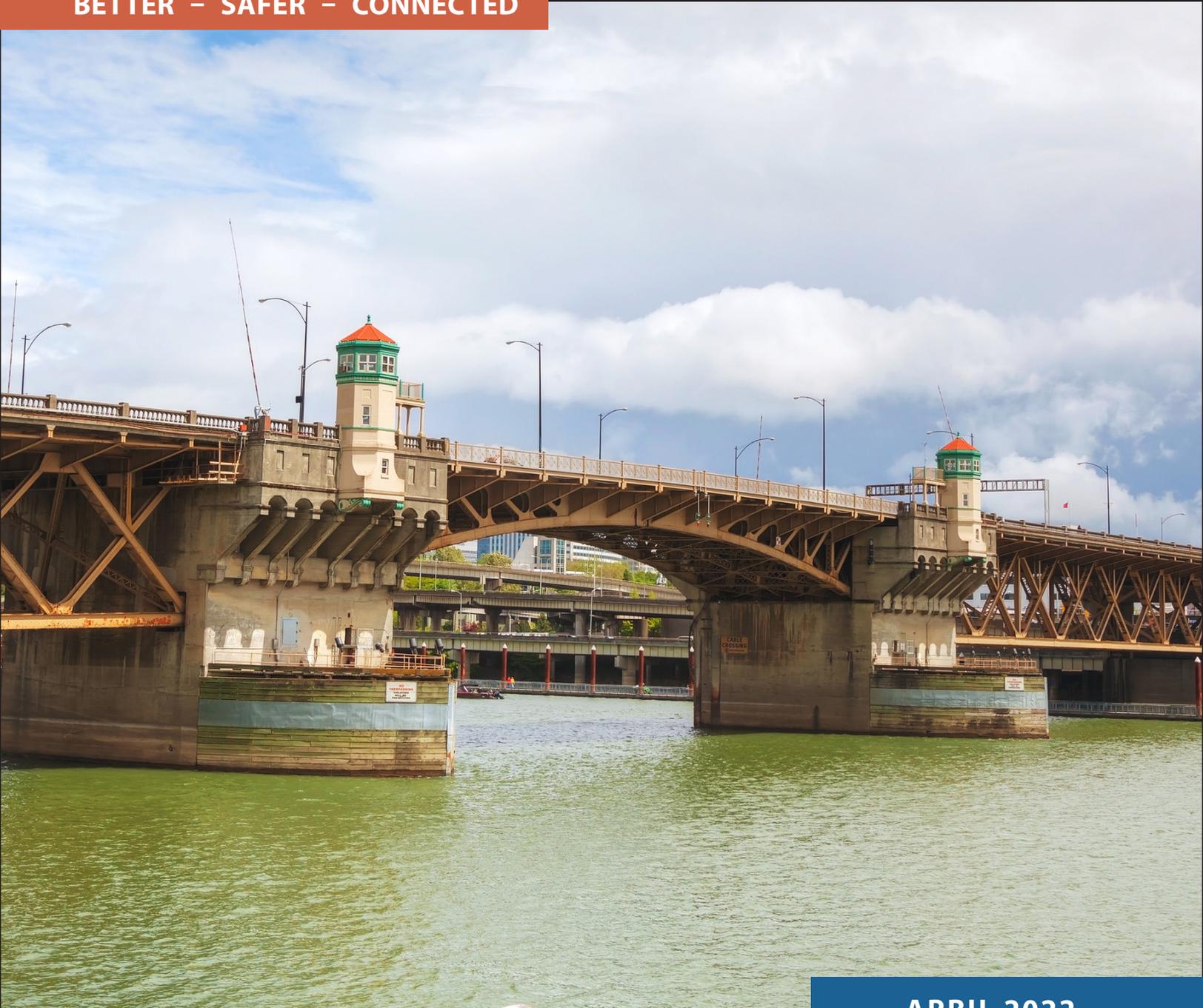


**EARTHQUAKE**  
**READY**  
**BURNSIDE BRIDGE**



**BETTER – SAFER – CONNECTED**



**APRIL 2022**

**Supplemental Draft Environmental Impact Statement**

# Executive Summary

For other questions including those related to the Americans with Disabilities Act and Civil Rights Title VI accommodations call 503-988-5050. You can also call Oregon Relay Service 7-1-1 or email [burnsidebridge@multco.us](mailto:burnsidebridge@multco.us). For information about this project in other languages please call 503-988-5970.

Para obtener información sobre este proyecto en español, ruso u otros idiomas, llame al 503-988-5970 o envíe un correo electrónico a [burnsidebridge@multco.us](mailto:burnsidebridge@multco.us).

Для получения информации об этом проекте на испанском, русском или других языках, свяжитесь с нами по телефону 503-988-5970 или по электронной почте: [burnsidebridge@multco.us](mailto:burnsidebridge@multco.us).

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# Summary

This summary of the Earthquake Ready Burnside Bridge (EQRB) Supplemental Draft Environmental Impact Statement (SDEIS) includes key information from the Draft Environmental Impact Statement (Draft EIS), including the project purpose and need, the Draft EIS range of alternatives, and the Draft EIS process to identify a Preferred Alternative. The Draft EIS is incorporated by reference in this SDEIS.

The EQRB Draft EIS included four build alternatives and identified one (the Long-span Alternative) as the Preferred Alternative. Following the issuance of the Draft EIS, additional cost and funding analysis identified a substantial risk that the construction costs of any of the build alternatives would be too high to reasonably be able to fund. This risk led the County to direct the Project team to identify and evaluate ways to reduce the Project's construction costs while still meeting the Project's purpose and need and striving to achieve the other advantages of the Draft EIS Preferred Alternative. The Refined Long-span Alternative evaluated in the SDEIS addresses that directive.

Following the public comment period on the SDEIS, a Final EIS will be prepared that will respond to comments on the Draft EIS and the SDEIS and will update information as needed. A Record of Decision (ROD) by the Federal Highway Administration (FHWA), either accompanying or following the Final EIS, will document a formal decision on which alternative to build, present the basis for the decision, specify the "environmentally preferable alternative," and identify the adopted means to avoid, minimize, and compensate for environmental impacts.

An EIS is a disclosure document required by the National Environmental Policy Act (NEPA) for projects that could significantly impact human or natural environments. An EIS describes the process through which a project was developed, analyzes the environmental effects of a proposed action including alternatives, and demonstrates compliance with other applicable laws and requirements. In addition to disclosure, it is meant as a tool to assist in decision-making. An EIS is required for any federal action that is expected to have significant environmental impacts or if there is significant public controversy.



## S.1 What is being proposed and why?

### Why are we considering creating an earthquake ready bridge in downtown Portland?

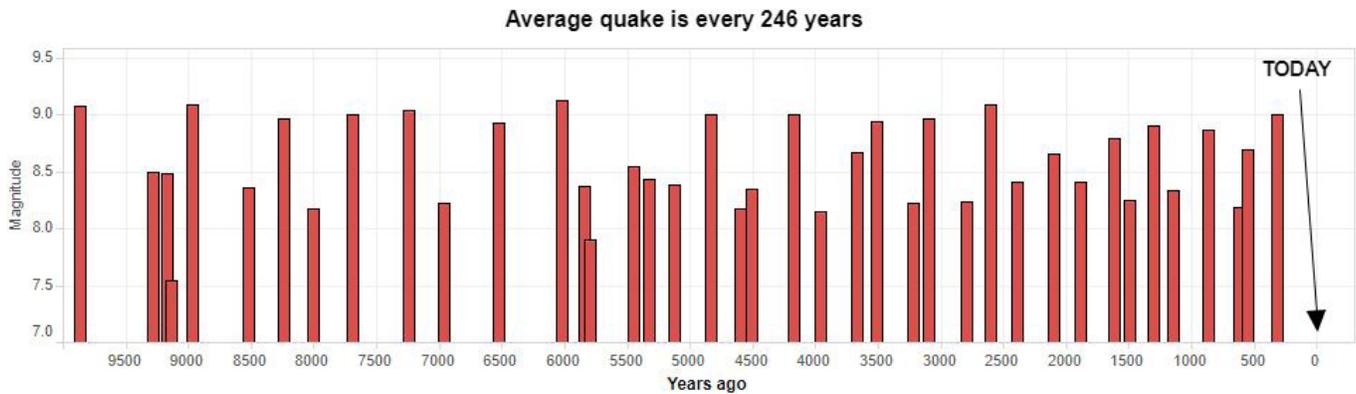
The primary purpose of the EQRB Project is to create a seismically resilient Burnside Street lifeline<sup>1</sup> crossing of the Willamette River that would remain fully operational and accessible for emergency responders, cars, trucks, buses, bikes and pedestrians immediately following the next Cascadia Subduction Zone (CSZ) earthquake. None of the old bridges in downtown Portland were designed to withstand this type of seismic event. A seismically resilient Burnside Bridge would support the region's ability to provide rapid and reliable emergency response, rescue, and evacuation after a major CSZ earthquake, as well as enable post-earthquake economic and community recovery. In addition to ensuring that the crossing is seismically resilient, the purpose is also to provide a long-term, low-maintenance safe crossing for all users for the next 100 years.

### What is the earthquake risk?

Oregon is located in the CSZ making it subject to some of the world's most powerful, recurring earthquakes. Geologic evidence shows that more than 40 such earthquakes have originated along the CSZ fault over the last 10,000 years. The last CSZ earthquake occurred 320 years ago, a timespan that exceeds 75 percent of the intervals between these major earthquakes (see Figure S-1). *The Oregon Resilience Plan* predicts extensive casualties, infrastructure damage, and economic losses from the next CSZ earthquake (OSSPAC 2013).

<sup>1</sup> A lifeline route is a road that allows emergency services to respond after a major earthquake or other disaster, allows evacuation, and allows for transport of food, water, medical supplies and other necessities.

**Figure S-1. Frequency and Magnitude of CSZ Earthquakes**



*Note: Earthquake magnitude (strength) numbers are approximate and based on the Richter scale.*

*Source: Oregon Live n.d.*

We also know that the impacts of the next CSZ earthquake can be reduced through preparation, including creating seismically resilient transportation “lifeline routes,” particularly to provide access to critical facilities in urban areas. Such lifeline routes will facilitate emergency response, rescue, and evacuation, as well as enable post-disaster economic and community recovery, and help prevent permanent population loss and long-term economic decline (OSSPAC 2013). The importance of having a seismically resilient lifeline route across the Willamette River is why Multnomah County has proposed to make the Burnside Bridge earthquake ready.

## Why is the Burnside Street crossing the best location?

Burnside Street extends 17 miles from Washington County to Gresham with very few overpasses that are vulnerable to collapse. By comparison, I-84, which runs relatively parallel to Burnside Street for the first three miles east of the river, is crossed in this section by 18 overpasses that were not built to current earthquake standards. In addition, unlike nearly all of the other downtown bridges, the Burnside Bridge approaches are not crossed by any I-5 or other highway overpasses that would collapse and block bridge access after a major earthquake.

The Burnside Bridge provides a key link in the Burnside Street lifeline route connecting two sides of our region across the Willamette River. However, at 94 years old, the bridge is an aging structure requiring increasingly more frequent and significant repairs and maintenance.

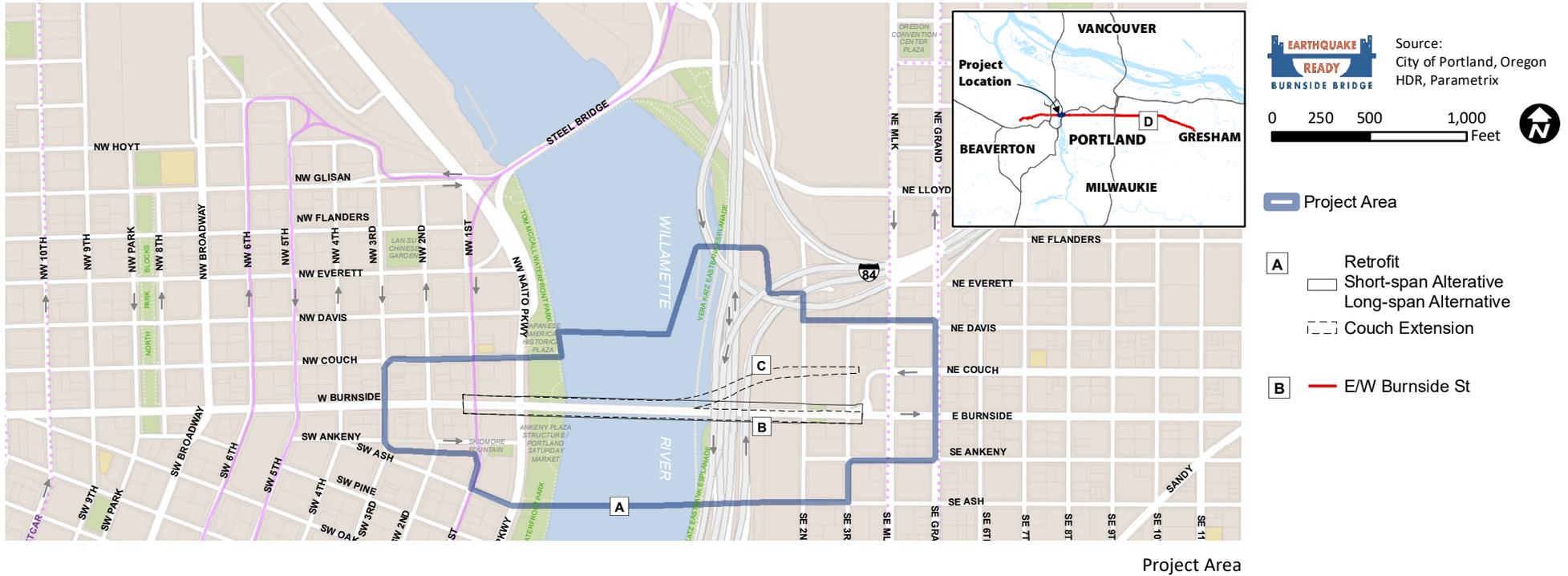
Given its design and condition, the current Burnside Bridge would collapse in the next CSZ earthquake. In fact, none of the aging bridges crossing the Willamette River would be usable after such an event.<sup>2</sup>

The intrinsic resiliency of Burnside Street (not including the existing bridge) is a key reason that a regional task force consisting of Metro, counties, cities, and the Red Cross designated the Burnside Corridor as a “Primary East-West Emergency Transportation Route” (Task Force 1996), a designation later reflected in regional plans (ODOT 2014).

The *Multnomah County Willamette River Bridges Capital Improvement Plan (2015–2034)* (Multnomah County 2015) prioritized creating a Burnside Street river crossing that can withstand a major earthquake. That led to the feasibility study (Multnomah County 2018) that confirmed that Burnside was the best location for creating an earthquake ready bridge in downtown Portland that would meet the proposed action’s purpose and need.

<sup>2</sup> Sources: Multnomah County Willamette River Bridges Capital Improvement Plan 2015; EQRB Geotechnical Report 2020; OSSPAC 2013; Oregon DOT Highways Seismic Plus Report 2014

Figure S-2. Project Area



## What is the project setting?

The Burnside Bridge, which crosses the Willamette River, is located in the center of Portland, Oregon (see Figure S-2). Burnside Street is Portland’s north-south street address baseline, and the Willamette River is the east-west baseline. The bridge provides daily connection across the Willamette River for about 35,000 vehicle trips and over 3,000 pedestrian and bicycle trips per day.

The current Burnside Bridge was built in 1926, replacing the original 1892 bridge. The current bridge supports four lanes of general traffic, one transit-only lane, bicycle lanes, and sidewalks, and provides on-street parking at the far western approach.

# What needs is the Project addressing?

## Need for a Seismically Resilient River Crossing and Lifeline Route

As noted above, all of the older bridges crossing the Willamette River are expected to suffer seismic damage in a major earthquake. None of the downtown bridges, including the newer ones, are expected to be usable immediately following the earthquake (see Figure S-3). Some of the older bridges are expected to collapse; those that don't collapse are expected to suffer moderate to extensive damage. Many of the bridges, including the Tilikum Crossing which is designed to not fail in the next CSZ earthquake, will nevertheless be unusable because the east approach is not seismically resilient due to liquefiable soils, and because the west approach will be blocked by the collapse of major highway viaducts and ramps located above it. The new Sellwood Bridge is also designed to not fail but is far from downtown and may be inaccessible from downtown due to landslide-prone slopes along Macadam Avenue.

Figure S-3. Potential for Bridge and Road Structure Collapse/Failure



Bridge Collapse Potential

**EARTHQUAKE READY**  
BURNSIDE BRIDGE

Source:  
City of Portland, Oregon  
Multnomah Co., Parametrix, ODOT

0 0.5 1 2 Miles

Earthquake Ready Burnside

## Need for Post-Earthquake Emergency Response

In their current condition, none of the designated lifeline routes or evacuation routes across the Willamette River will be available for emergency response, rescue, or evacuation immediately following, or possibly for months after, the earthquake. Figure S-4 is a simulation of how a major CSZ earthquake would impact the existing Burnside Bridge. <sup>3</sup> Although not simulated in this graphic, the I-5 and I-84 ramps on the east side and the Harbor Wall on the west side would also be anticipated to fail.

**Figure S-4. Simulation of Existing Burnside Bridge after CSZ Earthquake**



Source: Multnomah County

<sup>3</sup>This simulation was prepared by the Project Team based on the best available information on the likely magnitude, duration, and behavior of the next CSZ earthquake, as well as analysis of how the CSZ event would be likely to affect different elements of the existing bridge. The full video simulation can be found at: [https://www.youtube.com/watch?v=sn98JkN5HXc&feature=emb\\_title](https://www.youtube.com/watch?v=sn98JkN5HXc&feature=emb_title)

## Need for Post-Earthquake Recovery

Building resilient infrastructure is less costly to a community than losing access to and attempting to rebuild infrastructure following a disaster (Chang 2000). Transportation infrastructure damaged by an earthquake impairs a region's long-term ability to recover economically and socially after a disaster, adversely affecting a region's population and economy for many years after a major earthquake (OSSPAC 2013; Madhusudan and Ganapathy 2011).

## Need for Emergency Transportation Routes and Seismic Resiliency as Stated in Plan and Policy Directives

Local plans and policies that designate Burnside Street as a lifeline and primary evacuation route help describe the need for this Project. In addition, statewide policy describes the need through recommendations for creating seismically resilient transportation routes such as this proposed project. Relevant plans and policies include:



Regional Emergency Transportation Routes (Metro Task Force 1996)



City of Portland Evacuation Plan (Portland BEM 2017)



Oregon Resilience Plan (OSSPAC 2013)

## **Need for Long-Term Multimodal Travel Across the River**

In addition to its function as a lifeline route, Burnside Street serves as an important long-term multimodal (multiple modes of travel such as pedestrians, bicyclists, cars, trucks, and transit) connection between the east and west sides of the Willamette River in downtown Portland and between Gresham and Washington County. The existing Burnside Bridge carries approximately 35,000 vehicles and over 3,000 bicyclists and pedestrians per day. The bridge currently carries three bus routes and is planned to carry a streetcar line. Any changes to the existing crossing should serve not only the post-earthquake lifeline need but should also address the continued long-term need for a safe multimodal crossing.

See Chapter 1 of this SDEIS for the full discussion of the project's purpose and need statement.



## S.2 What are the possible solutions to meet the project purpose?

This section first describes the Draft EIS alternatives followed by the Refined Long-span Alternative studied in the SDEIS.

### How were the alternatives that were studied in the Draft EIS identified?

The process to identify and screen alternatives began in 2016 with the *EQRB Feasibility Study*. The EQRB project team worked with community and agency stakeholders to develop project objectives and a problem statement, build project awareness through early engagement, and analyze more than 100 options for creating an earthquake ready Willamette River crossing. The options covered a wide range of potential solutions including (see Figure S-5):



Preservation alternatives (update the bridge but not to full seismic resiliency, and supplement with a lower investment seismic solution such as trams, ferries, and other technologies)



Seismic retrofit alternatives (retrofit the existing bridge to full seismic resiliency)



Replacement alternatives (replace the existing bridge with a new bridge or tunnel)



Enhanced seismic retrofit alternatives (partial retrofit and partial replacement of existing bridge)



Enhance/replace a different bridge (make a different crossing earthquake ready).

Screening criteria were developed and applied (see the *EQRB Alternatives Screening Technical Memorandum*) with the Project's Stakeholder Representative Group, and the results were shared with other project committees (the Senior Agency Staff Group and the Policy Group) as well as with the public through online events and in-person open houses. Following public input, the feasibility study was completed in November 2018 and the Multnomah County Board of Commissioners adopted the draft Project Purpose and Need and the range of alternatives for further study.

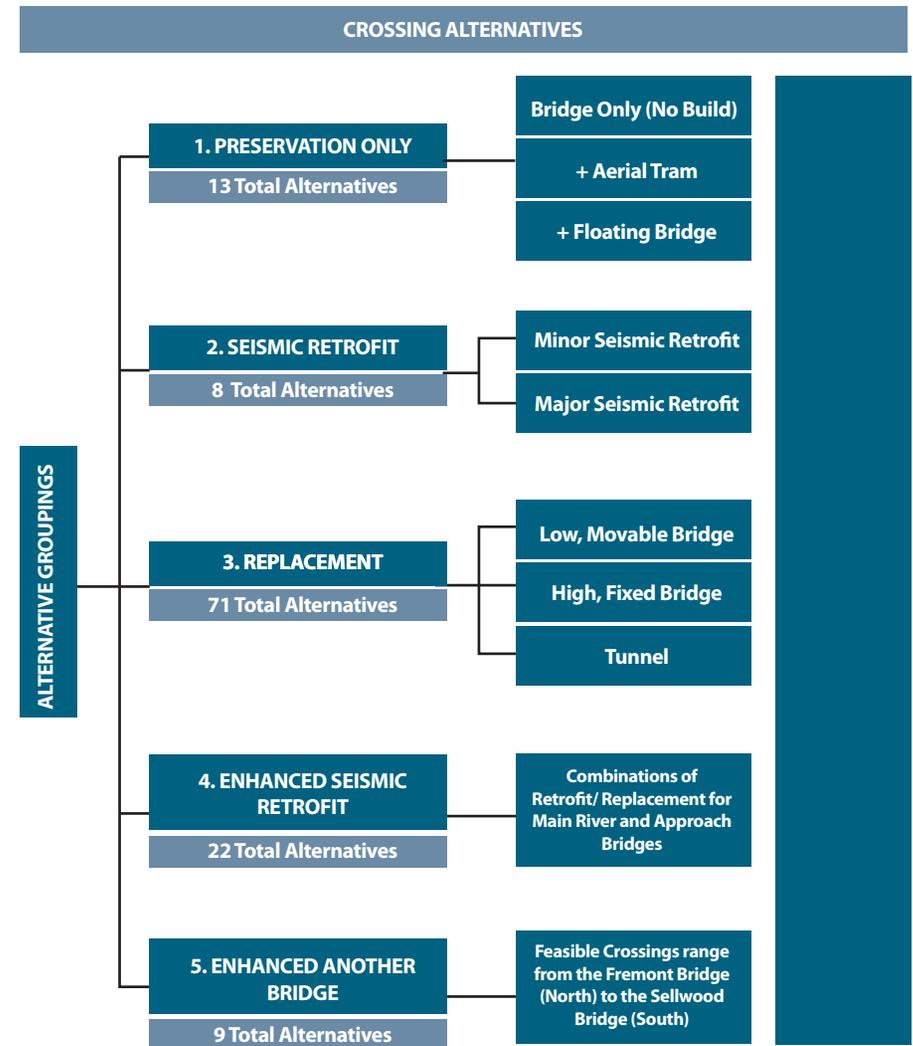
## Informal Scoping and Screening

Following the feasibility study, the project team conducted additional analysis and gathered stakeholder input to further evaluate, test and refine the recommended alternatives prior to initiating an EIS. This analysis and input led to further revisions to the range of alternatives:

- The High Fixed Bridge was dropped from further consideration because of added impacts and costs, and because it could not reasonably meet the US Coast Guard (USCG) vertical clearance requirements.
- Further geotechnical analysis clarified a heightened risk of seismic damage to bridge piers<sup>4</sup> located within deep, liquefiable soils located near both the east and west banks of the river. This led to the development of a “long-span” alternative that would minimize the number of piers within those zones and reduce overall construction costs.
- Agency and stakeholder input influenced the development and location of pedestrian, bicycle and Americans with Disabilities Act (ADA)-accessible connections at both the east and west ends of the bridge.
- Input from social services providers influenced revisions to the west bridge abutment so that the replacement alternatives could avoid blocking essential access doors to the Portland Rescue Mission during construction.
- Users of the Burnside Skatepark requested that the Project preserve the skatepark. In addition, historic preservation specialists determined that the skatepark is eligible for listing on the National Register of Historic Places. Through refined design and construction approaches, three of the four build alternatives studied in the Draft EIS would preserve the skatepark.

As a result of this additional analysis and input, the alternatives were refined, and four were advanced to the Draft EIS.

Figure S-5. Range of Potential Crossing Types Evaluated in the Feasibility Study



<sup>4</sup> Pier (aka, bent) – An intermediate vertical support under a bridge, made up of one or more columns connected at their top-most ends by a cap, strut, or other member. A pier is sometimes differentiated from a bent by the number of columns (one vs. more than one, respectively).

## Alternatives Carried Forward to the Draft EIS

The following summarizes the four build alternatives and options, and the No-Build Alternative, that were studied in detail in the Draft EIS. More detail can be found in Chapter 2 of the Draft EIS or in the *EQRB Bridge Replacement Technical Report* (Multnomah County 2021d).

Because the Project is intended to serve two reasonably foreseeable future conditions (both before and after the next CSZ earthquake), the EIS analysis considers how each alternative would perform in both of those scenarios.

### No-Build Alternative

As required by NEPA, the EIS evaluates a No-Build Alternative and compares its impacts to the proposed build alternatives. The No-Build analysis describes the impacts and outcomes if the proposed action is not implemented. The No-Build Alternative assumes that all other programmed and planned projects would move forward, but that the Burnside Bridge would not be made earthquake ready.

### Build Alternatives – Common Elements of Operations and Design

The four Draft EIS build alternatives are:

- The Enhanced Seismic Retrofit Alternative that would partially retrofit the existing bridge, as well as replace major components required to meet seismic design criteria.
- Three different replacement alternatives that would remove the existing bridge structure and build a new bridge at the same location. These include the Replacement Alternative with Short-span Approach, the Replacement Alternative with Long-span Approach, and the Replacement Alternative with Couch Extension.

Under normal operations, all build alternatives would provide access across the bridge for the same transportation modes that presently use the bridge. They are also being designed to accommodate potential future streetcar service. All build alternatives would also accommodate all river navigation and surface transportation modes (Union Pacific Railroad (UPRR) tracks, I-5, local streets, the MAX light rail transit line, and bicycle and pedestrian paths) that presently pass under the bridge.

All build alternatives would remain fully operational and accessible for all modes of transportation following a CSZ earthquake of up to a 9.0 magnitude on the Richter scale, providing a reliable crossing for emergency response, evacuation, and community and economic recovery.

The replacement alternatives would be designed and constructed to provide at least 2 feet of clearance between the bridge and adjacent buildings to allow independent movement during a seismic event.

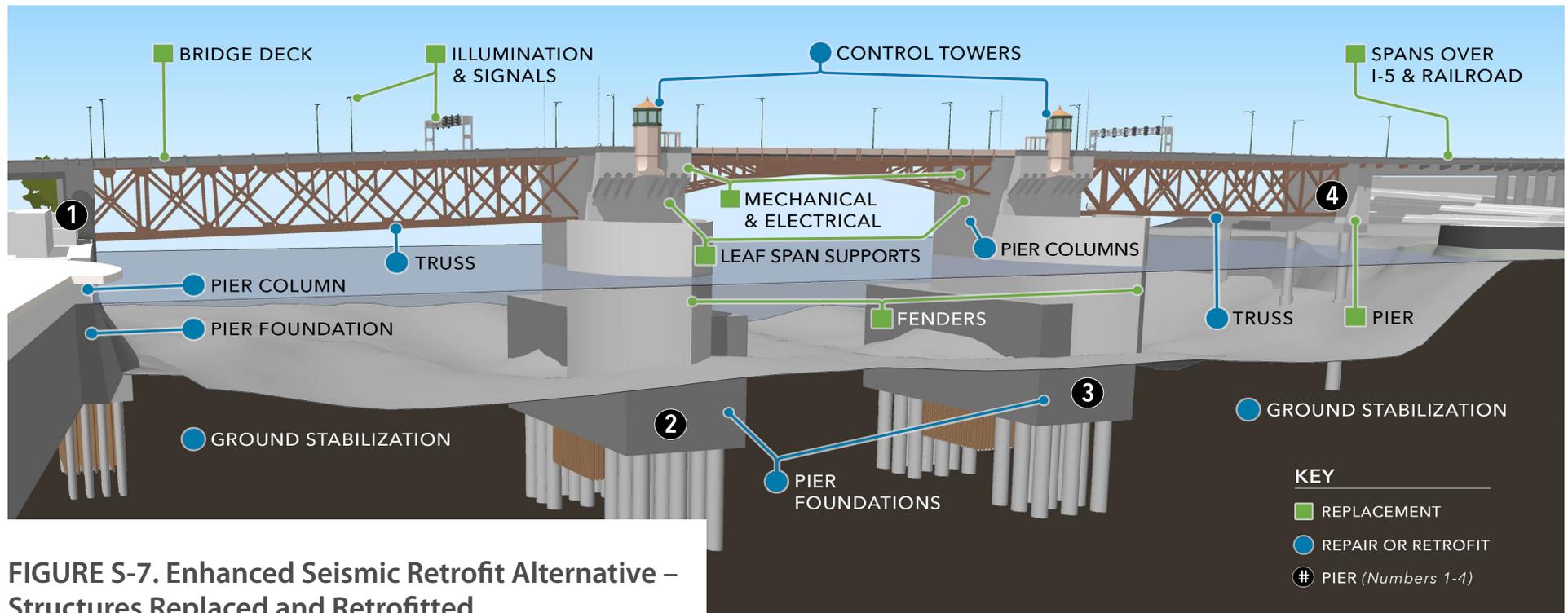
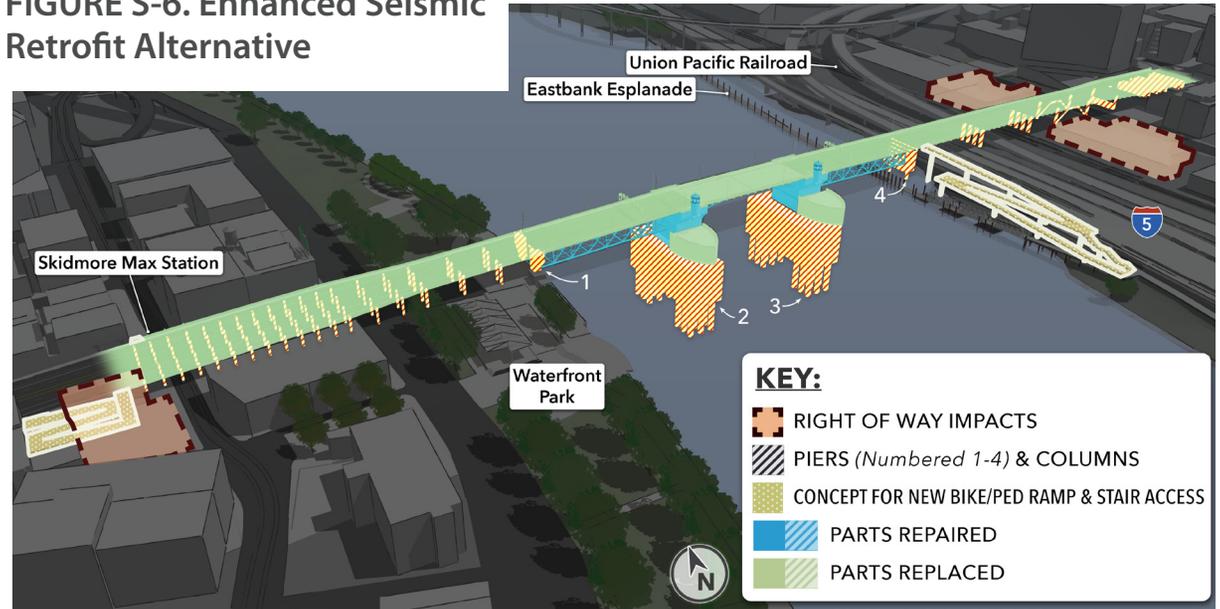
Presently, buildings and elevated highway infrastructure are very close (in some cases, with only a one-inch gap) to the bridge, making it likely that they would knock into each other during a major seismic event and increase the damage to both.

## Enhanced Seismic Retrofit Alternative

With this alternative, some parts of the bridge would be retrofitted and some would be replaced. Figure S-6 is an aerial view of the Retrofit Alternative and Figure S-7 shows which elements would be retrofitted or replaced. See Table S-1 for a comparison of the major bridge elements for all of the build alternatives.

Under this alternative, the bridge width would be the same as existing, which narrows over the water. Cross sections showing bus, vehicle, pedestrian, and bike lanes for different sections of each alternative are shown in Figure S-8.

### FIGURE S-6. Enhanced Seismic Retrofit Alternative



### FIGURE S-7. Enhanced Seismic Retrofit Alternative – Structures Replaced and Retrofitted



## Draft EIS Replacement Alternatives

The three replacement alternatives considered in the Draft EIS would remove and replace the existing Burnside Bridge. Like the existing bridge, they are comprised of three separate segments: the west approach spans, the east approach spans, and a movable center span system that would be constructed over the primary navigation channel. The Draft EIS replacement alternatives would widen the portion across the water to provide more space for bicycles, pedestrians, and safety buffers (see Figure S-8). For the movable section of the replacement alternatives, the Draft EIS studied bascule<sup>5</sup> span (similar to the existing bridge) as well as vertical lift options.

See Table S-1 for a comparison of the major bridge elements of the Draft EIS Alternatives and the Refined Long-span Alternative.

**Table S-1. Major Bridge Elements by Alternative**

Element	Retrofit Alternative	Short-Span Alternative	Draft EIS Long-Span Alternative	Refined Long-Span Alternative	Couch Extension
<b>Piers and bents</b>	Encase existing Piers 2 and 3 in concrete; Add multiple deep reinforced concrete foundation columns to Piers 1-4.  Seismic upgrade of all 34 existing on-land support bents and E and W bridge abutments. 7 bents located in GHZ.	Replace all piers on deep foundations; Bent on both approaches supported by columns on drilled shafts.  Stabilize soils surrounding 5 bents located in the GHZ on both approaches to protect against lateral spreading during a seismic event.	Same as Short-span.  Stabilize soils surrounding 1 bent located in GHZ in east approach.	Same as Long-span.  Stabilize soils surrounding 1 bent located in GHZ in east approach.	Same as Short-span.  Stabilize soils surrounding 8 bents located in GHZ in both approaches.
<b>West approach</b>	13 bents west of Naito Pkwy and 5 in Waterfront Park.	4 bents west of Naito Pkwy and 2 in Waterfront Park.	4 bents west of Naito Pkwy and 1 in Waterfront Park.	4 bents west of Naito Pkwy and 2 in Waterfront Park.	4 bents west of Naito Pkwy and 2 in Waterfront Park.
<b>East approach</b>	15 bents on land and 1 in river.	4 bents on land and 1 in river.	3 bents on land and 0 in river.	Same as Draft EIS Long-span	10 bents on land and 2 in river.
<b>Movable bridge span</b>	Retrofit or replace existing bascule span leaf.	Could be a bascule span or vertical lift bridge.	Same as Short-span.	Replace with bascule span leaf.	Same as Short-span.

*E = east; GHZ = geologic hazard zone (see Section S.3 and Figure S-14); W = west.*

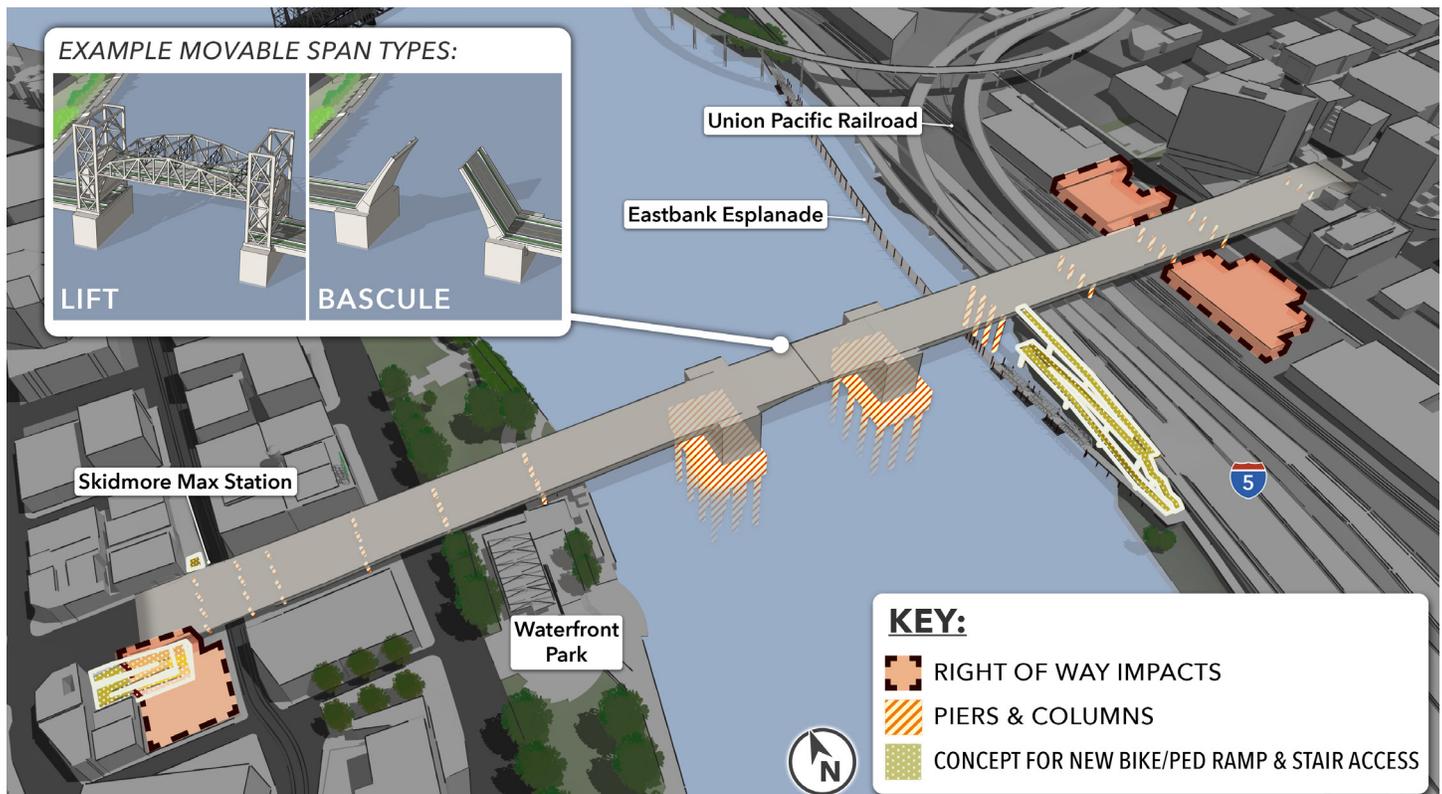
<sup>5</sup>Basculer – A bridge with one or two leaves which rotate from a horizontal to a near-vertical position, providing unlimited vertical clearance above.

## Replacement Alternative with Short-Span Approach

The Short-span Alternative would completely replace the existing structure but would be very similar in alignment. As with the existing bridge, the structural members of the approach spans would be below the bridge deck, and it would have the same connection to W Burnside and only slightly modified connections to NE Couch Street and E Burnside on the east end. The east and west approaches of the Short-span Alternative would each be composed of six spans (fewer than the existing bridge) connecting to a central movable span and would eliminate the need for the existing support bent (Pier 1) along the Harbor Wall. On the east approach, it would place one additional bent in the river east of the Vera Katz Eastbank Esplanade to maintain an obstruction-free navigation channel. Figure S-9 shows an aerial view of the proposed layout including the proposed locations of bents and span sections, as well as bascule and vertical lift options for the movable span.

This alternative would provide more space for bicycle and pedestrian infrastructure on the bridge, especially in the midspan of the bridge, than the Retrofit Alternative (Figure S-8). Connection points for bicycles and pedestrians at either end of the bridge would be the same as shown for the Retrofit Alternative in (Figure S-7).

**FIGURE S-9. Replacement Alternative Short-Span Approach**



## Replacement Alternative with Long-Span Approach

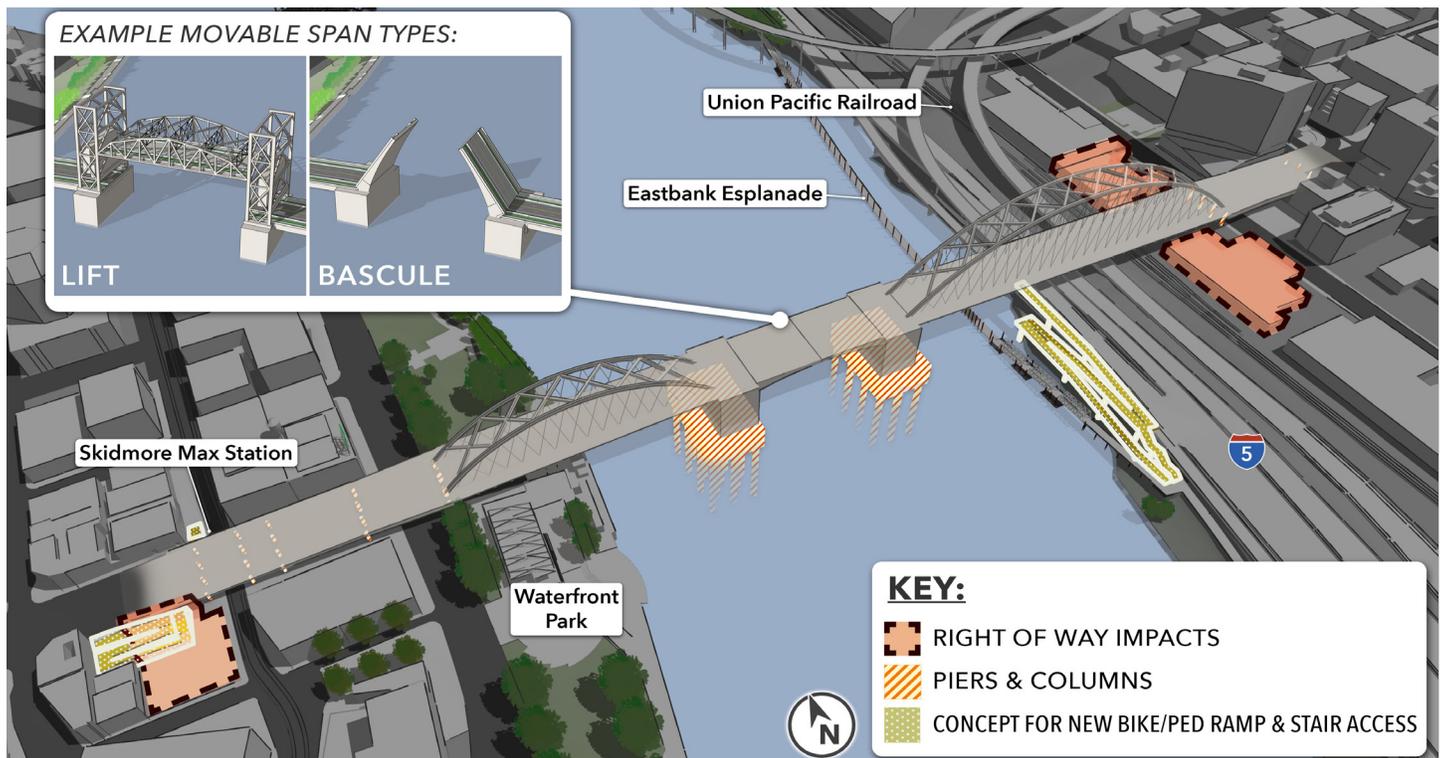
Except where identified below, the Long-span Alternative would be the same as the Short-span Alternative.

Bridge alignment and connections would be very similar to the Short-span Alternative. The primary differences would be that the Long-span Alternative approaches would be supported by above-deck superstructure that would reduce the need for piers, bents, deep foundation, and soil improvement work. Common long-span bridge types include tied-arch, cable-stayed and through-truss bridges, such as the nearby Fremont, Tilikum, and Steel or Hawthorne bridges, respectively. For the east approach, the height of the superstructure above the bridge deck could range from about 140 feet for a tied-arch bridge to about 250 feet or more for a cable-stayed bridge.

On the west side, the Long-span Alternative would include a clear span extending from the east side of Naito Parkway eastward approximately 450 feet to one of only two in-water piers at the west end of the center movable span (thus eliminating the columns in Gov. Tom McCall Waterfront Park and on the Harbor Wall). On the east side, the bridge would extend from the movable span in the river to just west of SE 2nd Avenue, approximately 740 feet (eliminating a pier from the river and two sets of piers west of SE 2nd Avenue). Table S-1 compares the major bridge elements of the alternatives.

Figure S-10 shows an aerial view of the Long-span Alternative with the proposed location of bents and bridge span sections assuming the superstructure would be a tied-arch span. It also shows examples of the two potential movable-span options: bascule and vertical lift.

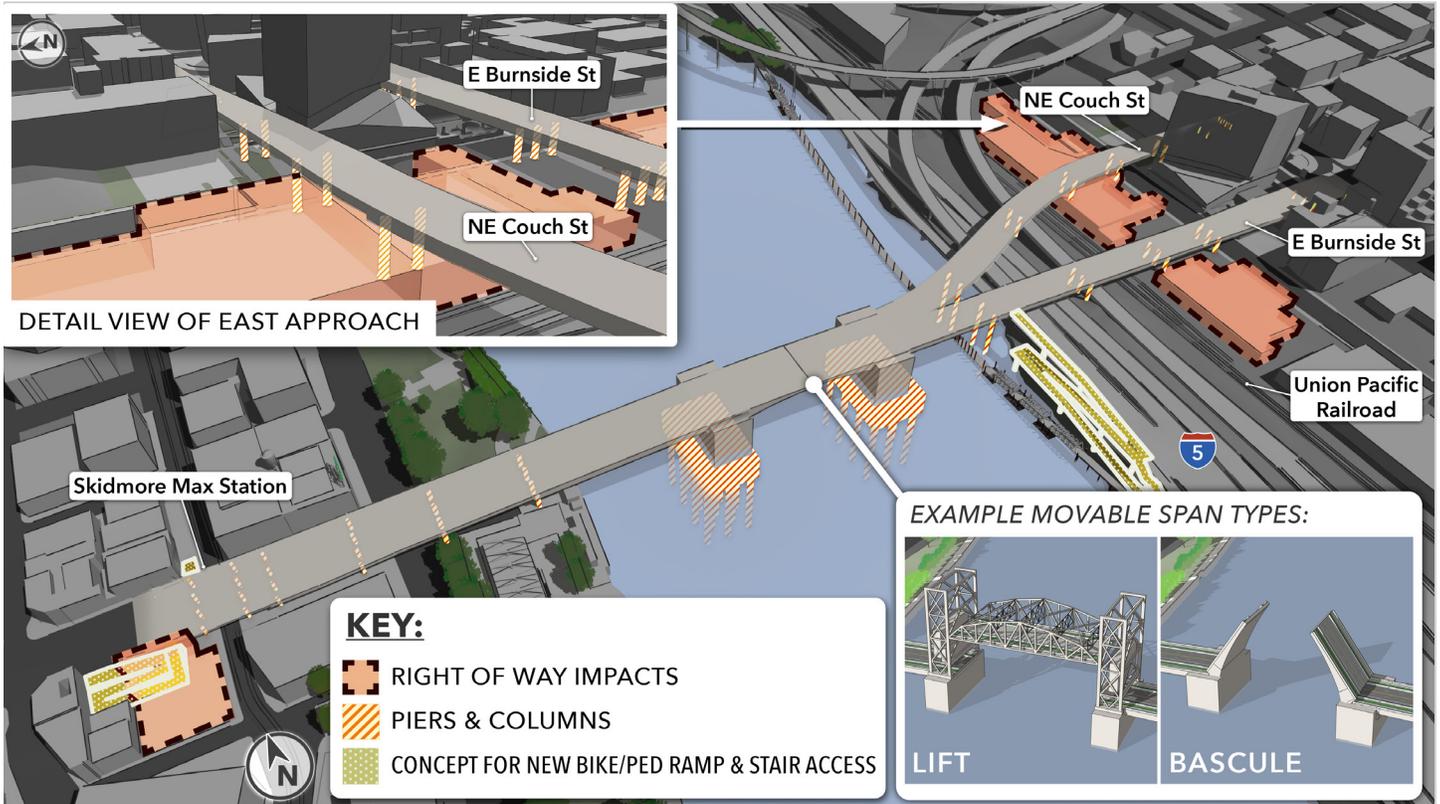
FIGURE S-10. Replacement Alternative with Long-Span Approach



## Replacement Alternative with Couch Extension

The Couch Extension Alternative (Figure S-11) has the same west approach and movable-span sections as the Short-span Alternative but would provide a different configuration for the east approach. The east approach span would extend the Burnside/Couch couplet approximately 1,100 feet farther west on a viaduct over SE 3rd and 2nd Avenues, the UPRR tracks, the freeway ramps, I-5 and the river, thus resulting in a bridge that splits just east of the movable span.

FIGURE S-11. Replacement Alternative with Couch Extension



# Project Refinements Studied in the Supplemental Draft EIS

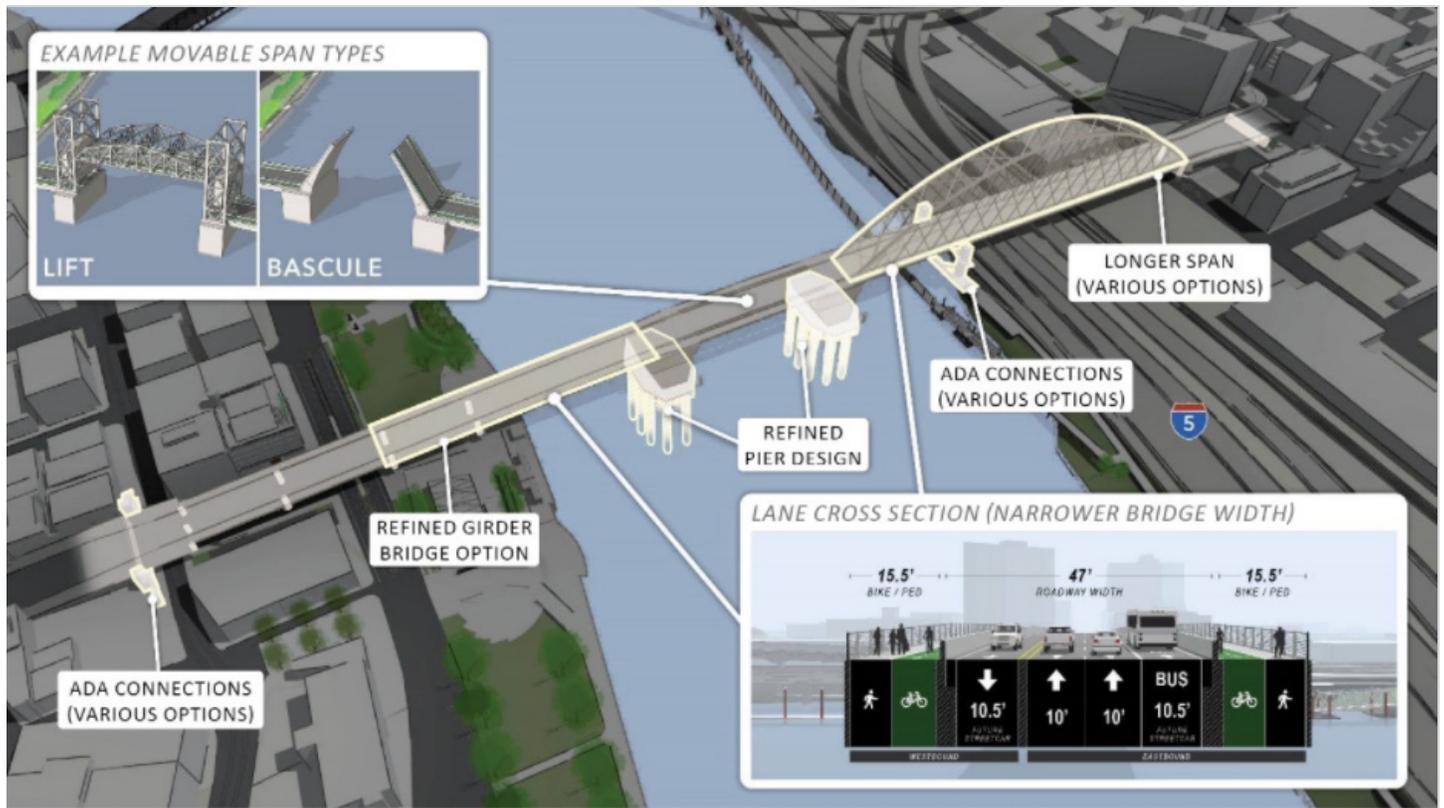
## Refined Long-Span Alternative

Horizontal and vertical bridge alignment, span lengths and connections would be very similar to the Draft EIS Long-span Alternative. The primary differences would be that the Refined Long-span Alternative would be narrower. It would have four rather than five motor vehicle lanes, and it would have narrower bicycle lanes and sidewalks (the width of the sidewalk plus bicycle lane would range from 14 to 17 feet in each direction, compared to 20 feet with the Draft EIS Long-span and 12.8 feet for the existing bridge). Narrowing the bridge is the primary source of cost savings.

The Refined Long-span Alternative also identifies one bridge type option (a girder bridge) for the west approach (whereas the Draft EIS Long-span has four types including girder, through-truss, cable-stayed, and tied-arch) and further evaluates bascule and vertical lift bridge options for the center movable span. The girder bridge and the bascule bridge are the lowest-cost options for those segments and provide environmental advantages over the other bridge types evaluated for the Draft EIS Long-span Alternative. For the east approach, the Refined Long-span evaluated refined tied-arch options and a refined cable-stayed option.

Figure S-12 identifies the elements of the Refined Long-span that are different from the Draft EIS Long-span Alternative that was identified in the Draft EIS as the Preferred Alternative. This SDEIS also studies four different lane configuration options for the Refined Long-span Alternative as shown in Figure S-13. While the SDEIS analysis considers a range of potential widths for the vehicle lanes and the bicycle/pedestrian facility widths (ranging from 14 to 17 feet in each direction), the widths shown in Figure S-12 and Figure S-13 represent the approximate average of that range.

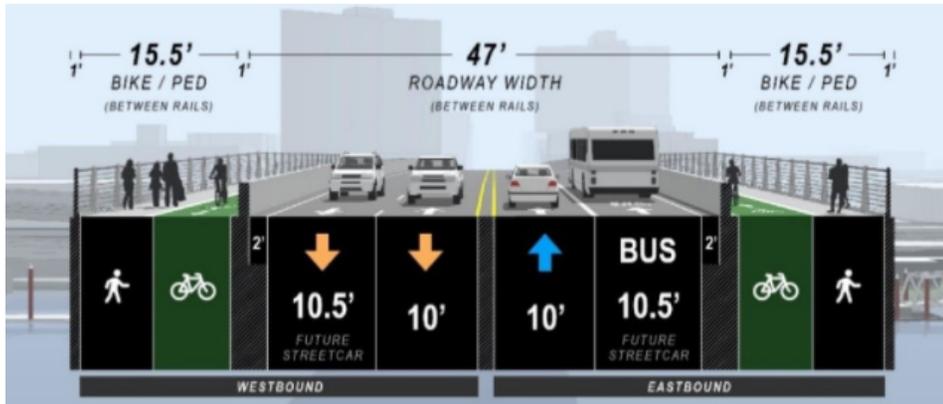
Figure S-12. Replacement Alternative – Refined Long-Span Alternative



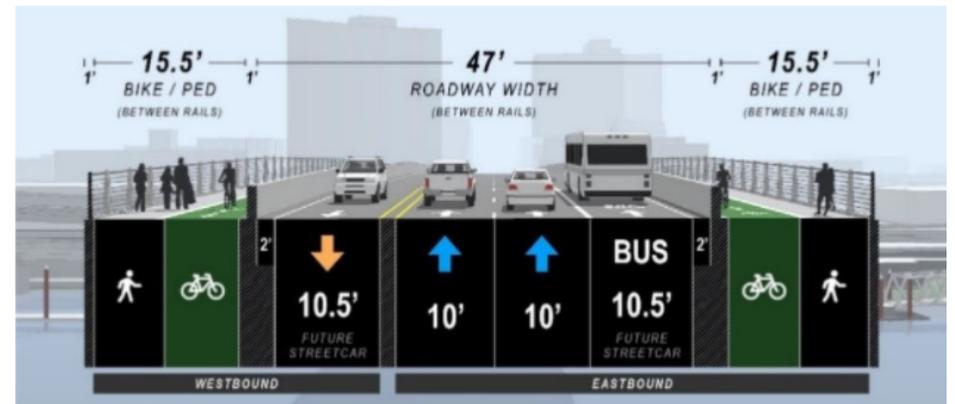
Notes: The Refined Long-span Alternative evaluated in the SDEIS includes both cable-stayed and tied-arch options for the east span. This figure shows only the tied-arch option. The Draft EIS studied and the SDEIS further evaluated bascule and vertical lift options for the center movable span. The inset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

## Figure S-13 Refined Long-Span Alternative – Lane Configuration Options

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



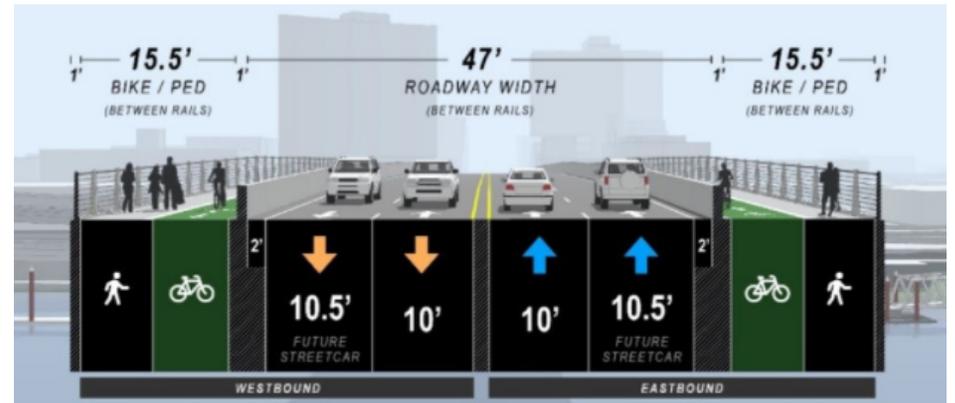
Option 1 – Two Westbound Lanes | One Eastbound + One Bus Lane



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 representative. A range of potential widths for different modes are being considered 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.

## **Comparison with the Refined Short-Span and Refined Couch Extension Alternatives**

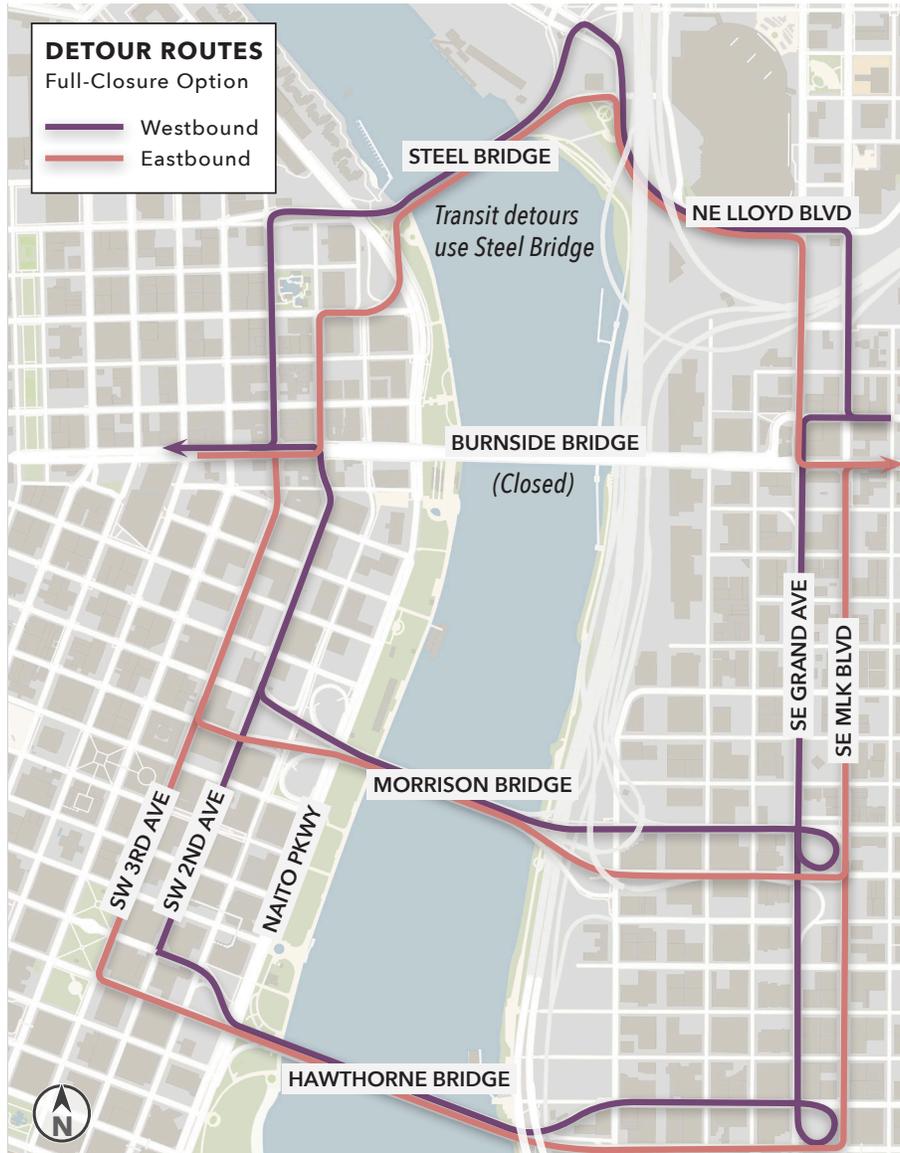
The Refined Long-span Alternative was evaluated in detail for this SDEIS because it is a lower cost version of the Draft EIS Preferred Alternative that provides many of the Preferred Alternative's advantages over the other build alternatives evaluated in the Draft EIS. For comparison purposes, the project team also evaluated how refined versions of the other Draft EIS replacement bridge alternatives – the Short-span and the Couch Extension Alternatives – would compare to the Refined Long-span Alternative. The refinements include the same cost-cutting measures that were applied to create the Refined Long-span Alternative (for example, a narrower bridge with four rather than five lanes). This evaluation demonstrated that while many of the impacts would be the same, the Refined Long-span Alternative, very similar to the Draft EIS Long span Alternative, has less seismic risk, lower impacts, and lower costs than similarly refined versions of the other replacement alternatives. Chapter 2 (Section 2.2.4) provides an overall comparison of performance, impacts, and costs for the three refined alternatives, and Chapter 3 provides a more detailed comparison of impacts for those environmental issues where there would be a meaningful difference among the refined alternatives.

## Temporary Bridge Options

The EQRB Draft EIS analyzed three temporary bridge options that could be constructed to allow some level of vehicular, pedestrian, and bicycle traffic to cross the Willamette River at Burnside while the main bridge is closed during construction. A temporary detour bridge would help reduce the impacts on cross-river travel but it would not accommodate all of the bridge's current vehicle travel demands.

Because the Temporary Bridge would have a high cost, higher impacts, longer duration of construction, and a limited ability to accommodate Burnside travel demand, the Preferred Alternative selected a No Temporary Bridge option and the Refined Long-span would also not include a temporary bridge during construction. With this option, the Burnside crossing would be fully closed to all modes for about 4 years with the replacement alternatives. Traffic management would include rerouting buses, autos, bicycles, and pedestrians to adjacent river crossings, as well as potentially implementing travel demand and transportation system management to reduce trips and encourage more transit, pedestrian, and bicycle use. Buses would likely detour across the adjacent Steel Bridge. Vehicle, bicycle and pedestrian traffic would detour over both the Steel Bridge and the Morrison Bridge, as well as the Hawthorne Bridge. See Figure S-14.

Figure S-14. Full Closure of Bridge During Construction



## Cost Estimates and Project Funding

The current cost estimates range from \$825 to \$915 million for the Refined Long-span Alternative and its range of Design Options being considered in the SDEIS. Similar to the Draft EIS Preferred Alternative, no temporary bridge for motor vehicles and/or bicyclists and pedestrians will be provided. Based on a high-level assessment, the Refined Long-span Alternative is still expected to be the lowest-cost alternative and the Couch Extension 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 FHWA Major Project process, a risk analysis will be performed on the Preferred Alternative in Summer 2022. The cost range for the Refined Longs-span Alternative (see SDEIS Attachment O, *Cost Assessment Summary Sheets*) reflects the bridge types assumed and an assessment of risks with each bridge alternative. As the project design advances, the cost range will narrow. The final cost will be influenced by design details, bridge type selection, risk mitigation, using the Construction Manager/General Contractor contracting method to identify cost-saving opportunities, and market conditions at the time of construction.

The Project has secured funding for the design phase, which is scheduled to begin after the Final EIS and issuance of the ROD.



## S.3 What would be the consequences of the different alternatives?

This section briefly summarizes the impacts of all of the Draft EIS alternatives and compares them to the impacts of the Refined Long-span Alternative that is the subject of this SDEIS.

### Consequences of the No-Build Alternative

The primary factor differentiating the No-Build Alternative from the build alternatives is that the No-Build Alternative would not meet the purpose and need of the Project. It would leave downtown Portland with no usable Willamette River crossing after the next CSZ earthquake. Currently, there are 45 traffic and transit lanes that cross the river in downtown. With the No-Build Alternative, all 45 lanes would be severed, significantly hampering emergency response, evacuation, reunification and long-term community and economic recovery. The No-Build Alternative would forego the build alternatives' bicycle, pedestrian and safety improvements as well as the ancillary improvements including improved stormwater quality, park and recreation access, improved security, and removal of contaminated soils and sediment. On the other hand, it would avoid the immediate adverse impacts associated with constructing the build alternatives, including the impact of removing the historic bridge. However, at 94 years old, the existing bridge will need to be replaced or significantly retrofitted at some point in the future.

### Consequences of the Build Alternatives

All of the build alternatives would meet the basic purpose and need for the Project, although the Draft EIS Long-span Alternative and the Refined Long-span Alternative would provide a greater level of seismic resiliency (due to fewer piers in the geologic hazard zone) compared to the other build alternatives. The following compares and contrasts the benefits and impacts of the build alternatives.



#### Traffic, Freight and Transit:

Long-term impacts would include small safety improvements, especially with the replacement alternatives, and the ability to run streetcar service across the bridge. The main difference between the Refined Alternative and all of the Draft EIS alternatives would be the reduction of motor vehicle lanes from five to four. This provides a significant cost savings but would also result in added congestion and slower travel times. Lane configuration options 1 and 2 would have the largest impact on congestion and travel time, while Lane Option 3 would have less congestion but greater safety impacts, and Lane Option 4 would have the greatest impact on bus travel times.

Because the Draft EIS replacement alternatives would have narrower average offset distance to the roadside barrier compared to No-Build, it would have greater vehicle crash rates. The Refined Long-span would have even narrower offset distances and so would have greater vehicle crash rates than the Draft EIS replacement alternatives; this would vary by lane configuration option with Lane Option 4 having the greatest vehicle crash rates.

Short-term impacts would differ primarily in that the Retrofit Alternative would have the shortest temporary closure duration of 2 years compared to 4 years with the replacement alternatives. Construction of all Build Alternatives would also require temporary closures of the MAX station under the west end of the bridge ranging from a total of 8 weeks for the Retrofit Alternative to a total of 14 weeks for the replacement alternatives; TriMet would use buses to shuttle passengers around the closed portion of MAX track.



## Bicyclists and Pedestrians:

Compared to the No-Build Alternative, all build alternatives, especially the replacement alternatives, would provide safer pedestrian and bicycle facilities across the bridge and would connect to the broader network; the replacement alternatives would also provide wider and more protected bicycle lanes and sidewalks. The Refined Long-span Alternative proposes 14- to 17-foot bike/ped facilities in each direction, compared to 12.8 feet on the existing bridge and 20 feet with the Draft EIS Long-span Alternative. All of the build alternatives would add a physical barrier separating the motor vehicle lanes from the bicycle and pedestrian facilities. While the Refined Alternative would be a substantial safety improvement for bicyclists and pedestrians compared to the existing bridge, it would not provide the same level of comfort as the Draft EIS Long-span and could have higher risk of conflict between bicyclists and pedestrians due to the bicycle and pedestrian facilities being narrower than proposed with the Draft EIS Long-span.

The Draft EIS evaluated adding either stairs or ramps near the west end of the bridge to connect to W 1st Avenue and the Skidmore MAX station, and studied ramp and elevator/stairs options near the east end that would connect to the Vera Katz Eastbank Esplanade. The Refined Alternative expanded the analysis, including the addition of an elevators/stairs option and an improved sidewalk connection option between the bridge and W 1st Avenue. While elevators and stairs would be an improvement over existing conditions and would generally be more convenient for pedestrians and many people with disabilities, they would be less convenient for bicyclists and subject to temporary maintenance closures and security concerns. The Draft EIS Preferred Alternative does not identify a preferred connection option, and potential refinements to the Preferred Alternative may not either, as discussed in Section 2.4.5 of this SDEIS.

Construction of all alternatives would temporarily (3.5 to 4.5 years) reroute approximately 500 to 1000 feet of the Waterfront Pathway around a construction zone in Gov. Tom McCall Waterfront Park. During construction, the Vera Katz Eastbank Esplanade would be closed for between 1.5 and 4.5 years, depending on the bridge alternative and Esplanade connection option. The Long-span Alternative (Draft EIS and Refined versions) would have the shortest closure (18 months) and the Couch Extension would have the longest (30 months). Building stairs and elevators for the connection between the bridge and the Esplanade would not cause any added closure duration, but building ramps, such as those evaluated in the Draft EIS, is estimated to increase the Esplanade closure duration by up to 2 to 3 years (for a total closure of 3.5 to 4.5 years). While the Esplanade is closed, there would be out-of-direction travel and potential avoidance of trips for pedestrians and bicyclists.



## Land Use, Economics and Displacements:

Property acquisitions and business displacements that would be required to build the bridges would be the main adverse impact. The main long-term difference among Draft EIS build alternatives would be that the Couch Extension would have two additional permanent property acquisitions. The Refined Long-span Alternative would have no permanent acquisitions other than easements and would have one less business displacement.

All of the alternatives would have a positive effect on regional employment and income due to construction spending. None of the alternatives would affect traffic enough to result in indirect effects on land use patterns or regional economics. During construction, all of the build alternatives would temporarily displace Portland Saturday Market operations from under the west end of the Burnside Bridge, but the replacement alternatives would displace the market for about one year longer than the Retrofit Alternative.



## Water Quality:

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. The differences among build alternatives would be relatively minor.



## Geology and Soils:

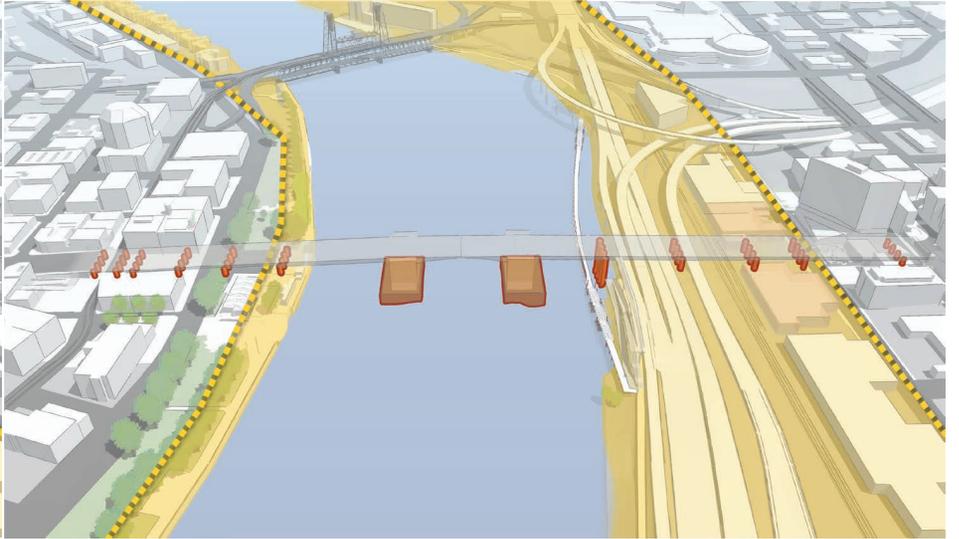
While temporary erosion could occur during construction, the largest geologic impact from the build alternatives would be the beneficial creation of an earthquake ready bridge that would mitigate the seismic impacts on the Burnside crossing. The Long-span Alternative (both the Draft EIS and the Refined versions) is unique among the alternatives in that it would largely avoid placing bridge supports in the geologic hazard zones on the east and west banks of the river (see Figure S-15).

Figure S-15. Build Alternatives' Bridge Supports Located in Geologic Hazard Zones

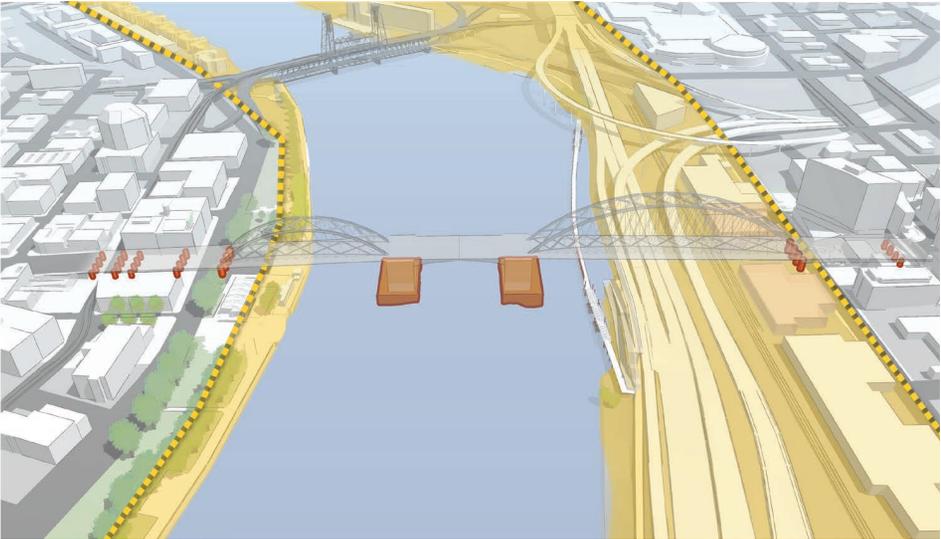
RETROFIT



SHORT-SPAN



LONG-SPAN



COUCH EXTENSION



 Columns and Supports       Geological Hazard Zone



## Hydraulics:

The conceptual designs evaluated during the Draft EIS indicated that while the Draft EIS Long-span Alternative would have less fill in the river than the other build alternatives, all of the build alternatives would have larger piers than the existing bridge and that increased fill would likely cause a small rise in future peak flood levels. Since the Draft EIS, a modified pier design and hydraulic modeling indicates that the Draft EIS Long-span Alternative may be able to avoid a rise in peak flood levels. The Refined Long-span Alternative would require less fill in the river than the Draft EIS Long-span and even less than the existing bridge. This would reduce the impact on peak flood levels but would be expected to increase scour.<sup>6</sup> The proposed bridge pier design would be unaffected by the predicted scour. In-water construction activities such as cofferdams<sup>7</sup> and temporary piles would temporarily increase peak flood levels and scour with all build alternatives. The optional ADA, bicycle and pedestrian ramps, or elevator/stair connections from the Eastbank Esplanade would require added fill in the river which would increase impacts to flood level rise and scour; the impact would be greater with the ramp options than with the elevators/stairs option. Reconnecting the existing City-owned staircase would avoid added flood level and scour impacts. Hydraulic modeling will be conducted again during the Final EIS phase to confirm how any refinements to the Preferred Alternative would impact peak flood levels and expected scour, as well as determine any needed mitigation.



## Vegetation and Wildlife:

The primary long-term impact would be the loss of habitat where permanent piers would be located in the river. This impact would be lowest with the Refined Long-span Alternative, and slightly lower with the Vertical Lift bridge option versus the Bascule option. All the build alternatives would provide permanent improvements in stormwater treatment that would benefit aquatic organisms. During construction, pile-driving causes hydroacoustic impacts that can harm fish and so would need to be conducted during regulatory in-water work windows. Other in-water construction activities, such as installing cofferdams or drilling shafts, would temporarily affect water quality and/or displace habitat that could affect aquatic organisms.



## Noise:

Construction of all of the build alternatives would generate noise that could temporarily affect residents living adjacent to the ends of the bridge. Potential construction noise mitigation is discussed in Chapter 3 of the Draft EIS. None of the alternatives, including the Refined Long-span Alternative, would increase long-term noise impacts, although the Couch Extension would cause minor changes in the noise impact locations at the east end of the bridge. The main existing and projected future source of traffic noise in the area is I-5 and related ramps, not the Burnside Bridge.

<sup>6</sup>Scour is the removal of sediment (such as sand) from the river bed by water flow. Changing water velocity can change scour.

<sup>7</sup>A cofferdam is a temporary enclosure that's built/placed in a river or other water body, extending from below the river bottom to above the water surface. The water inside is pumped out in order to create a dry space for doing work, such as drilling shafts or building bridge piers.



### **Air Quality:**

The build alternatives would have no long-term impacts on air quality but all of them would generate emissions and dust during construction that could affect the comfort and health of residents living adjacent to the west end of the bridge. Impacts are also possible for residents of older buildings on the east end although they are located farther from the immediate construction area. Potential mitigation is discussed in Chapter 3 of the Draft EIS.



### **Hazardous Materials:**

Construction of all of the build alternatives would create the risk for accidental spills or contact with existing contamination. The risk could be largely mitigated through best practices as well as response planning. Construction would also be likely to have a beneficial impact by removing existing contaminated sediments or soils during excavation and in-water work.



### **Climate Change:**

The Draft EIS build alternatives would have the same traffic capacity and operations as No-Build and the same predicted future traffic greenhouse gas (GHG) emissions. The Refined Long-span, however, with one less vehicle lane on the bridge, is modeled to cause minor traffic diversion to other bridges and increase congestion in some locations which would result in slightly higher GHG emissions than the other alternatives. With or without the project, future regional GHG emissions are predicted to be significantly lower than today because of expanded public transportation options, advancement in vehicle technologies, and more stringent fuel economy standards and emission-reduction efforts on a federal, state, and local level. Modeling indicates that with the No-Build and Draft EIS build alternatives (a five-lane bridge) regional GHG traffic emissions would be 27.6 percent lower by 2045 whereas with the Refined Long-span Alternative (a four-lane bridge), regional emissions would be 27 percent lower than existing. While not included in the model assumptions, the proposed pedestrian and bicycling improvements on the bridge could indirectly lead to more trips being taken by bicycle or walking rather than automobile, which could result in minor reductions in future GHG emissions. Construction activities, detours, and the manufacturing of construction materials would generate GHG emissions.



## Social Services, Environmental Justice and Equity:

During construction, all of the alternatives would generate increased noise, dust and emissions that could disproportionately affect the residents staying in the transitional housing and shelters located adjacent to the western bridgehead and to other homeless individuals in the area. Potential measures to mitigate those impacts are described in Chapter 3 of the Draft EIS. The biggest 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. Over the long term, the improved pedestrian, bicycle, and safety features on the Replacement bridges would be a substantial benefit to environmental justice<sup>8</sup> (EJ) populations. The potential for improved security under the bridge in Gov. Tom McCall Waterfront Park and Naito Parkway area (by eliminating columns that create shadows and reduce natural surveillance<sup>9</sup> of public spaces), especially with the Draft EIS Long-span and Refined Long-span Alternatives, would also benefit EJ populations. The Refined Long-span Alternative, with narrower bicycle and pedestrian facilities than proposed with the Draft EIS replacement alternatives, would not provide as much benefit to low income or minority bicyclists and pedestrians but would still be an improvement in safety and comfort compared to existing conditions or the Retrofit Alternative. The Refined Alternative with lane configuration Option 4, which eliminates the eastbound bus only lane, would result in longer bus travel times during parts of the day compared to the other Refined Alternative lane configuration options and to all of the Draft EIS alternatives.



## Parks and Recreation:

There would be no long-term adverse impacts to public parks but the replacement alternatives, especially the Long-span Alternative (both the Draft EIS and Refined versions), would benefit Gov. Tom McCall Waterfront Park by removing three to four sets of existing bridge columns in the park under the bridge. The replacement alternatives would require short-term (4-8 months total) closures of the Burnside Skatepark during construction; the Retrofit Alternative would permanently displace the Burnside Skatepark. All of the alternatives would close part of Waterfront Park during construction for 3.5 (Retrofit Alternative) to 4.5 (replacement alternatives) years, and all would require tree removal to allow for bridge construction (trees would be replanted). All of the build alternatives would require temporarily closing an area of the park north and south of the bridge, although the area south of the bridge would be smallest with the Refined Long-span Alternative. All alternatives would temporarily close a portion of the Vera Katz Eastbank Esplanade. The closure duration would be 18 months for the Long-span Alternative (both the Draft EIS and Refined versions); this would increase to 3.5 to 4.5 years with the ramps option for access between the bridge and the Esplanade.

<sup>8</sup> "Natural surveillance" is a principle of design that aims to increase personal safety and security in public spaces. It includes designing physical features so as to maximize visibility and foster positive social interaction.

<sup>9</sup> Environmental justice (EJ) populations, as used in this document, refers to low income and minority populations, as defined by the Executive Order on Environmental Justice.



## Historic Resources:

Additional analysis and agency input since the publication of the Draft EIS indicates that the above-deck bridge types (tied-arch, cable-stayed and through-truss) considered for the west approach with the Draft EIS Long-span Alternative would likely cause an adverse effect on the Skidmore/Old Town Historic District (a National Historic Landmark). This adverse effect, due to the tall, modern structure contrasting with the adjacent, shorter historic structures of the NHL District, would be avoided by selecting the girder bridge proposed with all other alternatives including the Refined Long-span Alternative. All the replacement alternatives would remove the Burnside Bridge, and the Retrofit Alternative would cause substantial changes that would render it no longer eligible for the National Register of Historic Places. The Retrofit Alternative would also remove the Burnside Skatepark which is eligible for the National Register; all the replacement alternatives would only require a short-term closure of the skatepark for safety during construction. The Draft EIS Long-span Alternative would alter the view of the historic White Stag sign from some viewpoints but would not physically impact it; all other bridge alternatives, including the Refined Long-span Alternative, would avoid or minimize effects on views of the sign.

Vibration during construction would be monitored to ensure that it does not cause physical harm to nearby unreinforced masonry buildings.

No previously recorded archaeological sites would be impacted by any of the build alternatives. There would be less ground disturbance in archaeologically sensitive areas with the Long-span alternatives and with the No Temporary Bridge option.



## Visual:

Because it would have the least visual change, the Retrofit would have the least potential for both adverse and beneficial visual impacts. The above-deck superstructures (tied-arch or cable-stayed) of the Draft EIS Long-span, and the potential for a vertical lift movable span with all of the Draft EIS replacement alternatives, have the highest potential to impact (both adversely and beneficially) views and visual experiences. Concerns and opportunities include the Skidmore/Old Town historic district, Gov. Tom McCall Waterfront Park, river views, views from the bridge, compatibility with existing visual features, and potential new or enhanced visual experiences. The Refined Long-span Alternative, with a girder bridge for the west approach and bascule bridge for the center movable span, would avoid many of the potential adverse visual effects of the Draft EIS Long-span Alternative.



## S.4 What is the preferred alternative?

This section summarizes the Draft EIS evaluation process that resulted in the selection of the Long-span Alternative as the Preferred Alternative in the Draft EIS and summarizes the preferred alternative refinement process that has occurred since the Draft EIS was published. The refinement process has included (1) identifying and evaluating ways to refine the preferred alternative so as to reduce the overall cost while still meeting the purpose and need and achieving many of the performance and environmental advantages of the Draft EIS Preferred Alternative, and (2) gathering agency and public input on those proposed refinements to help inform a decision on the refinements to the Preferred Alternative.

### The Draft EIS Preferred Alternative

Following almost 2 years of coordination, analysis, and input, in June 2020, the Project's Community Task Force (CTF) recommended that the Draft EIS Long-span Approach Alternative, and the No Temporary Bridge Option, be the Preferred Alternative (see descriptions of this alternative and option in Section S.2 above). The CTF's process to reach that recommendation included identifying the community's values, defining evaluation criteria and measures, and reviewing the performance and impacts of the various alternatives and options. It also considered the input from the team's technical experts, from resource agencies and other participating agencies, and from other stakeholders including the public.

In August 2020, the project team solicited input on the CTF's 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 who then reconfirmed their recommendation in September 2020. The recommendation was then unanimously endorsed by the voting members of the Project's Policy Group on October 2, 2020. The Multnomah County Board of Commissioners adopted a resolution on October 29, 2020, expressing approval for the recommended preferred alternative. Input received during the Draft EIS comment period confirmed that there was considerably more public support for the Draft EIS Long-span Alternative than for any of the other Draft EIS alternatives.

The CTF recommendation included consideration of how the alternatives performed on 49 different criteria covering 13 different topics:

- **Seismic resiliency**
- **Community quality of life**
- **Equity and environmental justice**
- **Crime reduction and personal safety**
- **Business and economics**
- **Parks and recreation resources**
- **Historic resources**
- **Visual and aesthetics**
- **Natural resources, climate change and sustainability**
- **Pedestrians, bicyclists and people with disabilities**
- **Motor vehicles, freight and emergency vehicles**
- **Transit**
- **Fiscal responsibility**

A description of the evaluation criteria and measures, as well as Draft EIS scoring results, can be found in the Draft EIS Attachment H. The Draft EIS 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. The Draft EIS Long-span Alternative was also the lowest cost of the build alternatives evaluated in the Draft EIS.

## 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 all of the build alternatives might exceed the availability of local, state, and federal funds to dedicate to the Project. Therefore, in winter 2021, County leadership directed the project team to identify and evaluate potential ways to reduce the overall cost of the Preferred Alternative (the Draft EIS Long-span 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, impacts, and tradeoffs of these potential revisions were provided to the public in November and early December 2021. Project committees endorsed the refinements to the Preferred Alternative, and the Multnomah County Board of Commissioners passed a resolution adopting the refinements on March 17, 2022. Final decisions will be made as part of the NEPA ROD 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 the 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. The SDEIS evaluates four different lane configurations for a four-lane bridge.
- **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 the SDEIS studied a narrower bridge. The SDEIS studied bicycle lane/sidewalk options ranging from 28 to 34 feet; 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 in 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 added two refined tied-arch options that could reduce costs by reducing geotechnical mitigation needs.
- **Movable Span** – The Draft EIS Preferred Alternative included bascule and vertical lift options for the movable span. The SDEIS further studied both options and found the bascule bridge to be the lowest cost and to have the least impact on historic and visual resources but has larger in-water piers.

## 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 to meet ADA requirements and to not preclude future connections to the Esplanade.

## 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.

- **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. 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 land/mudslide) that would exert massive lateral forces on any piers in those zones (the further 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 Alternative, tied-arch option, that pier would be a little farther up slope than with the Draft EIS Long-span. On the west side, the Draft EIS Long-span would have no piers in the geologic hazard 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 would need two sets of columns in the Park (the second fewest of any build alternative and three fewer than existing). Both of the long-span versions would avoid permanent impacts to the Burnside Skatepark that would be removed by the Retrofit Alternative and would have the shortest-duration closure of the Vera Katz Eastbank Esplanade during construction. Maintaining the existing stairs, or building new elevators and stairs to connect to the Esplanade, would avoid 2 to 3 years of added Esplanade closure that would result with the ramp options evaluated in the Draft EIS.
- **Historic Resources** – The Refined Long-span Alternative, with its girder bridge for the west approach, avoids causing an adverse effect on the Skidmore/Old Town Historic District (a National Historic Landmark). Analysis and agency input received since 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 is eligible for listing on the National Register of Historic Places. The Long-span Alternative (both the Refined and the Draft EIS versions) would require less ground disturbance in archaeologically sensitive areas.
- **Social Services and Equity** – Like the other replacement alternatives, both the Draft EIS and Refined versions of the Long-span Alternative would maintain the operations of the Portland Rescue Mission during construction (which would be temporarily closed by the Retrofit Alternative). As with all the 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 versions of the Long-span Alternative 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 has the second smallest.
- **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 adverse visual impacts associated with the tall, above-deck structures (tied-arch, cable-stayed or through-truss) on the west approach, as well as the vertical lift for the center span, that were considered with the Draft EIS Long-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 better maintains 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 alternative 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.

More information on the Draft EIS evaluation and recommendation can be found in the Preferred Alternative Technical Memo (Attachment H of the Draft EIS). More information on the proposed refinements to the Preferred Alternative (i.e., the Refined Long-span Alternative) are included in Chapters 2 and 3 of the SDEIS.

Following the public comment period on the SDEIS, there will be continued coordination with participating and permitting agencies, stakeholders, and the public, as well as refinement of the design and analysis, before the FHWA endorses the final action through the NEPA ROD that is expected to be issued in late 2022.



## S.5 What are the unresolved issues?

### Preferred Alternative

In the Draft EIS, the Long-span Alternative was identified as the Preferred Alternative. This alternative, combined with the No Temporary Bridge option, received broad agency and public support and was the lowest-cost build alternative in the Draft EIS. Since then, the Refined Long-span Alternative, with one less motor vehicle lane and other cost savings, was developed to capture the seismic resiliency benefits of the Draft EIS Long-span but at a substantially lower cost.

The project invited public input on the proposed refinements in November and December 2021, and the Multnomah Board of County Commissioners endorsed the Refined Long-span Alternative in March 2022. The project is again inviting public and agency input as part of this SDEIS comment period. The preferred alternative decision will not be final until the ROD is signed by FHWA at the end of the NEPA process, which is expected in late 2022.

### Bridge Type

The Draft EIS Preferred Alternative left open the decision on bridge types. Since the Draft EIS, additional analysis of bridge types and additional public and agency input has provided more information to inform the bridge type decision for each bridge section. For the west approach, the SDEIS found that a girder bridge reduces costs and reduces historic and visual impacts. For the center movable span, a bascule bridge reduces costs as well as visual impacts. For the east approach, the SDEIS further evaluated a cable-stayed option and a refined tied-arch option.

The analysis indicated that the impacts would be very similar and any significant impacts could be avoided or minimized. The primary differentiator between the two bridge types could be construction cost. Preliminary cost analysis suggests that the cable-stayed option could have a lower construction cost, but there is substantial uncertainty because the construction approach and experience of any particular bridge contractor will be an important cost factor. Therefore, the County is expected to carry both bridge type options forward so that future contractor bids can specify either bridge type, thereby eliminating the cost uncertainty associated with these significant bridge structures and allowing the County to select a bridge type based on actual contractor bids.

## Active Transportation Connections to the Bridge

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 bicycles 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:

- 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
- Stairs and elevator on both sides of the bridge
- Ramp on the north side of the bridge, and ramp and stairs on south sides of the bridge
- 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 higher 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).

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 and reliability 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.

See the *EQRB Revised Active Transportation Access Options Memorandum (Multnomah County 2022h)* for additional analysis and findings, including potential measures to help mitigate maintenance and security issues associated with public elevators.

## Construction Methods and Impacts

At this point in project development, there is always uncertainty regarding the exact construction means and methods, timelines, and other details. And yet, it is necessary to evaluate the potential construction-phase impacts so as to disclose potential impacts and to understand potential tradeoffs among the alternatives. For this reason, the construction assumptions are generally conservative and may reflect over-estimated impacts. This will not be more precisely known until the final design is complete and a contractor has determined exactly how they will build the bridge, and even then, adjustments are not uncommon.

## Mitigation Decisions

It is standard practice in a Draft EIS to identify a range of potential mitigation measures that could help to avoid, reduce, or compensate for adverse impacts, but to not yet commit to the final solutions. This is because there are multiple alternatives being considered and more analysis and coordination are needed to finalize the appropriate mitigation. Following the public comment period on the SDEIS, decisions on refinements to the Preferred Alternative design, and additional coordination with agencies, affected parties and the public, the proposed mitigation will be narrowed so that mitigation commitments can be made in the ROD. Even then, it will be necessary to leave some leeway for mitigation to be further refined during final design, permitting and construction contracting.

## Off-Site Staging Areas

Off-site construction staging sites could be required due to limited storage space adjacent to the bridge. The location would be the contractor's choice so the exact location cannot be known at this time. The environmental technical reports and the Draft EIS identify and evaluate several potential locations for off-site storage to represent the likely type of sites that could be used, and the likely impacts. It is expected that any chosen river access staging site would allow that type of use, would not displace existing uses, and would already be developed for barge and road access.

## Completing Federal Regulatory Consultation Requirements

The project team has coordinated with federal and state resource and permitting agencies as well as other participating agencies and Tribes. The Project's Agency Coordination Plan (Draft EIS Attachment F) defined the basic approach and coordination steps, and the EQRB Planning and Environment Linkages (PEL) Strategy (Draft EIS Attachment N) outlines the Project's approach for meeting the requirements for agency coordination and specific NEPA guidelines outlined in Executive Order (E.O.) 13807.

PEL is a collaborative and integrated approach to decision-making that engages the public, agencies, and Tribes, and considers environmental, community and economic goals starting early in the planning process and continuing through project development and delivery. Integrating these considerations and engaging stakeholders and agencies before formally initiating NEPA can result in a project that better incorporates multiple interests and objectives, while also reducing redundancy and the duration of the project development process. FHWA guidance, issued November 2016, prescribes a PEL approach based on 23 U.S.C. 168 as amended by the Fixing America's Surface Transportation (FAST) Act 10. It is commonly referred to as "statutory PEL" or Section 168 PEL. Among other things, Section 168 PEL outlines requirements for pre-Notice of Intent (NOI) activities including how agencies can conduct planning-phase analyses and make planning-phase decisions that they can use in the subsequent environmental review phase. It lays out various requirements including notification and timing with an emphasis on public and agency involvement. The EQRB Project used a PEL approach to help implement E.O. 13807 directives noted above, such as the goal to complete the EIS process in not more than 2 years. To ensure compliance with the E.O. and to secure the benefits of linking planning and NEPA, the project team developed a PEL strategy to guide informal scoping work as well as post-NOI activities. This strategy, including a summary of updated progress through the NOI and formal scoping, is included as Attachment N to the Draft EIS. E.O. 13807 was rescinded in February 2021, shortly before the Draft EIS was issued, and therefore no longer applies to the Project. Even so, the Project is continuing to generally follow the PEL strategy and is striving to expedite NEPA compliance.

The Project secured cooperating agency agreement on a permitting timetable with the USCG, the US Army Corps of Engineers, and the National Marine Fisheries Service (NMFS), and secured their concurrence on the Project Purpose and Need, and the range of alternatives to be studied in the EIS. The project team will be seeking permits from these agencies as well as other local, state, and federal agencies after the completion of the NEPA process.

In addition, the Project needs to complete two major federal approvals/agreements before FHWA can sign the ROD. Those include a Section 106 (of the National Historic Preservation Act) agreement regarding impacts to and mitigation for historic and archaeological resources, and a biological opinion that outlines the allowable impacts to fish or other species protected by the federal Endangered Species Act (the biological opinion was issued summer 2021).

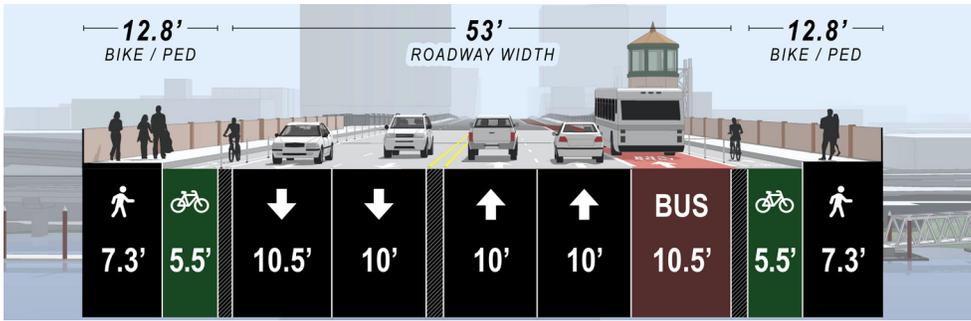
The Project initiated consultation for Section 106 with Oregon SHPO and Consulting Parties in 2020. Three meetings have been held with Consulting Parties including Tribes, and one more is planned for early 2022. SHPO has concurred on the API and the Determinations of Eligibility (DOEs) and began reviewing the Findings of Effect (FOEs) in December 2021. The Project also coordinated with the National Park Service in September 2021 to secure input on the potential for project alternatives to adversely affect the Skidmore/Old Town Historic District (a National Historic Landmark). Additional work and coordination to finalize the Memorandum of Agreement or a Programmatic Agreement for Section 106 would include:

- Receive input and concurrence from the Oregon SHPO on the FOEs.
- Invite the Advisory Council on Historic Preservation (ACHP) to review the DOEs, FOEs, and potential mitigation measures.
- Invite input from Consulting Parties, Oregon SHPO, ACHP and Tribes on the elements of a draft Section 106 agreement February–June 2022.
- Finalize and sign a Section 106 agreement in August 2022.

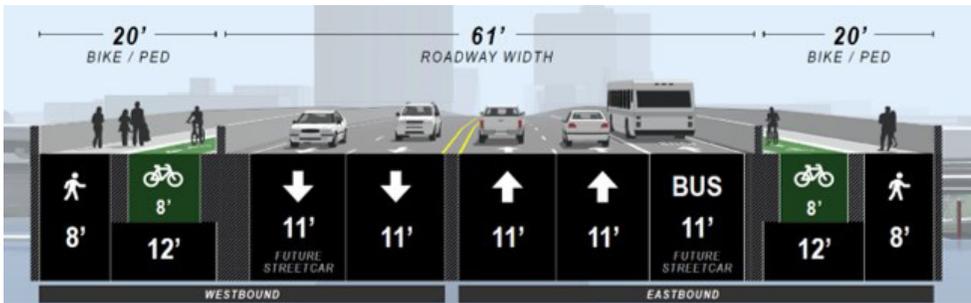
## **Bridge Cross Section and Allocation**

The Draft EIS evaluated bridge alternatives with five vehicle lanes, and the SDEIS studies a potential four-lane bridge, including several different lane configurations and different allocations of width for travel modes, as shown in Figure S-16. The exact lane configuration and the width allocation among different modes is a detail that may be determined in the ROD or delayed until final design.

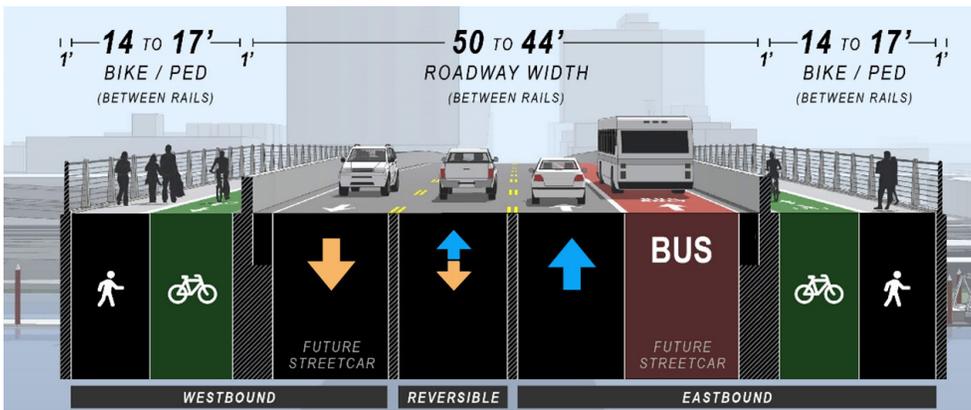
Figure S-16. Bridge Width - Cross Section over River



Existing Bridge Width



Draft EIS Long-Span Bridge Width



Refined Long-Span Bridge Width (Lane Configuration Option 3)

## Potential Future Lane Allocation

The analysis of future travel impacts is based on the existing transportation network combined with reasonably foreseeable future projects as described in adopted transportation and land use plans. Projects that are not in adopted and financially constrained plans are not considered to be “reasonably foreseeable.” However, it is possible that other projects, not in those plans, could occur within the planning horizon (2045) of the transportation analysis. For example, the City of Portland is studying the potential for implementing new transit-only lanes on various city roadways including the possibility of converting a general traffic lane into a westbound transit only lane on the Burnside Bridge. While this is just a study, and the project itself is not currently funded or considered reasonably foreseeable, the EQRB project team has coordinated with the City on the potential effects. The Refined Long-span Alternative, with one less motor vehicle lane on the bridge, would not preclude the ability of the City to implement a westbound bus only lane in the future but it would result in greater impacts to westbound cars and trucks.



## S.6 How is the Supplemental Draft EIS organized?

### The core of the SDEIS consists of three chapters:

- **Chapter 1**, Purpose and Need for the Project. This chapter explains the problems that the project is addressing and the intended outcomes from project implementation. The statement is the same in this SDEIS as it was in the Draft EIS.
- **Chapter 2**, Project Alternatives. This describes the Refined Long-span Alternative and how its design and elements would be similar to or different from the Draft EIS Long-span Alternative. It also summarizes the process followed during the 2018 Feasibility Study and subsequent informal scoping work to identify and screen potential solutions in order to reach the range of alternatives that are studied in the Draft EIS, the process to identify a Preferred Alternative in the Draft EIS, and the process after the Draft EIS to evaluate refinements to reduce the cost of the Preferred Alternative.
- **Chapter 3**, Affected Environment and Environmental Consequences. This chapter describes the impacts of the Refined Long-span Alternative that would be different from the impacts of the Draft EIS Long-span Alternative as described in the Draft EIS. It also compares the impacts to the No-Build Alternative and identifies any mitigation measures that would be different from those proposed for the Long-span Alternative in the Draft EIS.

Additional detail on the Draft EIS project alternatives and on the affected environment and impacts can be found in the Draft EIS and in the EQRB technical reports listed in Attachment D of the Draft EIS and on the project website.

See the SDEIS table of contents for a list of all of the SDEIS attachments. Key attachments include:

- **Attachment J**, Summary of Potential Mitigation, which lists in one location all of the potential mitigation measures that are scattered through the different sections of the Draft EIS Chapter 3 and the SDEIS Chapter 3. This has had minimal changes since the Draft EIS.
- **Attachment K**, Summary of Public Involvement and Agency Coordination. This has the same information that was in the Draft EIS Summary of Involvement and Coordination plus a summary of what has happened since the Draft EIS.
- **Attachment M**, Revised Draft Section 4(f) Analysis, which documents the Section 4(f) findings to date. Section 4(f) of the Department of Transportation Act, and subsequent regulations, apply specific requirements to minimize impacts to (“use” of) public parks and recreation resources and historic resources for projects that involve funding or other actions by the US Department of Transportation.