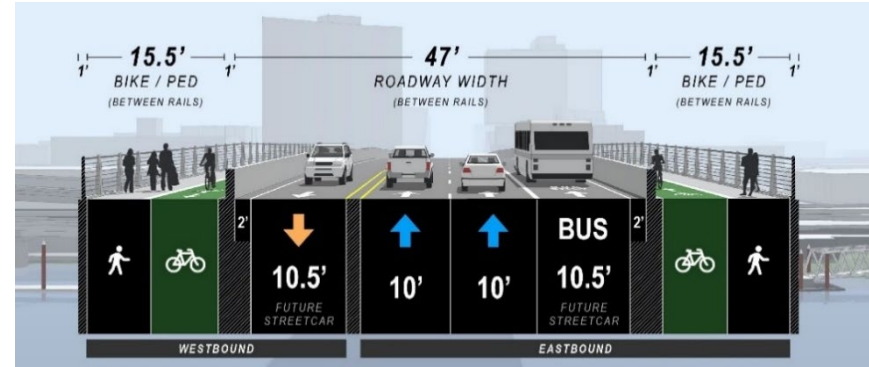
Refined Long-Span Bridge Width

Figure 2.4-8. Refined Long-Span Lane Configuration Options

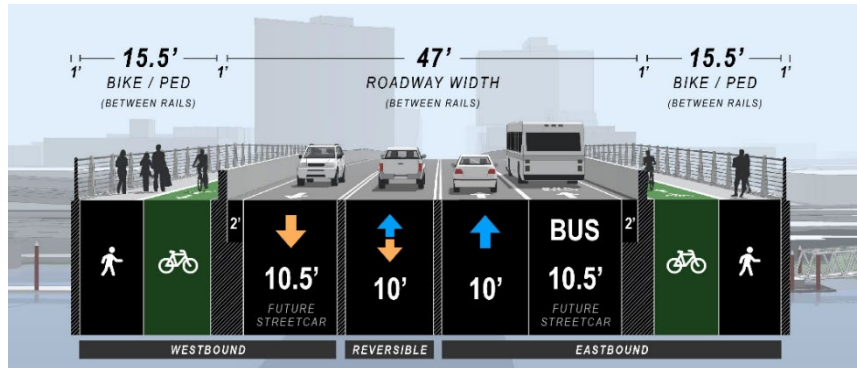
Four different lane configuration options are being evaluated for the Refined Long-span Alternative.



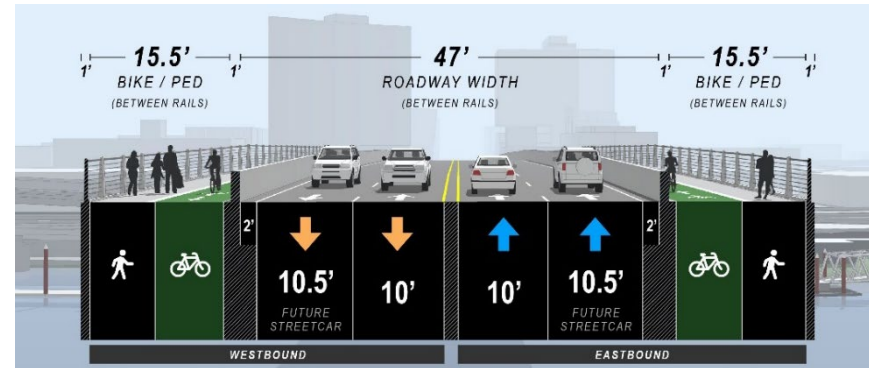
Option 1 – Two Westbound Lanes | One Eastbound + One Bus Lane



Option 2 – One Westbound Lane | Two Eastbound + One Bus Lane



Option 3 – Reversible Lane



Option 4 – Two Westbound Lanes | Two Eastbound Lanes (Bus Queue Jump)

Note: The sidewalk, bicycle lane and vehicle lane widths shown on the graphics are only representative. A range of potential widths for different modes are being considered (see Figure 2.4-7) and would be determined in final design. The analysis shows that within the range of sidewalk, bicycle lane (14 to 17 feet in each direction) and vehicle lane widths (10 to 10.5 feet) being considered, the differences in impacts are not significant.

2.4.3 West Approach over Gov. Tom McCall Waterfront Park

The view of the existing bridge from Gov. Tom McCall Waterfront Park is shown in Figure 2.4-9 (looking south) and in Figure 2.4-12 (looking north). The Refined Long-span would have a girder bridge for the west approach (see Figure 2.4-11 and Figure 2.4-15), which would be about the same width as the existing bridge and substantially narrower over Waterfront Park compared to the Draft EIS Long-span. The Draft EIS Long-span includes bridge types that would have above-deck structure over Waterfront Park (such as a tied-arch or cable-stayed [see Figure 2.4-10, Figure 2.4-13, and Figure 2.4-14] or a through-truss bridge). The Refined Long-span Alternative requires two sets of columns in the park (versus five with the existing bridge and one with the Draft EIS Long-span).

Figure 2.4-9. Existing View – Looking South from the Japanese American Historical Plaza in Gov. Tom McCall Waterfront Park



Figure 2.4-10. Draft EIS Long-Span Tied-Arch – Looking South from the Japanese American Historical Plaza in Gov. Tom McCall Waterfront Park



Figure 2.4-11. Refined Long-Span Girder – Looking South from the Japanese American Historical Plaza in Gov. Tom McCall Waterfront Park



Figure 2.4-12. Existing View – Looking North in Gov. Tom McCall Waterfront Park



Figure 2.4-13. Draft EIS Long-Span Tied-Arch, Looking North in Gov. Tom McCall Waterfront Park

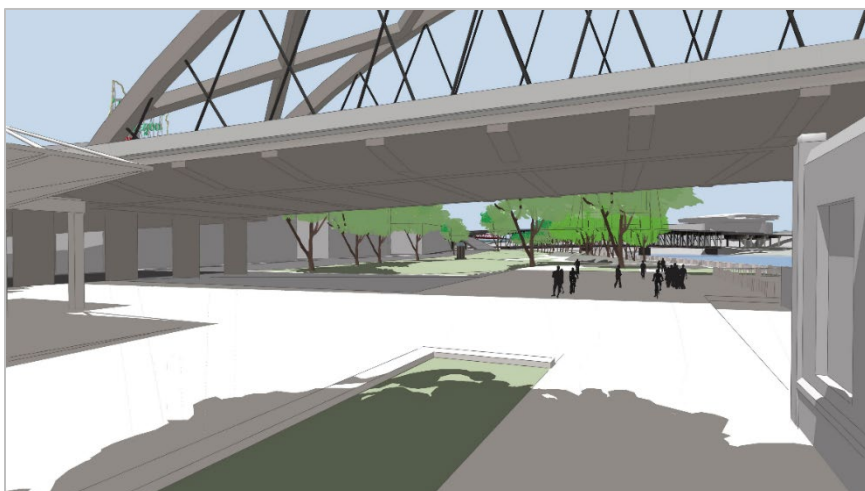


Figure 2.4-14. Draft EIS Long-Span Cable-Stayed – Looking North in Gov. Tom McCall Waterfront Park

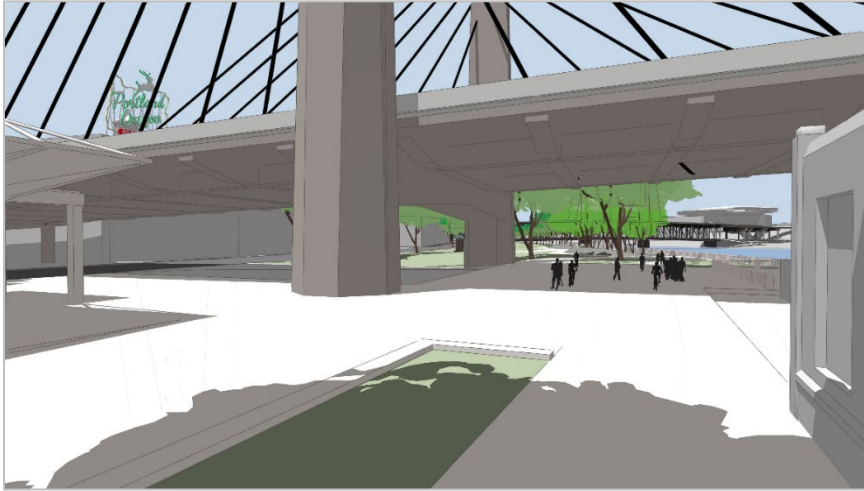


Figure 2.4-15. Refined Long-Span Girder – Looking North in Gov. Tom McCall Waterfront Park



2.4.4 East Approach

The Refined Long-span Alternative evaluates a potential span length change for the east approach tied-arch option that would minimize the risks and reduce costs associated with placing a pier and foundation in the geologic hazard zone that extends from the river to about E 2nd Avenue. The refined tied-arch option would place the eastern pier of the tied-arch span farther east. Increasing the length of the tied-arch span would also reduce the length and depth of the subsequent girder span to the east, which reduces its cost and increases the vertical clearance over the Burnside Skatepark. Two options were analyzed, one that terminates on the east side of 2nd Avenue (Option 1, see Figure 2.4-16) and one slightly shorter, terminating just west of 2nd Avenue (Option 2, see Figure 2.4-17). Option 1 was ultimately dropped from consideration because it would severely impact freight access to the adjacent businesses.

Figure 2.4-16. Refined Tied-Arch Option 1 – East Side of 2nd Avenue



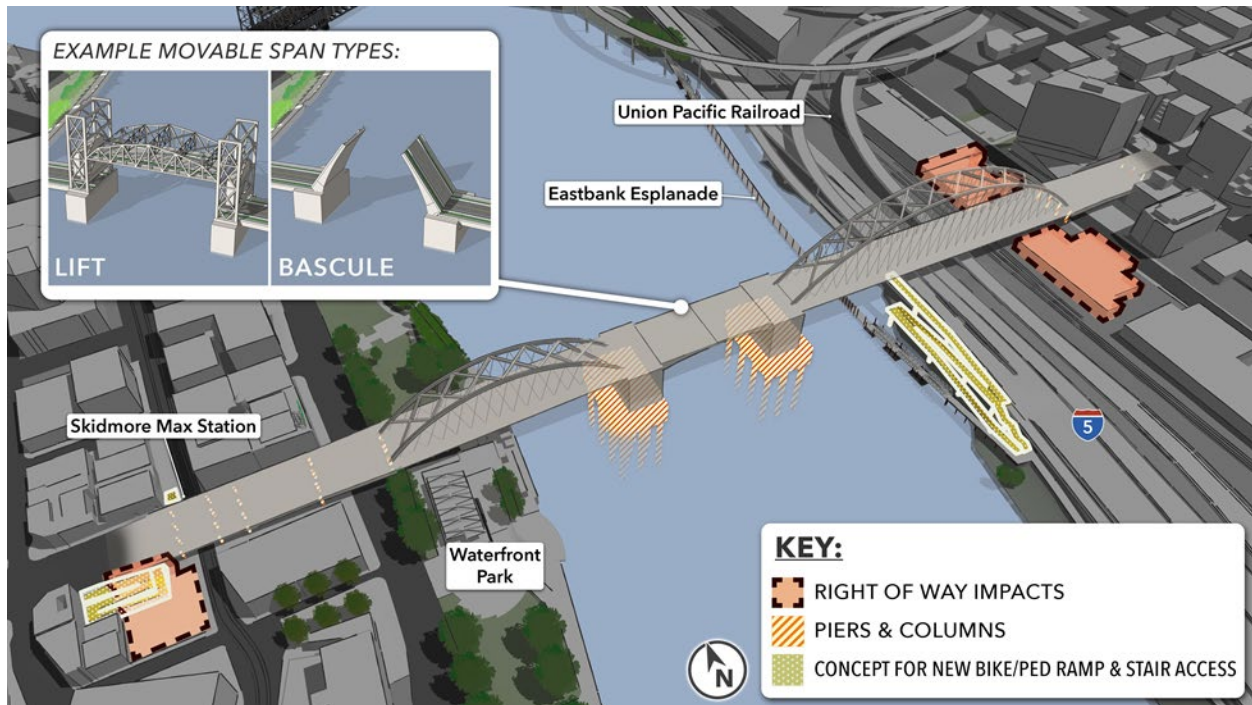
Figure 2.4-17. Refined Tied-Arch Option 2 – West Side of 2nd Avenue



2.4.5 ADA, Bicycle, and Pedestrian Access to the Vera Katz Eastbank Esplanade and West 1st Avenue

The Draft EIS evaluated several options for providing improved bicycle, pedestrian, and ADA access between the bridge and the Vera Katz Eastbank Esplanade near the east end of the bridge and between the bridge and 1st Avenue near the west end of the bridge. This SDEIS studies more options for the W 1st Avenue connection, and it further evaluates options for an Esplanade connection, as discussed below.

Figure 2.4-18. Draft EIS Long-Span ADA Access – Ramp/Stair Access



West Side Access to 1st Avenue

Near the west end of the existing bridge, there are stairs on both sides of the bridge connecting the existing bus stop on the bridge to 1st Avenue (under the bridge) where the existing Skidmore Fountain MAX station is located. The Draft EIS evaluated stair and ramp options at this location. The Refined Long-span Alternative evaluates replacing the stairs with ADA-accessible elevators combined with stairs (see Figure 2.4-19 and Figure 2.4-20) and improving the sidewalks between the end of the bridge and W 1st Avenue to create a safer and more convenient surface-level (no stairs, ramps, or elevators) ADA and pedestrian connection between the bridge and 1st Avenue. An important factor is that TriMet is considering the option to permanently relocate the bus stop off the Burnside Bridge, and TriMet is studying a proposal to close the existing Skidmore Fountain MAX station located under the bridge. The potential bus stop relocation and the potential MAX station closure would substantially reduce the purpose of a stair, ramp, or elevator connection to 1st Avenue at this location. There is a possibility that the stairs would, therefore, not be replaced. In that case, the ADA, pedestrian, and bicycle access from the bridge to 1st Avenue would be via improved sidewalks connecting the west end of the bridge at 2nd Avenue to 1st Avenue just one block east. If elevators with stairs become part of the refined Preferred Alternative, that decision would be revisited during final design when the future status of the Skidmore Fountain MAX station could be more certain.

Figure 2.4-19. Existing – Looking North



Figure 2.4-20. Refined Long-Span ADA and Pedestrian Access – Looking North



Vera Katz Eastbank Esplanade Access

Currently, a stairway (owned by the City of Portland and installed via a revocable permit) connects the southern (eastbound) sidewalk on the Burnside Bridge to the Vera Katz Eastbank Esplanade approximately 50 vertical feet below it. The stairway is primarily for pedestrians because it is not ADA-accessible and requires bicyclists to carry their bikes up or down the stairs. There is no existing connection between the Esplanade and the bridge's northern (westbound) sidewalk and bike lane. There is ADA, pedestrian, and bicycle access to the bridge approximately 1,000 feet east of these stairs at the eastern end of the bridge.

Replacing the existing bridge would require disconnecting the City-owned stairs. With the Refined Long-span Alternative, the existing stairway could likely be left in place and then connected to the new bridge. Replacing those stairs in kind after construction is also feasible. The Draft EIS evaluated the following range of options as potential upgrades to the existing staircase:

1. Stairs and elevator on the south side of the bridge only, with a signalized mid-block crossing on the bridge connecting the north and south sidewalks and bike lanes
2. Stairs and elevator on both sides of the bridge

3. Ramp on the north side of the bridge, and ramp and stairs on south sides of the bridge
4. Ramp and stairs on south side only, with a signalized mid-block crossing on the bridge connecting the north and south sidewalks and bike lanes

Because the cost and environmental impacts (flooding, aquatic habitat loss, vegetation loss, parkland footprint, and visual intrusion) of the ramp options would be substantially greater than with any of the other connection options, and because some ADA advocates have expressed concern that long ramps would be a barrier to many people in wheelchairs or with other mobility requirements, the Refined Long-span Alternative studied in this SDEIS evaluates a refined elevators/stairs option for direct Vera Katz Eastbank Esplanade access (see Figure 2.4-21 and Figure 2.4-22). At the same time, bicycle advocates have expressed a preference for the convenience and reliability of ramps over elevators, and some ADA advocates have expressed concern about the safety, reliability, and sanitary nature of elevators. In addition, the City of Portland has expressed interest in attempting to secure the funding, potentially with other partners, that would be needed to replace its existing stairs with ramps. Such ramps, or any other pedestrian, bicycle, or ADA connection to the Esplanade, could be implemented as an independent project (with independent purpose) that may or may not occur simultaneously with the EQRB Project; therefore, it is possible that the EQRB Project would either not provide any direct connection to the Esplanade or could connect the City's existing staircase to the new bridge. The staircase was originally installed by the City under a revocable permit from the County.

Figure 2.4-21. Existing Vera Katz Eastbank Esplanade Pedestrian Access



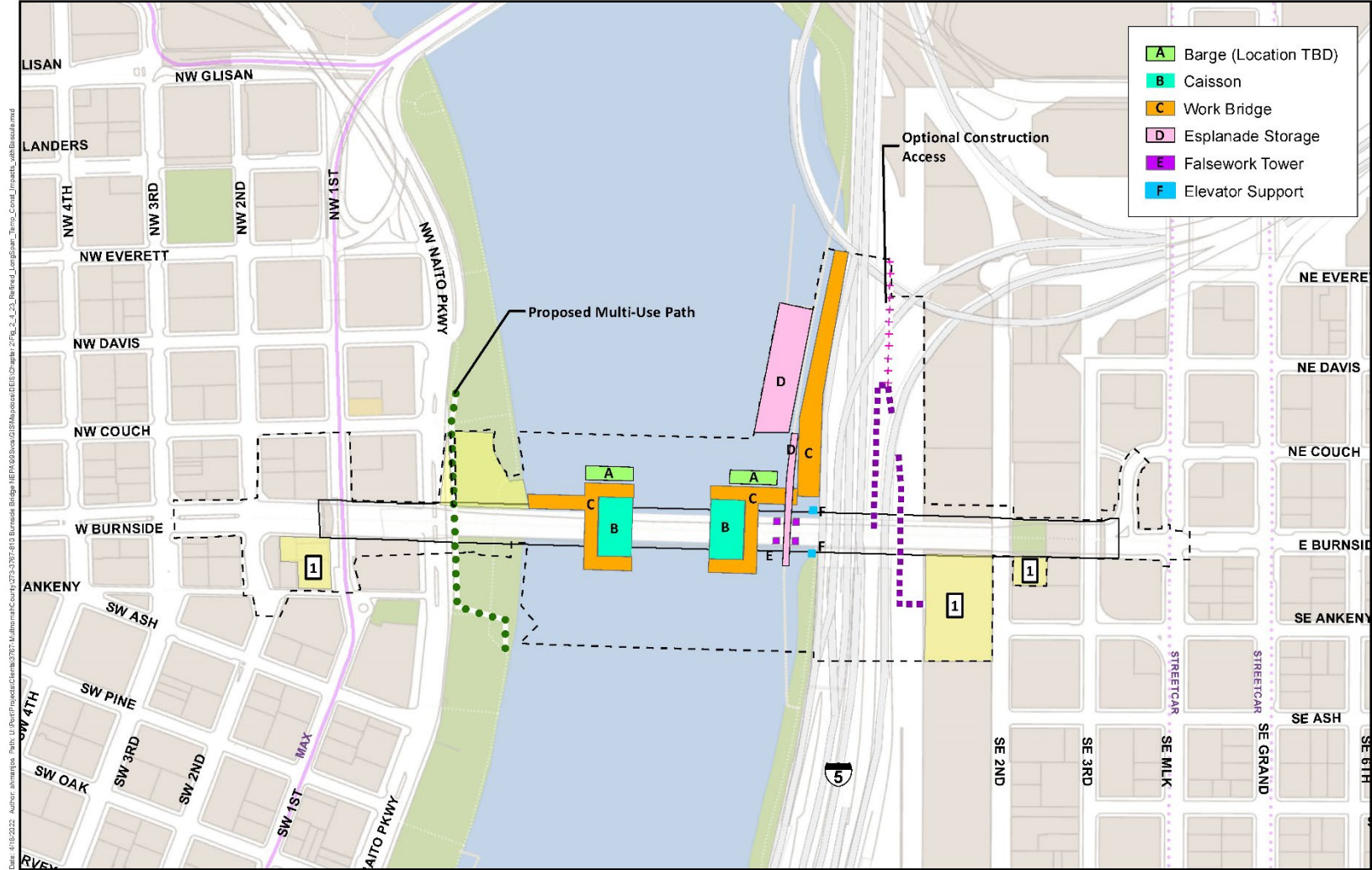
Figure 2.4-22. Refined Vera Katz Eastbank Esplanade ADA/Pedestrian Access

See the *EQRB Revised Active Transportation Access Options Memo* (Multnomah County 2022h) for additional analysis and findings, including potential measures to help mitigate maintenance and security issues associated with public elevators. For any option selected, the Portland Bureau of Transportation has stated that an 8-foot-wide minimum pedestrian through-zone must be provided.

2.4.6 Temporary Construction Impacts

Compared to the Draft EIS Long-span, the Refined Long-span construction area would be smaller on the south side of the bridge within Gov. Tom McCall Waterfront Park (due to a narrower bridge) and along the eastern shoreline south of the bridge (due to eliminating the ramp options for bike-ped-ADA access between the bridge and the Vera Katz Eastbank Esplanade). The construction area in Waterfront Park north of the bridge is also different from the Draft EIS; there is a reduced impact on the Japanese American Historical Plaza that would preserve 10 trees and a berm area (this change from the Draft EIS would apply to all build alternatives). At the far west end, the construction area is enlarged to include proposed sidewalk improvements between 2nd and 3rd Avenues and between Ankeny and Couch Streets. The in-water construction area would be slightly larger with a vertical lift than with a bascule movable span (see Figure 2.4-23 and Figure 2.4-24).

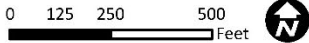
Figure 2.4-23. Refined Long-Span (with Bascule Lift) Temporary Construction Impacts



Date: 6/15/2022 Author: ahm/psw Path: U:\P\Projects\Clients\3767-Multimodal\IC\cur\12743207-610 Burnside Bridge\ERP\6936\2022\GIS\MapDocs\DEIS\Chapter_2\Fig_2_4_23_Refined_LongSpan_Temp_Const_Impacts_withBascule.mxd



Source:
City of Portland,
HDR, Parametrix

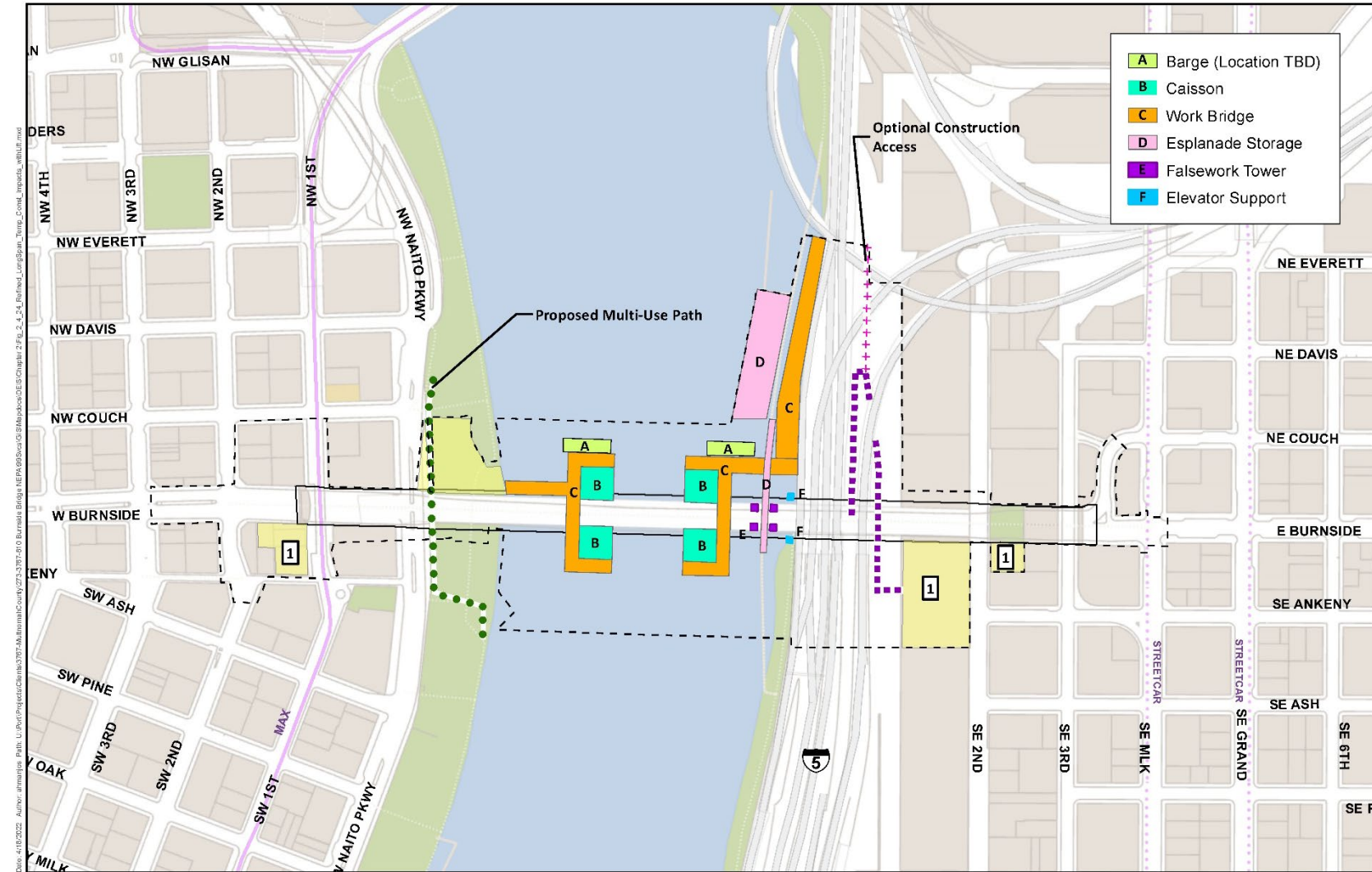


- Refined Long-span Alternative Footprint
- Boundary of Potential Construction Impacts
- Construction Staging 1
- Proposed Construction Access
- Proposed Multi-Use Path
- +++ Optional Construction Access

Temporary In-Water Impacts
Replacement Alternative
with Refined Long-span Alternative
with Bascule Lift

Earthquake Ready Burnside

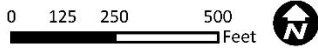
Figure 2.4-24. Refined Long-Span (with Vertical Lift) Temporary Construction Impacts



Date: 4/18/2022, Author: amarrigos, Path: U:\proj\Project\Clients\7077\Multimedia\Courtesy\273-3787-510 Burnside Bridge - EIPA\89\GIS\Mapbook\CE\Chapter 2\Fig_2_4_24_Refined_LongSpan_Temp_Impacts.mxd



Source:
City of Portland,
HDR, Parametrix



- Refined Long-span Alternative Footprint
- Boundary of Potential Construction Impacts
- Construction Staging 1

- Proposed Construction Access
- Proposed Multi-Use Path
- +++ Optional Construction

Temporary In-Water Impacts
Replacement Alternative
with Refined Long-span Alternative
with Vertical Lift

2.5 Cost Estimate

The current cost estimates range from \$830 to \$915 million for the Refined Long-span Alternative and its range of design options being considered in this SDEIS. Based on a high-level assessment, the Refined Long-span Alternative would be the lowest-cost alternative and the Couch Extension Alternative would be the highest-cost. Given the current conceptual level of design, these preliminary cost estimates are expressed as a probable range, which means that a final cost is expected to be within that cost range. As part of the Federal Highway Administration Major Project process, a risk analysis would be performed for any refinements to the Preferred Alternative in summer 2022. The cost range for the Refined Long-span, Refined Short-span, and Refined Couch Extension Alternatives (see Attachment N, Cost Risk Assessment Cost Estimate Summaries) reflects the bridge types assumed and an assessment of risks with each bridge alternative. As the project design advances, the cost range would narrow. The final cost would be influenced by design details, bridge type selection, risk mitigation, market conditions at the time of construction, and using a construction manager/general contractor contracting method to identify cost-saving opportunities.

2.6 Preferred Alternative

The EQRB Draft EIS identified the Long-span Alternative with no temporary bridge as the Preferred Alternative. This SDEIS evaluates potential design refinements to the Preferred Alternative that could reduce the construction cost while also meeting the project purpose and need.

2.6.1 Draft EIS Preferred Alternative

This section summarizes the Draft EIS alternatives evaluation process that led to the identification of a Preferred Alternative in the Draft EIS.

In June 2020, following almost 2 years of meetings, analysis, and input, the Project's Community Task Force (CTF) recommended that the Long-span Approach Alternative and the No Temporary Bridge Option be the Preferred Alternative. The task force's process to reach that recommendation included identifying the community's values, defining evaluation criteria and measures, and reviewing performance and impacts of the alternatives and options. The CTF considered input from the team's technical experts, from resource agencies and participating agencies, and from other stakeholders including the public.

In August 2020, the project team solicited input on the CTF recommendation from multiple stakeholder groups, agencies, and the public through online open houses, an online survey, and web meetings. This input, which indicated broad support (85 percent) for the Preferred Alternative recommendation, was provided back to the CTF which then reconfirmed its recommendation in September 2020. The recommendation was then endorsed by the Project's policy group on October 2, 2020. The Multnomah County Board of Commissions adopted a resolution on October 29, 2020, expressing approval for the recommended Preferred Alternative.

The CTF recommendation included consideration of how the alternatives performed on 49 different criteria covering 13 different topics. The Long-span Alternative scored 25 and 20 percent higher than the Retrofit Alternative and the Couch Extension Alternative, respectively, and just a little higher (about 4 percent) than the Short-span Alternative. In addition to the scoring, the CTF and others who weighed in considered other factors.

2.6.2 Potential Refinements to the Preferred Alternative

After the publication of the Draft EIS, updated cost and funding analysis identified a substantial risk that the construction cost of any of the build alternatives might exceed the availability of local, state, and federal funds to dedicate to the Project. Therefore, County leadership directed the project team to identify and evaluate potential ways to reduce the overall cost of the Draft EIS Long-span Alternative (the Preferred Alternative) while still meeting the purpose and need and achieving many of that alternative's performance and environmental advantages. Initial findings regarding the cost savings and tradeoffs of these potential revisions were provided to the public for comment in November and early December 2021. In early 2022, project committees endorsed the refinements to the Preferred Alternative, and on March 17, 2022, the Multnomah County Board of Commissioners passed a resolution adopting the refinements. Final decisions will be made as part of the NEPA record of decision expected in late 2022.

The following outlines the elements of the Draft EIS Preferred Alternative that are being considered for refinement.

Bridge Width

The Draft EIS Preferred Alternative is a five-lane, 110- to 120-foot-wide bridge (range depends on bridge type). The narrower bridge studied in this SDEIS would be 82 to 93 feet wide over the river and would have one less traffic lane and narrower bicycle and pedestrian facilities. It would accommodate approximately 78 feet (comparable to the existing bridge) for four vehicle lanes, as well as bike lanes and sidewalks in each direction. Narrowing the bridge poses the single greatest potential to reduce project costs.

- **Lane Configuration** – The Draft EIS Preferred Alternative studied one five-lane configuration for the bridge cross section. This SDEIS evaluates four different lane configurations for a four-lane bridge. As the road authority, the City of Portland will be asked to declare its preferred lane configuration.
- **Bicycle and Pedestrian Facilities** – The Draft EIS Preferred Alternative includes 40 feet of cross section dedicated to bicycles and pedestrians. As noted above, bridge width, whether for vehicles or active transportation, is a substantial factor in project cost, which is why this SDEIS studied a narrower bridge. The SDEIS studied bicycle lane/sidewalk width options ranging from 28 to 34 feet (summing both directions); narrower than the Draft EIS alternative but still wider than existing (25.6 feet). The exact allocation likely would not be decided until final design. All of the build alternatives studied in the Draft EIS and SDEIS include physical barriers between vehicle lanes and the bicycle lanes, which would be in addition to the above bicycle and pedestrian facility dimensions.

Bridge Type

- **West Approach** – The Draft EIS Preferred Alternative includes a wide range of bridge types for the west approach over the west channel of the river, Gov. Tom McCall Waterfront Park, and Naito Parkway. The SDEIS evaluates a refined girder bridge that would be the low-cost option and would have lower impacts compared to the other bridge types for the west approach.
- **East Approach** – The Draft EIS Preferred Alternative includes three different bridge types for the east approach including cable-stayed, tied-arch and through-truss. The SDEIS adds two refined tied-arch options that could reduce costs by reducing geotechnical mitigation needs.

Ancillary Elements

- The Draft EIS Preferred Alternative does not include decisions regarding potential ADA, bicycle, and pedestrian connections to the Vera Katz Eastbank Esplanade or to 1st Avenue. Such a connection to the Esplanade would serve no seismic resiliency function and is not needed to meet the project purpose and need; therefore, the Project could move forward with any or none of the potential connection options. Providing no connection, or reconnecting the existing City-owned stairs, would allow the City or others to pursue a new connection as a separate project with its own purpose, funding, and construction. At a minimum, the County would continue to coordinate with the City to ensure that the new bridge would be designed and built so as to not preclude future connections to the Esplanade.

2.6.3 Preferred Alternative Evaluation

The following summarizes the primary advantages of the Draft EIS Long-span Alternative relative to all the other Draft EIS build alternatives as described in the Draft EIS; in other words, it summarizes why the Draft EIS Long-span was selected as the Preferred Alternative in the Draft EIS. The following also describes how the performance of the Refined Long-span Alternative compares to the Draft EIS Long-span. Overall, the Refined Long-span would perform very similar to the Draft EIS Long-span, including for the core purpose of the Project (seismic resiliency) and for impacts and benefits to parks and equity. Because it would have one less motor vehicle lane, it would not perform as well for peak period traffic or transit. However, the narrower bridge and refined bridge designs would substantially reduce project costs and would reduce impacts for historic, natural, and visual resources. The following also summarizes how the refined versions (narrower bridge with four lanes) of the Short-span and Couch Extension Alternatives compare with the Refined Long-span and other alternatives.

- **Seismic Resiliency** – All the build alternatives would be seismically resilient, but the Long-span Alternative (Draft EIS and Refined versions) would carry the least risk. The Long-span Alternative would place the fewest piers in the geologic hazard zones (one, compared to four to five with the Short-span and eight with the Couch Extension Alternative). A large earthquake is expected to liquefy the entire eastern slope and a small portion of the western slope, which would cause lateral spread (essentially a landslide or mudslide) that would exert massive lateral forces on any piers in those zones (the farther down slope, the greater the force). The other alternatives would require significant jet grouting to stabilize the slope, but the Long-span Alternative (Draft EIS and Refined versions) would largely avoid this risk by installing a very long approach span on the east side that would require only one pier near the upper portion of the zone. With the Refined Long-span tied-arch option, that pier would be a little farther upslope than with the Draft EIS Long-span. On the west side, the Draft EIS Long-span would have no piers in the geologically hazardous zone, and the Refined Long-span would have one.
- **Parks and Recreation** – With only one set of columns (the fewest of any alternative) in Gov. Tom McCall Waterfront Park, the Draft EIS Long-span Alternative would open the most new space in the park, create views to the river from the park space under the bridge, and improve personal security in the public spaces under the bridge. The Refined Long-span (girder bridge) would need two sets of columns in the park (the same as the Short-span and Couch Extension Alternatives, and three fewer than existing). All the replacement alternatives (four- and five-lane options) would avoid permanent impacts to the Burnside Skatepark, which would be removed with the Retrofit Alternative. Both the long-span alternatives would have the shortest-duration closure (18 months) of the Vera Katz Eastbank Esplanade during construction, whereas the Short-span and Couch Extension Alternatives would close the facility for 30 months. The closure

duration would increase if the Project builds a ramp connection to the Esplanade. The ramp options evaluated in the Draft EIS would close the Esplanade for 3.5 to 4.5 years total with any of the bridge alternatives.

- **Historic Resources** – The Refined Long-span Alternative, as well as the Short-span and Couch Extension Alternatives, with a girder bridge for the west approach would avoid causing an adverse effect on the Skidmore/Old Town Historic District (a National Historic Landmark). Analysis and agency input received after publication of the Draft EIS indicates that the other bridge types (cable-stayed, tied-arch, or through-truss) that were considered for the Draft EIS Long-span in the west approach, would be expected to have an adverse effect on the historic district. Only the Retrofit Alternative would avoid removing the historic Burnside Bridge, although all build alternatives would have an adverse effect on that resource. However, the Retrofit Alternative is also the only alternative that would remove the Burnside Skatepark, which has been determined to be eligible for listing on the National Register of Historic Places. None of the alternatives would impact any previously recorded archaeological sites. The Long-span Alternative (both the Draft EIS and Refined versions) would have the least soil disturbance in archaeologically sensitive areas.
- **Social Services and Equity** – As with the other replacement alternatives, both the Draft EIS and Refined version of the Long-span Alternative would maintain the operations of the Portland Rescue Mission during construction (which would be temporarily displaced by the Retrofit Alternative), and like all build alternatives, after the next major CSZ earthquake, it would provide the only seismically resilient crossing in downtown Portland – a significant resource for post-disaster emergency aid and services. The Draft EIS Long-span would provide wider bicycle and pedestrian facilities on the bridge, but both the Draft EIS and Refined Long-span Alternatives, as well as the Short-span and Couch Extension Alternatives, would improve comfort and safety for bicyclists, pedestrians, and ADA users compared to the existing bridge.
- **Natural Resources** – The Refined Long-span Alternative has the smallest permanent footprint in the river including avoiding placing any piers in shallow water habitat. The Draft EIS Long-span Alternative has the second smallest. The Short-span and the Couch Extension Alternatives (four- and five-lane versions) would require an additional pier in the river and would place more total fill in the river compared with the Long-span Alternative.
- **Visual** – Because the Refined Long-span is proposed to have a girder bridge on the west approach and a bascule bridge for the center movable span, it avoids the Draft EIS Long-span adverse visual impacts associated with the tall, above-deck structures (tied-arch, cable-stayed, or through-truss) on the west approach and with the vertical lift for the center span. The girder and bascule bridge type options for these segments would maintain many of the existing, important views of the west side for travelers and park users, including the iconic view of the historic White Stag sign. Also, by avoiding any large above-deck structures for the center span and west approach, a bascule bridge would better maintain the open character of the existing bridge that has been identified as an important visual as well as social amenity.
- **Cost** – The Draft EIS Long-span Alternative was the lowest-cost of the build alternatives in the Draft EIS. The cost of the Refined Long-span Alternative would be substantially lower, thus reducing the risk that the Project could not be adequately funded. The Couch Extension Alternative would be the highest cost, followed by the Short-span Alternative.

Chapter 3 of this SDEIS provides more detail on how the impacts of the Refined Long-span Alternative compare with those of the Draft EIS Long-span Alternative.

Following the public comment period on this SDEIS, there will be continued coordination with participating and permitting agencies, stakeholders, and the public, as well as refinement of the design and analysis. The Federal Highway Administration is expected to sign and issue the NEPA record of decision which will include an endorsement of the preferred alternative.

2.7 Seismic Performance

The following information draws from the *EQRB Seismic Design Criteria Report* (Multnomah County 2022l) and is in addition to the summary discussion of seismic design criteria included in the Draft EIS. The seismic criteria apply to all alternatives.

The relevant seismic design and guidelines that are the basis of the bridge replacement Refined Long-span Alternative can be found in the *EQRB Seismic Design Criteria Report*. The purpose of the seismic design criteria is to identify the minimum requirements for seismic design for the National Environmental Policy Act–phase design assessment. Seismic assessment is based on two hazard assessment methods and corresponding minimum target performance. There are two levels of performance required – one at the Full Operation Design Earthquake ground motion and one at the Limited Operation Design Earthquake ground motion. Seismic performance requirements are as follows:

- Full Operation Design Earthquake – Full operation performance level for the full rupture of the CSZ earthquake. Damage sustained is negligible. Only minimal, superficial repairs and maintenance activities would be required post earthquake without interruption to traffic. All traffic modes are able to use the bridge immediately after the earthquake. Full operation of a movable span would be possible within weeks of the CSZ seismic event.
- Limited Operation Design Earthquake – Limited operation performance level for a design-level probabilistic earthquake with 7 percent probability of exceedance in 75 years (1,000-year return period). Damage sustained is minimal. The bridge allows for emergency vehicle use (after inspection and removal of debris). Movable components may not be operable without repairs. Damage is repairable but may have short-term traffic impacts. The limited operation performance objective will exceed the typical AASHTO-standard “no-collapse” criteria typically identified for the 1,000-year return period event.

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