

Chapter 3

Affected Environment and Environmental Consequences

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3 Affected Environment and Environmental Consequences

This chapter summarizes the impacts of the Refined Long-span Alternative on the environment within the potentially affected area. It does not describe the affected environment because that is the same as described in the EQRB Draft EIS (published February 5, 2021), except where differences are noted below. Many of the impacts for the Refined Long-span Alternative would also be the same as described in the Draft EIS for the Draft EIS Long-span Alternative. The Summary to this SDEIS includes a summary of the impacts from all the alternatives evaluated in the Draft EIS. The Draft EIS, including the discussion of the impacts from the No-Build, Long-span, Short-span, Couch Extension, and Enhanced Retrofit Alternatives, is incorporated by reference into this SDEIS.

The Draft EIS identifies a Preferred Alternative (the Draft EIS Long-span Alternative); this SDEIS evaluates several potential refinements to that alternative. As such, this document focuses on the impacts that would be different from those described for the Draft EIS Long-span Alternative in the EQRB Draft EIS. To better inform decision-making, this chapter compares the impacts of the Refined Long-span Alternative to those of the Draft EIS Long-span Alternative and the No-Build Alternative.

In addition to the Refined Long-span Alternative, 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.

Chapter 2 provides a summary of this comparison. The evaluation comparing refined versions of all three replacement alternatives demonstrated that the Refined Long-span, like the Draft EIS Long-span Alternative, has less seismic risk, reduces impacts, and costs less than the other build alternatives. This chapter provides more detail for those environmental elements where there would be a meaningful difference in impacts between the Refined Long-span and the Refined Short-span or Couch Extension Alternatives.

The information included in this SDEIS is a summary of the detailed analyses and findings that are documented in the supplemental memos listed in Attachment D as well as the technical reports that support the Draft EIS. Unless otherwise noted, the mitigation measures are potential at this point in time, and they would not be finalized until after the SDEIS comment period and before the Final EIS is published and the Record of Decision is signed.

3.1 Transportation

This section summarizes information from the *EQRB Transportation Supplemental Memorandum* (Multnomah County 2022).

3.1.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment.

3.1.2 Impacts

No-Build Alternative

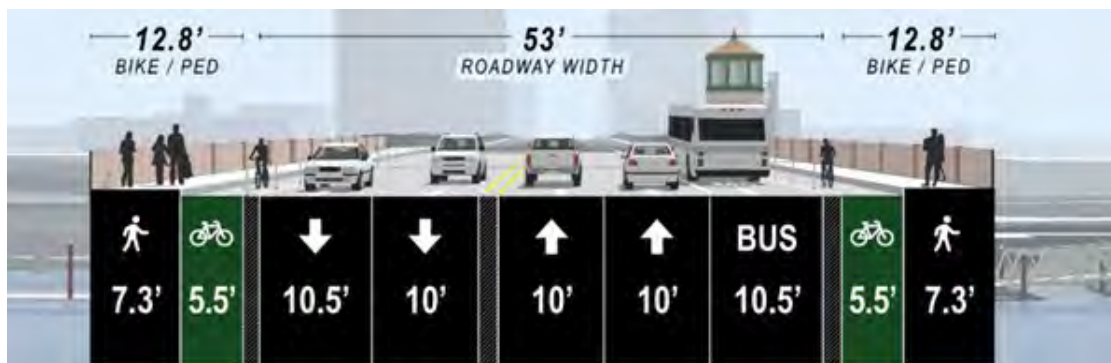
Since publication of the Draft EIS, the City of Portland has made several modifications to the roadway network in or near the project study area but not to the bridge itself. The City has converted relatively short sections of roadway lanes on E Burnside, W Burnside, and NE Couch Street from general-purpose lanes to either pocket lanes or bus-only lanes. These changes, as well as small signal operation changes, in No-Build conditions were modeled for the SDEIS. None of these revisions resulted in any meaningful difference in the 2045 no-build transit or traffic performance relative to the Draft EIS.

Refined Long-Span Alternative

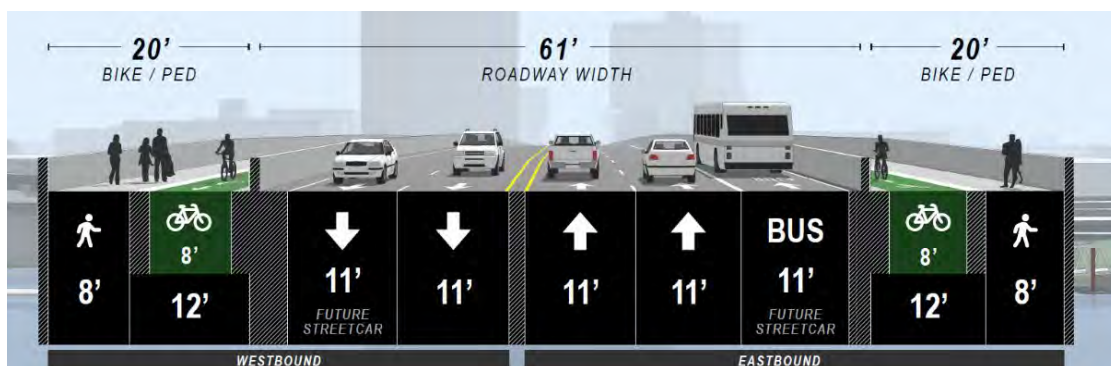
As described in Chapter 2 of this SDEIS, the Refined Long-span would differ from the Draft EIS Long-span in several ways that could alter how the Project affects various transportation modes and safety. Those key design differences are:

- A narrower bridge that would have the following differences:
 - One less vehicle travel lane (the Draft EIS includes five, the Refined Alternative includes four)
 - Less width dedicated to sidewalk and bicycle pathway (the Draft EIS includes 40 feet, the Refined Alternative includes 28 to 34 feet) (see Figure 3.1-1)

Figure 3.1-1. Bridge Width – Cross Section Over River



Existing Bridge Width



Draft EIS Long-Span Bridge Width



Refined Long-Span Bridge Width

*Note: there are four different lane configuration options for the Refined Alternative.

- Four different lane configuration options (see Figure 2.4-8 in Chapter 2 of this SDEIS)
 - 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
- Elevators and stairs (no ramps) for Americans with Disabilities Act (ADA) access to 1st Avenue below the bridge and to the Vera Katz Eastbank Esplanade below the bridge (see Figures 2.4-18 through 2.4-22 in Chapter 2 of this SDEIS).

The following impacts of the Refined Long-span Alternative would be the same as described in the Draft EIS for the original Draft EIS Long-span Alternative:

- Post-earthquake impacts
- Indirect impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas
- Parking and building access impacts

The rest of this section summarizes the key differences in impacts of the Refined Long-span Alternative, including the four lane configuration options, and compares them to the Draft EIS Long-span and No-Build Alternatives. Several terms used to describe impacts include:

- Zipper merge – Traffic lanes merge to form just one lane, which occurs with each of the lane configuration options.
- Level of service (LOS) – A measure of a road intersection's performance that is typically based on traffic volumes relative to traffic capacity. The City of Portland, like many other jurisdictions, has established LOS standards.

Traffic and Freight

- Vehicle demand volumes across the Burnside Bridge for all four lane options are projected to be very similar to the Draft EIS Long-span Alternative (all changes in volume are within 100 vehicles per of what was projected for the Draft EIS Long-span Alternative).
- With the modifications to signal timing at the W Burnside Street and NW/SW 2nd Avenue intersection and the four intersections along E Burnside Street and NE Martin Luther King, Jr. (MLK) Boulevard, the No-Build Alternative is projected to serve 96 percent of projected westbound traffic volume during the AM peak hour.
- Lane Option 1 (Balanced) is projected to serve 96 percent of projected eastbound traffic volume during the PM peak hour, resulting in increased intersection delay and queuing for the intersections along W Burnside Street during the PM peak hour. Modeling indicates that the City's LOS standards would be met at all study intersections during the AM peak hour. All study intersections are anticipated to operate within City LOS standards with the exception of NW Couch Street at NW 2nd Avenue, NW 3rd Avenue, and NW 4th Avenue, which are forecast to operate at LOS E or worse during the PM peak hour. Of the 26 study intersections, 16 (same as with the No-Build Alternative) would have queue lengths on one or more approaches that would exceed the existing storage length and cause traffic to back up into upstream intersections during the PM peak hour. Some intersection queue lengths would double when compared with the No-Build Alternative during the PM peak hour.
- Lane Option 2 (Eastbound Focus) is anticipated to serve 100 percent of the projected eastbound traffic at all times. During the AM and PM peak hours, it is projected to serve 94 and 100 percent of projected westbound traffic volume, respectively. Modeling indicates that the City's LOS standards would be met at all study intersections during the PM peak except at the intersection of NW Couch Street and NW 3rd Avenue, similar to the No-Build Alternative. Of the 26 study intersections, 16 (the same as with the No-Build Alternative) would have queue lengths on one or more approach(es) that would exceed the existing storage length and cause traffic to back up into upstream intersections during the PM peak hour. Most queue lengths would be similar to the No-Build Alternative.
- Lane Option 3 (Reversible Lane), because of its unique reversible lane, would operate the same as Lane Option 1 (Balanced) during the AM peak hour and the same as Lane Option 2 (Eastbound Focus) during the PM peak hour. It is projected to serve 100 percent of projected eastbound vehicle demand in the AM and PM peak periods and 100 percent of projected westbound traffic during the PM peak. However, only 94 percent of westbound traffic during the AM peak hour would be served. All study intersections are anticipated to operate within City LOS standards except NW Couch Street at NW 3rd Avenue, which is forecast to operate at LOS F during the PM peak hour, similar to the No-Build Alternative. Of the 26 study intersections, 16 (the same with as the No-Build Alternative) would have queue lengths on one or more approach(es) that would exceed the existing storage length and cause traffic to back up into upstream intersections during the PM peak hour. Most queue lengths would be similar to the No-Build Alternative.
- Lane Option 4 (General-Purpose with Bus Priority) eliminates the eastbound bus-only lane and instead has two general-purpose lanes in each direction, as well as added bus priority access (i.e., queue bypass) in the eastbound direction. Similar to the No-Build Alternative, Lane Option 4 is projected to serve 96 percent of projected westbound traffic volume during the AM peak hour. All study intersections are anticipated to operate within City LOS standards with the exception of NW Couch Street at NW 3rd Avenue, which is forecast to operate at LOS E

during the PM peak hour, similar to the No-Build Alternative. Of the 26 study intersections, 16 (same as with the No-Build Alternative) would have queue lengths on one or more approach(es) that would exceed the existing storage length and cause traffic to back up into upstream intersections during the PM peak hour. While Lane Option 4 would provide an eastbound bus-only queue jump lane, there is a concern that during the PM peak, buses would be caught in the eastbound general-purpose lanes along with all other traffic, thereby delaying their ability to access the bus-only queue jump lane. The 95th percentile queue length for the eastbound general-purpose through lanes is 260 feet, meaning the bus-only queue jump lanes would need to be at least 260 feet long for all buses to bypass the queuing. Additionally, downstream congestion from E Burnside Street/14th Avenue would likely impact operations along E Burnside Street, meaning the 260-foot-long queue could in fact be longer.

Transit

- Lane Option 1 (Balanced) is projected to produce the greatest ridership gains for bus Lines 12, 19 and 20, which have the highest ratio of transit person trips across the bridge relative to auto and commercial-use vehicle person trips.
- All lane options except Lane Option 4 (General-Purpose with Bus Priority) would have the same westbound PM peak travel time impact of 18 seconds.
- All lane options, with the exception of Lane Option 4, forecast ridership roughly equal to or improved compared with the Draft EIS Long-span Alternative.
- Only Lane Option 4 is anticipated to result in reduced ridership, likely due to maintained or slightly improved traffic operations.
- All the lane options would accommodate the future expansion of Portland Streetcar over the Burnside Bridge.
- Westbound auto traffic delay and queue spillback resulting from the zipper merge through the S-curve would create minor delay and create reliability impacts for transit operations under both Lane Options 2 and 3.
- The 50-foot and 47-foot cross sections both meet TriMet's minimum lane widths for bus facilities. The 44-foot cross section could impact transit operations and would increase minor crashes and mirror strikes for transit vehicles.
- A narrower bridge may not have adequate width to accommodate an existing westbound bus stop that is currently on the bridge near the stairs that connect to NW 1st Avenue. Buses also use that area as dwell space when buses are ahead of schedule. See the mitigation section for potential measures to replace these functions.
- Lane Options 1 (Balanced), 2 (Eastbound Focus) and 3 (Reversible Lane), which maintain the existing eastbound bus-only lane, are consistent with Portland Comprehensive Plan policies 9.5 (support for reducing vehicle miles traveled and a mode shift to active transportation and transit), 9.6 (prioritizing active transportation and transit before low-occupancy vehicles) and 9.22 (support to make transit the preferred transportation mode and implementation of transit priority and bus-only lanes outlined in the Portland Bureau of Transportation Enhanced Transit Corridors [ETC] Plan [City of Portland 2018]). Additionally, the Metro Regional Transportation Plan (Metro 2018) Policy 4 supports facilities that increase transit speeds and reliability through the implementation of the ETC Plan.
- The Lane Option 3 (Reversible Lane) proposed reversible lane configuration would result in only one general-purpose travel lane in the westbound direction outside of the AM peak hours. This

could pose challenges in implementing the ETC Plan for bus priority in the westbound direction in the future.

- Lane Option 4 (General-Purpose with Bus Priority) is not supported by the referenced policies above because of the removal of the bus-only lane. Bus queue jumps are integrated at both ends of the bridge span in the eastbound direction, but the facilities would not have the same travel time and reliability performance as the existing bus-only lane.

Active Transportation

- Active transportation volumes are expected to be the same as those projected in the Draft EIS.
- The bicycle level of traffic stress for the new bridge cross section is not anticipated to change from the build and no-build conditions described in the *EQRB Transportation Technical Report* (Multnomah County 2021o).
- The width available for people walking and biking on the mid-span cross section would be narrower under all the lane options compared to the Draft EIS Long-span Alternative. The space reserved for active modes in the Draft EIS Long-span Alternative totaled 40 feet. Under the four lane options, this space would be 28, 31, or 34 feet; a reduction in width of 30, 23, or 15 percent, respectively; this would still be at least 2 to 8 feet wider than the bicycling and walking facilities on the existing bridge.
- The *EQRB Transportation Supplemental Memorandum* (Multnomah County 2022l) lists specific design factors to be considered during final design of the active transportation space. These same considerations would apply to the Draft EIS Long-span Alternative, and they include considering different grades for the sidewalk and the bikeway in specific locations; adding a pedestrian crossing on the east leg of the W Burnside Street/2nd Avenue intersection; bicycle signal recommendations; a clear width of 8 feet for the pedestrian through-zone; a cane-detectable transverse strip for vision-impaired users; a bicycle path wide enough to allow occasional passing of bicyclists going in the same direction; and a crashworthy barrier between the active transportation space and vehicular traffic.
- ADA 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. This SDEIS evaluates replacing the stairs with ADA-accessible elevators combined with stairs 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.
- ADA access to the Vera Katz Eastbank Esplanade. 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 SDEIS, 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. 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 public 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.

- The existing northside stairs that access NE 3rd Avenue would be reconnected under all the lane options.

Safety

Table 3.1-1, Table 3.1-2 and Table 3.1-3 present the summary of the predicted crashes (total, fatal and injury, and property damage only) on the bridge plus at the intersections within the safety API for the 50-foot, 47-foot and 44-foot bridge roadway widths, respectively. The comparison analysis of the overall crashes for the three bridge cross section options is summarized below:

- The Draft EIS Long-span Alternative would have more crashes than the No-Build Alternative because of the narrower average offset distance to the roadside barrier and the fixed object from the general-purpose lanes.

- Under each bridge width scenario (i.e., 50-foot, 47-foot, and 44-foot), Lane Option 4 (General-Purpose with Bus Priority) would have the highest number of crashes because of the narrow average offset distance between the general-purpose lane and the roadside barrier compared to other lane options.
- Under each bridge width scenario (i.e., 50-foot, 47-foot, and 44-foot), there are no substantial differences in crash rates and number of crashes between Lane Option 1 (Balanced), Lane Option 2 (Eastbound Focus), and Lane Option 3 (Reversible Lane).
- There is no substantial difference in intersection geometry between the three bridge widths. For Lane Option 1 (Balanced), Lane Option 2 (Eastbound Focus), Lane Option 3 (Reversible Lane) and Lane Option 4 (General-Purpose with Bus Priority), the predicted crashes at the intersections are the same for different bridge widths.
- The study area (intersections plus bridge) is forecast to have the lowest number of crashes under the 50-foot bridge width scenario and any lane option scenario.
- Under the 47-foot bridge width scenario, Lane Options 1, 2, 3, and 4 for the study area (intersections plus bridge) would have less than one additional fatal and injury crash and approximately one more property damage only crash compared with the 50-foot cross section.
- Under the 44-foot bridge width, Lane Options 1, 2, and 3 for the study area (intersection plus bridge) are forecast to have two more fatal and injury crashes and six (2 percent) more property damage only crashes over the 20-year period. Under Lane Option 4 (General-Purpose with Bus Priority), there could be less than two additional fatal and injury crashes and approximately four more property damage only crashes compared with the 50-foot bridge width.

Table 3.1-1 Overall Estimated Performance Over 20 Years (Mid-Span and Intersection) – 50-foot Roadway Width

Alternative	Total (All Severities)	Fatal and Injury Crashes	Property Damage Only Crashes
No-Build Existing Cross Section	433.8	157.8	276.0
Build Draft EIS Cross Section	441.1	159.3	281.8
Lane Option 1 (Balanced): Two WB (GP) plus two EB (one GP and one bus-only lane)	442.7	158.8	283.9
Lane Option 2 (EB Focus): One WB (GP) plus three EB (two GP and one bus-only)	443.9	159.3	284.6
Lane Option 3 (Reversible Lane)	444.2	159.4	284.8
Lane Option 4 (GP with Bus Priority): Two WB GP plus two EB GP	473.3	168.2	305.1

EB = eastbound; GP = general-purpose; WB = westbound

Table 3.1-2. Overall Estimated Performance Over 20 Years (Mid-Span and Intersection) – 47-foot Roadway Width

Alternative	Total (All Severities)	Fatal and Injury Crashes	Property Damage Only Crashes
No-Build Existing Cross Section	433.8	157.8	276.0
Build Draft EIS Cross Section	441.1	159.3	281.8
Lane Option 1 (Balanced): Two WB (GP) plus two EB (one GP and one bus-only lane)	444.3	159.2	285.1
Lane Option 2 (EB Focus): One WB (GP) plus three EB (two GP and one bus-only)	445.5	159.7	285.8
Lane Option 3 (Reversible Lane)	445.8	159.8	286
Lane Option 4 (GP with Bus Priority): Two WB GP plus two EB GP	474.4	168.5	305.9

EB = eastbound; GP = general-purpose; WB = westbound

Table 3.1-3. Overall Estimated Performance Over 20 Years (Mid-Span and Intersection) – 44-foot Roadway Width

Alternative	Total (All Severities)	Fatal and Injury Crashes	Property Damage Only Crashes
No-Build Existing Cross Section	433.8	157.8	276.0
Build Draft EIS Cross Section	441.1	159.3	281.8
Lane Option 1 (Balanced): Two WB (GP) plus two EB (one GP and one bus-only lane)	451.1	161.1	290.0
Lane Option 2 (EB Focus): One WB (GP) plus three EB (two GP and one bus-only)	452.4	161.6	290.8
Lane Option 3 (Reversible Lane)	452.7	161.7	291.0
Lane Option 4 (GP with Bus Priority): Two WB GP plus two EB GP	479.1	169.8	309.3

EB = eastbound; GP = general-purpose; WB = westbound

The proposed bridge includes a barrier separating the roadway and the adjacent pedestrian and bicycle facility. This barrier would prevent motor-vehicle/pedestrian and motor vehicle/bicycle crashes. Because of this, the mid-span assessment focused on motor vehicle crashes within the barrier and pedestrian and bicycle crashes predicted using the American Association of State Highway and Transportation Officials Highway Safety Manual method are not included in the following analysis. A qualitative discussion on pedestrian and bicyclist safety is presented in Section 7.1.3 of the *EQRB Transportation Supplemental Memorandum* (Multnomah County 2022I) document. However, the barrier is a fixed object for motorists and would increase the number of motor vehicle crashes on the roadway compared to the existing tubular markers that separate vehicle traffic from bicycle users. More vehicle crashes are likely to occur where the average offset distance to the roadside barrier is narrower, resulting in Lane Option 4 (General-Purpose with Bus Priority) predicted to have the highest crash rate with the roadside barrier.

Comparison with the Refined Short-Span and Couch Extension Alternatives

As discussed in Chapter 2 and in the Chapter 3 introduction above, as part of investigating potential ways to reduce project costs, the project team also evaluated refined versions of the other Draft EIS

replacement bridge alternatives – the Short-span and the Couch Extension Alternatives. While the full width (five-lane) versions of these alternatives were studied in detail in the Draft EIS and were not selected as the preferred alternative, narrower (four-lane) versions were considered during the SDEIS development process to determine how they would compare to the Refined Long-span Alternative (a refined version of the Draft EIS Preferred Alternative). For transportation, the following summarizes how a Refined Short-span and a Refined Couch Extension Alternative, would compare to the Refined Long-span impacts described above.

Refined (Four-Lane) Short-Span Alternative

Traffic, transit, safety and active transportation performance and impacts would be identical to the impacts described for the Refined Long-span Alternative.

Refined (Four-Lane) Couch Extension Alternative

Active transportation impacts would be the same as described for the Refined Long-span Alternative. Traffic, transit and safety impacts would be the same in some cases and slightly different in others, depending on the lane configuration option. The main differences would be in the westbound direction because the Couch Couplet replaces the westbound S-curve located at the end of the east approach with a much longer-radius curve. The following compares the Refined Couch Extension to the Refined Long-span for each of the lane configuration options.

LANE OPTION 1 (BALANCED)

Traffic

- Eastbound AM/PM peak general-purpose traffic travel times would likely be the same.
- Westbound AM general-purpose volume throughput would likely increase.
- Westbound AM and PM peak general-purpose traffic operations would likely improve.

Transit

- Eastbound AM/PM peak transit travel times would likely be the same.
- Westbound AM and PM peak transit travel times would likely improve.
- Transit ridership would likely be the same.
- Transit reliability might improve slightly in the westbound direction.

Safety

- Might see higher motor vehicle speeds due to a significantly flattened Couch Street westbound S-curve.
- Where shoulders are narrowed, could see higher crash frequency.

LANE OPTION 2 (EASTBOUND FOCUS)

Traffic

- Westbound AM and PM peak general-purpose traffic operations would likely improve.
- Westbound AM general-purpose volume throughput would likely improve.
- Eastbound AM/PM peak general-purpose traffic travel times would likely be the same.

Transit

- Eastbound AM/PM peak transit travel times would likely be the same.
- Westbound AM and PM peak transit travel times would likely improve.
- Transit ridership would likely be unaffected.
- Transit reliability might improve slightly in the westbound direction

Safety

- Might see higher motor vehicle speeds.
- Where shoulders are narrowed, could see higher crash frequency.

LANE OPTION 3 (REVERSIBLE LANE)

Traffic

- Westbound AM and PM peak general-purpose traffic operations would likely improve.
- Westbound AM general-purpose volume throughput would likely improve.

Transit

- Westbound AM and PM peak transit travel times would likely improve.
- Transit ridership would likely be unaffected.
- Transit reliability might improve slightly in the westbound direction.

Safety

- Might see higher motor vehicle speeds.
- With a shorter reversible lane, operating the transitions into and out of the reversible/general-purpose lanes and operating overhead signage becomes even more critical. This could increase driver load and complexity.

LANE OPTION 4 (GENERAL-PURPOSE WITH BUS PRIORITY)

Traffic

- Westbound AM and PM peak general-purpose traffic operations would likely improve.
- Westbound AM general-purpose volume throughput would likely improve.

Transit

- Westbound AM and PM peak transit travel times would likely improve.
- Eastbound AM/PM peak transit travel times would likely be the same.
- Transit ridership would likely be the same.
- Transit reliability might improve slightly in the westbound direction.

Safety

- Might see higher motor vehicle speeds.
- Where shoulders are narrowed, could see higher crash frequency.

3.1.3 Mitigation

Potential mitigation measures to address permanent and temporary impacts during construction were identified and are summarized in Section 8 of the *EQRB Transportation Technical Report* (Multnomah County 2021o). The mitigation outlined in this SDEIS section addresses impacts identified for each of the lane options of the Refined Long-span Alternative. A summary of the proposed mitigation measures is provided in Table 3.1-4 below. There are no added short-term mitigation measures because they would be the same as described in the Draft EIS.

Table 3.1-4. Proposed Mitigation Measures

Mode	Lane Option 1 (Balanced)	Lane Option 2 (Eastbound Focused)	Lane Option 3 (Reversible Lane)	Lane Option 4 (General-Purpose with Bus Priority)
Traffic	No proposed mitigation	Same as for Lane Option 1.	Same as for Lane Option 1.	Same as for Lane Option 1.
Freight	No proposed mitigation	Same as for Lane Option 1.	Same as for Lane Option 1.	Same as for Lane Option 1.
Transit	<ul style="list-style-type: none"> Relocate the existing WB bus stop and dwell space off the bridge deck or provide additional width on the bridge deck to accommodate the stop and dwell space. 	<ul style="list-style-type: none"> WB Bus Queue Jump on NE Couch Street at MLK Boulevard and Grand Avenue. Relocate the existing WB bus stop and dwell space off the bridge deck or provide additional width on the bridge deck to accommodate the stop and dwell space. 	<ul style="list-style-type: none"> WB bus queue jump on NE Couch Street at MLK Boulevard and Grand Avenue. Relocate the existing WB bus stop and dwell space off the bridge deck or provide additional width on the bridge deck to accommodate the stop and dwell space. 	<ul style="list-style-type: none"> Extend the EB bus queue Jump at NE MLK Boulevard westward to avoid conflict with queueing through traffic. Relocate the existing WB bus stop and dwell space off the bridge deck or provide additional width on the bridge deck to accommodate the stop and dwell space.
Active Transportation	Ensure that there are mode-specific pavement markings on both the sidewalk and separated bike lanes to reinforce which space is for each mode and mitigate the narrower space for active transportation.	Same as for Lane Option 1.	Same as for Lane Option 1.	Same as for Lane Option 1.
Safety	The fatal and injury crashes could be reduced by adding additional shoulder width to both directions of travel. See below for specific shoulder widths for each of the lane options and bridge widths.	Same as for Lane Option 1.	Same as for Lane Option 1.	The fatal and injury crashes could be reduced by increasing shoulder width to a total of 6 feet in both directions of travel for all three bridge widths.

EB = eastbound; WB = westbound

In addition to the safety mitigation measures listed by lane option in Table 3.1-4 above, the following optional countermeasures to reduce the crash frequency apply to all four lane options:

- Reduce the speed limit on the bridge to 20 mph.
- Apply wider lane-line or raised markings with materials that provide better retroreflectivity during poor visibility or low light conditions. Non-reflective domes or reflective raised pavement markers could give the same pseudo rumble strip effect.
- Stripe with a solid line to prevent lane changes on the bridge.
- Include reflective tabs or reflective tape on the barriers for nighttime delineation.

Lane Option 1 (Balanced)

Transit Mitigation

Relocate the westbound TriMet bus stop and dwell space that is currently located on the bridge deck or widen the bridge deck to accommodate the needed space for the bus stop and dwell space.

Active Transportation Mitigation

Mode-specific pavement markings should be included for both the sidewalk and separated bike lanes on the bridge to reinforce which space is for each mode and mitigate the narrower space for active transportation.

Safety Mitigation

For the number of fatal and injury crashes on the bridge in Lane Option 1 (Balanced) to be comparable with the No-Build Alternative, the shoulder width could be increased to a total of 3 feet in both directions on the 50-foot bridge width and 4 feet in both directions on the 47-foot and 44-foot bridge widths. The increase in shoulder width could be accomplished by either expanding the bridge width or acquiring space from the bike lane and sidewalk. Table 3.1-4 presents a summary of optional countermeasures to reduce the crash frequency, but additional analysis is required to implement them.

The mitigation recommendations for the intersections are the same as those provided in the Draft EIS.

Lane Option 2 (Eastbound Focus)

The following proposed mitigation addresses impacts identified for Lane Option 2 (Eastbound Focus).

Transit Mitigation

Westbound bus queue jumps on NE Couch Street at the intersections with MLK Boulevard and Grand Avenue – Lane Option 2 (Eastbound Focus) removes a westbound general-purpose travel lane which would impact transit travel times and reliability. Installing queue jumps in the westbound direction would allow TriMet buses to avoid some delay caused by auto vehicle queuing at these intersections. A Rose Lane project that includes a business-access-and-transit lane from NE 12th Avenue to Grand Avenue is already proposed for this section of Couch Street.

Relocate the westbound TriMet bus stop and dwell space that is currently located on the bridge deck or widen the bridge deck to accommodate the needed space for the bus stop and dwell space.

Active Transportation Mitigation

The mitigation recommendations are same as for Lane Option 1 (Balanced).

Safety Mitigation

In Lane Option 2 (Eastbound Focus), the number of fatal and injury crashes on the bridge would be comparable to no-build conditions by increasing its shoulder width. The shoulder width could be increased to a total of 3 feet in both directions on the 50-foot bridge width and 4 feet in both directions on the 47-foot and 44-foot bridge widths. The increase in shoulder width could be accomplished by either expanding the bridge width or acquiring space from the bike lane and sidewalk. Table 3.1-4 presents a summary of optional countermeasures to reduce the crash frequency, but additional analysis is required to implement them.

The mitigation recommendations for the intersections are the same as those provided in the Draft EIS.

Lane Option 3 (Reversible Lane)

Transit Mitigation

Westbound bus queue jumps on NE Couch Street at the intersections with MLK Boulevard and Grand Avenue – Lane Option 3 (Reversible Lane) includes a reversible lane that adds capacity during peak-hour travel to the peak direction. In the non-peak direction of travel, capacity is thus reduced. Installing queue jumps in the westbound direction would allow TriMet buses to avoid some delay caused by auto vehicle queuing at these intersections. A Rose Lane project that includes a business-access-and-transit lane from NE 12th Street to Grand Avenue is already proposed for this section of Couch Street.

Relocate the westbound TriMet bus stop and dwell space that is currently located on the bridge deck or widen the bridge deck to accommodate the needed space for the bus stop and dwell space.

Active Transportation Mitigation

The mitigation recommendations are same as for Lane Option 1 (Balanced).

Safety Mitigation

The number of fatal and injury crashes on the bridge with the Lane Option 3 (Reversible Lane) would be comparable to the No-Build Alternative if the shoulder widths are increased to a total of 3 feet in both directions on the 50-foot bridge width and 4 feet in both directions on the 47-foot and 44-foot bridge widths. The increase in shoulder width could be accomplished by either expanding the bridge width or acquiring space from the bike lane and sidewalk. Table 3.1-4 presents a summary of optional countermeasures to reduce the crash frequency, but additional analysis is required to implement them.

The mitigation recommendations for the intersections are the same as those provided in the Draft EIS.

Lane Option 4 (General-Purpose with Bus Priority)

Transit Mitigation

Extend the eastbound bus queue jump at the eastern bridgehead at the intersection with NE MLK Boulevard. The queue jump is meant to speed up bus operations and separates buses from through

and right-turning vehicles. The traffic operations analysis shows that the 95th percentile queue length for right-turning vehicles would reach up to 550 feet. As the queue jump is currently designed, the right-turn queue would block transit vehicles, impacting their speed and reliability. Extending the queue jump beyond 550 feet would require the bridge deck to be wider for the length of the queue jump.

Relocate the westbound TriMet bus stop and dwell space that is currently located on the bridge deck or widen the bridge deck to accommodate the needed space for the bus stop and dwell space.

Active Transportation Mitigation

The mitigation recommendations are same as those for Lane Option 1 (Balanced).

Safety Mitigation

For the number of fatal and injury crashes on the bridge in Lane Option 4 (General-Purpose with Bus Priority) to be comparable to no-build conditions, the shoulder width would need to be increased to a total of 6 feet in both directions of travel for all the three bridge widths (i.e., 50-foot, 47-foot, and 44-foot widths). The increase in shoulder width could be accomplished by either expanding the bridge width or acquiring space from the bike lane and sidewalk. Table 3.1-4 presents a summary of optional countermeasures to reduce the crash frequency, but additional analysis is required to implement them.

The mitigation recommendations for the intersections are the same as those provided in the Draft EIS.

3.2 Navigation

For this SDEIS, there are no changes or revisions to Section 3.2, Navigation, of the EQRB Draft EIS.

3.3 Acquisitions and Relocations

3.3.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment.

3.3.2 Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the original Long-span Alternative, including the following:

- Post-earthquake impacts
- Impacts from potential off-site staging areas

Direct Impacts

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span. Design changes in the Refined Long-span Alternative would result in differences in short-term and long-term impacts to displacements and relocations.

Comparison to the Draft EIS Long-Span Alternative and the No-Build Alternative

The Draft EIS Long-span Alternative included several proposed fee acquisition areas. All permanent rights are now proposed to be acquired as permanent easements for bridge improvements per County direction. Following is a summary of right-of-way acquisition for the Draft EIS Long-span Alternative and the Refined Long-span Alternative. Acquisitions for both the tied-arch and cable-stayed Refined Long-span Alternative options are identical and have been combined for the purposes of Table 3.3-1 and Table 3.3-2.

Table 3.3-1. Right-of-Way Acquisition Summary

Displacements and Acquisitions by Long-Span Option	Fee Full and Partial Acquisitions	Easements	TCEs	Business Displacement Permanent (Temporary)
Draft EIS Long-Span Alternative	8	1	17	6 (0)
Refined Long-Span Alternative	0	12	18	5 (1)

TCE = temporary construction easement

Following is a list of all impacted properties associated with the Draft EIS Long-span Alternative and the Refined Long-span Alternative(s) for comparison.

Table 3.3-2. Impacted Properties

ID	TLID	Property Name	Draft EIS Long-Span (bus. displ.)	Refined Long-Span (bus. displ.)
1	1N1E34CA-09200	Central City Concern (Shoreline Building)	TCE Access	None
2	1N1E34DB-00900	Portland Rescue Mission	TCE access	Easement & TCE
3	1N1E34DB-01500	Portland Saturday Market Storage (City of Portland)	Easement ^b (1)	Easement ^b (1)
4	1N1E34DB-01400	University of Oregon Classroom (City of Portland)	Full ^a (1)	Easement ^a (1)
5	1N1E34DC-00800	Portland Saturday Market Administration Offices (Skidmore Fountain Plaza, LLC)	Full ^b (1)	Easement & TCE ^b (1)
6	1N1E34CD-00300	Salvation Army	TCE Access	None
7	1N1E34CD-00100	Vacant Lot (Skidmore Fountain Plaza, LLC)	Full	TCE
8	1N1E34DC-00900	Diamond Parking Services (Skidmore Fountain Plaza, LLC)	Full ^c (1)	TCE ^c (1)
9	1N1E34DC-01000	Diamond Parking Services (Skidmore Fountain Plaza, LLC)	Full	TCE
10	1N1E34DB-00600	University of Oregon (White Stag Building)	TCE Access	TCE Access
11	1N1E34DC-90000	Mercy Corps	TCE	Easement & TCE
12	1N1E34DB-01300	Japanese American Plaza (City of Portland)	TCE	TCE
13	1N1E34DC-03600	Ankeny Plaza Structure (City of Portland)	TCE ^b	TCE ^b
14	1N1E34DC-00100	BES Pump Station (City of Portland)	TCE	TCE
15	1N1E34DC-03700	Bill Naito Legacy Fountain (City of Portland)	None	None
16	1N1E34DA-01500	Pacific Coast Fruit Company	TCE ^d (1)	None
17	1N1E34DA-01900	Rose City Transportation (David Nemarnik)	Full (1)	Easement & TCE ^d (1)
18	1N1E34DD-01000	American Medical Response (Produce Row LLC)	Partial (1)	Easement & TCE (1)
19	1N1E34DA-02800	Eastside Exchange Building (Bridgehead Development LLC)	None	None
20	1N1E34DA-02602	The Yard – Pedestrian / Bike Right-of-Way (Bridgehead Development LLC)	None	None
21	1N1E34DA-02001	The Yard (Yard Residences LLC)	TCE	Easement
22	1N1E34DD-00900	Nemarnik Family Properties Parking Lot	None	TCE (1)

ID	TLID	Property Name	Draft EIS Long-Span (bus. displ.)	Refined Long-Span (bus. displ.)
23	1N1E34DD-00700	230 E Burnside Building (Templeton Office Investments LLC)	TCE Access	TCE Access
24	1N1E34DA-03100	Union Arms Apartments	None	None
25	1N1E34DA-02900	The Slate (Block 75)	None	None
26	1N1E34DA-03300	Block 76	Partial	Easement & TCE
27	1N1E34DA-3500	Fair-Haired Dumbbell	TCE Access	None
28	1N1E34DD-00100	5 MLK	TCE Access	None
A	N/A	Willamette River (Dept. of State Lands)	TCE	Easement & TCE
B	N/A	Vera Katz Eastbank Esplanade (City of Portland)	TCE	None
C	N/A	I-5 & I-84 (ODOT)	TCE	Easement & TCE
D	N/A	Union Pacific Railroad	TCE	Easement & TCE

bus. displ. = business displacements; easement = permanent easement; full = full acquisition; N/A = not applicable; TCE = temporary construction easement; TCE Access = temporary construction easement for access closures only; Temp. = temporary; TLID = Tax lot ID; partial = partial acquisition

a The University of Oregon uses this space and this is identified as a displacement of personal property.

b Portland Saturday Market would be permanently displaced from their administration offices and temporarily displaced from the storage and market space under the bridge.

c Diamond Parking Services would be displaced from Map IDs 8 and 9 but are only counted as one business displacement.

d The original Draft EIS Long-span Alternative could potentially displace the Pacific Coast Fruit Company business due to impacts to the Rose City Transportation building next door which shares a wall.

Long-Term Acquisition Impacts

The Refined Long-Span Alternative options would require four additional permanent acquisitions compared to the Draft EIS Long-span Alternative. The tied-arch and cable-stayed options include the same types of acquisitions from each property, only varying in size.

Impacts to the west bridgehead under the Draft EIS Long-span Alternative and Refined Long-span Alternative are shown in Figure 3.3-1 and Figure 3.3-2, respectively. Impacts for the east bridgehead under the Draft EIS Long-span Alternative and Refined Long-Span Alternative are shown in Figure 3.3-3 and Figure 3.3-4, respectively.

Impacts to public right-of-way would remain the same for the Draft EIS Long-span and Refined Long-span Alternatives.

Figure 3.3-1. Property Impacts – West Bridgehead, Draft EIS Long-Span Alternative

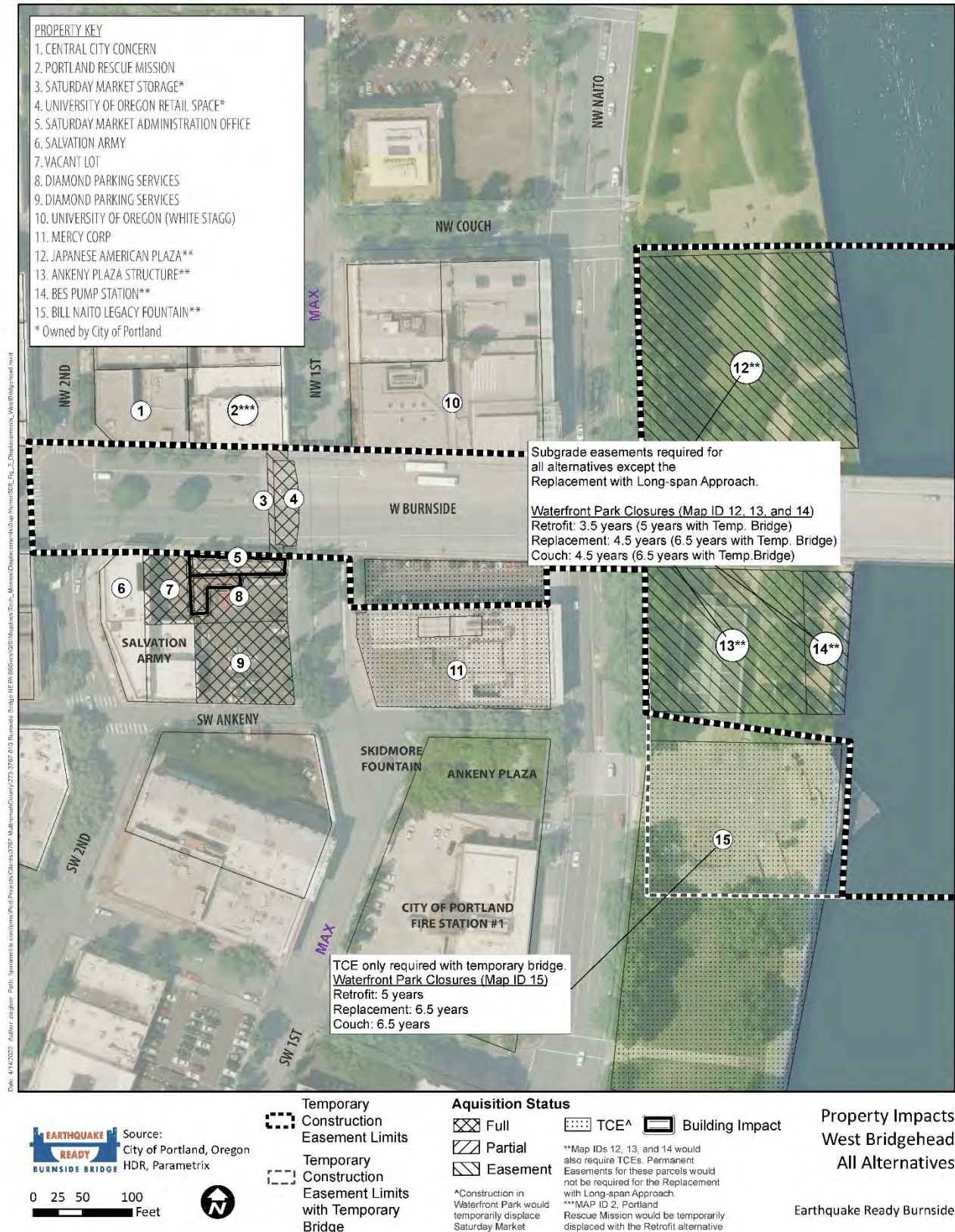


Figure 3.3-2. Property Impacts – West Bridgehead, Refined Long-Span Alternative



Figure 3.3-3. Property Impacts – East Bridgehead, Draft EIS Long-Span Alternative

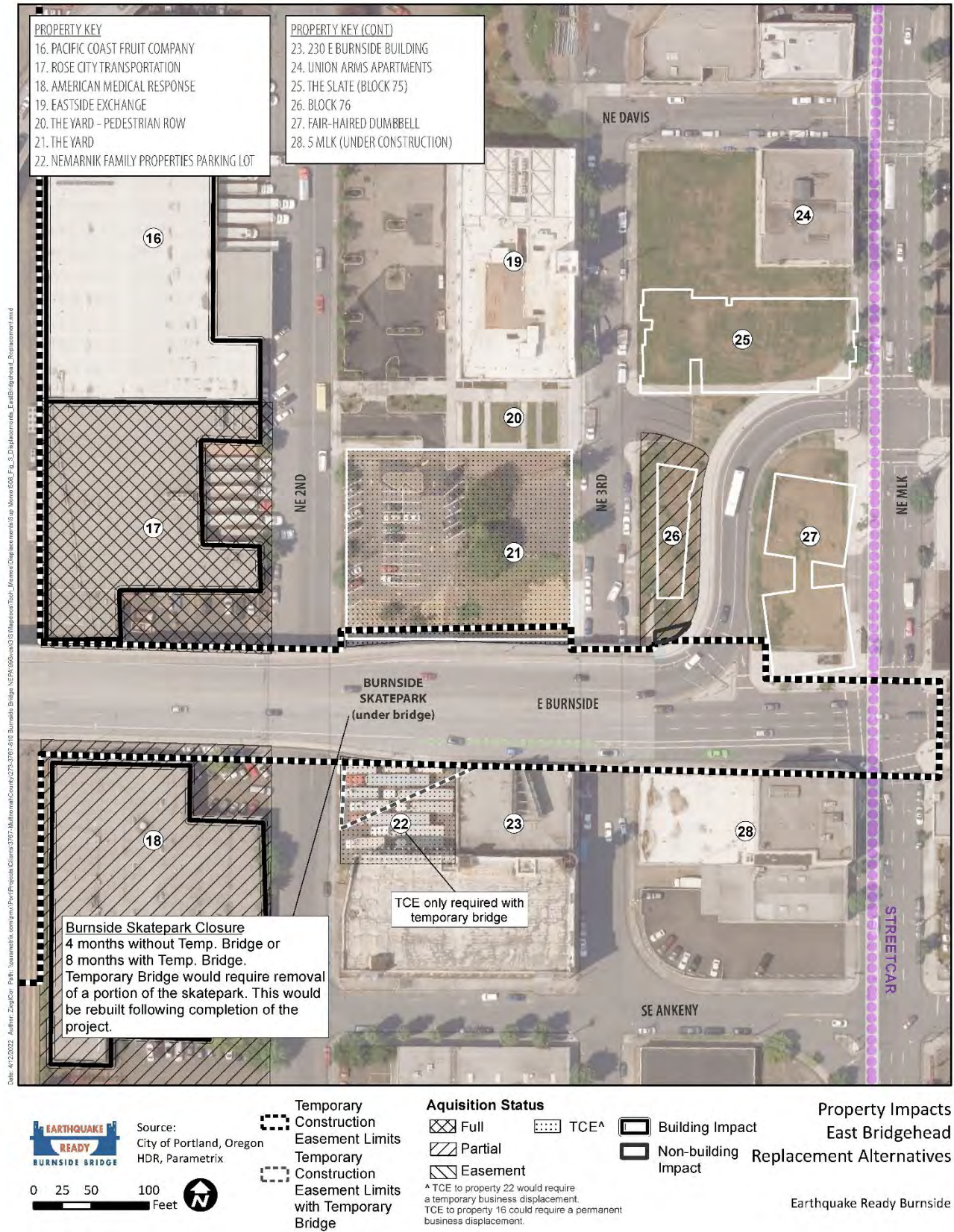
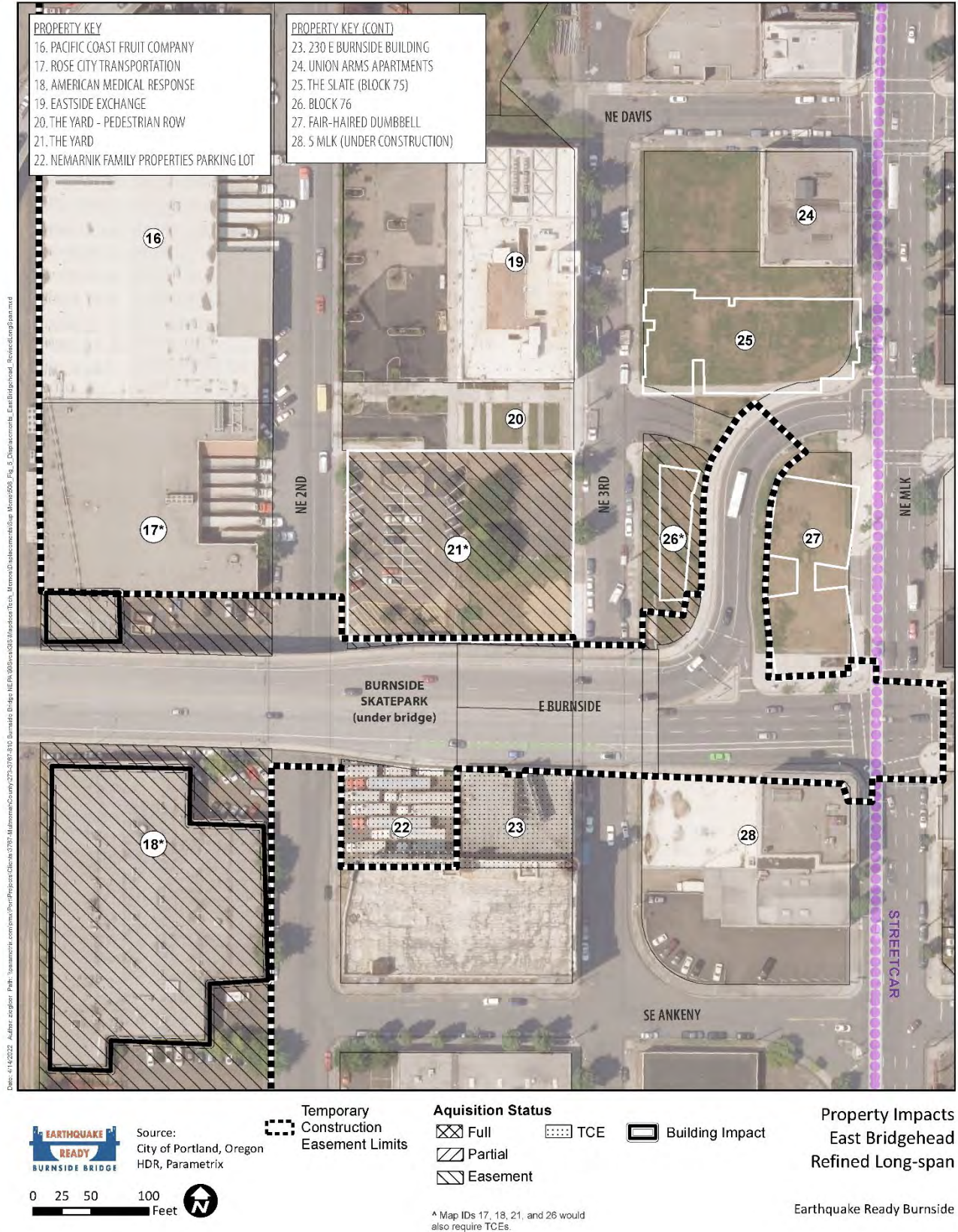


Figure 3.3-4. Property Impacts – East Bridgehead, Refined Long-Span Alternative



Long-Term Impacts Summary

- Draft EIS Long-span Alternative
 - One permanent easement, six (potential) full acquisitions, and two (potential) partial acquisitions
- Refined Long-span Alternative
 - 12 permanent easements and no full or partial acquisitions
 - Additional permanent impacts that would all be permanent easements with no displacement: Portland Rescue Mission (Map ID 2); Mercy Corp (Map ID 11); and the Yard (Map ID 21)
 - Reduced permanent impacts that would be easements in place of full acquisitions under the Draft EIS Long-span, with no displacement: University of Oregon Classroom (Map ID 4); the Portland Saturday Market Administrative Office (Map ID 5); the vacant lot owned by Skidmore Fountain Plaza, LLC, (Map ID 7); and Block 76 (Map ID 26)
 - Reduced permanent impacts that would be easements in place of full acquisitions under the Draft EIS Long-span, still requires a displacement: Diamond Parking Service Lots (Map IDs 8 and 9); Rose City Transportation (Map ID 17); and American Medical Response (Map ID 18)
- Additional long-term impact considerations
 - The Draft EIS Long-span Alternative would require a temporary easement from Union Pacific Railroad (UPRR) at the east bridgehead.
 - The Refined Long-span Alternative would require a temporary easement and a permanent easement for bridge facilities over UPRR property.
 - Negotiations with UPRR have historically taken a minimum of 12 months, which will need to be accounted for in the project schedule, and permanent rights are likely to take longer to acquire from the railroad than temporary rights.

Short-Term Acquisition Impacts

Temporary construction impacts associated with the Refined Long-span Alternative options would impact 18 properties which is one more than the Draft EIS Long-span Alternative. Some fee acquisition areas that were assumed for the Draft EIS Long-span Alternative have been converted to TCE areas for the Refined Long-span Alternative options, as the County will not be needing the majority of those areas permanently (see Table 3.3-2).

During construction of all original and refined long-span options, the same 51 doorways and garage/parking lot entrances would be temporarily affected. These access closures would require three additional TCEs to allow the County to compensate property owners for building modifications that would be necessary to provide alternate access for businesses during construction.

It is now assumed that access accommodations would be made for sidewalk construction and other short-term access impacts; therefore, a number of temporary easements for access closures that were assumed for the Draft EIS Long-span Alternative would no longer be needed. See Figure 3.3-5 and Figure 3.3-6 and Table 3.3-3 for updated access and parking impacts.

Off-site construction staging would impact the same properties for both the original Draft EIS Long-span and Refined Long-span Alternatives.

See the *EQRB Right-of-Way Technical Report* (Multnomah County 2021n) and *EQRB Right-of-Way Supplemental Memo* (Multnomah County 2022j) for other short-term acquisition impacts.

Short-Term Construction Impacts Summary

- Draft EIS Long-span Alternative
 - 10 properties affected by TCEs and 7 properties affected by TCEs for access only.
 - 51 building and parking lot entrances would be temporarily closed.
- Refined Long-span Alternative options
 - 15 properties affected by TCEs and 3 properties affected by TCEs for access only.
 - 51 building and parking lot entrances would be temporarily closed.
 - Additional temporary impacts: Portland Rescue Mission (Map ID 2), Portland Saturday Market Administration Offices (Map ID 5), The Vacant Lot Owned by Skidmore Fountain Plaza, LLC (Map ID 7), Diamond Parking Service Lots (Map IDs 8 and 9), Rose City Transportation (Map ID 17), American Medical Response (Map ID 18), the Nemarnik Family Properties Parking Lot (Map ID 23) and Block 76 (Map ID 26).
 - Reduced temporary impacts: Pacific Coast Fruit Company (Map ID 16) and The Yard (Map ID 21).

Table 3.3-3. Access Impacts

Door No.	TLID	Property Name	Door Type	Draft EIS Long-span Impact	Refined Long-span Impact
3	1N1E34CA -09200	Central City Concern (Shoreline Building)	Pedestrian	Temporary Short-term	Temporary Short-term
4	1N1E34CA -09200	Central City Concern (Shoreline Building)	Pedestrian	Temporary Short-term	Temporary Short-term
5	1N1E34CA -09200	Central City Concern (Shoreline Building)	Pedestrian	Temporary Short-term	Temporary Short-term
6	1N1E34DB -00900	Portland Rescue Mission	Garbage / Recycling	Temporary Short-term	Temporary Short-term
7	1N1E34DB -00900	Portland Rescue Mission	Pedestrian	Temporary Short-term	Temporary Short-term
8	1N1E34DB -00900	Portland Rescue Mission	Pedestrian (onto bridge)	Temporary Short-term	Temporary Short-term
9	1N1E34DB -00900	Portland Rescue Mission	Pedestrian (onto bridge)	Temporary Short-term	Temporary Short-term
10	1N1E34DB -00900	Portland Rescue Mission	Pedestrian	Temporary Long-term	Temporary Long-term
11	1N1E34DB -00900	Portland Rescue Mission	Pedestrian	Temporary Long-term	Temporary Long-term
12	1N1E34DB -00900	Portland Rescue Mission	Garage	Temporary Long-term	Temporary Long-term
13	1N1E34DB -01400	University of Oregon Retail Space (City of Portland)	Garage	Permanent Closure	Permanent Closure
14	1N1E34DB -01400	University of Oregon Retail Space (City of Portland)	Pedestrian	Permanent Closure	Permanent Closure
15	1N1E34DB -01400	University of Oregon Retail Space (City of Portland)	Pedestrian	Permanent Closure	Permanent Closure

Door No.	TLID	Property Name	Door Type	Draft EIS Long-span Impact	Refined Long-span Impact
16	1N1E34DB -01400	University of Oregon Retail Space (City of Portland)	Pedestrian	Permanent Closure	Permanent Closure
17	1N1E34DB -01400	University of Oregon Retail Space (City of Portland)	Pedestrian	Permanent Closure	Permanent Closure
18	1N1E34CD -00300	Salvation Army	Pedestrian	Temporary Short-term	Temporary Short-term
19	1N1E34DB -00600	University of Oregon (White Stag)	Pedestrian (onto bridge)	Permanent Closure	Permanent Closure
19a	1N1E34DB -00600	University of Oregon (White Stag)	Pedestrian (under bridge)	Temporary Long-term	Temporary Long-term
20	1N1E34DB -00600	University of Oregon (White Stag)	Loading Dock (under bridge)	Temporary Short-term	Temporary Short-term
21	1N1E34DC -90000	Mercy Corp	Pedestrian	Temporary Long-term	Temporary Long-term
30	1N1E34DA -02800	Eastside Exchange Building (Bridgehead Development LLC)	Pedestrian	None	None
31	1N1E34DA -02800	Eastside Exchange Building (Bridgehead Development LLC)	Pedestrian	None	None
32	1N1E34DA -02800	Eastside Exchange Building (Bridgehead Development LLC)	Pedestrian	None	None
33	1N1E34DA -02800	Eastside Exchange Building (Bridgehead Development LLC)	Pedestrian	None	None
35	1N1E34DA -02800	Eastside Exchange Building (Bridgehead Development LLC)	Garage	None	None
36	1N1E34DA -02800	Eastside Exchange Building (Bridgehead Development LLC)	Pedestrian	None	None
37	1N1E34DA -02800	Eastside Exchange Building (Bridgehead Development LLC)	Pedestrian	None	None
38	1N1E34DA -02001	The Yard (The Yard Residences LLC)	Pedestrian	None	None
39	1N1E34DA -02001	The Yard (The Yard Residences LLC)	Pedestrian	None	None
40	1N1E34DA -02001	The Yard (The Yard Residences LLC)	Pedestrian	None	None

Door No.	TLID	Property Name	Door Type	Draft EIS Long-span Impact	Refined Long-span Impact
41	1N1E34DA -02001	The Yard (The Yard Residences LLC)	Pedestrian	None	None
44	1N1E34DD -00700	230 E Burnside Building (Templeton Office Investments LLC)	Pedestrian	Temporary Long-term	Temporary Long-term
45	1N1E34DD -00700	230 E Burnside Building (Templeton Office Investments LLC)	Pedestrian	Temporary Short-term	Temporary Short-term
48	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
49	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
50	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
51	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
52	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
53	1N1E34DA -03300	Block 76	Pedestrian	None	None
54	1N1E34DA -03300	Block 76	Pedestrian	None	None
59	1N1E34DD -00100	5 MLK	Garage	Temporary Short-term	Temporary Short-term
60	1N1E34DA -03100	Union Arms Apartments	Pedestrian	None	None
61	1N1E34DA -03100	Union Arms Apartments	Pedestrian	None	None
62	1N1E34DA -03100	Union Arms Apartments	Pedestrian	None	None
63	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
64	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
65	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
66	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
67	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
68	1N1E34DA -02900	The Slate (Block 75)	Pedestrian	None	None
76	1N1E34DA -03500	The Fair-Haired Dumbbell	Pedestrian	Temporary Short-term	Temporary Short-term
77	1N1E34DD -00100	5 MLK	Pedestrian	Temporary Short-term	Temporary Short-term

Figure 3.3-5. Access Reference – West Bridgehead

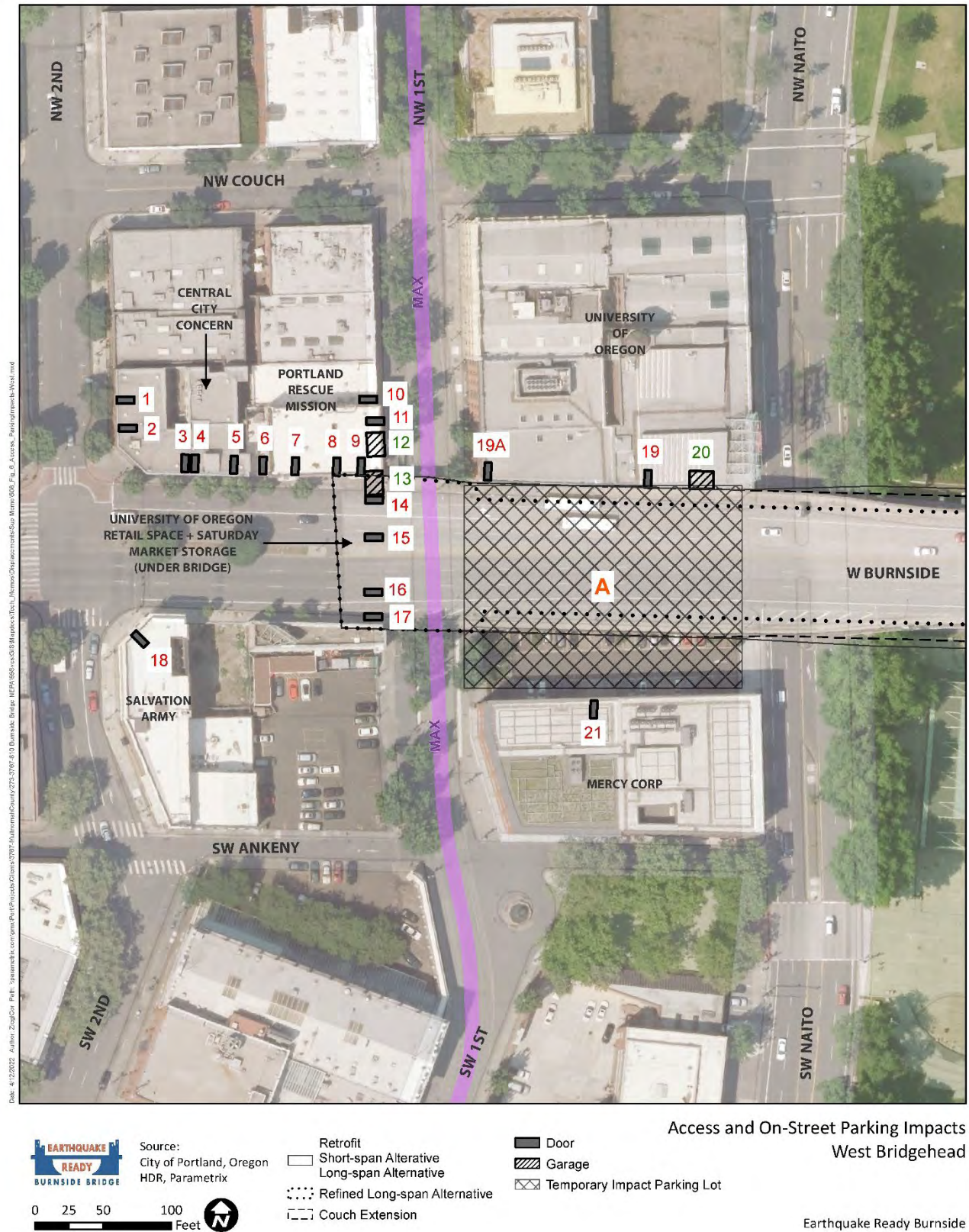
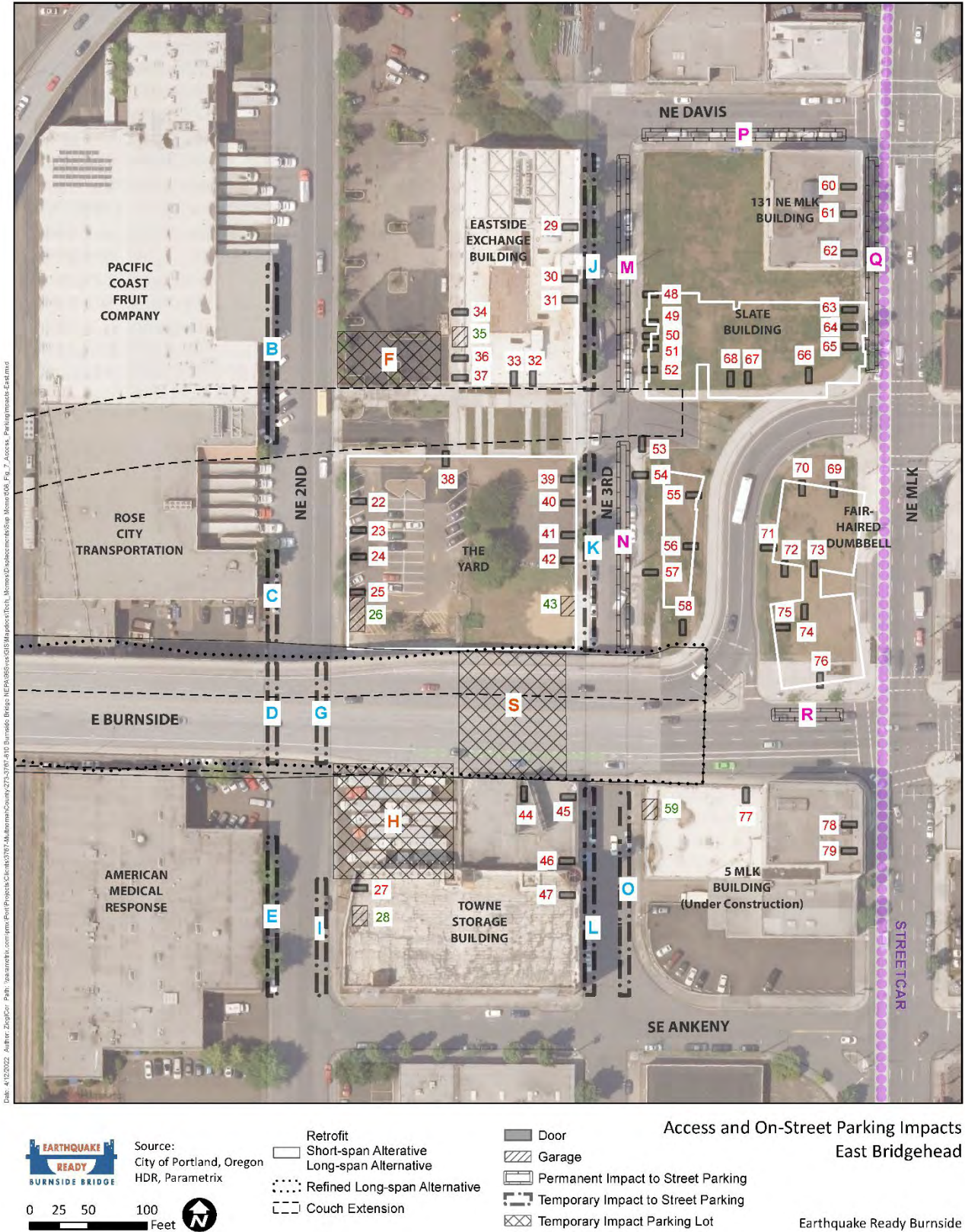


Figure 3.3-6. Access Reference – East Bridgehead



Relocations

Table 3.3-4 presents anticipated relocations for the Draft EIS Long-span Alternative and the Refined Long-span Alternative options.

Table 3.3-4. Displacements/Relocations by Long-Span Alternative

Alternative	Residential	Non-Residential
Draft EIS Long-Span	0	6
Refined Long-Span	0	6

Residential Relocation

There are no residential relocations anticipated with any of the long-span alternatives.

Non-Residential Relocation

Both the Draft EIS Long-span and the Refined Long-span Alternatives anticipate six non-residential displacements/relocations. Following are the differences in non-residential displacements across the long-span options. (See Figure 3.3-5 and Figure 3.3-6).

- Pacific Coast Fruit Company (PCFC) (east, Map ID 16) – The Draft EIS Long-span Alternative, though not directly affecting the PCFC parcel, would require relocation of the business due to an important portion of its operations being located within the Rose City Transportation building (Map ID 17) which is 100 percent affected by the Draft EIS Long-span Alternative. The Refined Long-span Alternative options reduce impacts to a small section of the Rose City Transportation building, which would require some reconfiguration of the PCFC operations, some personal property relocation, and re-routing of the PCFC rooftop conveyor system, but is anticipated to no longer require a full business relocation. This could change depending on a professional architect analysis of the building impact, but for the purpose of this report, it is believed that the interior of the building could be reconfigured, and the business would not be displaced. PCFC is also leasing the Nemarnik Family commercial parking lot (east - Map ID 22) for its freight trucks. The parking lot would need to be temporarily closed for the duration of the Project. It is assumed that a portion of the Produce Row property (east - Map ID 18) that is being acquired and cleared for the Project could be used to mitigate PCFC truck parking during construction.
- Rose City Transportation freight business (east, Map ID 17) – As mentioned above, impacts to the Rose City Transportation building are smaller with the Refined Long-span Alternative options. The portion of the building that would need to be removed for construction is currently being used by PCFC, so no impacts to the Rose City Transportation business operations are assumed due to the building impact. Rose City Transportation also leases the Nemarnik Family commercial parking lot (east - Map ID 22) which would be considered a temporary personal property relocation per above.

See the *EQRB Acquisitions and Relocations Technical Report* (Multnomah County 2021b) for descriptions of the other displacements that are assumed with the Draft EIS Long-span Alternative and which remain unchanged in the Refined Long-span Alternative.

Comparison with the Refined Short-Span and 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. The refinements include the same cost-cutting measures that were applied to create the Refined Long-span Alternative.

Chapter 2 provides a summary of this comparison and Chapter 3 provides more detail for those environmental elements where there would be a meaningful difference in impacts between the Refined Long-span and the Refined Short-span or Refined Couch Extension Alternatives.

For acquisitions and relocations, the Refined Short-span would have the same impacts as the Refined Long-span described above, plus permanent easements on five additional parcels to accommodate the additional bridge piers required by the Short-span Alternative (as described in the Draft EIS). The Refined Couch Extension Alternative would have the highest number of right-of-way acquisitions, temporary construction easements, permanent easements, and fee acquisitions of all of the refined alternatives. In the west approach, the impacts would be the same as with the Short-span Alternative. The differences would occur within the east approach where the Couch Extension is divided into a couplet with the westbound portion located in a new alignment. The impacts of the Refined Couch Extension Alternative would be the same as described in the Draft EIS for the five-lane Couch Extension Alternative, except that a refined (narrower, four-lane) version would have a smaller permanent easement within the Pacific Fruit Company parking lot.

3.3.3 Mitigation

No changes to mitigation approaches are proposed with the Refined Long-span Alternative.

3.4 Land Use

3.4.1 Affected Environment

There are no changes/revisions to the EQRB Draft EIS description of the Affected Environment.

3.4.2 Impacts

Refined Long-span Alternative

Most of the land use impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the original Long-span Alternative, including the following:

- Post-earthquake impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas

This section describes the land use impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span.

Summary of Impacts

Impacts to land use resources from the Refined Long-span Alternative are similar to those evaluated in the Draft EIS for the Long-span Alternative. The biggest difference is that the Refined Long-span Alternative does not require full and partial acquisitions. Instead, the Refined Long-span includes permanent easements which would still result in business displacements. The Refined Long-span Alternative would require more temporary construction easements and fewer temporary construction easement accesses than the Draft EIS Long-span Alternative.

Direct Impacts

The Refined Long-span Alternative would result in 12 permanent easements and 5 business displacements compared with the Draft EIS Long-span Alternative impacts of 6 full acquisitions, 2 partial acquisitions, 1 permanent easement, and 6 business displacements. The business displacements for the Refined Long-span Alternative would include the Portland Saturday Market Storage, Saturday Market Administration Offices, University of Oregon Retail Space, Rose City Transportation, and American Medical Response. The Portland Rescue Mission and Mercy Corps would require permanent easements under the Refined Long-span Alternative but would not be displaced.

New stairs and elevators on the west approach may conflict with a Central City Plan District requirement for building frontages to have active uses on the ground floor including doors, windows, lobbies, retail, etc. In addition, a new elevator in this location could require City Historic Resource Review and may not be consistent with City design guidelines. This could compel access between the bridge and 1st Avenue (MAX station) to be provided via improved sidewalks only.

The refined bridge design results in less land converted to a transportation use as shown in Table 3.4-1 as compared with the Draft EIS Long-span Alternative.

Table 3.4-1. Land Use Types Permanently Converted to Transportation Use by Alternative

Land Use Type	Draft EIS Long-Span Alternative (acres)	Refined Long-Span Alternative – Cable-Stayed (acres)	Refined Long-Span Alternative – Tied-Arch (acres)
Commercial	0.04	0.05	0.05
Industrial	1.63	0.10	0.01
Institutional	0	0	0
Mixed Use	0	0.03	0.03
Multifamily	0	0	0
Park/Open Space	0	0	0
Parking	0.3	0	0
Right-of-way	0	0.02	0.02
Social Services	0	0.002	0.002
Vacant	0.08	0.02	0.004
Totals	2.05	0.22	0.12

Source: Summarized from the *EQRB Acquisitions and Displacements Supplemental Memo* (Multnomah County 2022a).

Indirect Impacts

Indirect land use impacts are similar to those for the Draft EIS Long-span Alternative. Redevelopment opportunities would be slightly less than with the Draft EIS Long-span because the Refined Long-span impacts fewer buildings on the east side. In addition, the Refined Long-span uses more permanent easements rather than full or partial property acquisitions, so current property owners would retain ownership.

Consistency with State and Local Planning Goals

The Refined Long-span Alternative is generally consistent with state and local planning goals as described in the *EQRB Land Use Technical Report* (Multnomah County 2021); however, the Refined Long-span lane configuration Option 4 would remove a bus lane. Removing the bus lane could potentially impact public transit reliability which would be inconsistent with the *Metro 2018 Regional Transportation Plan* (Metro 2018, page 3-75) goal of ensuring land uses are transit supportive.

Similar to the Draft EIS Long-span Alternative, the Refined Long-span Alternative's pedestrian and bicycle lanes are consistent with the *2035 Comprehensive Plan* (City of Portland 2020) and the City's transportation system plan goals of promoting active transportation modes (City of Portland 2019).

3.4.3 Mitigation

Mitigation measures would be the same as described in the *EQRB Land Use Technical Report* (Multnomah County 2021).

3.5 Economics

3.5.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment, which primarily includes three census tracts intersected by the proposed Project: Census Tract 21, Census Tract 51, and Census Tract 106. However, economic effects of the Project and its construction may extend more broadly across Portland and Multnomah County.

3.5.2 Impacts

Refined Long-Span Alternative

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the original Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect Impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span Alternative. Impacts that are the same are only briefly summarized for reference purpose. Unless noted otherwise, the Refined Alternative impacts are the same for all roadway lane configurations.

Direct Impacts

Traffic Flow Impacts

The design of the Refined Long-span Alternative reduces the number of lanes on the roadway compared to the existing bridge and the Draft EIS Long-span Alternative (four lanes versus five lanes). Depending on the specific lane configuration, this could reduce average speeds, increase travel times for trips across the bridge, and increase travel time costs to travelers.

Traffic flows on the bridge and intersections in the vicinity of the bridge were analyzed for the *EQRB Transportation Supplemental Memo* (Multnomah County 2022I) using the VISSIM and SimTraffic traffic simulation software to identify the best-performing lane configuration during peak hours:¹ Lane Option 4 and the No-Build Alternative are estimated to perform at a similar level of efficiency, and Lane Options 1, 2, and 3 perform worse than Lane Option 4 and the No-Build Alternative.

¹The VISSIM and SimTraffic analyses did not include the Draft EIS Replacement Long-span Alternative. However, given that this alternative has a wider footprint and maintains the same number of lanes and lane configuration as the No-Build scenario, its performance can be expected to be no worse (or possibly better) than the No-Build.

Traffic volume throughput² is reduced below demand during the PM peak hours (throughput of 71 percent in the eastbound direction under Option 1, and 84 percent in the westbound direction under Options 2 and 3). The intersection performance is forecast to worsen as well with three intersections being below City of Portland level of service standards.

Traffic Safety Impacts

The introduction of shoulders and wider vehicle lanes on the bridge under the build scenarios compared to the existing conditions could improve safety and reduce the number of crashes on the bridge. However, the impact of the physical barrier separating the roadway and the bicycle and pedestrian lanes is more complex. This barrier is a fixed object; it does prevent pedestrian-vehicle and bicycle-vehicle collisions, but it also introduces a risk that some vehicles crash into it.

The safety performance was estimated for the *EQRB Transportation Supplemental Memo* (Multnomah County 2022l) using the AASHTO³ Highway Safety Manual (HSM) Predictive Method for urban and suburban arterials combined with crash modification factor adjustments for relevant road treatments. The analysis was conducted for a mid-span location and at the approach intersections of NW 2nd Avenue/ W Burnside Street, NE Martin Luther King, Jr., Boulevard/E Burnside Street, and NE Couch Street/NE Martin Luther King, Jr., Boulevard.

Table 3.5-1 and Table 3.5-2 display the safety performance for both the mid-span bridge section and approach intersections. All Build Alternatives (including Draft EIS Replacement Long-span) are estimated to increase the number of crashes on the bridge. The Refined Long-span Alternative in all lane configurations increases the number of crashes relative to the No-Build and relative to the Draft EIS Replacement Long-span Alternative. Lane Options 1, 2, and 3 have impacts of a similar magnitude while Option 4 has a much greater impact. Over 20 years, compared to the Draft EIS Long-span Alternative, Options 1, 2, and 3 of the Refined Long-span Alternative are estimated to increase the number of fatal and injury crashes by about 2 and the number of property damage-only crashes by about 6 to 7; Option 4 is estimated to increase these crashes by 9 and 24, respectively. The increase in the number of road crashes on the bridge would increase total social costs of accidents. Over 20 years, compared to the Draft EIS Long-span Alternative, Options 1, 2, and 3 of the Refined Long-span Alternative are estimated to increase total social accident costs by about \$2 to \$2.5 million while Option 4 is estimated to increase them by \$10.7 million.

Refined Long-span Options 1, 2, and 3 are estimated to reduce the number of crashes on approach intersections compared to the No-Build and to the Draft EIS Long-span Alternative. Over 20 years, the impact amounts to a reduction in the number of fatal or injury crashes by 1 to 2, and property damage-only crashes by 2 to 3. The Draft EIS Long-span Alternative and Refined Long-span Option 4 do not have any significant impact on crashes on the approach intersections as compared to the No-Build.

² Traffic performance is often analyzed in terms of volume demand and volume throughput. Volume demand is the amount of traffic that would like to use a certain roadway or intersection during the peak hour. The volume throughput represents the actual amount of the volume that is able to make it through during the peak hour. Throughput less than demand implies traffic delays and queueing that may extend upstream.

³ American Association of State Highway and Transportation Officials

Table 3.5-1. Safety Performance of Mid-Span Bridge Section, Incremental Crashes Compared to the No-Build Scenario, 2026–2045

Alternative	Total Crashes	Fatal and Injury Crashes	Property Damage Only Crashes	Monetary Cost Impact (2019 \$M)
Draft EIS Replacement Long-Span	7.3	1.5	5.8	\$1.7
Lane Option 1 (Balanced) Two WB (GP) plus two EB (one GP and one bus-only lane)	14.5	3.1	11.4	\$3.6
Lane Option 2 (EB Focus) One WB (GP) plus three EB (two GP and one bus-only)	16.3	3.6	12.7	\$4.2
Lane Option 3 (Reversible Lane)	15.9	3.5	12.4	\$4.1
Lane Option 4 (GP with Bus Priority) Two WB GP plus two EB GP	40.6	10.7	29.9	\$12.4

Source: *EQRB Transportation Supplemental Memo* (Multnomah County 2022I). Monetary cost impact calculated assuming social costs of accidents recommended by U.S. Department of Transportation (\$1,114,500 for a serious injury and \$4,500 per vehicle per property damage-only crash based on US DOT, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, February 2021).

EB = eastbound; GP = general purpose; M = millions; WB = westbound

Table 3.5-2. Safety Performance of Approach Intersections, Incremental Crashes Compared to the No-Build Scenario, 2026–2045

Alternative	Total Crashes	Fatal and Injury Crashes	Property Damage Only Crashes	Monetary Cost Impact (2019 \$M)
Draft EIS Replacement Long-Span	0	0	0	\$0.0
Lane Option 1 (Balanced) Two WB (GP) plus two EB (one GP and one bus-only lane)	-4	-1.7	-2.3	-\$2.0
Lane Option 2 (EB Focus) One WB (GP) plus three EB (two GP and one bus-only)	-4.6	-1.7	-2.9	-\$2.0
Lane Option 3 (Reversible Lane)	-3.9	-1.5	-2.4	-\$1.7
Lane Option 4 (GP with Bus Priority) Two WB GP plus two EB GP	0	0	0	\$0.0

Source: *EQRB Transportation Supplemental Memo* (Multnomah County 2022I). Monetary cost impact calculated assuming social costs of accidents recommended by US Department of Transportation (\$1,114,500 for a serious injury and \$4,500 per vehicle per property damage-only crash based on US DOT, Benefit-Cost Analysis Guidance for Discretionary Grant Programs, February 2021).

EB = eastbound; GP = general purpose; M = millions; WB = westbound

Transit and Active Transportation

The existing bus stop on the bridge that serves TriMet bus Lines 12, 19, and 20 would be relocated one block west which would cause inconvenience to some users but would be beneficial to others. The data on the number of users affected by this inconvenience is not available, but it is believed to be small and therefore the cost equivalent of added travel time would be small.

The bicycle level of traffic stress for the Refined Long-span is not expected to change compared to the No-Build and the Draft EIS Long-span Alternatives. However, it is noted that while conflicts between bicyclists and pedestrians are less likely with the Refined Long-span Alternative relative to the No-Build, they are more likely with the Refined Long-span Alternative relative to the Draft EIS

Long-span given the narrower bicycle lanes and removal of the separator stripe between bicycle lanes and pedestrian sidewalks. The total and marginal economic effects (accident costs) is expected to be small.

Short-Term Construction Impacts

Most construction-related impacts are the same in the Refined Long-span Alternative and Draft EIS Long-span Alternative with the exception of construction costs. Construction costs of the Refined Long-span Alternative are lower than costs of the Draft EIS Long-span Alternative. This would result in lower economic impacts in Multnomah County and Oregon in terms of business activity metrics such as business revenue, and job creation. The reduction would be approximately proportional to the percentage reduction in construction expenditures taking place in Multnomah County and Oregon.

Conclusions

The Refined Long-span Options 1, 2, and 3 are estimated to reduce traffic flow through the Burnside Bridge in the PM peak period compared to the No-Build and the Draft EIS build alternatives. The Project would provide an economic boost to the local, regional, and state economies. Given that the cost of the Refined Long-span is less than the cost of the Draft EIS Long-span Alternative, the magnitude of impact could be expected to be smaller as well.

Other conclusions are similar to those pertaining to the Draft EIS Long-span Alternative. In particular:

- Under the No-Build Alternative, the Burnside Bridge is not expected to survive a major earthquake. This would result in severe disruptions to the transportation of people and goods and emergency services across Portland. Under all build alternatives, the Burnside Bridge would serve as a vital post-earthquake connection, facilitating and accelerating the recovery and reconstruction efforts in the entire region.
- The proposed barriers separating traffic from the bicycles and pedestrian facilities would decrease conflicts between these modes, but it is estimated that they would increase the number of motor vehicle crashes because they introduce a risk that some vehicles crash into them.
- The short-term negative impacts of the build alternatives include various construction-related disruptions. These include detours and impediments to access to certain buildings, businesses, public services, and amenities.

3.5.3 Mitigation

Mitigation measures would be the same as for the Draft EIS Long-span Alternative. They include measures that aim to (1) reduce the financial burden of various impacts to the affected parties; (2) provide public awareness about the construction schedule, closures, and various other impacts; and (3) provide information about alternate ways to access destinations temporarily affected by construction activities.

3.6 Public Services

3.6.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment.

3.6.2 Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the original Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect Impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span Alternative.

Refined Long-Span Alternative Impacts

Direct Impacts

The proposed refinements to the bicycle lanes, sidewalks, bridge piers, west and east approaches, and Americans with Disabilities Act access would not change the impacts to public services as described in the Draft EIS for the Long-span Alternative.

However, eliminating one motor vehicle lane would have different impacts than those detailed in the Draft EIS for the Long-span Alternative, and those impacts would vary depending on the lane configuration option.

Comparison with the Draft EIS Long-Span Alternative and the No-Build Alternative

The *EQRB Public Services Technical Report* (Multnomah County 2021m) reports no changes to traffic movement or alterations to critical emergency access routes (the Burnside Bridge is a designated emergency corridor from west to east [see Figure 3.6-1]). Updated traffic operations and lane configurations for the Refined Long-span Alternative would result in impacts to traffic movement and critical emergency access routes that would vary by lane configuration option. Detailed traffic analysis and comparisons of traffic impacts between SDEIS lane options and Draft EIS Long-span Alternative can be found in the *EQRB Transportation Supplemental Memo* (Multnomah County 2022l).

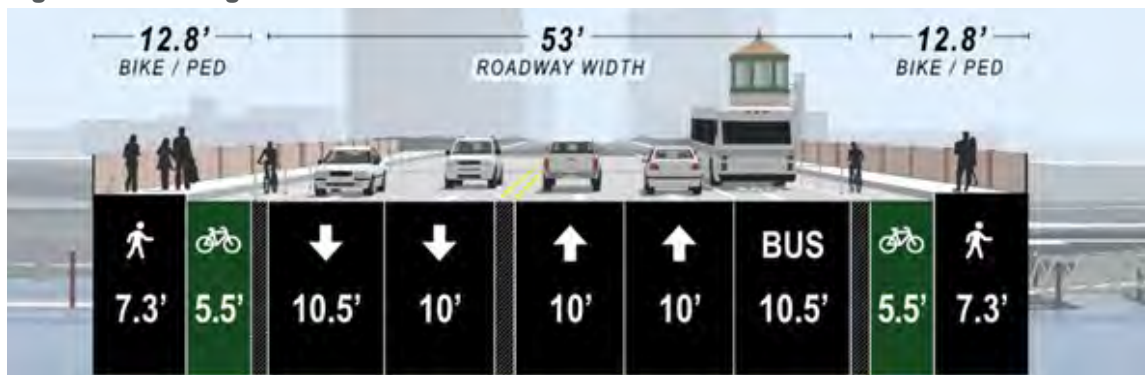
Figure 3.6-1. Existing Public Service Resources and Emergency Access Routes



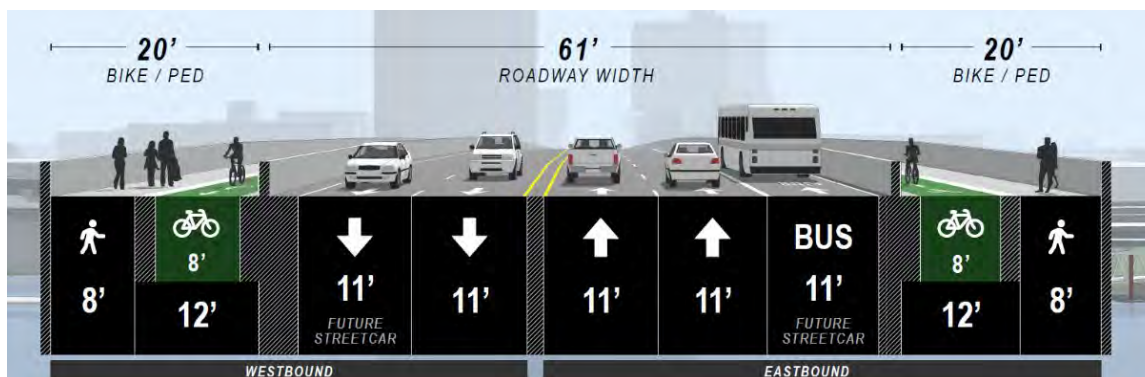
The primary difference for emergency vehicle operations with the Refined Long-span Alternative compared to the Draft EIS Long-span and No-Build Alternatives would depend on the lane configuration option. According to Portland Fire and Rescue, Lane Configuration Option 4, which eliminates the eastbound bus only lane would have the greatest impact. The other options, which keep the bus only lane but eliminate one general purpose lane on the bridge (see Figure 3.6-2 for designs of No-Build and Draft EIS Long-span Alternative lane configurations) have less impact.

The removal of a lane has the potential to restrict vehicles on the bridge from making way for emergency vehicles in the event of an emergency. This could cause an emergency vehicle to be more susceptible to traffic congestion, even when the emergency vehicle is using audible and/or visual signals. Every moment is crucial in response to fires, crimes, or medical emergencies, and delayed response times have the potential to lead to more severe impacts. Emergency vehicles moving eastbound across the bridge from Portland Fire and Rescue Station #1 are high priority, as emergency vehicles can take any bridge back to Station #1 but would typically use the eastbound Burnside Bridge as the most direct route for emergency response to incidents on the east side of the river (note that there are also existing stations on the east side of the river). The four-lane configuration options in the Refined Long-span Alternative would result in changes described in the following sections.

Figure 3.6-2. Bridge Width – Cross Section Over River



Existing Bridge Width



Draft EIS Long-Span Bridge Width

Lane Option 1 (Balanced)

Lane Option 1 consists of two westbound lanes (general-purpose) plus two eastbound lanes (one general-purpose and one bus-only lane). This option would eliminate one general eastbound lane from the Draft EIS Long-Span and No-Build Alternatives. The removal of the eastbound lane would limit the ability for traffic to make way for emergency vehicles heading eastbound on the Burnside critical emergency access route. Although vehicles would still have access to an outside lane in each direction on the bridge (general-purpose lane westbound, bus lane eastbound) to allow emergency vehicles to travel uninterrupted in the inside or center lane, the removal of a lane could still cause emergency vehicles to be more susceptible to traffic congestion. See Option 1 on Figure 3.6-3 for detailed lane configuration design for the Refined Long-span Alternative.

Portland Fire and Rescue indicated that it has operational concerns about the potential for traffic congestion impacts to emergency vehicle movement in this option. Lane Option 1 would create the most congestion among all the lane options. This lane option would have increased delays for general traffic that could affect emergency vehicles crossing eastbound from the fire Station #1.

Lane Option 2 (Eastbound Focus)

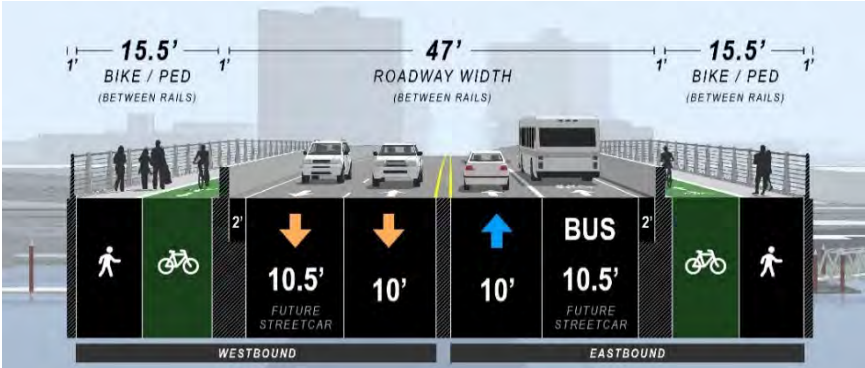
Lane Option 2 consists of one westbound lane (general purpose) plus three eastbound lanes (two general-purpose and one bus-only). This option would eliminate one general westbound lane from the Draft EIS Long-span and No-Build Alternatives. The removal of the westbound lane would limit the ability for traffic to make way for emergency vehicles heading westbound on the Burnside Bridge. Eastbound traffic would be required to move into the two outside lanes (one general-purpose and one bus-only lane) to allow for passage of the westbound emergency vehicle on the innermost eastbound lane, which would be similar to the No-build Alternative. See Option 2 of Figure 3.6-3 for detailed lane configuration design for this Refined Long-span Alternative.

Portland Fire and Rescue indicated concerns about the potential for traffic congestion impacts to emergency vehicle movement in this lane option.

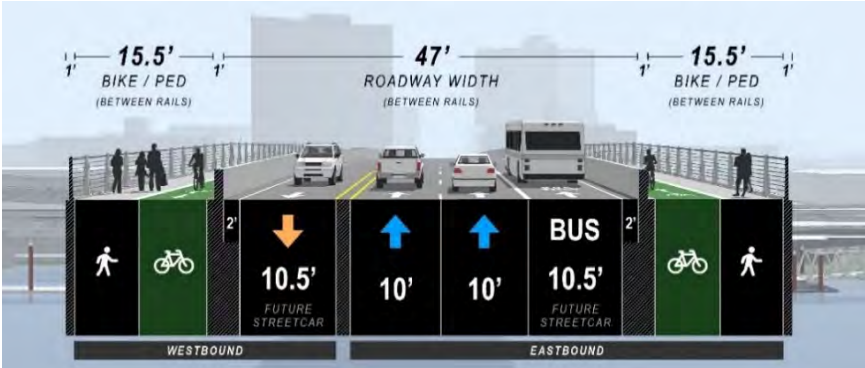
Lane Option 3 (Reversible Lane)

Lane Option 3 consists of 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). In this option, there would be two westbound general-purpose lanes during the AM peak period (5:00 a.m. to 10:00 a.m.) and two eastbound general-purpose lanes during the PM peak period (10:00 a.m. to 5:00 a.m.). This option would eliminate one general westbound or eastbound lane from the Draft EIS Long-span Alternative and No-Build Alternative depending on the time of day. During the AM peak period, traffic would be required to move to an outside lane in either direction on the bridge (general-purpose lane westbound, bus lane eastbound) to allow emergency vehicles to travel past in the inside or center lane. In the PM peak period, eastbound traffic would be required to move into the two outside lanes (one general-purpose and one bus-only lane) to allow for passage of the westbound emergency vehicle on the innermost eastbound lane (similar to the No-Build Alternative).

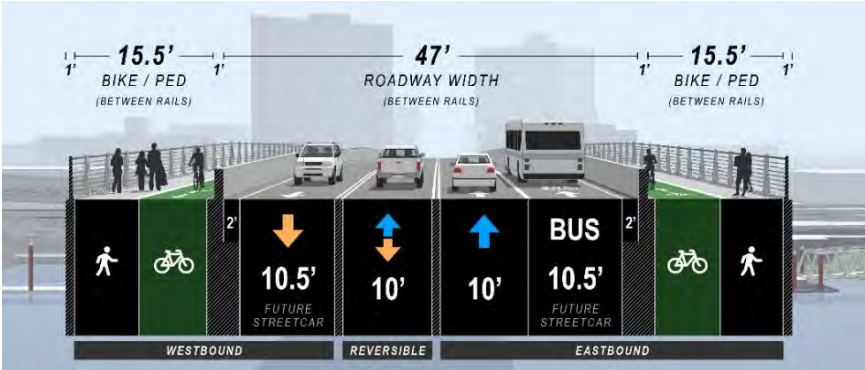
Figure 3.6-3. Refined Long-Span Lane Configuration Options



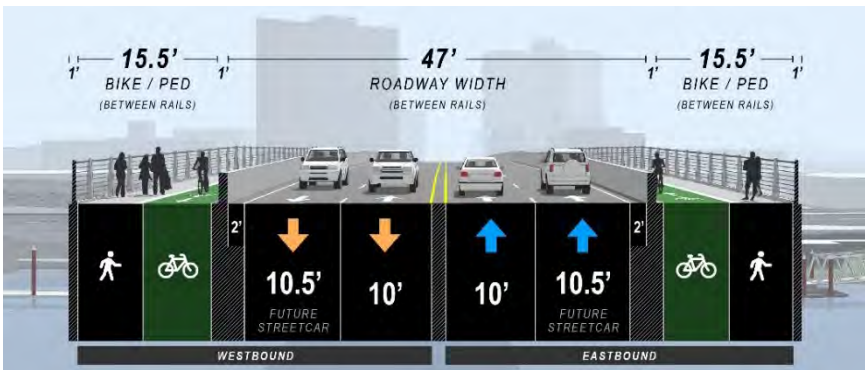
Option 1 – Two Westbound Lanes | One Eastbound + One Bus Lane



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)

The possibility of dynamic traffic controls on the bridge could aid emergency vehicle passage by blocking off the reversible lane to vehicle traffic in the event of an emergency. This scenario would require a real-time monitor at a traffic controls center. Portland Fire and Rescue prefers Lane Option 3 because it would help keep traffic moving in the reversible lane and retains the existing eastbound bus lane, which preserves lane space for cars to move over and make way for oncoming emergency response vehicles. See Option 3 on Figure 3.6-3 for detailed lane configuration design for this Refined Long-span Alternative.

Lane Option 4 (General Purpose with Bus Priority)

Lane Option 4 consists of two westbound general-purpose lanes, two eastbound general-purpose lanes, and bus priority access (i.e., queue bypass) at each end of the bridge. This option would eliminate one general-purpose eastbound lane from the Draft EIS Long-span and No-Build Alternatives. The removal of the eastbound lane would limit the ability for traffic to make way for incoming emergency vehicles heading eastbound on the Burnside critical emergency access route. Vehicles would still have access to an outside lane in each direction on the bridge to allow emergency vehicles to travel uninterrupted in the inside or center lane. The removal of the eastbound bus lane would make eastbound emergency responses more difficult because there is limited space for cars to move over if all lanes are filled with vehicles in peak congestion. See Option 4 of Figure 3.6-3 for detailed lane configuration design for this option of the Refined Long-span Alternative.

The lack of a transit-only lane for traffic to pull into to make way for emergency vehicles in this lane option causes concern to Portland Fire and Rescue.

3.6.3 Mitigation

Mitigation is proposed as discussed in the Draft EIS, with the added measures discussed above for specific lane configuration options. To mitigate for temporary construction activities affecting public services, detailed coordination regarding construction locations and phasing would be required with the appropriate parties including fire departments, emergency responder services, school transportation services, and law enforcement. Motorists are required to yield right-of-way to emergency response vehicles that are using audible and/or visual signals; emergency vehicles would be substantially less affected by congestion compared to other motorists. With Lane Option 3 (Reversible Lane), a traffic operations control center and dynamic signaling would assist emergency vehicle movement over the bridge.

3.7 Utilities

There are no changes/revisions to the EQRB Draft EIS description of the affected environment.

3.7.1 Refined Long-Span Alternative

Most of the utility impacts from the Refined Long-span Alternative and its options would be the same as described for the Draft EIS Long-span Alternative, including the following:

- Post-earthquake impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas
- Indirect impacts

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span Alternative.

3.7.2 Refined Long-Span Alternative Impacts

Direct Impacts

The selection of either a cable-stayed or tied-arch option and related pier locations for the east approach of the Refined Long-span Alternative would result in differences to quantity, type, and cost of utilities impacted (see Table 3.7-1 and Table 3.7-2). Each Refined Long-span Alternative evaluated could be paired with either the movable vertical lift or movable bascule configuration for the center span without any changes in direct impacts to utilities.

Table 3.7-1. Relocated Utilities Comparison – Draft EIS and Refined Long-Span Alternatives

Utility Owner ^a	Category	Affects Portland Metro Region	Warrants Special Consideration	Draft EIS Long-Span Potential Impact	Refined Long-Span Tied-Arch Potential Impact	Refined Long-Span Cable-Stayed Potential Impact
BES	Pump Station	Yes	Yes	Protect	Protect	Protect
BES	4 in	None	None	None	None	None
BES	6 in	None	None	90 ft	None	None
BES	8 in	None	None	None	None	None
BES	10 in	None	None	None	None	None
BES	12 in	None	None	30 ft	50 ft	50 ft
BES	14 in	None	None	20 ft	20 ft	20 ft
BES	15 in	None	None	40 ft	80 ft	80 ft
BES	16 in	None	None	180 ft	180 ft	180 ft
BES	18 in	None	None	200 ft	None	None
BES	21 in	None	None	None	None	None
BES	24 in	Yes	Yes	290 ft	490 ft	490 ft
BES	28 in	Yes	Yes	None	None	None
BES	30 in	Yes	Yes	470 ft	None	380 ft
BES	30 in, Deep Bore	Yes	Yes	Protect	Protect	Protect
BES	34 in	Yes	Yes	None	None	None

Utility Owner ^a	Category	Affects Portland Metro Region	Warrants Special Consideration	Draft EIS Long-Span Potential Impact	Refined Long-Span Tied-Arch Potential Impact	Refined Long-Span Cable-Stayed Potential Impact
BES	42 in, Deep Bore	Yes	Yes	Protect	Protect	Protect
BES	48 in	Yes	Yes	None	None	None
BES	54 in	Yes	Yes	None	None	None
BES	72 in	Yes	Yes	None	None	None
BES	74 in	Yes	Yes	None	None	None
BES	78 in	Yes	Yes	100 ft	None	None
BES	102 in	Yes	Yes	Protect	Protect	Protect
BES	168 in	Yes	Yes	Protect	Protect	Protect
BES	264 in	Yes	Yes	Protect	Protect	Protect
Lumen Local ^b	Underground	Yes	None	510 ft	120 ft	120 ft
Lumen Local ^b	Submarine	Yes	Yes	400 ft	400 ft	400 ft
Lumen Local ^b	Bridge Attachment	Yes	Yes	1,490 ft	1,490 ft	1,490 ft
AT&T LNS	None	None	None	None	None	None
Lumen National (formerly Level 3)	Communications	None	None	Unknown	Unknown	Unknown
Multnomah County Bridge ^a	PVC waterline	None	None	All	All	All
Multnomah County Bridge ^a	Electrical conduits	None	None	All	All	All
Multnomah County Bridge ^a	Street light conduit	None	None	All	All	All
Multnomah County Bridge ^a	Fiber optic conduit	None	None	All	All	All
Comcast	Overhead	None	None	300 ft	300 ft	300 ft
Comcast	Underground	None	None	None	None	None
Zayo	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
City of Portland Traffic and Lighting	Overhead	None	None	50 ft	50 ft	50 ft
City of Portland Traffic and Lighting	Underground	None	None	2,010 ft	1,810 ft	1,810 ft
City of Portland Traffic and Lighting	Underground Fiber	None	None	400 ft	200 ft	200 ft
NW Natural	Service/Meter	None	None	2 ea	1 ea	1 ea
NW Natural	1 in	None	None	None	None	None
NW Natural	2 in	None	None	200 ft	None	None
NW Natural	4-1/2 in	None	None	200 ft	None	None
NW Natural	6-5/8 in	None	None	None	None	None
NW Natural	20 in	Yes	Yes	None	None	None

Utility Owner ^a	Category	Affects Portland Metro Region	Warrants Special Consideration	Draft EIS Long-Span Potential Impact	Refined Long-Span Tied-Arch Potential Impact	Refined Long-Span Cable-Stayed Potential Impact
ODOT	Underground	None	None	100 ft	None	None
ODOT	Underground Fiber, 12 in	None	None	None	None	None
ODOT	Underground Fiber, 18 in	None	None	None	None	None
ODOT	Underground Fiber, 30 in	None	None	None	80 ft	None
ODOT	Underground Fiber, 42 in	None	None	None	None	None
PGE	Overhead	None	None	None	None	None
PGE	Underground	None	None	1,110 ft	450 ft	450 ft
Portland Streetcar	Rail	Yes	None	None	None	None
PP&R	Electric	None	None	790 ft	None	None
PP&R	Gas, 2 in	None	None	None	None	None
PP&R	Lighting	None	None	460 ft	430 ft	430 ft
PP&R	Sanitary, 4 in	None	None	100 ft	None	None
PP&R	Storm, 1 in	None	None	None	None	None
PP&R	Storm, 3 in	None	None	None	None	None
PP&R	Storm, 4 in	None	None	None	None	None
PP&R	Storm, 6 in	None	None	None	None	None
PP&R	Storm, 8 in	None	None	110 ft	120 ft	120 ft
PP&R	Storm, 10 in	None	None	None	None	None
PP&R	Storm, 12 in	None	None	60 ft	None	None
PP&R	Irrigation	None	None	None	50 ft	50 ft
PP&R	Fountain	None	None	None	None	None
BTS	Underground Fiber	None	None	120 ft	None	None
PWB	Water Main	None	None	1,440 ft	210 ft	210 ft
TriMet	Trackwork	Yes	Yes	None	None	None
TriMet	Power Distribution	Yes	Yes	150 ft	150 ft	150 ft
TriMet	Communications	Yes	Yes	150 ft	150 ft	150 ft
TriMet	Fare Collection	Yes	Yes	2 ea	2 ea	2 ea
TriMet	At-grade Station	Yes	Yes	1 ea	1 ea	1 ea
Verizon	Underground	None	None	400 ft	None	None
Henkels and McCoy	Underground	None	None	Unknown	Unknown	Unknown
Wave Broadband	Overhead	None	None	Unknown	Unknown	Unknown
Wave Broadband	Underground	None	None	Unknown	Unknown	Unknown
Burnside Skatepark	Lighting	None	Yes	None	None	None

Utility Owner ^a	Category	Affects Portland Metro Region	Warrants Special Consideration	Draft EIS Long-Span Potential Impact	Refined Long-Span Tied-Arch Potential Impact	Refined Long-Span Cable-Stayed Potential Impact
Total Length of Relocated Utilities ^c	None	None	None	12,050 ft	6,830 ft	7,130 ft

a Multnomah County was not quantified, as its relocation work is part of the Project.

b Lumen Local, formerly CenturyLink

c Does not include unknown impacts.

BES = City of Portland Bureau of Environmental Services; ea = each; ft = feet; in = inches; ODOT = Oregon Department of Transportation; PGE = Portland General Electric; PP&R = Portland Parks and Recreation; PWB = City of Portland Water Bureau

Table 3.7-2. Relocation Cost Comparison – Draft EIS and Refined Long-Span Alternatives

Utility Owner ^a	Cost	Draft EIS Long-Span Potential Impact	Refined Long-Span Tied-Arch Option	Refined Long-Span Cable-Stayed Option
BES ^b	Reimbursable	\$ 660,000	\$ 340,000	\$ 520,000
BES ^b	Non-Reimbursable	None	None	None
Lumen Local (formerly CenturyLink)	Reimbursable	\$ 300,000	\$ 300,000	\$ 300,000
Lumen Local (formerly CenturyLink)	Non-Reimbursable	\$ 900,000	\$ 730,000	\$ 730,000
Lumen National (formerly Level 3)	Reimbursable	Unknown	Unknown	Unknown
Lumen National (formerly Level 3)	Non-Reimbursable	Unknown	Unknown	Unknown
Comcast	Reimbursable	None	None	None
Comcast	Non-Reimbursable	\$ 70,000	\$ 70,000	\$ 70,000
Zayo	Reimbursable	Unknown	Unknown	Unknown
Zayo	Non-Reimbursable	Unknown	Unknown	Unknown
City of Portland Traffic and Lighting	Reimbursable	\$ 720,000	\$ 540,000	\$ 540,000
City of Portland Traffic and Lighting	Non-Reimbursable	\$ 390,000	\$ 390,000	\$ 390,000
NW Natural	Reimbursable	None	None	None
NW Natural	Non-Reimbursable	\$ 240,000	\$ 20,000	\$ 20,000
ODOT	Reimbursable	None	None	None
ODOT	Non-Reimbursable	\$ 50,000	\$ 40,000	None
PGE	Reimbursable	\$ 300,000	\$ 130,000	\$ 130,000
PGE	Non-Reimbursable	\$ 210,000	\$ 80,000	\$ 80,000
Portland Streetcar	Reimbursable	None	None	None
Portland Streetcar	Non-Reimbursable	None	None	None
PP&R	Reimbursable	\$ 440,000	\$ 40,000	\$ 40,000
PP&R	Non-Reimbursable	\$ 200,000	\$ 200,000	\$ 200,000

Utility Owner ^a	Cost	Draft EIS Long-Span Potential Impact	Refined Long-Span Tied-Arch Option	Refined Long-Span Cable-Stayed Option
BTS	Reimbursable	\$ 60,000	None	None
BTS	Non-Reimbursable	None	None	None
PWB	Reimbursable	\$ 430,000	\$ 50,000	\$ 50,000
PWB	Non-Reimbursable	None	None	None
TriMet	Reimbursable	None	None	None
TriMet	Non-Reimbursable	\$ 2,290,000	\$ 2,220,000	\$ 2,220,000
Verizon	Reimbursable	None	None	None
Verizon	Non-Reimbursable	\$ 180,000	None	None
Henkels and McCoy	Reimbursable	None	None	None
Henkels and McCoy	Non-Reimbursable	None	None	None
Wave Broadband	Reimbursable	None	None	None
Wave Broadband	Non-Reimbursable	None	None	None
Burnside Skatepark	Reimbursable	None	None	None
Burnside Skatepark	Non-Reimbursable	None	None	None
Total	Reimbursable	\$ 2,910,000	\$ 1,380,000	\$ 1,570,000
Total	Non-Reimbursable	\$ 4,530,000	\$ 3,720,000	\$ 3,680,000

a Multnomah County was not included in this evaluation, as its cost is part of the project.

b BES relocation costs include \$1,000,000 for protecting the 30-inch and 42-inch deep bore pipes under the river.

Relocation costs for the two pipes is estimated at an additional \$15,000,000.

Source: Multnomah County 2022

BES = City of Portland Bureau of Environmental Services; ea = each; ft = feet; in = inches; ODOT = Oregon Department of Transportation; PGE = Portland General Electric; PP&R = Portland Parks and Recreation; PWB = City of Portland Water Bureau

Comparison to the Draft EIS Long-Span Alternative and the No-Build Alternative

The Refined Long-span Alternative would have a reduced impact to utilities compared to the Draft EIS Long-span Alternative. This is due to the Refined Long-span Alternative's reduction in the number of piers and foundations on the east bank. As summarized in Table 3.7-1 and Table 3.7-2, any of the Refined Long-span Alternative options considered would result in less total impact to utilities and lower utility relocation costs than the Draft EIS Long-span Alternative. It is expected that the Refined Long-span Alternative would reduce the utility relocation cost by more than \$2 million dollars than that shown for the Draft EIS Long-span Alternative.

The impacts from the different east approach bridge type options for the Refined Long-span Alternative would be slightly fewer with the tied-arch option compared to the cable-stayed option. The locations of utility impacts and utility providers impacted would differ due to the different foundation sizes and locations.

The ADA, bicyclist, and pedestrian access options evaluated in the SDEIS would not have any additional impacts to utilities.

3.7.3 Mitigation

Mitigation measures would be the same as described in the Draft EIS.

3.8 Social and Neighborhoods

This section summarizes information from the *EQRB Social/Neighborhood Supplemental Memo* (Multnomah County 2022k).

3.8.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment.

3.8.2 Impacts

Most of the social and neighborhood impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the original Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect impacts
- Impacts from potential off-site staging areas

The rest of this section describes the impacts of the Refined Long-span (four-lane) Alternative that would be different from the Draft EIS version of the Long-span Alternative.

Neighborhood Cohesion and Quality of Life

The existing bridge has five sets of bridge support columns in Governor Tom McCall Waterfront Park. Comparatively, the Draft EIS Long-span Alternative proposed one set and the Refined Long-span Alternative would have two sets of bridge columns within Waterfront Park. The Refined Long-span would provide more open space under the bridge for park users compared to No-Build but less than the Draft EIS Long-span (see Figure 2.4-9 through 2.4-15 in this SDEIS).

The narrower bridge proposed with the Refined Long-span Alternative would reduce the amount of shaded area over Governor Tom McCall Waterfront Park and the Vera Katz Eastbank Esplanade as compared with the Draft EIS Long-span Alternative. This would provide more natural light contributing to a more open feel for users and events and activities hosted under the bridge and would be similar to the No-Build Alternative.

Near the west end of the bridge, County-owned stairways on each side of the bridge connect the bridge to 1st Avenue below the bridge. Replacing these with either elevators and stairs, or with an improved sidewalk connection from the end of the bridge, would provide a better ADA connection. Near the east end of the bridge, a City-owned staircase connects the Vera Katz Eastbank Esplanade to the south side of the bridge 50 feet above it. This staircase could be reconnected to the new bridge (Refined Long-span), or it could be replaced with an upgraded connection (the Draft EIS and SDEIS evaluated ramp options and elevator/stairs options). Any upgrades to the existing stairway connection could be implemented as a separate City-sponsored project, as discussed in Chapter 2 of this SDEIS. Adding ramps or new stairs and elevators would improve access for many users compared with the No-Build Alternative (see Figure 2.4-18 to Figure 2.4-22 in this SDEIS). However, there are security and safety concerns with all options, and reliability concerns with elevators.

The Refined Long-span Alternative would provide more space for sidewalks and bicycle lanes than the No-Build which could lower the potential risk for pedestrian and bicycle interactions compared to the existing bridge (No-Build Alternative). However, the Refined Alternative (with 14 to 17 feet of sidewalk and bike lane in each direction) would not reduce the risk as much as the Draft EIS

Long-span (20 feet of sidewalk and bike lane in each direction) (see Figure 2.4-7 in this SDEIS). Narrower bicycle and pedestrian facilities could affect accessibility and usage.

Community Facilities and Social Service Providers

The Refined Long-span Alternative would have one less vehicle lane, accommodating four lanes rather than five as evaluated in the Draft EIS. The following summarizes bus travel times for the four lane options evaluated with the Refined Alternative.

- Westbound bus travel times for Lane Option 1 are 4.5 percent slower than Lane Options 2 and 3, but 14 percent faster compared to Lane Option 4. Eastbound travel is 9 percent faster compared to Lane Options 2 and 3, and 35 percent faster compared to Option 4. In the westbound direction, travel time reliability performance is worse compared to Lane Options 2 and 3.
- Westbound bus travel times are the fastest under Lane Options 2 and 3, but eastbound travel times under Lane Options 2 and 3 are 9 percent slower than Lane Option 1. However, this option is 30 percent faster compared to Lane Option 4. Westbound reliability (during the PM peak) is similar to Lane Options 1 and 3. Eastbound reliability with this option would not see the queue spillback impacts that are anticipated to impact Lane Option 4.

Lane Option 4 does not include a bus-only lane which could adversely impact eastbound bus riders. Travel times for buses are the slowest under Option 4. In the eastbound direction, travel across the bridge is between 50 and 40 percent slower, while in the westbound direction, travel times are between 15 and 20 percent slower. Eastbound reliability would be impacted by auto queuing at the intersection with Martin Luther King, Jr., Boulevard which is not present in Lane Options 1 through 3. This could impact eastbound bus riders needing to make connections or accessing services on either side of the bridge.

Compared to the two full acquisitions required by the Draft EIS Long-span Alternative, the Refined Long-span Alternative would not require any full acquisitions but would acquire properties as permanent easements. Five properties would require easements including the Portland Rescue Mission and Mercy Corps under the Refined Long-span Alternative. Social service providers Portland Rescue Mission and Mercy Corps would not be displaced. Similar to the Draft EIS Long-span Alternative, the Saturday Market Administration and storage locations and the University of Oregon retail space would still be permanently displaced by the Refined Long-span Alternative's easements. It is not anticipated that the permanent relocation of these facilities would alter social interactions, cohesion, or the overall character of the neighborhood.

Temporary Impacts

Construction impacts, including travel time delays for automobiles and transit during construction, would be very similar to the Draft EIS Long-span, with a few exceptions.

- Closure durations for community facilities would be the same, except for the different Vera Katz Eastbank Esplanade ADA-pedestrian-bicycle access options. The ramp options considered in the Draft EIS would close the Esplanade periodically over a 2- to 3-year period, whereas the elevators and stairs option considered in this SDEIS would close the Esplanade periodically over an 18-month period.
- The Refined Long-span Alternative would have a smaller construction area footprint south of the west end of the bridge within Governor Tom McCall Waterfront Park. The smaller construction area would make more park space available to users during construction (refer to the temporary construction impact figures in the *EQRB Description of Alternatives* [Multnomah County 2021g]).

- Portland Rescue Mission and Mercy Corps would require temporary construction easements under the Refined Long-span Alternative. Unlike the Draft EIS Long-span Alternative, the Refined Long-span Alternative would not require a temporary access easement for the Portland Rescue Mission, and its accesses would remain open.).

3.8.3 Mitigation

Potential mitigation listed in the Draft EIS for the Long-span Alternative also applies to the Refined Long-span Alternative. In addition, the Project could provide a construction information web page containing contact information so that individuals and businesses could communicate questions and concerns regarding temporary access impacts, and they could view information on measures to maintain access. This measure would apply to any of the build alternatives.

3.9 Environmental Justice

This section, based on the *EQRB Environmental Justice Supplemental Memorandum* (Multnomah County 2022d), summarizes the environmental justice (EJ) information that is different from the Draft EIS Long-span Alternative, as reported in the Draft EIS.

3.9.1 Affected Environment

The EJ affected environment is the same for the Refined Long-span Alternative as was reported in the Draft EIS for the Draft EIS Long-span Alternative, including:

- Background and Definition
- Regulatory Context
- Methodology and Data Sources
- Descriptions of Environmental Justice Populations and Communities

3.9.2 Public Involvement

As of the writing of this SDEIS, four rounds of broad-based public and stakeholder outreach have been conducted between January 2019 and January 2022. For each of these engagement rounds, the public outreach team contacted neighbors and organizations identified in the EQRB Diversity, Equity, and Inclusion (DEI) Plan to gather feedback around the needs and perspectives of those who belong to or serve environmental justice communities near the project.

- Round 1 Engagement (January 2019 to September 2019) informed the public of the status of the Project and sought input on draft evaluation criteria that helped inform the selection of a preferred alternative and the refined bridge alternatives, including options for managing traffic during construction and the allocation of street space to be studied during the environmental review.
- Round 2 Engagement (January 2020 to September 2020) informed the public of the status of the Project and sought input on the Recommended Preferred Bridge Alternative and traffic management option during construction to be included in the Draft EIS. The onset of the COVID-19 pandemic in Oregon beginning in March 2020 greatly affected the outreach strategy. The project team had to quickly adjust to digital and socially distant outreach measures. No tabling or in-person focus group events were held. The primary activities for this engagement were focused online, with an online open house and survey, a project webinar, and numerous virtual briefings with community organizations.
- Round 3 Engagement (December 2020 to February 2021) informed the public of the status of the Project and sought input on a range of possible bridge types and a list of evaluation criteria topics for comparing them. After receiving strong community support for the recommended Replacement Long-span as the Preferred Alternative, Multnomah County proceeded into bridge type evaluation and selection. Due to the COVID-19 pandemic, no tabling or in-person events were held. The primary activities for this engagement were focused online, with an online open house and survey, a project webinar, and numerous virtual briefings with community organizations.
- Round 4 Engagement (May 2021 to December 2021) informed and gathered stakeholder feedback on potential design refinements intended to reduce the cost of the Preferred Alternative. The project team also asked for input from the public about the type of bridge that should be constructed, including consideration of girder, truss, cable-supported, and tied-arch options, as well as bascule and lift options for the bridge's movable span. The primary engagement activities included an online open house and survey, a project webinar, discussion group meetings with members of communities identified in the

project's DEI Plan, and numerous virtual briefings with community organizations, agencies, and neighborhood stakeholders.

For detailed information on the public and stakeholder outreach process and a complete summary of each of the EQRB outreach rounds, refer to the following documents:¹

- *EQRB Public Involvement Plan* (Multnomah County 2019b)
- *EQRB Diversity, Equity, and Inclusion Plan* (Multnomah County 2019a), which also provides more information on the Multnomah County CELs Program
- A detailed summary for each round of public and stakeholder outreach, including activities, findings, results, and demographics are documented in the following:
 - EQRB Public Engagement Summary (Round 1) (Multnomah County 2019)
 - EQRB Public Engagement Summary (Round 2) (Multnomah County 2020a)
 - EQRB Public Engagement Summary (Round 3) (Multnomah County 2021i)
 - EQRB Public Engagement Summary (Round 4) (Multnomah County 2022h)

Community Engagement Liaison Program

Throughout the EQRB Project, Multnomah County has partnered with the Community Engagement Liaisons (CELs) Program to continue building relationships and engaging with currently and historically underserved and underrepresented communities, including EJ communities. The liaisons' efforts have engaged the Black and African American, Native American, Vietnamese, Chinese, Latinx, Japanese, Arabic, and Russian and Ukrainian communities. These communities were identified in the EQRB DEI Plan based on frequently spoken languages within a one-mile radius of the project area and/or because of historical and cultural roots in the project area. The CELs Program has also focused on tracking survey responses and participation from non-English-speaking and BIPOC² community groups (Spanish, Vietnamese, Chinese, Arabic, Japanese, Russian/Ukrainian, Black and African American, and Native American).

Since the completion of the Draft EIS, the liaisons used online discussion groups and survey methods to help inform and gather input from their respective communities due to restrictions for in-person events during the COVID-19 pandemic. The online open house and surveys were translated by the CELs Program into six languages: Arabic, Simplified Chinese, Japanese, Russian, Spanish, and Vietnamese.

SDEIS Outreach (2021)

Since the completion of the *EQRB Environmental Justice Technical Report* (Multnomah County 2021i), additional public and stakeholder outreach has been conducted by Multnomah County and the project team. This outreach informed the development of the Refined Long-span Alternative, as well as helped identify potential impacts to EJ populations resulting from design modifications compared to the Draft EIS Long-span Alternative. Public outreach has also focused on gathering input on bridge types and cost-saving measures being considered, with an emphasis on hearing from participants belonging to or representing DEI and EJ communities.

¹ Project documents available at the following website: <https://www.multco.us/earthquake-ready-burnside-bridge/project-library>

² Black, Indigenous, and people of color

Community Briefings

Public and stakeholder outreach since completion of the Draft EIS has primarily consisted of online, small group meetings given public health concerns from the ongoing COVID-19 pandemic. Table 3.9-1 below summarizes stakeholder meetings that have occurred since the Draft EIS and as of this writing.

Table 3.9-1. Public and Stakeholder Community Briefings (2021)

Date	Stakeholder	EJ Considerations
May 14, 2021	Burnside Skatepark	None applicable.
May 27, 2021	Oregon Walks	None applicable.
July 1, 2021	Multnomah County Sustainability and Innovation Committee	None applicable.
July 13, 2021	Portland Planning and Sustainability Commission	None applicable.
July 14, 2021	Portland Bicycle and Pedestrian Advisory Committee	The committee discussed how considerations around environmental justice populations were factored into cost savings for the Refined Long-span Alternative. The Project has emphasized ADA improvements and the preservation of transit access as a result of EJ considerations.
July 22, 2021	Portland Rescue Mission (PRM)	<ul style="list-style-type: none"> PRM discussed potentially improved ADA connections from the bridge to the Skidmore Fountain MAX station and Eastbank Esplanade, which are expected to benefit PRM clients, a majority of whom are low-income, homeless/houseless, and/or minority individuals. Improved access would also facilitate ADA access to PRM services. PRM expressed support for the proposed sidewalk improvements, elevator, and stairs.
August 17, 2021	Disability Rights Oregon	Potential for improved ADA connections from the bridge to the Skidmore Fountain MAX station and Eastbank Esplanade would be anticipated to benefit ADA users including people living with disabilities who are also low-income or minority persons.
August 23, 2021	Multnomah County Office of Diversity and Equity	None applicable.
September 15, 2021	Burnside Skatepark	None applicable.
September 15, 2021	TriMet Committee on Accessible Transportation	The committee provided input on potential upgrades to ADA access between the bridge, the Skidmore Fountain MAX station, and the Eastbank Esplanade. The committee helped revise options considered in the Draft EIS (including a combination of elevators, ramps, and stairs) to the SDEIS refined option, which uses both elevators and stairs. These facilities would also provide improved pedestrian and potentially bicycle access for all users, including EJ populations. The committee noted that while elevators are more accessible, stairs may be more reliable in a post-earthquake scenario.

ADA = Americans with Disabilities Act; EJ = environmental justice; PRM = Portland Rescue Mission; SDEIS = supplemental draft environmental impact statement

Additional EJ outreach to share and gather input on the potential refinements to the Draft EIS Preferred Alternative included:

- November 2021 – Portland Parks and Recreation – Accessibility Committee meeting – briefing with ADA advocates.
- December 8, 2021 – Social Services/DEI Working Group meeting – The working group is composed of social service providers and people representing underserved populations. On this occasion, the group met to discuss and provide input on the proposed cost-saving refinements to the Draft EIS Preferred Alternative, with a focus on gathering feedback from DEI, EJ, and social services stakeholders.
 - The working group members included individuals representing NAACP PDX, Because People Matter, Big Through Projects, Mercy Corps Northwest, Portland Rescue Mission, Janus Youth Programs, Central City Concern, and Union Gospel Mission.
 - The meeting agenda included an overview of proposed cost-saving refinements, west approach bridge type, movable-span bridge type, bridge width, lane configurations, community engagement, connections to the Skidmore Fountain MAX Station and the Vera Katz Eastbank Esplanade, and construction impacts.
 - The working group provided input on proposed cost-saving refinements including potential changes to the overall width of the bridge, the bridge and movable-span types being considered, and potential impacts resulting from construction.
 - Social service providers noted that few people typically camp under the bridge given a high exposure to the elements. The group noted that very few people (five to six) will sometimes camp on SW 1st Avenue under the bridge. Social service providers also confirmed that the Night Strike program is back to operating a weekly evening program for the homeless under the bridge in Gov. Tom McCall Waterfront Park.
- November–December 2021 – An email was sent to organizations that represent EJ populations to encourage them to learn and share input through the online open house and survey open from November 12 to December 14, 2021.
 - The interested parties list included over 40 groups and organizations representing DEI and EJ populations, including but not limited to:
 - Multnomah County Office of Homeless Services, Department of Community Justice, Disability Services Advisory Council, Senior Advisory Council, Youth Commission
 - APANO
 - Asian Health and Services Center
 - Bridgetown Night Strike (Because People Matter)
 - Central City Concern
 - Coalition of Communities of Color
 - Multnomah County
 - Elders in Action
 - Hispanic Chamber
 - Home Forward
 - Homeless Veterans Center

- IRCO
- Janus Youth Programs
- Mercy Corps
- NAACP
- NARA
- NAYA
- OPAL/YEJA
- Portland African American League Forum (PAALF)
- Portland Rescue Mission
- Portland Police Bureau Service Coordination Team
- Ride Connection
- Rose Haven
- Salvation Army Female Emergency Shelter
- Sisters of the Road
- TriMet LIFT Paratransit Service
- Union Gospel Mission
- Urban League of Portland
- Vancouver Avenue Baptist Church
- VOZ
- Email invitations included links to the online open house at burnsidebridge.participate.online where visitors could learn about and provide input on cost-saving measures for the Preferred Alternative.
- The website landing page and online open house were also provided in seven different languages including Spanish, Vietnamese, and Russian.

Webinar

The project team hosted a public webinar on Wednesday, December 1, 2021. The purpose of the webinar was to:

- Provide a supplemental or alternative way to learn about the cost-saving refinements to the Preferred Alternative and provide feedback.
- Provide an opportunity to virtually meet and interact with the project team, especially because of restrictions on in-person events.
- Provide an opportunity for people to ask questions directly to the project team and get answers in real-time, especially for individuals who do not belong to an organization that may have already received a briefing.

The event was hosted on Zoom and livestreamed to YouTube for greater accessibility. It was promoted with a news release, social media posts, and an e-newsletter. A total of 28 participants joined the Zoom meeting, and four viewers tuned in to watch the YouTube livestream.

A [recording of the webinar](#) is available to view on Multnomah County's YouTube channel. As of January 31, 2022, the webinar recording had 32 views.

Online Open House and Survey

The online open house and survey featuring the cost-saving refinements to the Preferred Alternative were available to the general public from November 12 through December 14, 2021. This online activity provided an opportunity for people to learn about the status of the Project and review and provide input on the proposed refinements. The online open house included an overview video about the status of the Project and proposed refinements, captioned in seven languages.

The online open house and survey received over 4,000 visitors and over 1,500 responses. The survey included a mix of multiple-choice qualitative and open-ended questions. It also requested users' travel mode and demographic information. The online open house and survey were translated by the CELs Program into six languages: Arabic, Simplified Chinese, Japanese, Russian, Spanish, and Vietnamese.

A total of 1,509 people responded to the Round 4 Cost-Saving Measures survey, similar to the level of engagement with the previous survey opportunity in early 2021. Neither of the online surveys conducted in 2021 achieved the level of participation reached during the 2020 online survey, which sought input on recommending a preferred alternative.

Results from the surveys completed in languages other than English were compared to the aggregate results of all survey respondents. Overall, results from surveys completed in languages other than English were fairly similar to the total responses.

Of all 1,509 participants, 67 percent identified as White/Caucasian. The next largest participating demographic groups were those who identified as Asian (10 percent) and Hispanic/Latinx (6 percent). The remaining participants identified as Slavic (3 percent), African American/Black (2 percent), Indigenous North American (2 percent), Middle Eastern (2 percent), Native Hawaiian or Pacific Islander (1 percent), and prefer to self-describe (2 percent). Some participants preferred not to answer (12 percent).

3.9.3 Impacts

Introduction

Most of the impacts to EJ populations would be the same for the Refined Long-span as described in the Draft EIS for the Draft EIS Long-span Alternative, including:

- Post-earthquake impacts
- Impacts from off-site staging areas
- Indirect impacts
- Project benefits

The pre-earthquake impacts and the temporary construction impacts of the Refined Long-span Alternative would be very similar to the impacts described in the Draft EIS for the Long-span Alternative. The few differences in impacts are described in the text below and summarized in Table 3.9-2. Impacts that would be the same as those disclosed for the Long-span Alternative in the Draft EIS are not repeated here but are incorporated by reference.

Environmental Justice Impacts

Governor Tom McCall Waterfront Park Users – The Refined Long-span Alternative would have two sets of bridge columns in Waterfront Park, which is four fewer than existing and No-Build conditions, and one more

than with the Draft EIS Long-span Alternative (see Figures 2.4-12 through 2.4-15 in this SDEIS). This means that the Refined Alternative would increase usable open space under the bridge in Waterfront Park, compared to existing conditions and the No-Build, but not as much as with the Draft EIS Long-span Alternative. A narrower bridge proposed by the Refined Long-span Alternative would reduce the amount of shaded area over Waterfront Park and the Vera Katz Eastbank Esplanade, compared to the Draft EIS Long-span Alternative. This would provide more natural light contributing to a more open feel for users, events, and activities hosted under the bridge.

A reduction in the number of bridge columns in Waterfront Park is anticipated to benefit EJ populations that access Waterfront Park by increasing visibility under the bridge, which is considered a real and perceived safety benefit for all users. A more open feel and improved safety under the bridge is also expected to benefit social service providers such as Night Strike, which distributes free meals to low-income and minority populations who access or camp in the area under the bridge.

Table 3.9-2. Summary of Potential Design Refinements and Impacts on Environmental Justice Populations

Refined Long-Span Alternative	How the Refinement Affects Impacts to EJ Populations as Compared to the Draft EIS Long-Span and No-Build or Existing
Bridge Width – The total width of the bridge over the river would be approximately 82 to 93 feet (range varies with bridge type and segment); by 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 vehicles lanes, bike lanes and pedestrians, which is comparable to the existing bridge.	<ul style="list-style-type: none">• A narrower shaded area over Waterfront Park and the Vera Katz Eastbank Esplanade compared to the Draft EIS Long-span would create a more open feel under the bridge.• Narrower pedestrian and bike lanes could increase the potential risk for pedestrian/bike interactions compared to the Draft EIS Long-span Alternative, which could affect accessibility and usage.
Lane Configuration – The refined bridge design would accommodate four vehicle lanes (rather than five as evaluated in the Draft EIS). Several different lane configuration options are being evaluated, including eastbound bus priority (Options 1–3) and queue jumps (Option 4).	This option could reduce reliability for bus riders needing to make connections on time or accessing services on either side of the bridge compared to existing lane configurations and the Draft EIS lane configurations.
Bicycle and Pedestrian Lanes – The total width of the bicycle lanes and pedestrian sidewalks would be approximately 31 feet. This is wider than the existing bridge but 9 feet narrower than what was described in the Draft EIS for the Replacement Alternatives. Physical barriers between vehicle lanes and the bicycle lanes would be in addition to the above dimensions.	Narrower pedestrian and bicycle lanes could increase the potential risk for pedestrian/bike interactions which could affect accessibility and usage compared to the Draft EIS Long-span Alternative. The Refined Long-span Alternative provides more space than the No-Build Alternative but narrows the amount of space available by 9 feet from the Draft EIS Long-span Alternative.

Refined Long-Span Alternative	How the Refinement Affects Impacts to EJ Populations as Compared to the Draft EIS Long-Span and No-Build or Existing
<p>West Approach – The Refined Long-span Alternative considers a girder bridge type for the approach over the west channel of the river, Waterfront Park, and Naito Parkway. Compared to the cable-stayed and tied-arch options evaluated in the Draft EIS, this option would reduce costs and avoids an adverse effect to the Skidmore/Old Town National Landmark Historic District. The west approach would include two sets of columns in Waterfront Park compared to just one with the tied-arch option and five with the existing bridge.</p>	<ul style="list-style-type: none"> • A reduction in the number of columns in Waterfront Park compared to the existing bridge would improve real and perceived safety under the bridge by creating a more open feel and improving sightlines and visibility. • Avoidance of an adverse effect to the Skidmore/Old Town National Historic Landmark District is considered a benefit to EJ populations who reside in and access the area. • The Draft EIS Long-span places one support along Naito Parkway. The Refined Long-span Alternative includes an additional pier reducing open space in the park. But the Refined alternative provides more open space than the No-Build Alternative which has five columns.
<p>ADA Access to Other Facilities – The Draft EIS evaluated multiple options for providing upgraded connections from the Eastbank Esplanade and from 1st Avenue to the bridge. The SDEIS further evaluated an elevators/stairs option for the Esplanade and evaluated both an elevators/stairs option and an improved sidewalk option for 1st Avenue. For the Esplanade connection, the project could also reconnect the City's existing stairway to the new bridge and allow the City to upgrade that connection as a separate, future project.</p>	<ul style="list-style-type: none"> • All of the upgrade options would provide improved ADA and bicycle connections to other facilities for all users including EJ populations. • All of the upgrade options have safety and security concerns: ramps because they are long descents/ascents, are out of the public eye, and actively mix different modes; elevators because they are enclosed and out of the public eye. • Elevators have unique reliability concerns. If not properly maintained and repaired, closures could intermittently force some users, including EJ populations, to use alternative access locations.
<p>Construction Area – Revised construction area south of the west end of the bridge within Waterfront Park has a smaller footprint than described in the Draft EIS.</p>	<p>Smaller Boundary of Potential Construction Impacts on the south side of bridge means less area would be closed during full construction period. More space would be available for park users, including EJ populations.</p>
<p>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 of this SDEIS for more information regarding construction impact extent and closure timeframes.</p>	<p>No difference in impacts to EJ populations compared with the Draft EIS Long-span Alternative.</p>
<p>Construction Access and Staging – The construction access and staging is expected to be the same as that described in the Draft EIS.</p>	<p>No difference in impacts to EJ populations compared with the Draft EIS Long-span Alternative.</p>
<p>Temporary use of Governor Tom McCall Waterfront Park – Temporary use of the park is expected to be the same as that described in the Draft EIS on the north side of the bridge. On the south side of the bridge, the impacted space has been reduced to an area north of the Waterfront Park trellis.</p>	<p>No difference in impacts to EJ populations compared with the Draft EIS Long-span Alternative.</p>
<p>Property Acquisitions and Relocations – Property acquisitions and relocations are similar to those listed in the Draft EIS, except that they have been modified to reflect a narrower set of bridge design options.</p>	<p>No difference in impacts to EJ populations compared with the Draft EIS Long-span Alternative.</p>
<p>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.</p>	<p>No difference in impacts to EJ populations compared with the Draft EIS Long-span Alternative.</p>

Refined Long-Span Alternative	How the Refinement Affects Impacts to EJ Populations as Compared to the Draft EIS Long-Span and No-Build or Existing
Vegetation – the Refined Long-span would remove slightly fewer trees and have fewer vegetation impacts than the Draft EIS Long-span, primarily within Waterfront Park south of the bridge.	No difference in impacts to EJ populations compared to the Draft EIS Long-span Alternative.
Temporary Freeway, Rail, Street, and Trail Closures – Temporary closures are expected to be the same as those described in the Draft EIS.	No difference in impacts to EJ populations compared to the Draft EIS Long-span Alternative.

Bicycle Lanes and Sidewalks – The Refined Long-span Alternative’s proposed 14- to 17-foot pedestrian and bicycle lanes (each direction) could decrease the potential risk for pedestrian and bicycle interactions relative to the No-Build, but to a lesser degree than the Draft EIS Long-span Alternative which proposes 20-foot bicycle and pedestrian facilities (see Figures 2.4-7 and 2.4-8 in this SDEIS). The proposed pedestrian and bicycle lanes are expected to benefit any EJ populations who depend on walking or bicycling as a primary means of transportation. By expanding the amount of dedicated space for walking and cycling, the Refined Long-span Alternative would improve safety conditions for EJ populations traveling by foot or by bicycle over existing conditions.

ADA-Bicycle-Pedestrian Access to the Vera Katz Eastbank Esplanade – Near the east end of the bridge, a City-owned staircase, built through a revocable permit, connects the Esplanade to the south side of the bridge 50 feet above it. The stairway would need to be disconnected for bridge demolition and construction, but with the Refined Long-span Alternative it could be reconnected following construction. The Draft EIS and SDEIS also evaluated upgraded connection options (ramp options and elevator/stairs options). Any upgrades to the existing stairway connection could be implemented as a separate City-sponsored project, as discussed in Chapter 2 of this SDEIS. Adding ramps or new stairs and elevators would improve access for many users, including EJ populations, compared with the No-Build Alternative (see Figure 2.4-18 to Figure 2.4-22 in this SDEIS). There are security and safety concerns with all options, and reliability concerns with elevators. The potential impacts of temporary elevator closures are not anticipated to disproportionately impact EJ populations.

ADA-Bicycle-Pedestrian Access to Skidmore MAX station – Near the west end of the bridge, County-owned stairs connect each side of the bridge to 1st Avenue below the bridge. Replacing these with either elevators and stairs, and/or with an improved sidewalk connection from the end of the bridge, would provide improved ADA access between the bridge and 1st Avenue. Improved access to the Skidmore Fountain MAX station and historic district is anticipated to benefit EJ populations who are also transit riders, especially those that depend on transit as a primary mode of transportation. Access to the Skidmore Fountain MAX station would improve access to the citywide MAX network for all riders, including EJ populations. However, TriMet is currently studying a proposal to permanently close this MAX station, and the current bus stop on the bridge is expected to move to a new location just west of the bridge, which would greatly reduce the benefits of installing elevators at the proposed location.

Transit Users – The Refined Long-span Alternative would remove one vehicle lane, accommodating four lanes rather than five as evaluated in the Draft EIS. Four different lane configuration options (see Figure 2.4-8 in this SDEIS) are being considered. Lane Options 1, 2, and 3 would not meaningfully change the adverse effects or benefits to EJ populations. Lane Option 4, however, is the only option that would not include an eastbound bus-only lane; compared to Draft EIS Long-span, No-Build, and the other Refined Alternative lane configuration options, this could reduce reliability for eastbound bus riders, including EJ populations, needing to make connections or access services on either side of the bridge compared to the Draft EIS or No-Build lane configurations.

Social Service Providers – The Refined Long-span Alternative would require permanent easements on properties currently used by the Portland Rescue Mission and Mercy Corps. However, as with the Draft EIS Long-span Alternative, the Refined Long-span Alternative would not displace these or any other social service agencies, thereby avoiding disproportionate and adverse impacts to EJ populations.

Temporary Access Closures – Most of the temporary construction impacts to EJ populations would be the same for the Refined Long-span Alternative as described for the Draft EIS Long-span Alternative, with two exceptions:

- Access to the Portland Rescue Mission would not be temporarily rerouted during construction. This is considered a benefit to EJ populations.
- The construction area south of the bridge within Governor Tom McCall Waterfront Park would have a smaller footprint for the Refined Long-span than was described for the Draft EIS Long-span Alternative. The smaller construction area would provide more space available to users during construction (see Figure 2.4-23 in this SDEIS) which is considered a benefit to EJ populations who may use the park or access the park for social services.

3.9.4 Mitigation

Potential EJ-related mitigation measures would be the same for the Refined Long-span Alternative as described for the Draft EIS Long-span Alternative in the Draft EIS, with one addition. To address potential long-term impacts to businesses and communities during construction, there could be a construction web page for people and businesses to access with questions and concerns regarding any temporary access impacts to businesses and measures to maintain access. This is a new mitigation measure since the Draft EIS, but it would apply to any of the build alternatives. Construction updates and use of the web page would be promoted through relevant organizations that directly serve EJ populations such as Portland Rescue Mission and the Salvation Army.

3.10 Parks and Recreation

The information in this section is summarized from the *EQRB Parks and Recreation Supplemental Memo* (Multnomah County 2022g) and from the EQRB Draft EIS (Multnomah County 2021h)

3.10.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment.

3.10.2 Impacts

Most of the adverse effects to parks and recreation resources would be temporary and caused by construction activities. The majority of parks and recreation resources considered in this SDEIS, including Governor Tom McCall Waterfront Park (Waterfront Park), Ankeny Plaza, the Willamette Greenway Trail, and the Vera Katz Eastbank Esplanade (Esplanade), would have no adverse direct long-term impacts under either the Draft EIS Long-span Alternative or the Refined Long-span Alternative. Waterfront Park and the Esplanade would benefit from the long-term effects of either the Draft EIS Long-span or the Refined Long-span having fewer bridge supports in or near these resources.

Many of the parks and recreation impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the Draft EIS Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect impacts
- Impacts from potential off-site staging areas

Direct long-term and temporary impacts would also be similar, although there would be notable differences. Table 3.10-1 lists the elements of the Refined Alternative that would have a different effect on parks and recreation resources, and it provides a brief description of the impacts compared to the Draft EIS Long-span and No-Build Alternatives. All other elements of the Refined Long-span, described in Chapter 2 of this SDEIS, would have no effect on park and recreation resources or would not have a different effect than that described in the Draft EIS. The rest of this section, following Table 3.10-1, elaborates on the differences and similarities in impacts between the Refined Long-span Alternative and the Draft EIS Long-span Alternative.

Table 3.10-1. Summary of Effects for Park and Recreation Resources

Refined Long-Span Alternative	How the Refinement Affects Impacts, Compared to the Draft EIS Long-Span and No-Build or Existing
Bridge Width – The total width of the bridge over the river would be approximately 82 to 93 feet (range varies with bridge type and segment); by comparison, the Draft EIS Replacement alternatives were approximately 110 to 120 feet wide over the river.	<ul style="list-style-type: none"> • Narrower shaded area over Waterfront Park and Eastbank Esplanade compared to Draft EIS Long-span; about the same as existing conditions.
West Approach – Refined girder bridge type over the west channel of the river and Waterfront Park.	<ul style="list-style-type: none"> • Generally higher vertical clearance over Waterfront Park compared to the Draft EIS Long-span girder option. • Includes two sets of columns within the park, whereas the Draft EIS Long-span has just one; the existing bridge has five sets of columns in the park.

Refined Long-Span Alternative	How the Refinement Affects Impacts, Compared to the Draft EIS Long-Span and No-Build or Existing
East Approach – The refined alternative would place the eastern pier of the tied arch span just to the west of 2nd Ave.	<ul style="list-style-type: none"> • No difference in impacts to Esplanade. • Slightly higher vertical clearance over the skatepark compared to the Draft EIS Long-span.
ADA Access to Other Facilities – The refined approach could reconnect the existing staircase to the Eastbank Esplanade but also evaluates an upgraded ADA/bicyclist/pedestrian access option (elevators and stairs). The upgrade could also be completed as a separate, future project by the City.	<ul style="list-style-type: none"> • Less impact to the Esplanade's existing upland structure compared with the Draft EIS Long-span proposed ramp. Removes 30 fewer trees between the Esplanade and I-5, south of the bridge. • Provides access to both travel directions on the bridge to and from the Esplanade, increases ADA and pedestrian accessibility; elevator and stairs not as operationally reliable as the Draft EIS ramp option, but better than existing. • More impact than reconnecting the existing stairs
<p>Construction Area – Revised construction area south of the west end of the bridge within Waterfront Park has a smaller footprint than described in the Draft EIS.</p> <p>Revised construction area north of the west end of the bridge within Waterfront Park does not include cherry trees. This change would apply to all build alternatives.</p>	<ul style="list-style-type: none"> • Smaller Boundary of Potential Construction Impacts on the south side of bridge means less area is closed during the full construction period.

ADA = Americans with Disabilities Act

Governor Tom McCall Waterfront Park and the Willamette River Greenway Trail

Compared to the Draft EIS Long-span Alternative, the Refined Long-span Alternative would have a narrower deck width by 27 to 28 feet, generally higher vertical clearance above Waterfront Park, one additional set of piers within Waterfront Park, and would have a girder bridge over the park thus eliminating any tall structural elements above the deck (see Figure 3.10-1 and Figure 3.10-2 below, as well as Figures 2.4-9 through 2.4-15 in Chapter 2 of this SDEIS). The added vertical clearance beneath the bridge would reduce the shading in the park and over the trail and increase the flexibility for use of the park underneath the bridge. Having two sets of piers in the park would be an additional impact compared to the Draft EIS Long-span Alternative, but there would be three fewer sets of piers within the park compared to the No-Build Alternative.

Figure 3.10-1. View in Waterfront Park Under Bridge from Japanese American Historical Plaza – Refined Long-Span, Girder



Figure 3.10-2. View in Waterfront Park Under Bridge from Japanese American Historical Plaza – Draft EIS Long-Span, Tied-Arch



As discussed in the Draft EIS, the temporary impacts of the Draft EIS Long-span Alternative in Waterfront Park would directly affect the southern half of the Japanese American Historical Plaza (located just north of the bridge), the area under the Burnside Bridge, and a portion of the Willamette Greenway Trail. The construction impacts would disrupt many annual events held in Waterfront Park.

The Refined Long-span short-term impacts would have the same duration as the Draft EIS Long-span Alternative, but it would reduce the area of Waterfront Park that would be closed during construction. In contrast to the Draft EIS Long-span, the Refined Long-span Alternative would avoid closing the Ankeny Plaza structure or any other portion of the park south of the plaza (see Figure 2.4-23 in Chapter 2 of this SDEIS).

Further, a reconfiguration of the assumed barge access area north of the bridge in the Japanese American Historical Plaza would remove 10 fewer flowering cherry trees near the seawall (see Figure 2.4-23 in Chapter 2 of this SDEIS). This same revision would also be applied to the Draft EIS Build Alternatives.

Vera Katz Eastbank Esplanade

As described in the Draft EIS, the floating section of the Esplanade would be disassembled and stored out of the way during some periods of constructing the Draft EIS Long-span Alternative. Users would be rerouted to detours, though this would not mitigate for lost recreation use. Many events that use the Esplanade would need to be relocated. The Esplanade restrictions would also impact the Kevin J. Duckworth Memorial Dock, which is attached to the Esplanade. These impacts would be the same for the Refined Long-span Alternative.

Compared with the Draft EIS Long-span, the Refined Long-span would have a narrower deck width by 27 to 28 feet, reducing shading and the feeling of bulk over the Esplanade. Currently, there is a City-owned staircase connecting the Esplanade to the south side of the bridge 50 feet above it. This staircase could be reconnected to the new bridge, or it could be replaced with an upgraded connection. Any upgrades to the existing stairway connection could be implemented as a separate City-sponsored project, as discussed in Chapter 2 of this SDEIS. The Draft EIS studied options for upgrading this connection with either stairs and elevators or ramps and stairs (see Figures 2.4-21 and 2.4-22 in Chapter 2 of this SDEIS). The Refined Long-span Alternative further evaluated stairs and an elevator on the north and south sides of the bridge. Compared to the long ramps evaluated in the Draft EIS, elevators and stairs would have less disturbance to the upland portion of the Esplanade, preserve up to 30 trees, and would potentially provide more convenient ADA access than the long ramps. However, for bicyclists, the elevators and stairs option is considered to be less convenient than a ramp, and elevators pose security concerns and require more maintenance. The ramps evaluated in the Draft EIS would require an additional 2 to 3 years of construction time closure of the Esplanade.

Burnside Skatepark

As with the Draft EIS Long-span Alternative, the Refined Long-span Alternative would require intermittent closures of the Burnside Skatepark during construction, but it would not have long-term direct effects on the skatepark. No new supports would be installed within the skatepark, and the existing bridge support within the skatepark would remain in place but would be disconnected from the bridge above it.

With the cable-stayed bridge type, no new supports would be added near the skatepark. With the tied-arch bridge type, a new bridge support would be placed on the west side of 2nd Avenue (see Figure 2.4-17 in Chapter 2 of this SDEIS). The Refined Long-span Alternative would allow slightly more vertical clearance above the skatepark compared to the Draft EIS Long-span Alternative and would generally have the same impacts as the Draft EIS Long-span Alternative compared to the No-Build Alternative (see Chapter 2.4.4 for additional information).

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 would provide 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. The refinements include the same cost-cutting measures that were applied to create the Refined Long-span Alternative.

While all of the replacement bridge alternatives (four-lane or five-lane versions) would avoid long-term adverse impacts to public parks, and most of the short-term impacts would be the same for all bridge replacement alternatives, there is one notable difference for the Couch Extension Alternative. Both a four-lane and a five-lane version of this alternative would close the Eastbank Esplanade for approximately 30 months compared to 18 months for the Refined Long-span and the Refined Short-span Alternatives.

3.10.3 Mitigation

The proposed mitigation for the Refined Long-span Alternative would be the same as described in the Draft EIS for the Draft EIS Long-span Alternative.

3.11 Historic and Archaeological Resources

3.11.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment for archaeological resources. The description of the affected environment is unchanged from the EQRB Draft EIS for historic and archaeological resources as no resources were added or removed from the Area of Potential Effect; however, a more detailed description of several buildings now merits inclusion in the SDEIS because of potential effects of the Refined Long-span Alternative and a more specific understanding of potential bridge types. The Draft EIS included affected environment descriptions for the Burnside Bridge, Portland Harbor Wall, Ankeny Pump Station, Central Fire Station, White Stag Sign, and Burnside Skatepark (Multnomah County 2021h). This SDEIS adds the following descriptions as part of the affected environment to facilitate discussion of impacts. The Draft EIS also included a description of previously recorded archaeological sites in the project area (none of which would be impacted by any of the alternatives).

White Stag Block

The White Stag Block is defined by NW Naito Parkway on the east, NW Couch Street on the north, NW 1st Avenue on the west, and West Burnside on the south. The Block is composed of three historic buildings: the Bickel Block (1883) at NW Naito Parkway and NW Couch Street; the Skidmore Block (1889) at NW 1st Avenue and West Burnside; and the Willamette Tent and Awning Building (1910) at West Burnside and NW Naito Parkway. The three buildings have been combined into one complex that serves as the University of Oregon's Portland campus. When the Burnside Bridge was constructed in the mid-1920s, the southern façades of the Skidmore Block and Willamette Tent and Awning Building were truncated and rebuilt. In this process, the new western approach span was physically attached to adjacent buildings.

Figure 3.11-1. The White Stag Block, looking northeast from the Burnside Bridge.



Bates Building

The Bates Building was constructed in 1885 as a hotel. It is on the north side of West Burnside extending west from NW 1st Avenue. It is currently occupied by the Portland Rescue Mission. Its southern façade was reduced for the construction of the Burnside Bridge in 1925–1926.

Figure 3.11-2. The Bates Building, looking north along West Burnside.



Burnside Hotel

The Burnside Hotel is at the northeast corner of NW 2nd Avenue and West Burnside. It was constructed circa 1901 as a hotel and altered for construction of the Burnside Bridge in 1925–1926.

Figure 3.11-3. The Burnside Hotel, looking northeast from the Intersection of West Burnside and NW 2nd Avenue.



Salvation Army Building

The Salvation Army Building is at the southeast corner of SW 2nd Avenue and West Burnside. It was constructed in 1904, presumably for commercial uses. The 1909 Sanborn map depicts the building occupied by five stores: two facing onto Burnside and three facing onto SW 2nd Avenue. When it was acquired by the Salvation Army is unknown. As late as 1950, it was mapped as a restaurant and hotel (Sanborn 1908-1950:I:74).

Figure 3.11-4. The Salvation Army Building, looking southeast at the intersection of West Burnside and NW 2nd Avenue.



Reed Building

The Reed Building was constructed in 1890 as a warehouse. It was acquired in 2007 by Mercy Corps, which constructed a new building to the east of the Reed Building. The Reed Building was renovated and seismically retrofitted for use by Mercy Corps. The building sits approximately 25 feet south of the Burnside Bridge west approach. Two buildings that once occupied that space were removed in the 1960s, and a surface parking lot now fills that space.

Figure 3.11-5. The Reed Building, looking northeast from the intersection of SW 1st Avenue and SW Ankeny. The new Mercy Corps building is to the right.



Frigidaire/Templeton Building

The Frigidaire Building was constructed in 1929 to serve as the location for the retail sales of Frigidaire refrigerators. Those sales were relocated in 1933, and the building was subsequently occupied by the Oregon Liquor Control Board. It was used by Ronald Templeton from 1959 to 1997, hence its secondary name. With very minor alterations, the building has retained its original character and was individually listed in the National Register of Historic Places in 1989 as a property in the Portland Eastside Multiple Property Documentation.

The Frigidaire Building was constructed to be attached to the eastern approach of the Burnside Bridge. The bridge sidewalk provided direct public access to the building interior and to display windows.

Figure 3.11-6. The Frigidaire/Templeton Building, looking west.



3.11.2 Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the original Long-span Alternative, including the following:

- Post-earthquake impacts
- Construction phase (temporary) impacts
- Indirect impacts
- Impacts from potential off-site staging areas

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative

(with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span Alternative.

Table 3.11-1 lists the elements of the Refined Alternative that would have a different effect on historic resources and provides a brief description of the impacts compared to the Draft EIS Long-span Alternative and No-Build Alternative. All other elements of the Refined Long-span, described in SDEIS Chapter 2, would have no effect on historic resources or would not have a different effect than that described in the Draft EIS. The rest of this section, following Table 3.11-1, elaborates on the differences and similarities in impacts between the Refined Long-span Alternative and the Draft EIS Long-span Alternative for each historic site affected.

Table 3.11-1. Summary of Proposed Design Refinement Impacts to Historic Resources

Elements of the Refined Long-Span Alternative	How the Refinement Affects Impacts, Compared to the Draft EIS Long-Span and No-Build or Existing
Bridge Width – The total width of the bridge over the river would be approximately 82–93 feet (range varies with bridge type and segment); by comparison, the Draft EIS replacement alternatives were approximately 110–120 feet wide over the river.	<p>There would be a wider separation between the bridge deck/sidewalk and the Frigidaire/Templeton Building compared to the Draft EIS Long-span Alternative. A connection for the entry at the bridge level would be retained.</p> <p>There would be a wider separation between the bridge and the White Stag Block than with the Draft EIS Long-span Alternative. The White Stag Block is currently connected to or touching the bridge.</p>
West Approach – This SDEIS evaluates a refined girder bridge type for the approach over the west channel of the river, Waterfront Park, and Naito Parkway.	The refined girder bridge would have less intrusion into Skidmore/Old Town National Historic Landmark District than the Draft EIS Long-span Alternative and would have similar bulk/massing to the existing bridge. Compared to the Draft EIS Long-span, this would avoid a Section 106 adverse effect that would occur with the tied-arch or cable-stayed bridge types.
East Approach – The Refined Alternative would place the eastern pier of the tied-arch span either on the east side of 2nd Avenue (Option 1) or just to the west of 2nd Avenue (Option 2). Increasing the length of the tied-arch span would also reduce the length and depth of the subsequent girder span to the east.	<p>Tied-Arch Option 1 with a pier on east side of 2nd Avenue would place the pier just west of the Burnside Skatepark and it would partially block views of the park from 2nd Avenue. It would allow more vertical clearance above the park compared to the Draft EIS Long-span.</p> <p>Tied-Arch Option 2 would not place piers near the Skatepark; it would allow slightly more vertical clearance over the Skatepark compared to the Draft EIS Long-span.</p>
ADA Access to Other Facilities – This SDEIS evaluates an elevator/stairs option and an improved sidewalk option for providing direct ADA access between the bridge and W 1st Avenue including the Skidmore Fountain MAX station. It also evaluates an option for improved access from the Eastbank Esplanade to the bridge.	With elevators/stairs to W 1st Avenue, there would be a slight visual change within or near the Skidmore/Old Town National Historic Landmark District compared to Draft EIS Long-span and existing bridge, but it would not be an adverse effect.

ADA = Americans with Disabilities Act

Skidmore/Old Town National Historic Landmark District

The Refined Long-span Alternative effects would be largely limited to five contributing resources within the National Historic Landmark District (NHLHD) on West Burnside from NW/SW Naito Parkway west to NW/SW 2nd Avenue. Those five resources are individually addressed below.

Elements of the Refined Long-span Alternative that could affect the NHLHD include potential elevators for Americans with Disabilities Act access on NW/SW 1st Avenue and West Burnside. The elevators would introduce new visual elements along West Burnside, altering a portion of the NHLHD setting.

This would affect the setting within 4 of the 20 blocks in the NHLD, with few if any effects for a substantial part of the NHLD. Design of the elevators would be subject to historic review and would meet the Skidmore/Old Town Historic District Design Guidelines. The Draft EIS Long-span Alternative included ramp options only on the south side of the bridge. The ramps would not have the above-deck vertical element of the elevators but would have a much larger footprint.

Another design element (of both the Draft EIS Long-span and the Refined Long-span Alternatives) with possible effects would be the new center span, which could be either a vertical lift or bascule lift span. A vertical lift would create a new visual element that would be visible from the NHLD. This would be somewhat ameliorated by its distance from the NHLD (300 to 500 feet), and it would not be visible at street level through much of the NHLD.

The proposed western approach with the Refined Long-span would be a girder span that maintains the open character of the existing approach and maintains existing views. The girder bridge of the Refined Alternative avoids the visual impact of the tied-arch and cable-stayed bridge options of the Draft EIS Long-span. These tall, modern structures would not be compatible with the character and visual appearance of the district and would obstruct historic views from and to the district. As such, the girder bridge type associated with the Revised Long-span avoids what would otherwise be an adverse effect on the district with the Draft EIS Long-span tall bridge options.

Because none of the proposed impacts associated with the Refined Long-span Alternative would alter the characteristics of the NHLD that qualify it as an NHLD nor alter the NHLD's integrity, a no adverse effects finding has been recommended for the Skidmore/Old Town National Historic Landmark District. Like all Section 106 recommendations from the project team, this recommendation is subject to Oregon State Historic Preservation Office review and concurrence.

White Stag Block

The girder approach span proposed with the Revised Long-span Alternative would eliminate the attachment of the buildings in the White Stag Block to the bridge and would create an opening between the approach span and the adjacent buildings (the Draft EIS Long-span would as well). Separating the bridge approach from the building would be conducted according to the Secretary of the Interior's Standards for the Treatment of Historic Properties, including minimizing material loss and visual changes to retain historic character. Creating this separation would enhance the ability of the White Stag Block to survive a major earthquake (the White Stag Block has been seismically retrofitted). It would also provide greater public visibility of the ground-level façade of the Skidmore Block, which has been obscured under the existing bridge approach span since 1926.

Because the proposed changes would follow the Secretary of the Interior's Standards for the Treatment of Historic Properties, there would be no impacts to the historic character of the White Stag Block. A no adverse effects finding is therefore recommended for the Refined Alternative for the White Stag Block.

Bates Building

Both the Draft EIS Long-span and the Refined Long-span would have similar effects. A new sidewalk would replace the existing sidewalk. Removal of the existing sidewalk and construction of a new sidewalk would be conducted according to the Secretary of the Interior's Standards for the Treatment of Historic Properties, including minimizing material loss and visual changes to retain historic character. Any repairs to the façade may be subject to Portland Historic Resource review. There is no evidence the Bates Building has been seismically retrofitted.

Because the proposed changes would follow the Secretary of the Interior's Standards for the Treatment of Historic Properties, there would be no impacts to the historic character of the Bates Building. A no adverse effects finding is therefore recommended for the Refined Alternative for the Bates Building.

Burnside Hotel

Both the Draft EIS Long-span and the Refined Long-span would have similar effects as for the Bates Building. The Burnside Hotel is situated where the current approach span reaches street level, which would also be true of the Refined Long-span Alternative girder span. A new sidewalk would replace the existing sidewalk. Removal of the existing sidewalk and construction of a new sidewalk would be conducted according to the Secretary of the Interior's Standards for the Treatment of Historic Properties, including minimizing material loss and visual changes to retain historic character. There is no evidence the Burnside Hotel has been seismically retrofitted.

Because the proposed changes would follow the Secretary of the Interior's Standards for the Treatment of Historic Properties, there would be no impacts to the historic character of the Burnside Hotel. A no adverse effects finding is therefore recommended for the Refined Alternative for the Burnside Hotel.

Salvation Army Building

Both the Draft EIS Long-span and the Refined Long-span would have similar effects as for the Bates Building and the Burnside Hotel. A new sidewalk would replace the existing sidewalk. Removal of the existing sidewalk and construction of a new sidewalk would be conducted according to the Secretary of the Interior's Standards for the Treatment of Historic Properties, including minimizing material loss and visual changes to retain historic character. There is no evidence the Salvation Army Building has been seismically retrofitted.

Because the proposed changes would follow the Secretary of the Interior's Standards for the Treatment of Historic Properties, there would be no impacts to the historic character of the Salvation Army Building. A no adverse effects finding is therefore recommended for the Refined Alternative for the Salvation Army Building.

Reed Building

None of the build alternatives would directly affect the Reed Building. The number of bents for the Refined Long-span girder bridge approach would be substantially reduced compared to existing, thus providing a more open view to the north. Although a change in the setting, it does not "restore" a historical perspective as the Reed Building never had direct frontage at-grade onto Burnside Street.

A no adverse effects finding is therefore recommended for the Refined Alternative for the Reed Building.

Ankeny Pumping Station

The Refined Long-span girder bridge (as well as the Draft EIS Long-span bridge options) would alter the setting to the north through reduction in the number of bents under the new west approach and removal of Pier 1 immediately north of the pump station. The station continues to serve an important function in the city's water and sewer system. Its structural integrity must therefore be maintained. Other than the minor change to setting, the design modifications would not affect the Ankeny Pumping Station.

A no adverse effects finding is therefore recommended for the design modifications for the Ankeny Pumping Station.

Portland Harbor Wall

The Harbor Wall was constructed around the pre-existing Burnside Bridge Pier 1. The Refined Long-span Alternative includes removing Pier 1 and constructing a paved surface to the edge of river across the gap left by removal of the pier. This would also involve removal of the Harbor Wall railing around Pier 1, which is one of two remaining segments of the 1930s concrete railing. The other remaining segment is along the river face of the Ankeny Pumping Station and would not be removed. The Draft EIS Long-span Alternative would also remove Pier 1 but would not cover the gap left by removal of the pier.

The proposed removal of Pier 1 and the associated Harbor Wall railing would be conducted according to the Secretary of the Interior's Standards for the Treatment of Historic Properties, including matching the design, color, texture, and materials in the construction of the new paved surface and minimizing material loss and visual changes to retain historic character. The proposed removal of Pier 1 and the associated Harbor Wall railing would affect approximately 150 linear feet of the Harbor Wall. This represents only 3 percent of the total length of the Harbor Wall. The planned pavement to replace the Pier 1 location would establish a more complete linear alignment for the Harbor Wall with the top of the riverbank.

Because the proposed changes would follow the Secretary of the Interior's Standards for the Treatment of Historic Properties, there would be no impacts to the historic character of the Portland Harbor Wall. A no adverse effects finding is therefore recommended for the Refined Alternative for the Portland Harbor Wall.

White Stag Sign

None of the proposed design modifications would directly affect the White Stag Sign. The proposed center vertical lift span option would include towers that would partially obscure the view of the sign looking to the west. This effect would diminish as the viewer moves west and the present open viewshed would be maintained west of the center span. The impact would be avoided with the bascule lift option.

A no adverse effects finding is recommended for the Refined Alternative for the White Stag Sign.

Burnside Bridge

The proposed Refined Long-span Alternative applies only to elements of a new bridge that would completely replace the existing bridge. They therefore do not alter the Draft EIS recommendation of an adverse effects finding for the Burnside Bridge.

Frigidaire/Templeton Building

The Frigidaire Building was constructed to be attached to the eastern approach of the Burnside Bridge. The bridge sidewalk provided direct public access to the building interior and to display windows. The Refined Long-span design modifications would reduce the sidewalk connection, which was an integral element of the building design. In addition, the cable-stayed option for the eastern approach would introduce diagonal cables in front of the Frigidaire Building. The existing bridge balustrade would be lost with demolition of the bridge. A new railing would be required for safety around the new opening between the Frigidaire Building and the sidewalk. This railing should be sensitive in design to the historic character of the Frigidaire Building.

These changes would compromise the feeling and setting of the Frigidaire Building but not other elements of the historic resource. It is therefore recommended that the Refined Long-span Alternative would not have an adverse effect with the tied-arch bridge nor with the cable-stayed

bridge as long as cables are located between the sidewalk and the bridge deck to avoid obscuring the building frontage from the sidewalk.

Union Pacific Railroad

The proposed Refined Long-span Alternative would affect the setting of the UPRR by reducing the number of bents and constructing a new visual element with either a tied-arch or cable-stayed approach span crossing over the UPRR. There would be no other effects to the railroad.

A no adverse effects finding is therefore recommended for the Refined Alternative for the UPRR.

Burnside Skatepark

One existing bridge bent is situated near the western edge of the Skatepark and has been incorporated into Skatepark features. All build alternatives would remove the uppermost segment of this bent, with the remainder of the bent remaining in place to continue as an element of the Skatepark. The Refined Alternative cable-stayed option would remove the other existing bents and place new support columns a considerable distance west of the Skatepark. The Refined Alternative tied-arch option would be supported by two columns on the west side of NE/SE 2nd Avenue, across the street from the Skatepark. This would affect the Skatepark setting.

The Skatepark is situated in an industrial district with some recent development for retail and residential uses. The new columns for the tied-arch option would be placed at or near an existing bent. The columns are more massive than the bent but otherwise do not substantially alter the setting. A finding of no adverse effect is recommended for the Refined Alternative cable-stayed option and for the tied-arch option.

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 – 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.

Impacts from a Refined (four-lane) Short-span or Couch Extension Alternative would be the same as described above for the Refined Long-span Alternative, except for the Frigidaire Building. The Refined Short-span or Couch Extension alternative would result in the same sidewalk and railing changes in front of the Frigidaire Building as with the Draft EIS Long-span and the Refined Long-span Alternatives, but they do not include a cable-stayed bridge type option and therefore would avoid that associated visual change. All the replacement alternatives (whether with four or five lanes) would have an adverse effect on just one resource (the removal of the existing Burnside Bridge).

3.11.3 Mitigation

The potential mitigation measures presented in the *EQRB Cultural Resources Technical Report* (Multnomah County 2021f) are still under consideration. The Refined Long-span Alternative does not have additional impacts that would require new or altered mitigation measures; however, additional mitigation measure ideas that were not included in the Draft EIS are described below.

Mitigation for the Demolition of the Burnside Bridge

- Many of the images of the 1926 Burnside Bridge in the collections of the City of Portland are not scanned and available online. Identify historic photographs and other visual materials in the City of Portland and Multnomah County archives, Multnomah Library, and the Oregon Historical Society that depict the 1926 Burnside Bridge, including images made during design, construction, dedication, use of the bridge between 1926 and the present day. Scan these photographs and make them publicly available through the City of Portland archives portal online. These images may also be used in other mitigation and documentation efforts.
- Expand on the proposal to update/refresh/bolster the existing Historic American Engineering Record documentation of the Burnside Bridge and upgrade the image quality of the illustration plates in the narrative document. Make a better-quality set of Historic American Engineering Record images available online.
- Manufacture a three-dimensional model of the bridge of durable materials for documentation and public exhibition.
- Create a digital three-dimensional scan of the bridge to support other mitigation, such as interpretation. Perhaps the three-dimensional scan could also be used to create a file that people could download and print their own three-dimensional model.
- Record a video of the bridge opening and closing.
- Record a video of the bridge cab interior during opening and closing. Include narration from operator explaining the process of opening and closing the bridge.
- Record a video of the internal bridge machinery during the opening and closing sequence.
- Record a video record bridge demolition/deconstruction.
- Design and construct interpretive/educational signage on the history of the bridge for placement on the bridge and/or adjacent locations.
- Prepare and publish a history of the lower Willamette River bridges (from the Sellwood Bridge to the St. Johns Bridge) in the context of the human and environmental history of the lower Willamette River.
- Commission a LEGO expert to create an instruction booklet and parts list so people could download and order their own LEGO to build a Burnside Bridge model at home.

Mitigation for Portland Harbor Wall

- Although removal of Pier 1 is not recommended as an adverse effect on the Portland Harbor Wall, reuse of those portions of the original Harbor Wall railing that would be removed should be considered.

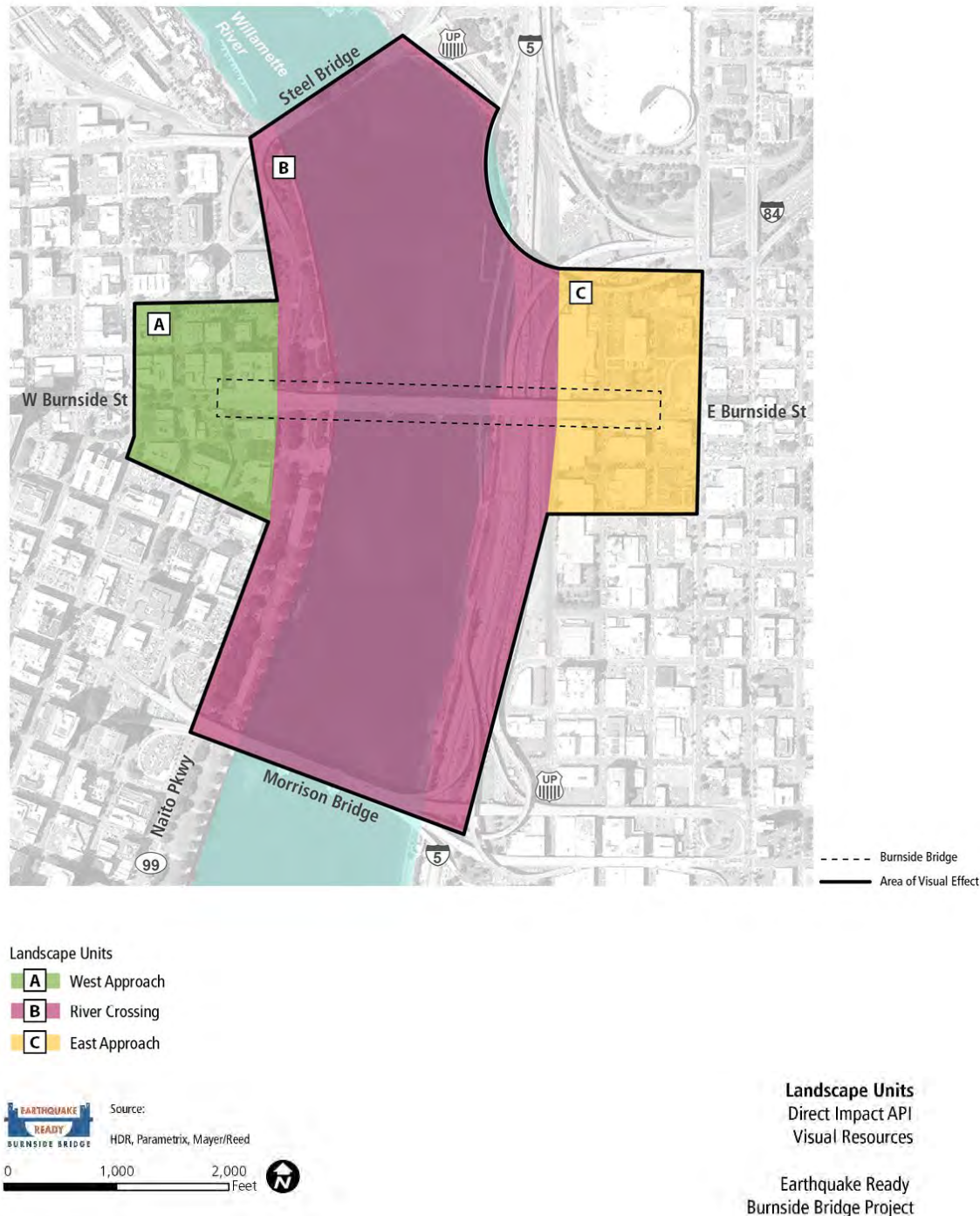
3.12 Visual Resources

This section is based on information in the *EQRB Revised Visual Resources Technical Report* (Multnomah County 2022i) and refers to information included in the EQRB Draft EIS (Multnomah County 2021h).

3.12.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment. For context, the area of visual effect was defined by three landscape units shown in Figure 3.12-1.

Figure 3.12-1. Landscape Units Map



3.12.2 Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect Impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas.
- Most of the direct impacts in the East Approach and the River Crossing landscape units

The following describes the impacts of the Refined Long-span (four-lane) Alternative that would be different from the Draft EIS Long-span Alternative and compares them to the impacts of the No-Build Alternative (existing bridge) and the Draft EIS Long-span as documented in the EQRB Draft EIS. The analysis considers visual compatibility and viewer sensitivity to determine overall impacts to visual quality.

West Approach

Within the west approach, two elements of the Refined Alternative – the refined girder bridge type and the Americans with Disabilities (ADA)/pedestrian access to 1st Avenue – would have different visual effects than the Draft EIS Long-span.

Refined Girder

The below-deck support system of the refined girder bridge for the west approach allows above-deck elements to remain very low in height, retaining views from, to, and over the bridge. Materials and future girder design would be important factors in determining how compatible the bridge would be with the surrounding landscape unit, particularly the Old Town District. The girder bridge would have two sets of large columns in Gov. Tom McCall Waterfront Park, whereas the Draft EIS Long-span would have one set of larger columns and the existing bridge has five sets of smaller columns. See Figures 2.4-9 through 2.4-15 in Chapter 2 of this SDEIS.

In the Refined Alternative, the west span girder is paired with a tall vertical element (tied-arch or cable-stayed bridge) on the east span. The varied, asymmetrical scale of the bridge on either side of the river differs from the existing sense of symmetry centered on the river.

A small number of travelers,¹ those moving slowly, would be the most likely to notice impacts. Neighbors in close proximity or moving slowly, such as recreational users in Gov. Tom McCall Waterfront Park, would be most likely to be affected. Notable impacts would include the reduction in the number of bridge columns. Vertical clearance under the bridge would be similar or a little higher than with the existing bridge. Travelers include motorists, pedestrians, and bicyclists, all with varying duration on the bridge. Many neighbors would be moving by the bridge, including touring, commuting, and recreational neighbors, with a shorter duration. Others, such as residential and commercial neighbors, would have longer durations of exposure.

The low-profile structure of the girder bridge would not impede views for travelers or neighbors on or near the west approach, lending to natural harmony. Open views from this part of the bridge would

¹ For more information on the user types used for analysis, see the *EQRB Revised Visual Resources Technical Report* (Multnomah County 2022i).

allow travelers to see landmarks to the west and east, facilitating cultural order and project coherence. Neighbors typically have a strong preference to maintain existing conditions; therefore, the similar scale, form, and visual character of the alternative to existing is likely to please neighboring viewers.

Refined ADA/Pedestrian Access at 1st Avenue

Currently, there are stairs on both sides of the bridge connecting it to 1st Avenue below the bridge. Potential options studied to upgrade that connection included ramps as well as elevators and stairs. The existing ornamental archway reading “Saturday Market Old Town” would be taken down during bridge demolition but may be reinstalled after construction as mitigation if desired. Retaining the archway would not affect the visual character of the area, but removing it would affect the visual character. The demolition of the Saturday Market Administrative offices building on this block would provide a more open pedestrian experience. Materials used and the design of the elevator towers would significantly define the visual character of the structure and determine the compatibility with the surrounding historic district. The materials and design should be compatible with the surrounding context, consistent with the requirements of the Skidmore/Old Town Historic District Guidelines. See the *EQRB Cultural Resources Technical Report* (Multnomah County 2021f) for additional information.

For both options (Draft EIS ramps and SDEIS elevator/stairs), viewers in relatively close proximity would see impacts. Pedestrian travelers and neighbors would be the most affected due to being users of the facility and their slow rate of movement. The building removal would affect the spatial layout of the area, opening views to both travelers and neighbors. Vehicular travelers would be minimally affected due to their rate of travel. The elevator shafts would be in views of all westbound travelers and more pronounced for pedestrian travelers in both directions. Elevator shafts would impact views of the bridge from neighbors below on NW 1st Avenue. The project scale of the Draft EIS ramp option is larger in footprint, while the scale of the elevator is larger vertically. The scale of the ramp would be noticed more by neighbors below the bridge where they would see the ramp. The elevator would be noticed more by travelers and neighbors on the bridge deck.

East Approach

In this landscape unit the ADA/pedestrian access to the Vera Katz Eastbank Esplanade is the primary element that would have different visual effects than the Draft EIS Long-span Alternative.

Vera Katz Eastbank Esplanade ADA/Pedestrian Access Point

ELEVATORS AND STAIRS OPTION

In this landscape unit, the Refined Alternative could reattach the existing City-owned staircase that connects the Eastbank Esplanade to the south side of the bridge. This SDEIS also evaluates options to upgrade the existing single stair structure on the south side of the bridge with an elevator tower and stair structure on both the south and north sides for ADA/pedestrian access to the Esplanade. A structure with a similar form and footprint to the existing stair would not contrast with the visual character of the East Approach. See Figures 2.4-21 and 2.4-22 in Chapter 2 of this SDEIS.

The increased footprint and height of the structure, as well as the alignment along the river, would increase the distance from which it could be seen and the duration of time it would be seen by travelers. Vehicular travelers would be minimally affected by the structures due to their rate of travel, but pedestrian and bicycle travelers would view the structures for a longer duration. The structures would be seen by neighbors on the Eastbank Esplanade and in Gov. Tom McCall Waterfront Park;

however, the scale of the structures would likely not cause large visual impact due to their relative size next to the bridge structure. The scale of the elevator structure is in keeping with the scale of the existing structure, neutralizing impacts. While the tower on the north side of the bridge is an addition, the scale of the new structure is small in relation to the bridge and is not anticipated to block important views for any length of time. The design and materials are unknown at the time of this writing, but the conceptual design is in keeping with the context and would likely have no adverse effects on project coherence.

Reconnecting the existing stairway to the new bridge would appear very similar to the No-Build Alternative.

DRAFT EIS RAMPS OPTION

In comparison, the long ramps evaluated in the Draft EIS would have a much larger footprint than either the existing stairs or the proposed elevator/stairs option. (See Figures 2.4-2 and 2.4-3 in Chapter 2 of this SDEIS.) The design of the ramps would be a factor in how much they complement or contrast with the visual character of the East Approach. Blocking views to the freeway to the east could be seen as a beneficial impact. However, the footprint required could remove the majority of existing trees in the area, greatly affecting the visual character of the east bank of the river directly south of the Burnside Bridge. The fact that there are few trees along the Esplanade bestows each tree as a contribution to the visual character of the bank, providing shade and a sense of natural harmony to viewers. The height and scale of the structure would alter views from the Vera Katz Eastbank Esplanade and from the west side of the river to the east. The ramp structure would be seen from the bridge deck, especially by eastbound travelers. Vehicular travelers would be minimally affected by the structure due to their rate of travel, but pedestrian and bicycle travelers would view the structure for a longer duration.

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 with the Refined Long-span Alternative. The refinements include the same cost-cutting measures that were applied to create the Refined Long-span Alternative.

Visual impacts from a Refined (four-lane) Short-span or Couch Extension Alternative would be the same as described in the Draft EIS for the five-lane versions of those alternatives, with one addition: the range of potential visual impacts would include those from the ADA/pedestrian access options at 1st Avenue and at Vera Katz Eastbank Esplanade as discussed above for the Refined Long-span Alternative. The potential visual impacts for all three refined alternatives would be the same or very similar for the west approach and the center span. For the east approach, the Refined Long-span Alternative has the potential for greater visual changes (beneficial and adverse) because of the tall cable-stayed or tied-arch bridge type options with fewer piers, as compared to the Refined Short-span or Couch Extension Alternatives that would have girder bridges with more piers.

3.12.3 Mitigation

The Draft EIS describes an approach to use during bridge type selection and during final design to reduce adverse visual effects and provide visual benefits from the Project. For the Refined Long-span Alternative, important considerations in final design would include the following:

- Selecting a design and materials for the west approach girder bridge that would be compatible with the views from Gov. Tom McCall Waterfront Park.
- Retaining the ornamental archway reading “Saturday Market Old Town” on the west approach over 1st Avenue.
- Selecting a design and materials for the elevators and stairs at this location to be compatible with the surrounding Skidmore/Old Town Historic District.
- Designing the elevator towers and stairs in the east approach to complement the character of the Vera Katz Eastbank Esplanade and views from the new bridge deck.

3.13 Geology

3.13.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment.

3.13.2 Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described for the Draft EIS Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect Impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas.

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span Alternative.

Refined Long-Span Alternative Impacts

Direct Impacts

The proposed refinements to the bicycle lanes and sidewalks would not change the impacts on soils and geology as described in the Draft EIS for the Long-span Alternative (see Figure 3.13-1 for the geology analysis direct API and see Figure 3.13-2 for liquefaction and susceptibility within this API). However, the Draft EIS Long-span Alternative and the Refined Long-span Alternative would vary in the number of bent shaft foundations associated with the west and east approaches, lift type, and ADA access. While the impacts are similar in nature to those described for the Draft EIS Long-span Alternative, they would have varying magnitudes of impact on geology and soils with the assumption that a higher number of shafts represents a greater impact to underlying geology and soils. See Table 3.13-1 for a comparison of these impacts, including movable span options.

Table 3.13-1. Comparison of Shafts Needed for Draft EIS Long-Span Alternative versus Refined Long-Span Alternative

Alternative (movable span option)	Number of Shafts	Shaft Diameter (feet)	Shafts in Water
Draft EIS Long-Span (basculer lift)	116	3–12	53
Draft EIS Long-Span (vertical lift)	108	3–12	45
Refined Long-Span – tied-arch (basculer lift)	65	3–12	28
Refined Long-Span – tied-arch (vertical lift)	59	3–12	22
Refined Long-Span – cable-stayed (basculer lift)	69	3–12	28
Refined Long-Span – cable-stayed (vertical lift)	63	3–12	22

Comparison with the Draft EIS Long-Span Alternative and the No-Build Alternative

The Refined Long-span Alternative with a bascule lift option, either tied-arch or cable-stayed, would have fewer total shafts and fewer shafts in the water as compared with either of the Draft EIS Long-span Alternative options.

The Refined Long-span Alternative with a vertical lift option, either tied-arch or cable-stayed, would have fewer total shafts and in-water shafts than the Draft EIS Long-span Alternative options. The Refined Long-span Alternative with tied-arch and vertical lift bridge options would have the least number of total shafts in comparison to any of the Draft EIS Long-span or Refined Long-span Alternatives, and therefore is anticipated to have the least impact to geology and soils.

Comparison of the Refined Long-span Alternative to the No-Build Alternative is effectively the same as presented in the Draft EIS for the Draft EIS Long-span Alternative. Geology and soils, representing earth-material, and groundwater throughout the Project Area would not be disturbed under the No-Build Alternative; therefore, it would not be different from existing conditions. The existing earth-materials would remain in place except where disturbed by other non-related EQRB Project activities such as construction of new buildings or other works. There is some potential that future maintenance in the project footprint could negatively affect earth-material present that may be associated with implementation of EQRB Project construction. With the No-Build Alternative, structural earthwork such as deep shafts and soil cementation would not occur. Therefore, during and post CSZ earthquake, geological and soil movement would inflict extensive damage on the bridge rendering it unusable.

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

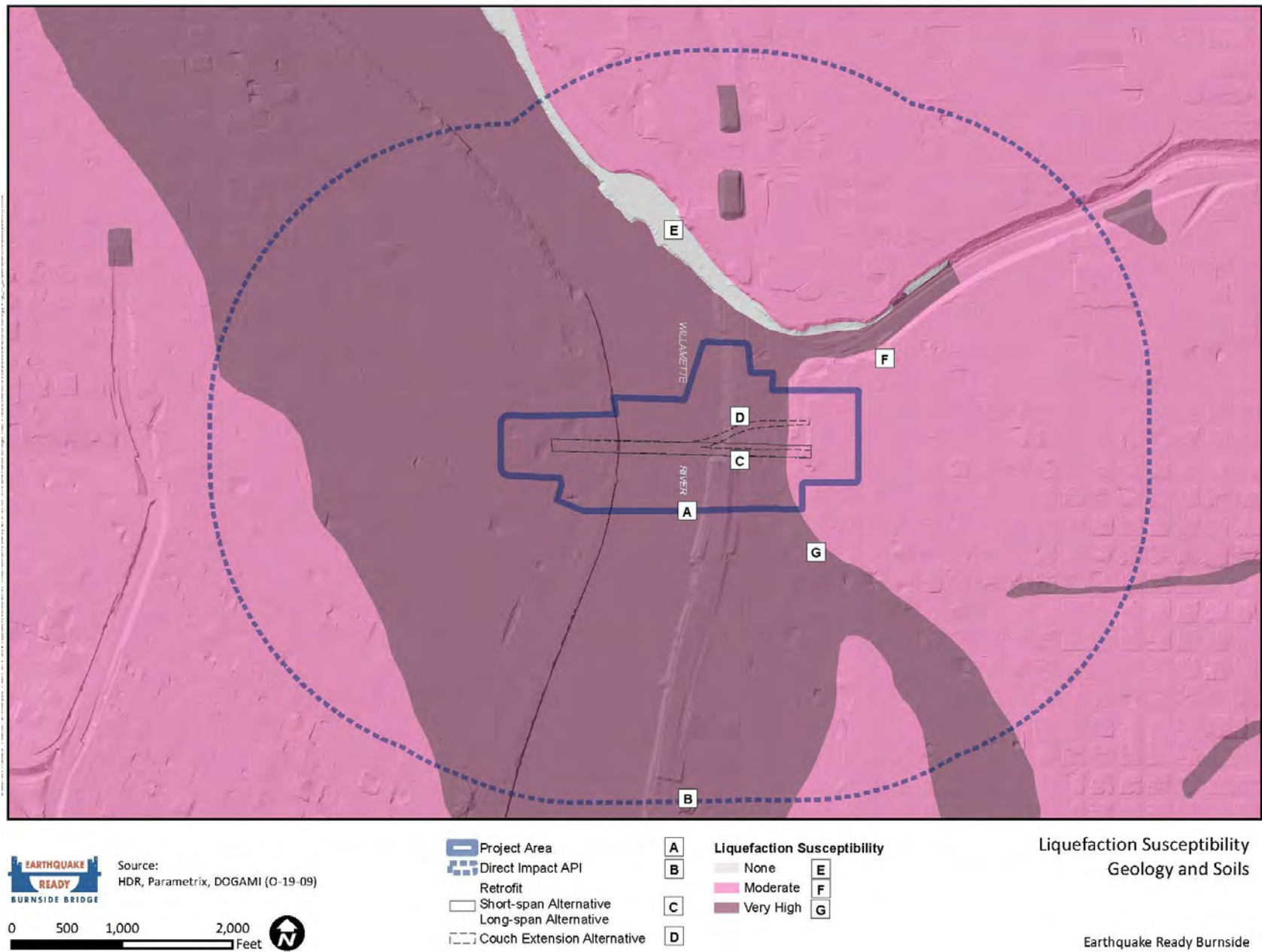
The Refined Long-span Alternative was evaluated in detail for this SDEIS because it is a lower-cost version of the Draft EIS Preferred Alternative that still provides many of the Preferred Alternative's advantages over the other build alternatives evaluated in the Draft EIS. For comparison purposes, 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 with the Refined Long-span Alternative. The refinements include the same cost-cutting measures that were applied to create the Refined Long-span Alternative.

The Refined (four-lane) Short-span and Couch Extension Alternatives would have more in-water piers and shafts than the Refined Long-span. In addition, the Refined Short-span and Couch Extension Alternatives would locate more bridge supports (four and eight, respectively) in the geologic hazard zone on the east bank (the Refined Long-span would have one support near the upslope edge of this zone). Supports in this geologic hazard zone pose much greater seismic risk because of the extensive liquefaction and lateral shift that will occur here, thus requiring deep and extensive soil grouting/cementation. The soils and geology impacts would be fewer with the Refined Long-span Alternative than with either the Refined Short-span or Refined Couch Extension Alternatives.

3.13.3 Mitigation

The mitigation would be the same as described in the Draft EIS for the Draft EIS Long-span Alternative.

Figure 3.13-2. Liquefaction Susceptibility in the API



3.14 Water Quality

3.14.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment.

3.14.2 Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as those described for the Draft EIS Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span.

Refined Long-Span Alternative Impacts

Direct Impacts

The potential refinements to the bicycle lanes, sidewalks, bridge piers, the west and east approaches, and Americans with Disabilities Act access would not change the impacts to water quality as described in the Draft EIS for the Long-span Alternative. However, the Draft EIS Long-span Alternative and the Refined Long-span Alternative would vary in the amount of impervious surface due to a narrower bridge structure for the Refined Long-span Alternative. While the impacts are similar in nature to those described in the Draft EIS for the Long-span Alternative, the difference in impervious surface area would have effects on the volume of stormwater generated, thereby creating a different magnitude of impact to water quality. See Figure 3.14-1 for stormwater drainage systems within the API.

Comparison to the Draft EIS Long-Span Alternative and the No-Build Alternative

The narrower bridge deck in the Refined Long-span Alternative would result in a reduction of total impervious area within the project API when compared to both the Draft EIS Long-span and No-Build Alternatives. See Table 3.14-1 for a comparison of impervious area.

Table 3.14-1. Comparison Net Increase/Decrease in Impervious Area

Alternative	Net Increase/Decrease in Impervious Area (acres)
No-Build	0.0
Draft EIS Long-Span	0.9
Refined Long-Span	-0.3

The reduction in impervious surface would impact the volume of runoff being discharged to the Willamette River and to the City of Portland's combined sewer overflow system. The Refined Long-span Alternative would decrease the total volume of that runoff in comparison with both the Draft EIS Long-span and No-Build Alternatives. Table 3.14-2 summarizes the areas being discharged to the different drainage systems located within the project API.

Table 3.14-2. Impervious Areas within the API Discharge Location by Alternative

Alternative	West Bank CSO (acres)	West Bank Storm (acres)	East Bank CSO (acres)	East Bank Storm (acres)	Bridge Deck to River (acres)
No-Build	7.1	0.0	6.4	3.7	1.6
Draft EIS Long-Span	6.6	1.6	6.4	5.0	0.0
Refined Long-Span	6.4	1.2	6.3	4.5	0.0

CSO = combined sewer overflow

The Refined Long-span would rebuild less of the existing impervious areas at either end of the bridge and therefore results in a smaller amount of total impervious area that requires treatment as part of the Project. Table 3.14-3 summarizes the amount of impervious area within the API that would be treated or not treated to the current water quality design standards for transportation projects within the project area.

Table 3.14-3. Acres of Impervious Area within the API Treated and Untreated by Alternative

Alternative	Treated (acres)	Untreated (acres)
No-Build	0.5 ^a	18.2
Draft EIS Long-Span	7.5 ^a	12.1 ^b
Refined Long-Span	6.0 ^a	12.4 ^b

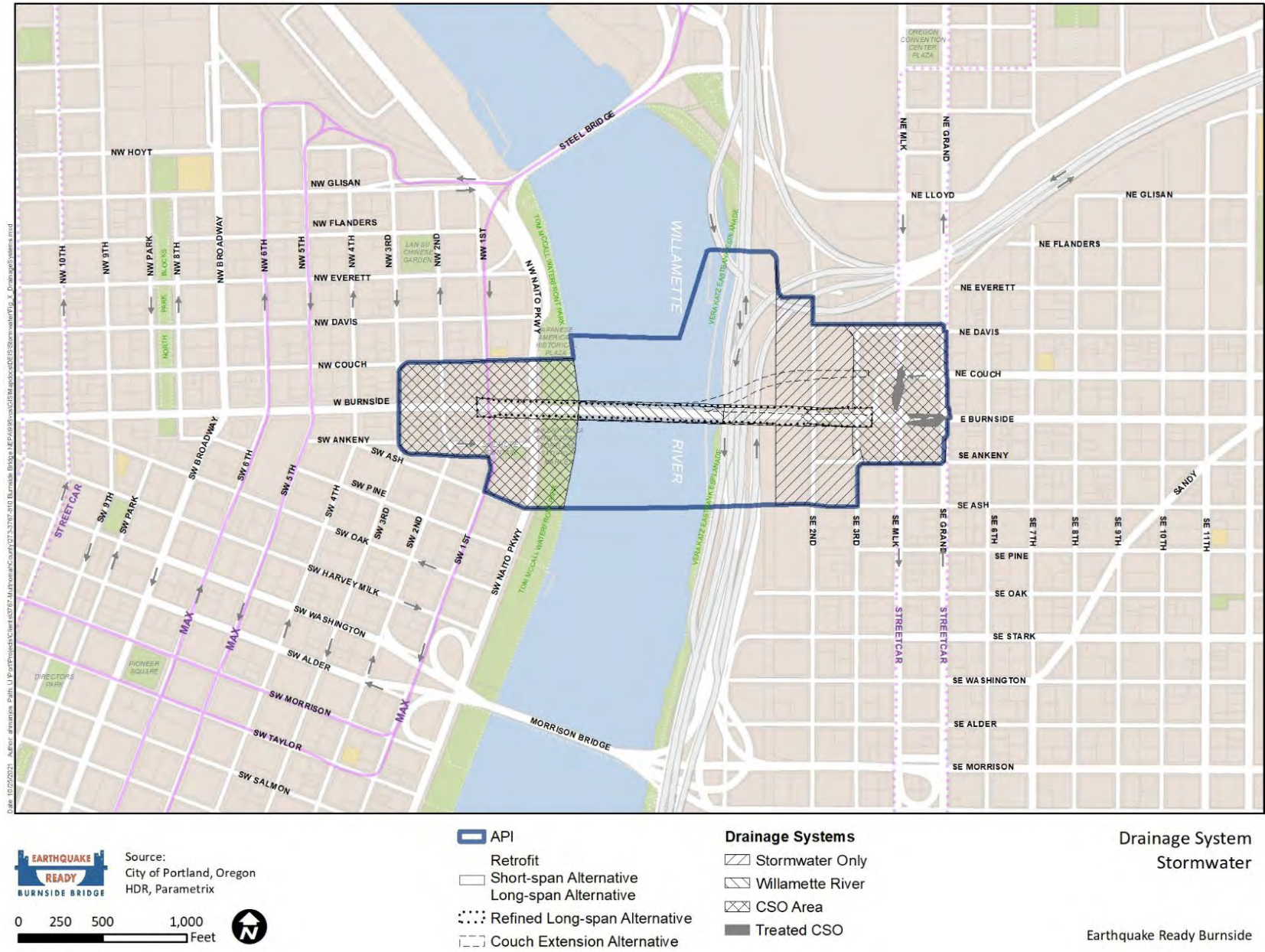
a Is currently or would be treated to current regulatory standards for transportation projects

b Impervious area within the API that is not considered CIA and therefore does not require water quality treatment

3.14.3 Mitigation

The type of mitigation would be the same as discussed for the Draft EIS Long-span Alternative. The only change would be the amount of mitigation that is required. The Refined Long-span Alternative would result in a decrease in total impervious area within the API compared with both the No-Build and the Draft EIS Long-span Alternatives. Less impervious area would result in less stormwater runoff volume that would require stormwater management.

Figure 3.14-1. Existing Stormwater Drainage System



3.15 Floodplain and River Hydraulics

3.15.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment for hydraulics.

3.15.2 Impacts

Some of the impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the original Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect impacts

This section describes the impacts of the Refined Long-span (four-lane) Alternative that would be different from the Draft EIS version of the Long-span Alternative and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-Span Alternative.

Long-Term Direct Impacts

The differences in hydraulic impacts for the Refined Long-span Alternative are due to a design that includes a narrower bridge with narrower in-water piers (perpendicular to and obstructing less flow) that are longer in the direction of the flow (spread footings that are parallel to flow) than the Draft EIS Long-span piers, thus reducing the Project's potential impacts on flooding but increasing the potential impacts on scour.

Table 3.15-1 shows the magnitude of floodway encroachment (based on the Willamette River floodway cross-sectional area calculated by the Federal Emergency Management Agency) for the different alternatives. Compared to the No-Build and Draft EIS Long-span Alternatives, the Refined Long-span Alternative would have the lowest potential impacts on flooding. The vertical lift option would have the lowest potential among the refined lift configurations.

Table 3.15-1. Estimated Floodway Encroachment

Alternative (movable span option)	Total Lateral Surface Area (sq ft) ^a	Change Compared to Existing (sq ft) ^b	Floodway Cross- Sectional Area (sq ft)	Percent of Floodway Occupied by Permanent Structures	Difference Compared to Existing ^c (percent)
No Change No-Build, existing	11,213	None	65,683	17	None
Lower Impact Refined Long-Span ^d (vertical lift)	7,426	-3,787	65,683	11	-6
Lower Impact Refined Long-Span ^d (basculer lift)	9,481	-1,732	65,683	14	-3
Lower Impact Draft EIS Long-Span ^e (vertical lift)	10,610	-602	65,683	16	-1
Higher Impact Draft EIS Long-Span ^d (basculer lift)	14,664	3,451	65,683	22	5

Source: Existing base flood elevation of 32 feet (FEMA 2010).

^a Total lateral surface area: In contact with the flow of the water at base flood elevation.

b Total change in lateral surface area: difference between proposed lateral surface area and existing lateral surface area. Negative values indicate a decrease.

c In the Draft EIS Technical Report and Draft EIS this was called “Increase Compared to Existing,” the title was updated to “Difference compared to existing” because the impacts now mainly represent a decrease in the percent of the floodway occupied. The difference was calculated by finding the total change in lateral surface area and applying it to the floodway cross sectional area, represented as a percent for comparative purposes.

d The Refined Long-span Alternatives were analyzed for both the tied-arch and cable stay configurations, and the full table for results are presented in Appendix A of the *EQRB Hydraulic Impact Analysis Supplemental Memorandum* (Multnomah County 2022e). Both configurations would have the same impacts with respect to floodway encroachment.

e The Draft EIS Long-span Alternatives were analyzed using the tied-arch configuration. Cable-stayed configurations would have similar impacts.

sq ft = square feet

Table 3.15-2 shows the estimated change in potential scour length, which was calculated based on percent change in footing length compared to the existing condition. These values will be refined through hydraulic modeling and design modifications prior to publication of the Final EIS (note that the analysis done for the SDEIS reflected complete removal of Pier 1 and Pier 4. Detailed modeling for the Final EIS will be updated to reflect a potential partial removal of Pier 1 and complete removal of Pier 4). These estimates show that while the Draft EIS Long-span and Refined Long-span Alternatives would eliminate existing bridge Piers 1 and 4, and therefore eliminate scour associated with those piers, they have the potential for increased scour at the two remaining in-river piers (2 and 3). The Refined Alternative has greater potential for scour around these piers compared to the Draft EIS Long-span Alternative due to the proposed design that includes a spread footing configuration.

Table 3.15-2. Estimated Percent Change in Scour Length

Alternative (movable span option)	Pier 1 ^a	Pier 2	Pier 3	Pier 4
No Change No-Build, existing	None	None	None	None
Lower Increase Draft EIS Long-Span ^b (vertical lift)	-100	15	15	-100
Lower Increase Draft EIS Long-Span ^b (basculer lift)	-100	43	43	-100
Medium Increase Refined Long-Span ^c (basculer lift)	-100	107	107	-100
Medium Increase Refined Long-Span ^c (vertical lift)	-100	107	107	-100

Source: Lengths sourced from respective design plan sets (Multnomah County) and measured in Bluebeam.

NOTE: Percent change calculated based on percent increase in footing length compared to existing condition. Magnitude categories (lower, medium, etc.) are based on the original ranges used in the Draft EIS.

a The scour analysis is based on footprint size change to each pier. It is assumed for all of the Replacement Alternatives considered in the SDEIS that Pier 1 would be removed to below the mudline.

b The Draft EIS Long-span Alternatives were analyzed using the tied-arch configuration. The cable-stayed configurations would be anticipated to have similar in-channel impacts.

c The Refined Long-span Alternatives were analyzed for both the tied-arch and cable stay configurations, and the full table for results are presented in Appendix A of the *EQRB Hydraulic Impact Analysis Supplemental Memorandum* (Multnomah County 2022e). Both configurations would have the same impacts with respect to floodway encroachment.

The range of conceptual floodplain impacts outside of the floodway is presented in Table 3.15-3. All the Draft EIS Long-span and the Refined Long-span options would reduce floodplain encroachment

outside of the floodway compared to existing conditions. The Draft EIS Long-span and Refined Long-span Alternatives would be expected to have a similar magnitude of effects on floodplain encroachment.

Table 3.15-3. API Floodplain Encroachment (Outside of the Floodway)

Alternative	West Approach (ft)	East Approach (ft)	Design Total (ft)
No Change No-Build, existing	180	61	241
Lower Impact Draft EIS Long-Span (tied-arch)	106	12	118
Lower Impact Refined Long-Span (tied-arch)	120	12	132
Lower Impact Draft EIS Long-Span (cable-stayed)	111	47	158
Lower Impact Refined Long-Span (cable-stayed)	106	40	146

ft = feet

In addition to the bridge piers, the proposed Americans with Disabilities Act (ADA)-pedestrian access between the bridge and the Vera Katz Eastbank Esplanade has the potential to increase base flood¹ elevations, increase scour in an area with previously identified riverbed scouring, and mobilize contaminated sediments. The refined ADA access option, which includes stairs and elevator configuration, would place more fill in the floodplain compared to the No-Build Alternative but less than the ramp and stairs options would. There would be more shafts placed below the ordinary high water² level and within the regulatory floodway with the ramp and stairs options evaluated in the Draft EIS than for the refined elevators/stairs option. A full qualitative hydraulic analysis of impacts associated with the refined ADA access options is available in the *EQRB Revised Active Transportation Access Options* (Multnomah County 2022h).

Temporary Impacts

The in-water work for the Refined Long-span Alternative would be similar to that described for the Draft EIS Long-span Alternative, except that the replacement bridge in-water foundations would be raised, thereby eliminating the need for cofferdams and instead allowing for the use of a temporary caisson lowered to an elevation about mid-height of the water column, which would be expected to create less disturbance to riverbed sediments. Additionally, the existing piers would be fully removed, and the existing in-water piles would be removed, subject to the design option advanced. In-water work to remove and replace the piers for the Refined Long-span Alternative would include the use of a perched caisson and a seal course, pile driving, and the construction or placement of the support shafts. These activities would temporarily increase the potential for contraction scour

¹ The base flood, or 100-year flood, has a 1 percent chance of being equaled or exceeded in any given year. The base flood elevation and 100-year floodplain are typically the primary regulated Federal Emergency Management Agency (FEMA) flood parameters

² The ordinary high water mark is a biological vegetation mark, defined by regulations, that scientists use to identify the most common high water elevation that occurs in a channel.

and mobilization of contaminated sediments in the channel, and the impacts resulting from the perched caisson placement would be anticipated to be fewer with the potential design refinements compared to the cofferdam-related impacts discussed in the Draft EIS.

During bridge construction, the maximum fill in the river would be the sum of the permanent bridge piers (including any temporary caissons or cofferdams), any Vera Katz Eastbank Esplanade ADA access support structures, and the temporary work bridge pilings. The refined ADA access option would have similar construction activities to those discussed in the Draft EIS; however, the location of construction activities associated with the refined ADA access option would be closer than other options to an area of the channel where previous scour effects have been observed. An increase in construction activity at this location could exacerbate scour and mobilize contaminated sediments that may be present in the vicinity. The overall construction footprint would be smaller from what was included in the Draft EIS, as the elevators place fewer obstructions in the channel than the ramps connecting to the Eastbank Esplanade that were included in the Draft EIS.

The temporary work bridges would likely have the same amount of floodway encroachment (6 percent of the floodway) for all alternatives, so the difference in total maximum temporary floodway encroachment is determined by the permanent bridge piers, which are larger for the Draft EIS Long-span (occupying 16 to 22 percent of the floodway) than for the Refined Long-span (occupying 11 to 14 percent of the floodway), as shown in Table 3.15-4.

Table 3.15-4. Estimated Temporary Floodway Encroachment

Alternative	Floodway Cross-Sectional Area (sq ft)	Permanent Bridge Total Lateral Surface Area (sq ft) ^a	Permanent Bridge Percent of Floodway Occupied	Work Bridge Total Lateral Surface Area (sq ft) ^a	Work Bridge Percent of Floodway Occupied	Total Percent of Floodway Occupied ^b
No Change No-Build (existing)	65,683	11,213	17	None	None	17
Lowest Impact Refined Long-Span ^d (vertical lift)	65,683	7,426	11	3,920	6	17
Lowest Impact Refined Long-Span ^d (basculer lift)	65,683	9,480	14	3,640	6	20
Lowest Impact Draft EIS Long-Span ^c (vertical lift)	65,683	10,610	16	3,640	6	22
Highest Impact Draft EIS Long-Span ^c (basculer lift)	65,683	14,664	22	3,640	6	28

Source: Existing Base Flood Elevation of 32 feet (FEMA 2010).

a Total Lateral Surface Area: In contact with the flow of the water at base flood elevation

b Total Percent of Floodway Occupied: sum of proposed permanent and temporary lateral surface area floodway encroachments of floodway cross-sectional area.

c The DEIS Long-span Alternatives were analyzed using the tied-arch configuration. Cable-stayed support configurations would have similar impacts.

d The Refined Long-span Alternatives were analyzed for both the tied-arch and cable stay configurations, and the full table for results are presented in Appendix A. Both configurations would have the same impacts with respect to floodway encroachment.

sq ft = square feet

Comparison with the Refined Short-Span and 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.

Chapter 2 provides a summary of this comparison, and Chapter 3 provides more detail for those environmental elements where there would be a meaningful difference in impacts between the Refined Long-span and the Refined Short-span or Couch Extension Alternatives. For hydraulics, permanent impacts would be slightly larger and temporary impacts would be substantially larger for the Refined Short-span and Couch Extension Alternatives than for the Refined Long-span Alternative.

The permanent volume of fill would be very similar for all of the refined (four-lane) alternatives (0.4 to 0.8 acre for each). The permanent lateral surface area of the piers in the floodway would be about 10 percent larger for the Short-span and the Couch Extension Alternatives than for the Refined Long-span. The Refined Short-span and Couch Extension Alternatives would place an additional pier in the river near the eastern shore. During construction, in-river cofferdams required to build the in-river piers for the Short-span and Couch Extension Alternatives would have a combined footprint of 0.5 to 0.7 acre, or about three to six times larger than that required to build the in-river piers of the Refined Long-span Alternative (0.1 to 0.2 acre). Because higher volumes of fill and larger lateral surface area in the floodway increase flood levels, the Refined Long-span would be expected to have lower impacts than the other refined alternatives.

3.15.3 Mitigation

The Refined Long-span Alternative would have the same mitigation options as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.16 Vegetation, Wildlife and Aquatic Resources

3.16.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment.

3.16.2 Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described for the Draft EIS Long-span Alternative, including the following:

- Post-earthquake impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-Span.

Refined Long-Span Alternative Impacts

Direct Impacts

Several of the potential refinements in the Refined Long-span Alternative, including a revised cross section and lane configuration options, bicycle lanes, and the west approach, would not change the impacts to vegetation, wildlife and aquatic species as described in the Draft EIS for the Long-span Alternative.

However, the Draft EIS Long-span Alternative and the Refined Long-span Alternative would vary regarding temporary impacts to vegetation, wildlife and aquatic species for construction activities including the east approach with a tied-arch, addition of sidewalk and roadway improvements west of NW/SW 1st Avenue, revised Americans with Disabilities Act (ADA) access (elevators and stairs) at the Vera Katz Eastbank Esplanade, the temporary storage of the Eastbank Esplanade floating dock, and the use of caissons¹ versus cofferdams for in-water work. See Figure 3.16-1 for Draft EIS Long-span temporary construction impacts and Figure 3.16-2 and Figure 3.16-3 for Refined Long-span temporary construction impacts.

The Draft EIS and Refined Long-span Alternatives would also vary in regard to the amount of permanent impacts to aquatic habitat for in-water pier numbers and foundation sizes related to a narrower bridge width and revised ADA access at the Eastbank Esplanade (elevators and stairs). See Figure 3.16-4 for Draft EIS Long-span and Figure 3.16-5 and Figure 3.16-6 for Refined Long-span permanent impacts.

While the temporary and permanent impacts are similar in nature to those described in the Draft EIS for the Long-span Alternative, they would have varying magnitudes of impact on vegetation, wildlife, and aquatic resources. See Table 3.16-1 to Table 3.16-3 for a comparison of these impacts, including movable span options.

¹ Caissons would be lowered to an elevation about mid-height of the water column to construct footing caps, thereby avoiding additional disturbance of the riverbed needed for a cofferdam.

Indirect Impacts

Vegetation

No indirect impacts to vegetation are anticipated.

Wildlife

No indirect impacts to wildlife are anticipated.

Aquatic Species

As with the direct impacts, the type of indirect impacts is the same as was evaluated in the Draft EIS, but the magnitude differs with the Refined Long-span Alternative. An anticipated indirect impact would be less stormwater discharge and related impacts to flow in the river due to a reduction in impervious surfaces from a narrower bridge in the Refined Long-span Alternative compared to the Draft EIS Long-span Alternative. However, these impacts to flow from decreased runoff would be negligible due to the large size of the river and the requirement for treatment of runoff.

Figure 3.16-1. Draft EIS Long-Span Temporary Construction Impacts

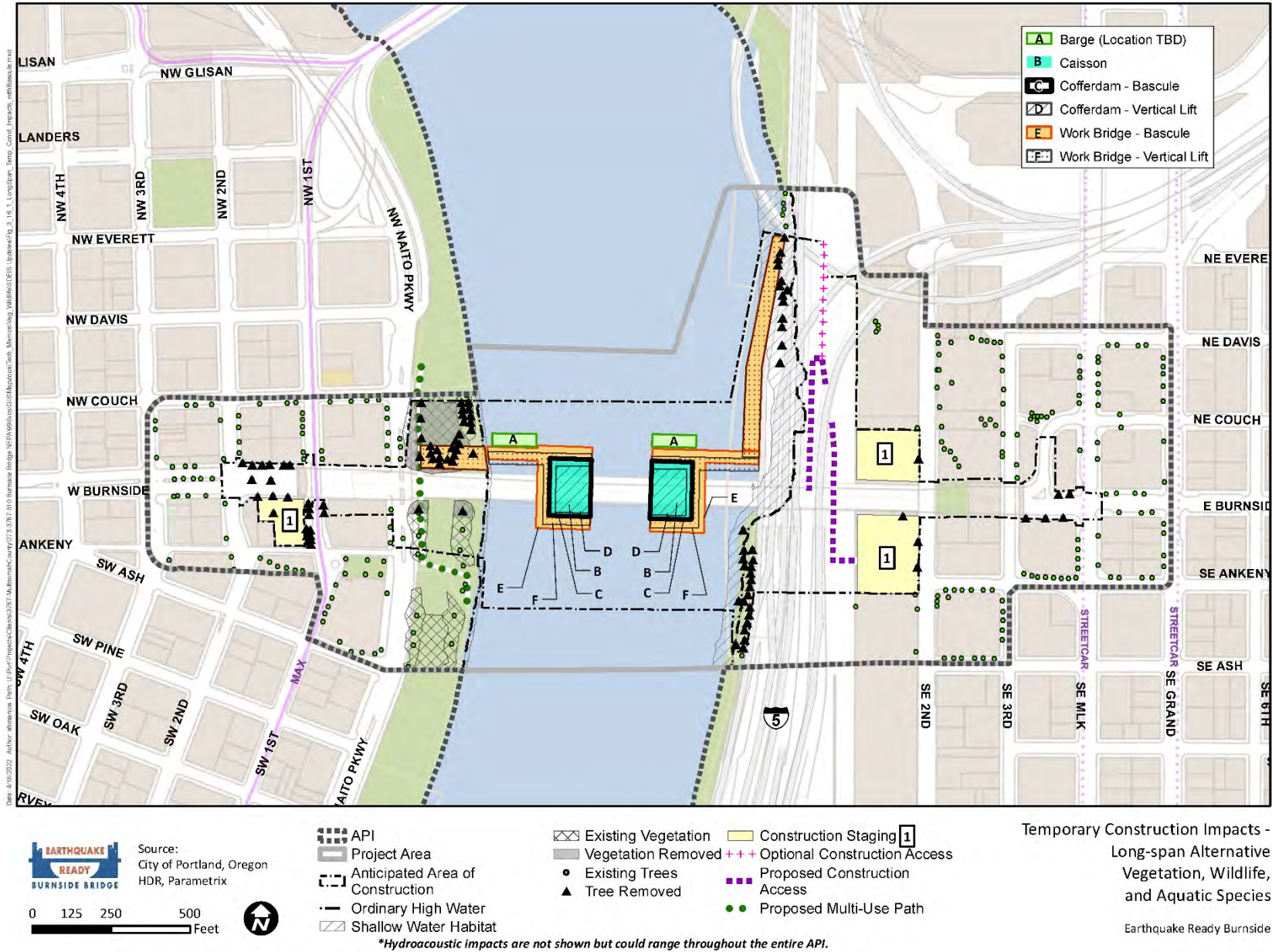


Figure 3.16-2. Refined Long-Span Temporary Construction Impacts (with Bascule Lift)

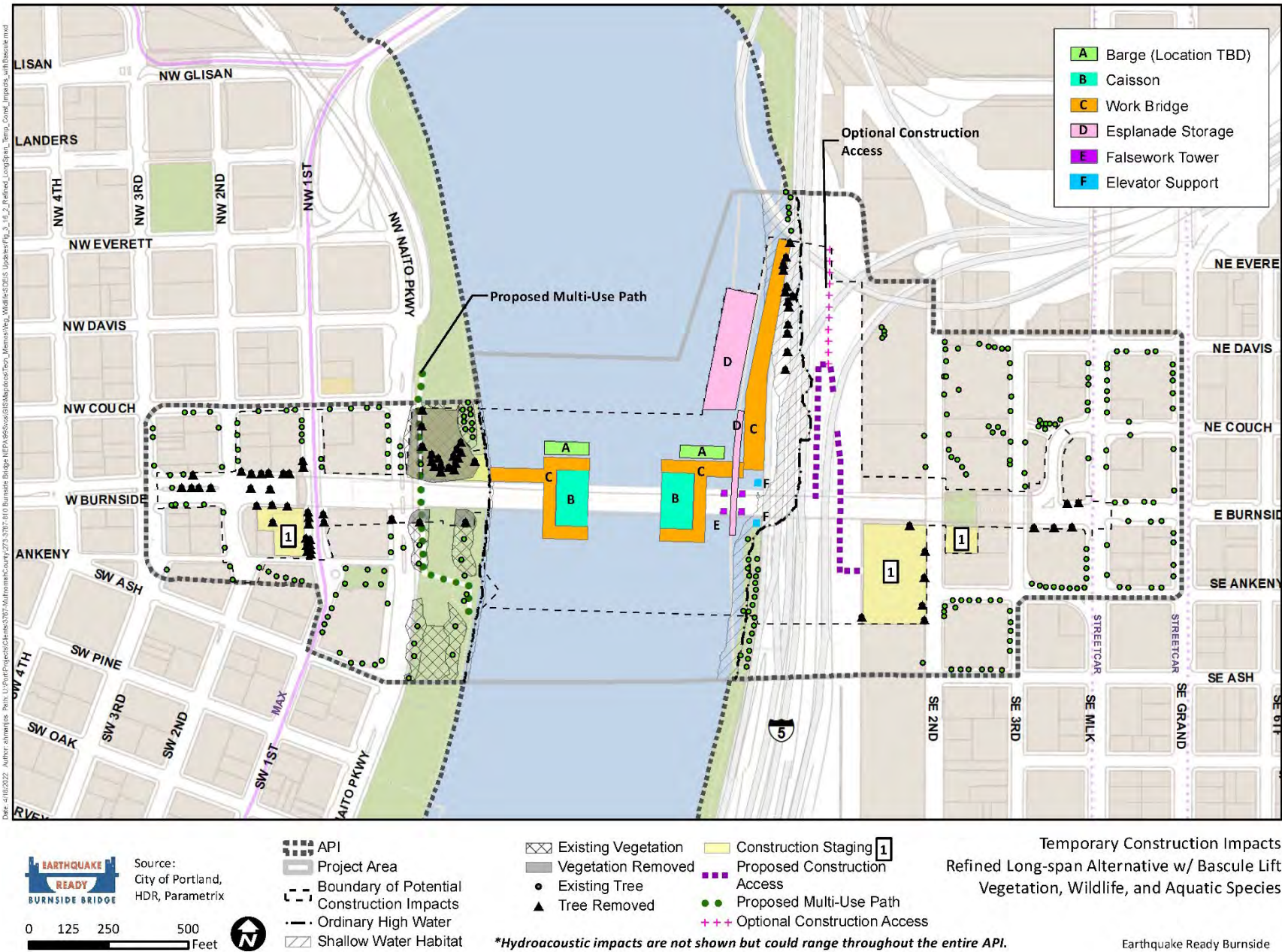


Figure 3.16-3. Refined Long-Span Temporary Construction Impacts (with Vertical Lift)

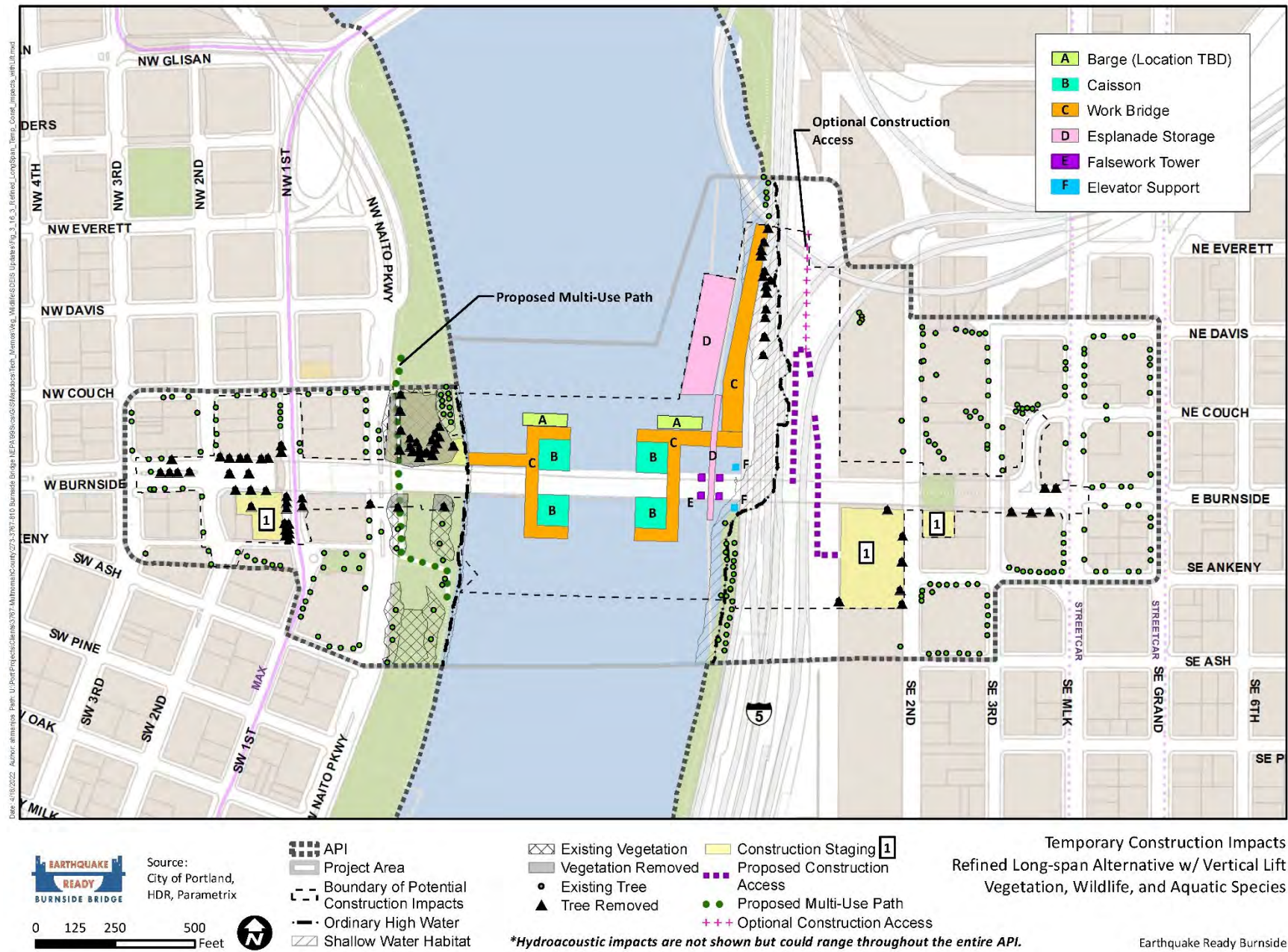




Figure 3.16-5. Refined Long-Span with Bascule Lift Permanent Structure

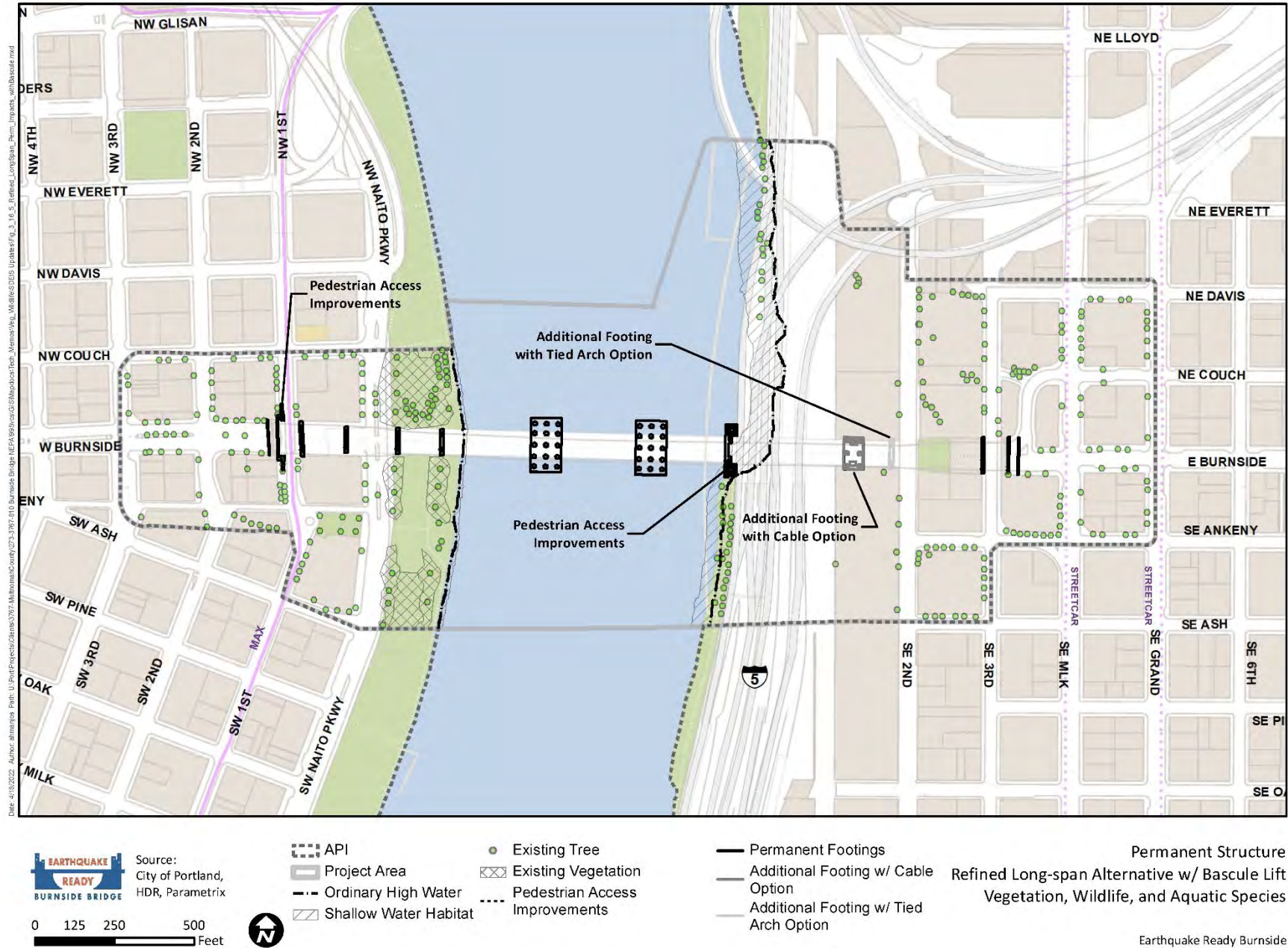
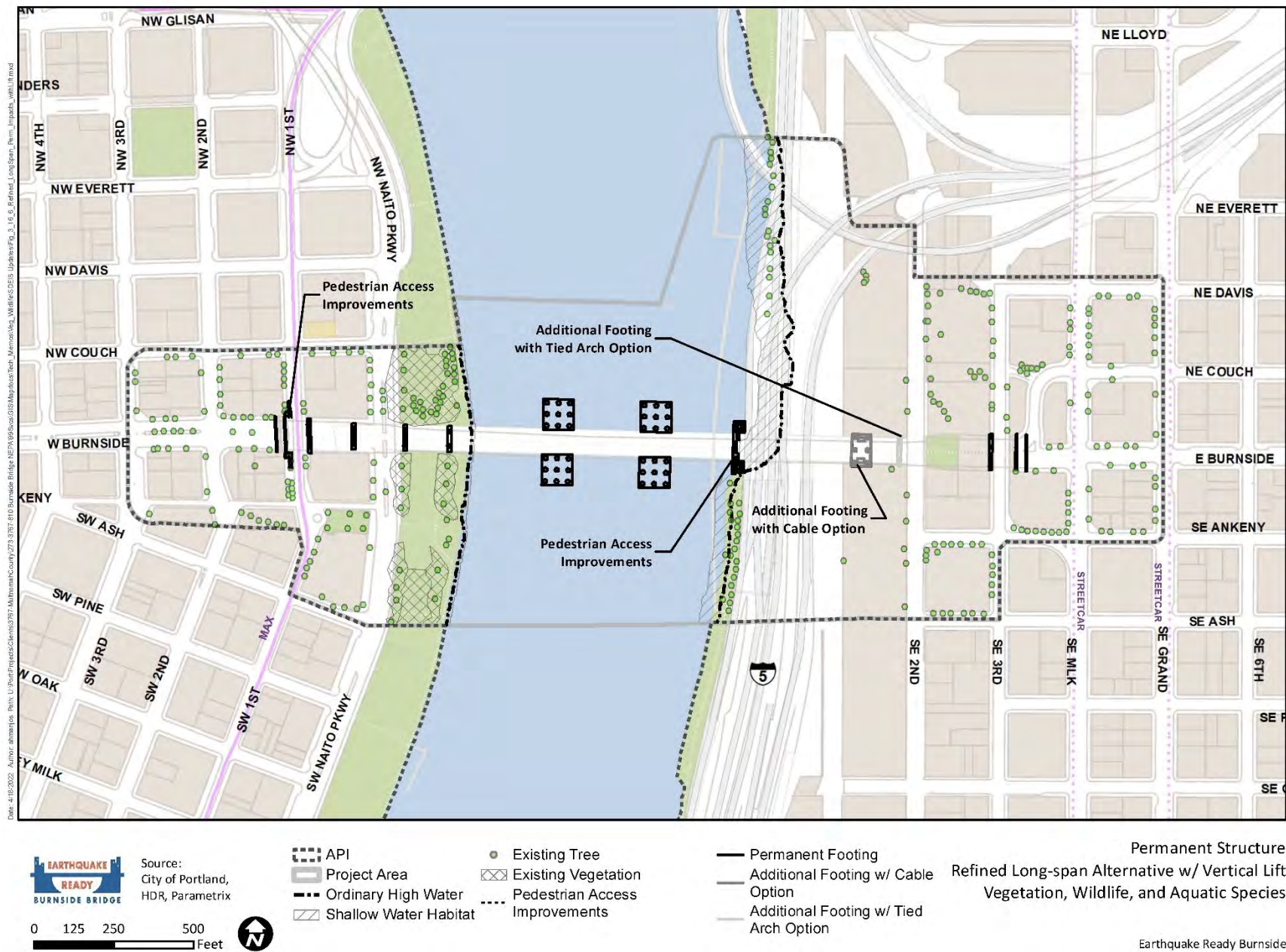


Figure 3.16-6. Refined Long-Span with Vertical Lift Permanent Structure



Comparison with the Draft EIS Long-Span Alternative and the No-Build Alternative

Temporary Construction Impacts

Construction of the Refined Long-span Alternative would directly impact vegetation, wildlife, and aquatic species in the same way as the Draft EIS Long-span Alternative. The estimated construction period is the same as for the Draft EIS Long-span Alternative, at 4.5 years, but the anticipated area of temporary construction impacts is different due to additional sidewalk and roadway improvements, different construction staging areas, and the change from a pedestrian ramp to stairs and elevators. The anticipated area of construction impacts for the Refined Long-span is larger than for the Draft EIS Long-span Alternative (see Table 3.16-2).

VEGETATION

Sidewalk improvements with the Refined Long-span Alternative would increase the construction area on the west side. There is little vegetation in this area, although seven trees would need to be removed with the Refined Long-span that would remain with the Draft EIS Long-span Alternative. On the other hand, the narrower bridge would decrease the construction area in Waterfront Park on the south side of the bridge, resulting in less vegetation removal. In addition, refined construction assumptions with the Refined Long-span would avoid removing 10 Japanese flowering cherry trees that would have been removed by the Draft EIS Long-span Alternative. On the east side, the anticipated area of construction would be reduced south of the bridge compared to what would occur with the pedestrian ramp evaluated for the Draft EIS Long-span. The total amount of vegetation that would be removed with the Refined Long-span Alternative is less than with the Draft EIS Long-span Alternative (see Table 3.16-2).

WILDLIFE

The Refined Long-span Alternative would have similar impacts to wildlife as the Draft EIS Long-span Alternative. However, the Refined Long-span Alternative would have less vegetation removal and a smaller amount of habitat and food source loss.

AQUATIC SPECIES

The use of caissons during construction is one of the potential design refinements. Whereas the Draft EIS evaluated impacts from cofferdams for in-water work on the piers, caissons would be used with the Refined Long-span. Caissons would reduce impacts to aquatic species and their habitat as compared to cofferdams. Cofferdams and caissons are similar in that they are temporary structures installed in the river to create a dewatered area for construction. Cofferdams extend into the river bottom, whereas the bottom of the caissons would be perched above the river bottom. The caisson that would be located in the water column would temporarily reduce available habitat for fish and other aquatic species, but on a smaller scale than a cofferdam. Both of the Refined Long-span Alternatives would have fewer impacts from caissons than from the cofferdams included for the Draft EIS Long-span. The Refined Long-span Alternative with the bascule lift would occupy less area than the Refined Long-span with the vertical lift (see Table 3.16-1).

Table 3.16-1. Approximate Temporary Construction Activities Causing Impacts to Vegetation, Wildlife, and Aquatic Species

Build Alternative (movable span option)	Number of Piles below OHWM	Area of Piles below OHWM (sq ft)	Number of Piles in SWH	Area of Piles in SWH (sq ft)	Caisson/ Cofferdam Area (acres)	Loss of Vegetation/ Wildlife Habitat (acres)	Tree Removal (number of trees)	Duration of Construction (years)	Duration of Pile Driving (days)
Draft EIS Long-Span (bascule lift)	730	2,300	103	330	1.5	1.3	87	4.5	135–145
Draft EIS Long-Span (vertical lift)	650	2,050	103	330	1.5	1.3	87	4.5	135–145
Refined Long-Span (bascule lift)	566	1,790	51	170	0.05	1.0	77	4.5	135–145
Refined Long-Span (vertical lift)	677	1,860	51	170	0.07	1.0	77	4.5	135–145

OHWM = ordinary high water mark; SWH = shallow water habitat; sq ft = square feet

As with the Draft EIS Long-span, the Refined Long-span would require the installation and removal of piles to support the work bridges within the Willamette River. The Refined Long-span with a vertical lift has a different layout of work bridges, but the same number of piles as were estimated for the Draft EIS Long-span Alternative.²

The Draft EIS summarizes impacts from a pedestrian connection from the Vera Katz Eastbank Esplanade, which was assumed to be an ADA-accessible ramp that would be located south of the bridge. The refined design now proposes elevators and stairs at that location instead. Similar to the ramps for the Draft EIS Long-span, this would result in temporary construction impacts to the Willamette River. With the elevators and stairs combination, the Refined Long-span construction would result in an overall smaller area of temporary impact and fewer piles in shallow water habitat (SWH) than the Draft EIS Long-span Alternative with the ADA-accessible ramp (see Table 3.16-1 for a comparison of temporary impacts to SWH). The Refined Long-span Alternative would also include periodic removal and on-site storage of a section of the Eastbank Esplanade floating dock over a period of 18 months. The floating dock would be moored with temporary steel pile; the installation of this temporary steel pile would result in a temporary in-water impact including SWH. Table 3.16-2 below shows updated impacts that take into consideration the additional elements associated with temporary piles for the Refined Long-span Alternative, the Draft EIS Long-span Alternative, and the No-Build Alternative.

Table 3.16-2. Estimated Temporary Construction Physical Impacts and Duration for All Alternatives

Alternative	Temporary Construction Area (acres)	Loss of Vegetation/ Wildlife Habitat (acres)	Loss of Trees (quantity)	Number of Piles below OHWM	Pile Driving Duration (total days)	Years of Construction
No-Build	0	0	0	0	0	0
Draft EIS Long-Span	30.7	1.3	87*	650–730	135–145	4.5
Refined Long-Span	32.7	1.0	77	566–677	135–145	4.5

*Tree inventory has been updated since the Draft EIS was published, which results in an additional 6 trees within Tom McCall Waterfront Park that would be removed under both the Draft EIS Long-span and the Refined Long-span. OHWM = ordinary high water mark

Permanent Impacts

Permanent impacts from the Refined Long-span are the same type as for the Draft EIS Long-span Alternative, which is a loss of habitat from the placement of structure below the ordinary high water mark (OHWM). Permanent structure includes pier footings, pier substructure, drilled shafts, navigation bollards, a debris fender, and columns from the pedestrian access improvements, see Table 3.16-3. Additional permanent structure would be installed above the OHWM, including bridge footings and footings for the east approach (tied-arch or cable-stayed option; see Figure 3.16-5 and Figure 3.16-6). Some of the permanent elements are only applicable with certain options (e.g., debris fender only with the vertical lift option). In the Draft EIS Long-span, the vertical lift option had

² The Draft EIS was written at an earlier stage of design in which fewer piles were estimated. The piling needed to support the oscillator and drilled shafts, the work bridge needed within the footprint of the footing cap, and the work bridge needed for the Eastbank Esplanade pedestrian improvements were not considered. Therefore, the number of piles below OHWM is greater than what was included in the Draft EIS, but not because of the Refined Long-span Alternative design.

a smaller permanent footprint than the bascule lift option. With the Refined Long-span Alternative, the vertical lift option has a different design, which increases the overall footprint and is now larger in area than the bascule lift option. Although larger in area, the vertical lift option is smaller than the bascule lift option in volume due to the existing timber piling that would be left in place.

Approximately 50 percent of the existing timber piling would be removed with the bascule lift option, while none of the existing timber piling would be removed with the vertical lift option.

Table 3.16-3. Draft EIS Long-Span Alternative and Refined Long-Span Alternative Approximate In-Water Permanent Direct Impacts

Build Alternative (movable span option)	Area of Structure below OHWM ^a (acres)	Number of Shafts below OHWM	Number of Shafts in SWH	Area of Structure in SWH (sq ft)	GI Zone Area below OHWM (sq ft)	GI Zone Area within SWH (sq ft)	Loss of Macro- invertebrate Habitat (sq ft)
Draft EIS Long-Span (bascule lift)	0.8	53	6	211	0	0	0
Draft EIS Long-Span (vertical lift)	0.5	45	6	211	0	0	0
Refined Long-Span (bascule lift)	0.4	28	1	113	0	0	0
Refined Long-Span (vertical lift)	0.6	22	1	113	0	0	0

^a Area of structure below OHWM includes the pier footing, pier substructure, shafts, navigation bollards, debris fender (Vertical Lift only), and pedestrian connection columns.

GI = ground improvements; OHWM = ordinary high water mark; sq ft = square feet; SWH = shallow water habitat

Similar to the Draft EIS Long-span, the Refined Long-span would have permanent structure placed within SWH, which would further reduce available habitat used by Endangered Species Act-listed salmonids. The amount of SWH loss is less with the Refined Long-span than with the Draft EIS Long-span Alternative options. Like the Draft EIS Long-span Alternative, the Refined Long-span Alternative would require ground improvements but not below the OHWM or within SWH. Therefore, no impacts to macroinvertebrate habitat are anticipated from ground improvements. For a comparison of permanent impacts to aquatic species, see Table 3.16-3.

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 – 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.

For vegetation, wildlife, and aquatic resources, permanent in-water and upland habitat impacts would be larger, and temporary impacts would be substantially larger for the Refined Short-span and Couch Extension Alternatives compared with the Refined Long-span Alternative. The Refined Couch Extension Alternative would have the highest adverse impacts of the three refined alternatives.

In-water piers for the Refined Long-span, Couch Extension, and Short-span Alternatives would permanently displace a similar area of aquatic habitat. However, the refined Couch Extension Alternative would displace about 10 percent more shallow water habitat than the other two refined alternatives. The Refined Couch Extension would also displace about 10 percent more trees. Both

the Refined Short-span and Couch Extension Alternatives would require extensive soil grouting/cementation below the ordinary high water mark, as well as within shallow water habitat, to stabilize piers in those areas, whereas the Refined Long-span would require no piers or soil grouting in either of these habitats. The Refined Short-span and Couch Extension Alternatives would also have three to six times more temporary fill below ordinary high water compared to the Refined Long-span Alternative, thus impacting a larger area of aquatic habitat.

3.16.3 Mitigation

Mitigation activities would be the same as described for the Draft EIS Long-span Alternative.

3.17 Wetlands and Waters

3.17.1 Affected Environment

There are no changes/revisions to the EQRB Draft EIS description of the affected environment.

3.17.2 Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described for the Draft EIS Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect Impacts
- Impacts from potential off-site staging areas

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span.

Refined Long-Span Alternative Impacts

Direct Impacts

Several of the potential refinements in the Refined Long-span Alternative including a revised cross section and lane configuration options, bicycle lanes and sidewalks, and the west approach would not change the impacts to wetlands and waters as described in the Draft EIS for the Long-span Alternative.

However, the Draft EIS Long-span Alternative and the Refined Long-span Alternative would vary in regard to amount of permanent impacts for in-water pier numbers and foundation sizes related to a narrower bridge width and revised Americans with Disabilities Act access at the Vera Katz Eastbank Esplanade (elevators and stairs). The Draft EIS and Refined Long-span Alternatives would also vary regarding temporary impacts for construction activities including falsework if a tied-arch is selected for the east approach. While the impacts are similar in nature to those described in the Draft EIS for the Long-span Alternative, they would have varying magnitudes of impact on wetlands and waters. See Table 3.17-1 for a comparison of these impacts, including movable span options.

Comparison with the Draft EIS Long-Span Alternative and the No-Build Alternative

For both the Draft EIS and Refined Long-span Alternatives, temporary in-water impacts would occur during construction (see Table 3.17-1). As with the Draft EIS Long-span, the Refined Long-span would require the installation and removal of piles to support the work bridges within the Willamette River. The Refined Long-span with a vertical lift has a different layout of work bridges, but the same number of piles as approximated for the Draft EIS Long-span Alternative is anticipated.¹

¹ The Draft EIS was written at an earlier stage of design in which fewer piles were estimated. The piling needed to support the oscillator and drilled shafts, the work bridge needed within the footprint of the footing cap, and the work bridge needed for the Eastbank Esplanade pedestrian improvements were not considered. Therefore, the number of piles below OHWM is greater than what was included in the Draft EIS, but not because of the Refined Long-span Alternative design.

The Draft EIS summarizes impacts from a pedestrian connection from the Eastbank Esplanade, which was assumed to be an Americans with Disabilities Act–accessible ramp that would be located south of the bridge. The refined design includes elevators and stairs at that location instead. Similar to the ramps for the Draft EIS Long-span, the Refined Long-span would result in temporary construction impacts to the Willamette River. The Refined Long-span Alternative would also include periodic removal and on-site storage of a section of the Eastbank Esplanade floating dock over a period of 18 months. The floating dock would be moored with temporary steel pile; the installation of these temporary steel piles would result in a temporary in-water impact.

Similar to the ramps in the Draft EIS Long-span Alternative, the Refined Long-span would require temporary removal of riprap along the east bank so that the piles can be installed for the stairs and elevators. Once construction is complete, the same amount of riprap that would be removed would be replaced for a net zero change. This is a decrease from what was included in the Draft EIS, as the elevators have a much smaller footprint than the ramps connecting to the Eastbank Esplanade that were included in the Draft EIS.

Whereas a cofferdam is included for removal and replacement of the in-water piers in the Draft EIS (See Figure 3.17-1), a different approach is now under consideration for the Refined Long-span to use a caisson instead of a cofferdam. A caisson would be located within the water column but would not disturb the riverbed other than the shafts it is supported on. This would reduce the temporary impacts to waters as compared to the Draft EIS Long-span Alternative. See Figure 3.17-2 for temporary in-water impacts with a bascule lift, Figure 3.17-3 for temporary in-water impacts with a vertical lift, and Table 3.17-1 for structure quantities below the ordinary high water mark (OHWM).

If a tied-arch is selected for the east approach, additional temporary impacts to the river would occur from the installation of temporary falsework towers that would be used to erect the arches (Figure 3.17-2 and Figure 3.17-3). It would consist of pile that would be driven into the riverbed, and then a steel tower would be erected on top. Once the arch is constructed, the towers and piles would be removed.

As shown in Table 3.17-1, the Refined Long-span Alternative options would have fewer temporary in-water construction impacts than the Draft EIS Long-span Alternative options. The Refined Long-span with a bascule would have the smallest area of impact and the fewest overall number of temporary piles needed.

Table 3.17-1. Comparison of Permanent and Temporary Structures below the Ordinary High Water Mark

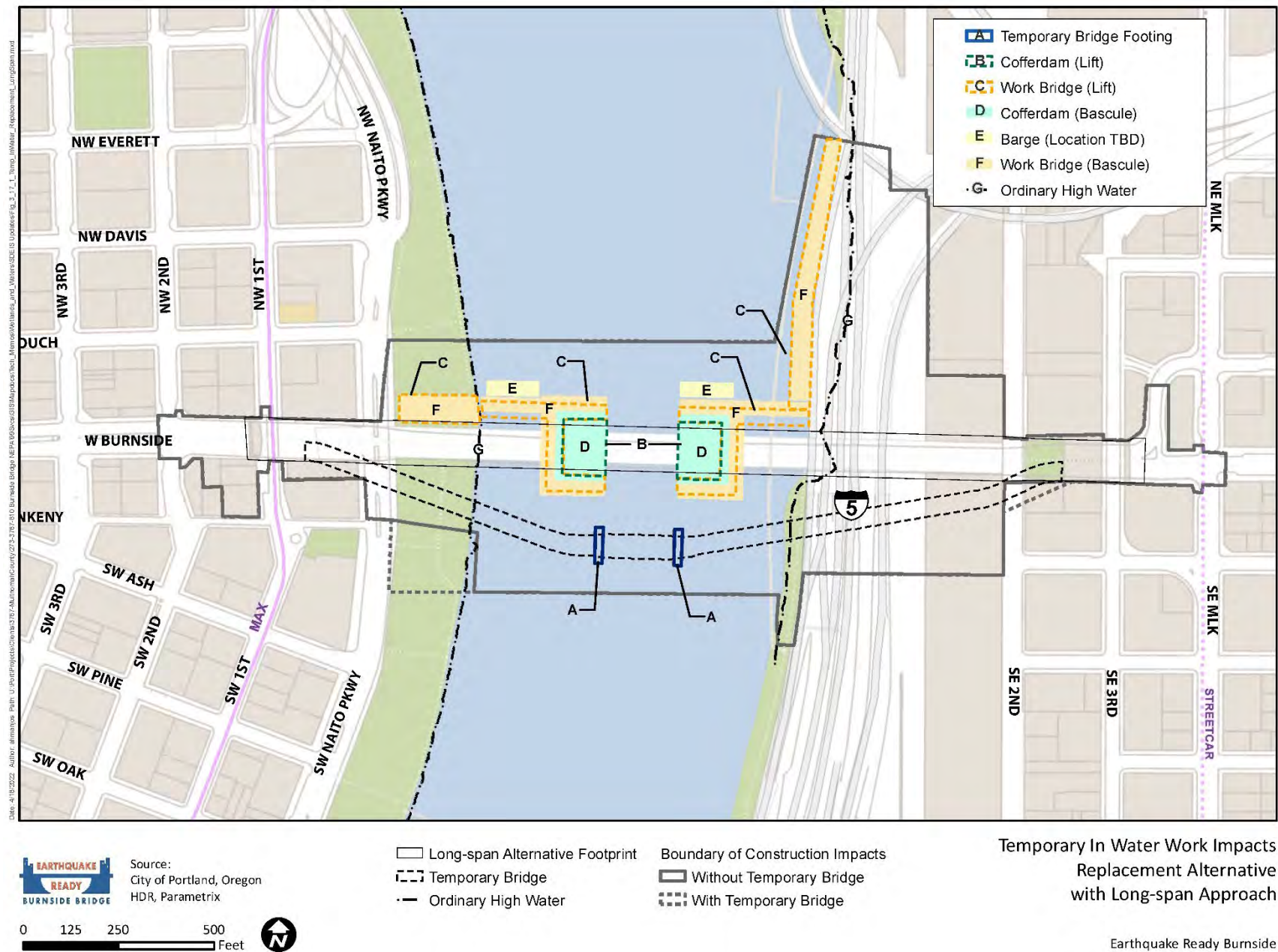
Alternative (movable span option)	Permanent Area of Structure ^a (acres)	Permanent Number of Shafts	Permanent Net Fill/Removal (acres)	Temporary Area of Piles (sq ft)	Temporary Number of Piles ^b	Temporary Cofferdam/ Caisson (acre)	Temporary Esplanade Storage (sq ft)	Temporary Riprap Removal/ Replacement – Ramps (sq ft)	Temporary Riprap Removal/ Replacement – Elevators (sq ft)
No-Build	0.4	None	0	None	None	None	None	None	None
Draft EIS Long-Span (basculer lift)	0.8	53	0.07	2,300	730	1.5	100	26,842	None
Draft EIS Long-Span (vertical lift)	0.5	45	-0.27	2,050	650	1.5	100	26,842	None
Refined Long-Span (basculer lift)	0.4	28	-0.25	1,790	566	0.05	100	None	4,933
Refined Long-Span (vertical lift)	0.6	22	-0.03	1,860	677	0.07	100	None	4,933

a Area of structure includes the pier footing, pier substructure, shafts, pedestrian connection columns, debris fender (vertical lift only), and navigation bollards.

b Number of piles includes all piles needed for bridge work and pedestrian improvements. The Draft EIS Long-span includes pile counts for ramps, while the Refined Long-span includes pile counts for elevators and stairs.

sq ft = square feet

Figure 3.17-1. Temporary In-Water Impacts – Draft EIS Long-Span Alternative



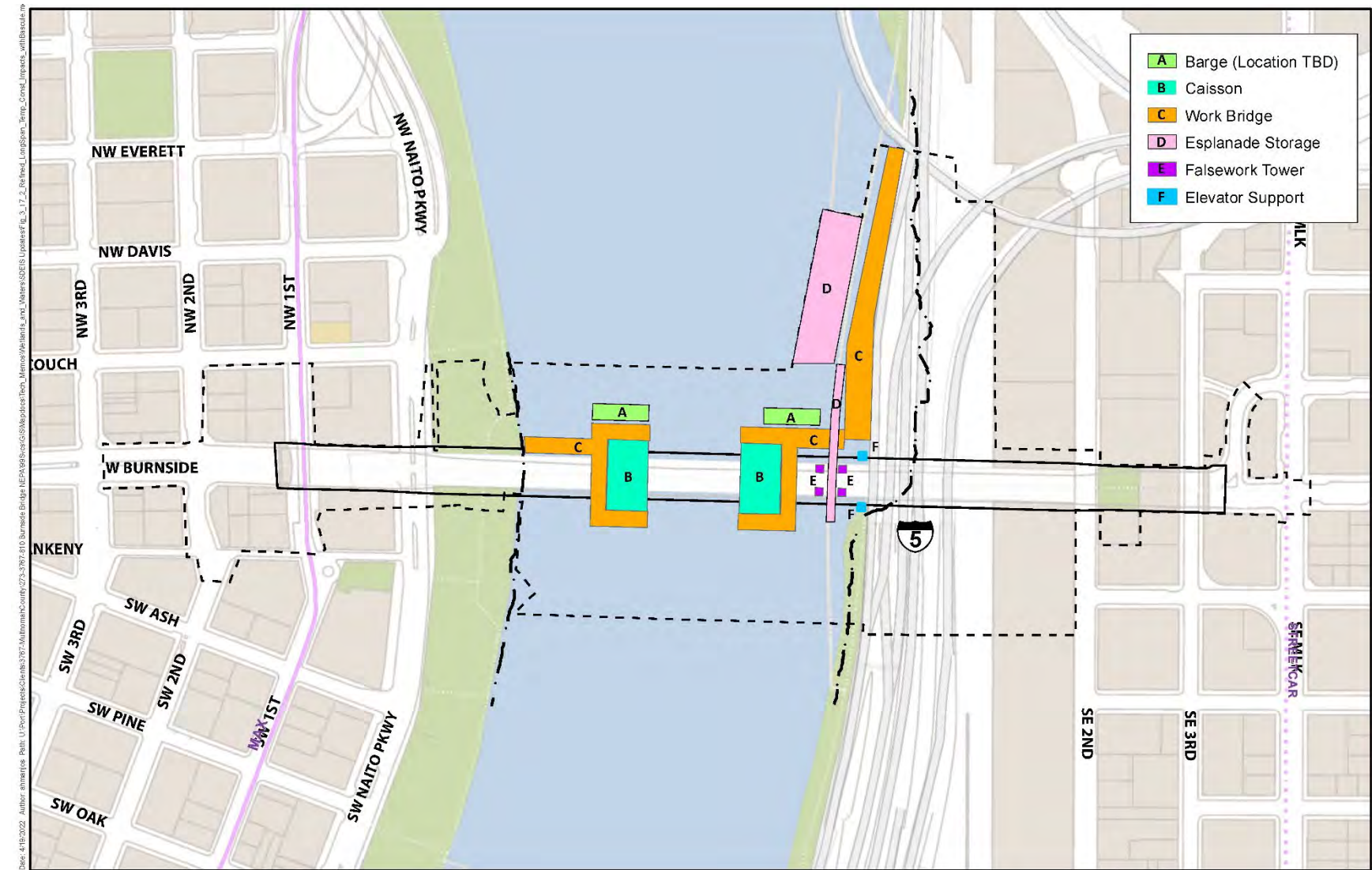
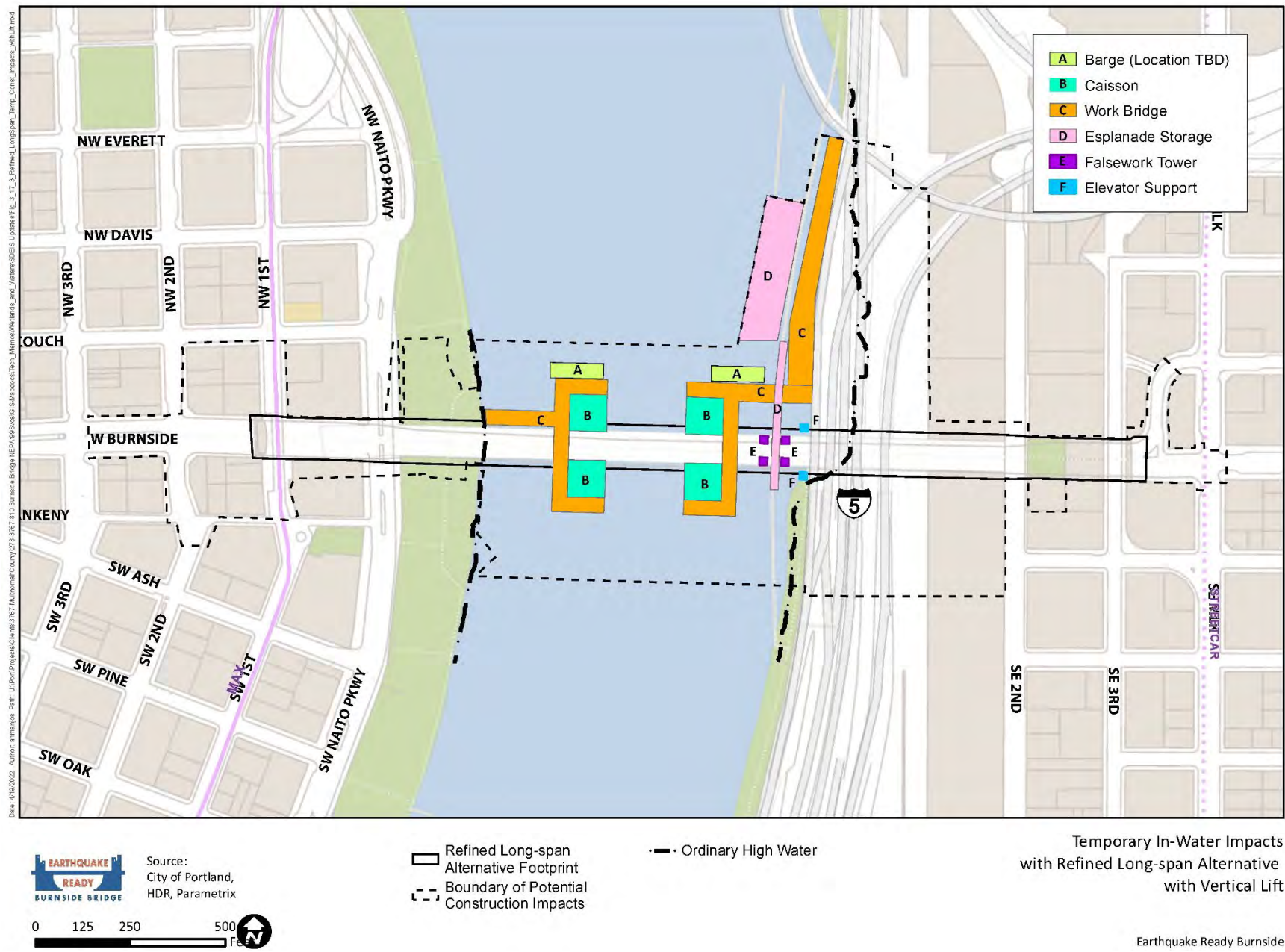


Figure 3.17-3. Temporary In-Water Impacts – Refined Long-Span Alternative with Vertical Lift



Permanent impacts to the Willamette River are anticipated from the removal and replacement of the in-water piers for both the Draft EIS Long-span (Figure 3.17-4) and Refined Long-span (Figure 3.17-5 and Figure 3.17-6) Alternatives. With the Refined Long-span Alternative, the existing Pier 4 would be permanently removed. Portions of the existing Pier 2 and Pier 3 would be removed, and new footings would be built around the portions that are left in place. The total permanent fill from structures is shown in Table 3.17-1. Permanent structures include the pier substructure, shafts, navigation bollards, debris fender (only applicable with the vertical lift), and the pier footings.

The Refined Long-span bascule lift option would have the least area of permanent structure below the OHWM when compared to any of the Draft EIS Long-span or Refined Long-span options and the same area as the No-Build Alternative. The Refined Long-span Vertical Lift Option would have the least number of shafts of the Draft EIS Long-span and Refined Long-span options.

The total impacts to waters in terms of removal and fill below the OHWM is different than the area of permanent structure due to removal of materials from around the existing footings that will not be replaced. As stated above, portions of Piers 2 and 3 would be removed, Pier 4 would be entirely removed, as well as riprap and other non-native fill materials. Pier 1 would be partially left in place. When adding the total potential permanent removal below OHWM and subtracting that from the total potential permanent fill, the Draft EIS Long-span Vertical Lift Option would have the greatest amount of non-native material net fill removal. The Refined Long-span Bascule Lift Option would have slightly less non-native material net fill removal than the Draft EIS Long-span Vertical Lift Option. The Refined Long-span Vertical Lift Option would have a minor amount of net fill removal while the Draft EIS Long-span Alternative Bascule Lift Option would have a positive permanent net fill (Table 3.17-1).

The varying amount of permanent fill and removal associated with the Draft EIS and Refined Long-span Alternatives would have related impacts to loss and degradation of aquatic habitat and scour occurrence. Less fill and removal would decrease the loss and degradation of aquatic habitat, as well as lessen the risk of increasing scour and mobilizing contaminated sediments. Conversely, more fill and removal below the OHWM would exacerbate these impacts. See Section 3.15, Floodplain and River Hydraulics, and Section 3.16, Vegetation, Wildlife and Aquatic Resources, of this SDEIS for information in this regard.

Additionally, the Refined Long-span Alternative would have less impervious surface than the Draft EIS Long-span Alternative and would generate less stormwater runoff and would therefore have a more beneficial impact on water quality (see Section 3.14, Water Quality, of this SDEIS).

The No-Build Alternative is unable to be quantified in terms of a comparison of permanent impacts. However, it would have the most extensive impacts to waters after a Cascadia Subduction Zone earthquake. The bridge would either collapse or become severely damaged, which would alter the riverbed and cause substantial erosion and sedimentation. This would degrade water quality and aquatic habitat, creating harmful conditions for aquatic species at the existing bridge site and several miles downstream.

3.17.3 Mitigation

Mitigation would be the same as described in the Draft EIS for the Draft EIS Long-span Alternative.

Figure 3.17-4. Permanent In-Water Impacts – Draft EIS Long-Span Alternative

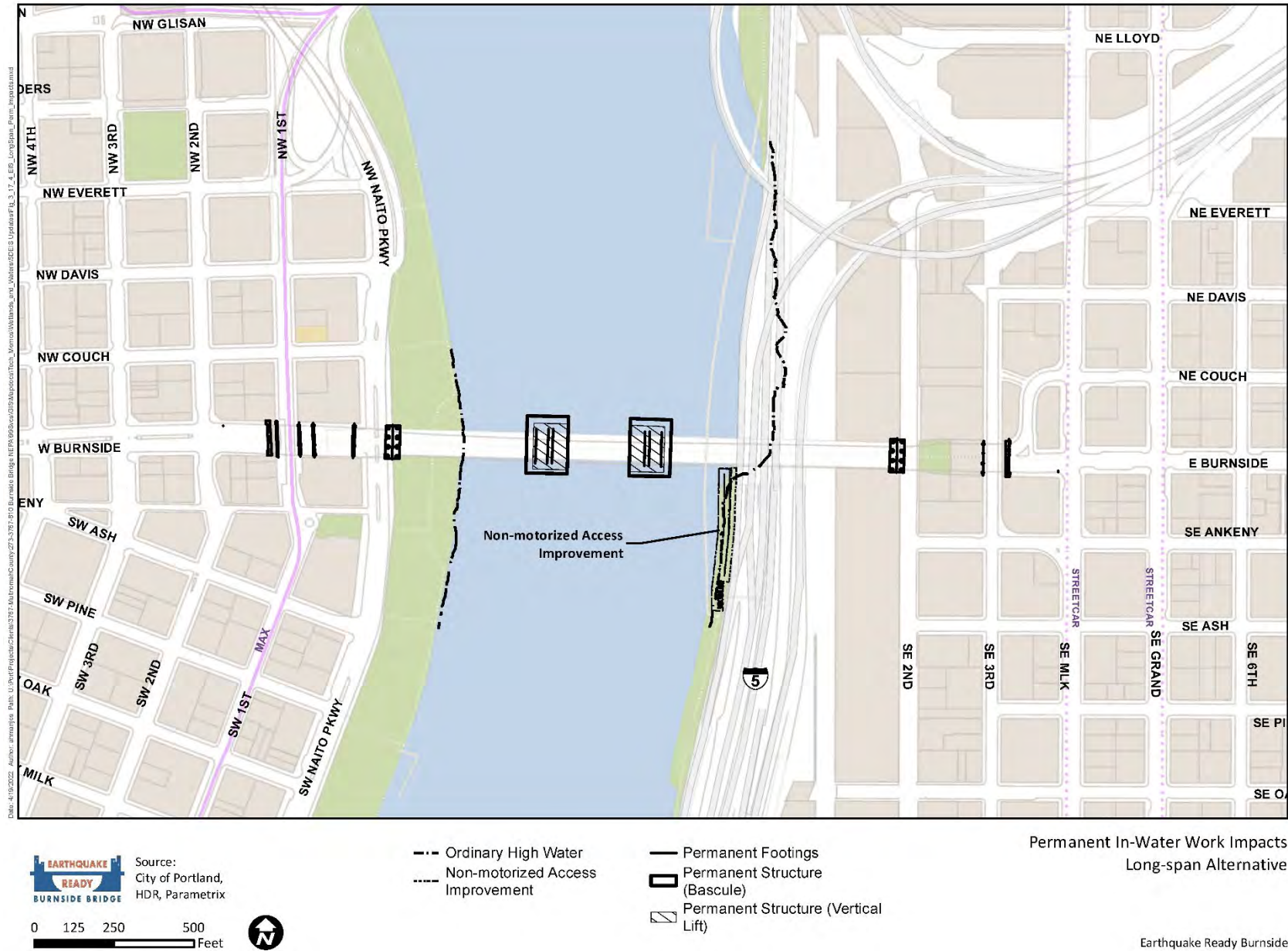
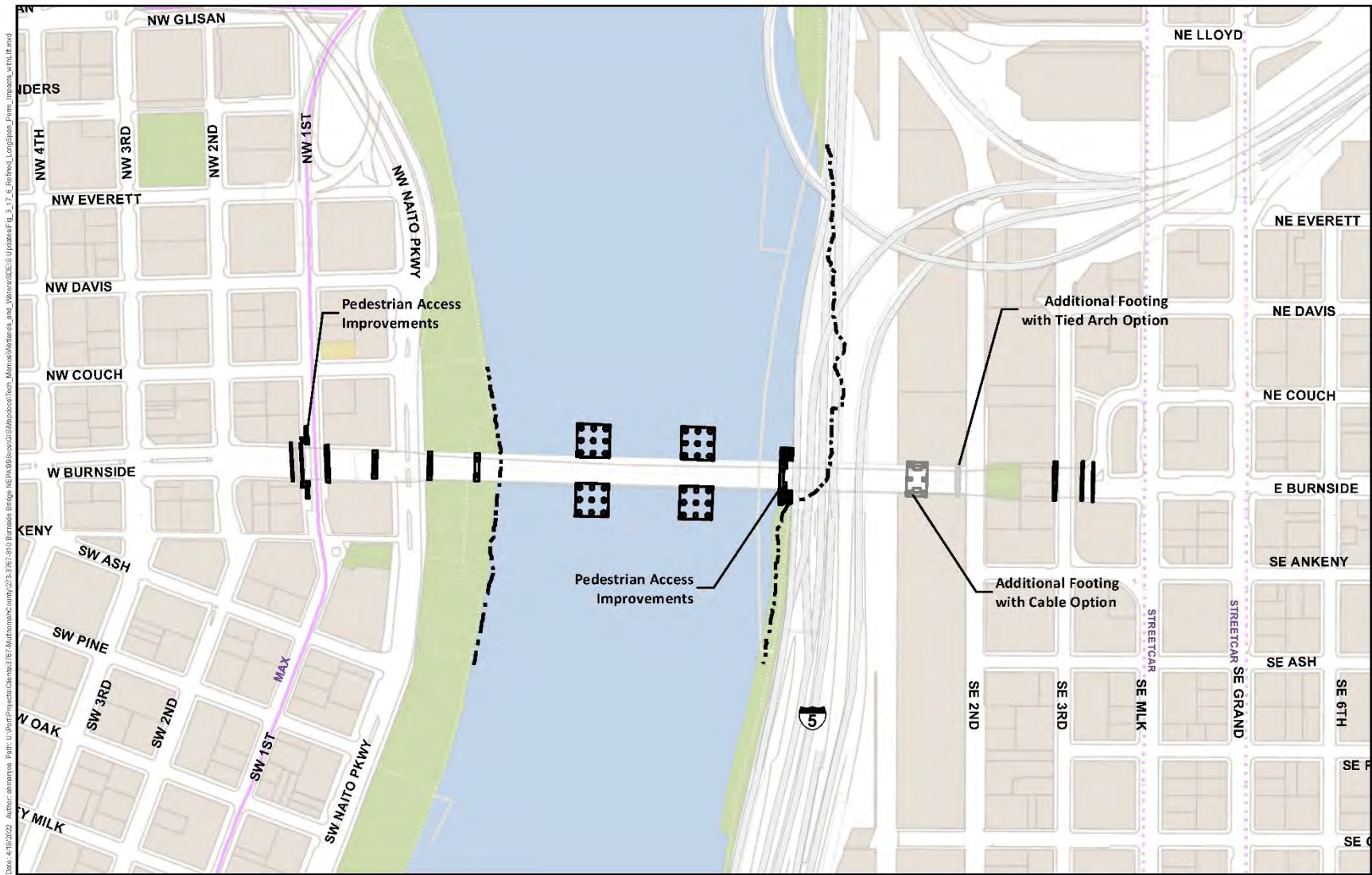




Figure 3.17-6. Permanent In-Water Impacts – Refined Long-Span Alternative with Vertical Lift



Date: 4/18/2022 Author: almanee Path: U:\port\Projects\Clients\1767\MultnomahCounty\23-310 Burnside Bridge NEPA\6650\GIS\Map\Section_Memo\Wetters_and_Vaughan\SEIS Updates\Fig_3_17_6_Refined_LongSpan_Perm_Impacts_w/IL.mxd



Source:
City of Portland,
HDR, Parametrix

0 125 250 500
Feet



--- Ordinary High Water
--- Pedestrian Access
Improvements

— Permanent Footing
— Additional Footing w/ Cable
Option
— Additional Footing w/ Tied
Arch Option

Permanent In-Water Work Impacts
Refined Long-span Alternative w/ Vertical Lift

Earthquake Ready Burnside

3.18 Noise and Vibration

This section is summarized from the *EQRB Noise Supplemental Memo* (Multnomah County 2022f) and refers to the EQRB Draft EIS (Multnomah County 2021h) and related technical reports for information that has not changed.

3.18.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment.

3.18.2 Impacts

No-Build Alternative Impacts

As described in Section 3.1, Transportation, of this SDEIS, there would be very slight changes in traffic volumes relative to the volumes documented in the Draft EIS. On Burnside Street within the Noise API, traffic volume would decrease by 0.1 percent relative to what was analyzed for the No-Build Alternative (and the Long-span Alternative) in the Draft EIS. On the other streets included in the noise analysis, traffic volumes would decrease by 0.2 percent on average relative to what was analyzed in the Draft EIS. The changes in traffic volumes represent an insignificant change to traffic noise of less than 0.01 decibel (dB); therefore, the analysis of No-Build and other alternatives using the same traffic assumptions remains consistent with what was analyzed in the Draft EIS.

Refined Long-Span Alternative Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the Long-span Alternative, including:

- Post-earthquake impacts
- Indirect Impacts
- Construction phase (temporary) impacts
- Impacts from potential off-site staging areas

Because the Refined Long-span Alternative would have the same alignment, a narrower cross section, and only slightly lower traffic volumes, the direct long-term impacts would be nearly the same as the Draft EIS Long-span Alternative and No-Build. Compared to the No-Build and Build Alternatives reported in the Draft EIS, the Refined Long-span Alternative would result in five fewer residential impacts. Predicted exterior traffic noise levels would range from 59 A-weighted decibels (dBA) hourly equivalent sound level [Leq(h)] to 75 dBA Leq(h) and would exceed the Noise Abatement Approach Criteria (NAAC) at 262 NAAC B uses (residences), and 8 NAAC C uses across the Gov. Tom McCall Waterfront Park (3 seating areas or locations with information plaques) and Vera Katz Eastbank Esplanade (5 benches). For receptors where there is no exterior use, such as at places of worship and the university, interior noise levels would range from 40 dBA Leq(h) to 43 dBA Leq(h) with none of these locations exceeding the NAAC.

For the Refined Long-span Alternative, relative to existing conditions, traffic noise levels are anticipated to be slightly higher in some areas and slightly lower in others. Increases up to 1 dB would be due to slightly increased traffic volumes on area roadways. Decreases up to 2 dB would be due to reductions in traffic volumes on some roadways as other projects come online in the area network that would change traffic patterns in the area. Compared to the No-Build and Draft EIS Long-span Alternatives, sound levels would range from no difference to levels 3 dB lower. This is a result of increased setback distance to the closest noise sensitive receptors. As a result, there would

be five fewer residential (NAAC B) impacts and two fewer public use (NAAC C) impacts. Traffic noise levels would continue to be highest for outdoor use areas located closest to I-5 on the east side of the Willamette River. Traffic noise levels on the west side of the river result mostly from I-5 traffic noise originating on the east side of the river but are also influenced by traffic on Burnside Street and Naito Parkway.

3.18.3 Mitigation

Operational noise mitigation is not feasible for any of the build alternatives.

For construction impacts, the mitigation and abatement strategies for the Refined Long-span Alternative are the same as those evaluated for other build alternatives in the Draft EIS.

3.19 Air Quality

3.19.1 Affected Environment

There are no changes or revisions to the EQRB Draft EIS description of the affected environment for air quality.

3.19.2 Direct Impacts

The EQRB Draft EIS (Multnomah County 2021h) found that No-Build traffic conditions are the same as the Draft EIS Long-span Alternative because bridge capacity and traffic and vehicle mix would be the same. Relative to these conditions, the Refined Long-span Alternative, under worst-case traffic conditions coinciding with lane configuration Options 2 and 3, would carry slightly less traffic across the bridge. Specifically, the Refined Long-span Alternative would reduce the annual average daily traffic on Burnside Street by 3.4 percent and would reduce peak hour traffic volumes by less than 1 percent relative to the Draft EIS Long-span Alternative (and No-Build). Inclusive of all roadways analyzed, roadway traffic would change by less than 1 percent relative to the Draft EIS Long-span and No-Build Alternatives. However, PM peak hour traffic would be reduced by approximately 10 percent along NW/SW 2nd Avenue under either lane configuration option because traffic would be diverted to other roadways to find more efficient routes relative to the No-Build Alternative.

SDEIS Section 3.1, Transportation, provides further discussion of the differences in traffic congestion and volumes for the Refined Long-span Alternative compared to the Draft EIS Long-span or No-Build alternatives. The level of service would be the same on Burnside Street, side streets, or interstates. Similarly, delays along Burnside Street, side streets, and interstates would not change, and the share of diesel vehicles would be same with the Refined Alternative as for the Draft EIS Alternatives. As with the Draft EIS, it is for these reasons that a level of service summary was not calculated for the Project. Traffic forecast details are presented in the *EQRB Transportation Technical Report* (Multnomah County 2021o) and the *EQRB Transportation Supplemental Memo* (Multnomah County 2022l) and the *EQRB Air Quality Technical Report* (Mutnomah County 2021c).

Based on the traffic comparison, long-term direct impacts from the Refined Long-span Alternative are expected to remain approximately the same (i.e., less than a 1 percent difference in roadway traffic for roads analyzed (see Table 3 in the *EQRB Air Quality Supplemental Memo* [Multnomah County 2022b])). For this reason, the analysis of long-term, direct air quality impacts is the same as that disclosed in the EQRB Draft EIS.

Other impacts from the Refined Long-span Alternative would be the same as described in the Draft EIS, including the following:

- Post-earthquake impacts
- Indirect Impacts
- Construction phase (short-term) impacts
- Impacts from potential off-site staging areas
- Mobile source air toxics
- Cumulative impacts

3.19.3 Mitigation

Potential mitigation for short-term air emissions would be the same as described in the Draft EIS for the Draft EIS Long-span Alternative.

3.20 Hazardous Materials

3.20.1 Affected Environment

There are no changes/revisions to the EQRB Draft EIS description of the affected environment.

3.20.2 Impacts

Most of the impacts from the Refined Long-span Alternative and its options would be the same as described in the Draft EIS for the original Long-span Alternative, including the following:

- Post-earthquake impacts
- Indirect Impacts
- Impacts from potential off-site staging areas

This section describes the impacts of the Refined Long-span (four-lane) Alternative (with no temporary bridge) that would be different from the Draft EIS version of the Long-span Alternative (with no temporary bridge) and compares them to the impacts of the No-Build Alternative and the Draft EIS Long-span Alternative.

Refined Long-Span Alternative Impacts

Several of the proposed refinements in the Refined Long-span Alternative, such as a revised cross section, lane configuration options, and bicycle lanes and sidewalks, would not change hazardous materials' impacts as described in the Draft EIS for the Long-span Alternative.

However, the Draft EIS Long-span Alternative and the Refined Long-span Alternative would vary in the number and type of right-of-way acquisitions needed in regard to the number of permanent impacts due to a difference in the number of total shafts, as well as to a difference in in-water pier numbers and foundation sizes related to a narrower bridge width and the type of ADA access at the Vera Katz Eastbank Esplanade. The Draft EIS and Refined Long-span Alternatives would also vary regarding temporary impacts for construction activities including falsework if a tied-arch is selected for the east approach. While the impacts are similar in nature to those described in the Draft EIS for the Long-span Alternative, they would have varying magnitudes of impact on hazardous materials.

The Draft EIS Long-span Alternative had eight proposed fee acquisition areas (six full acquisitions and two partial acquisitions), as well as one permanent easement and multiple temporary construction easements (TCEs).

For the Refined Long-span Alternative options, there would be no full or partial acquisitions. Rather, permanent right-of-way would be acquired as permanent easement for bridge improvements. Table 3.20-1 compares the right-of-way acquisition summary for the Draft EIS Long-span Alternative and the Refined Long-span Alternative tied-arch and cable-stayed options.

Table 3.20-1. Right-of-Way Acquisition Summary

Displacements and Acquisitions by Long-Span Option	Fee Full and Partial Acquisitions	Easements	TCEs	Businesses Displaced Permanent (Temporary)
Replacement – Draft EIS	8	1	17	6 (0)
Replacement – Tied-Arch	0	12	18	5 (1)
Replacement – Cable-Stayed	0	12	18	5 (1)

TCE = temporary construction easement

As shown, no full or partial property acquisitions are anticipated for the Refined Long-span Alternative options, although a number of permanent and temporary construction easements would need to be obtained. The modification from full or partial right-of-way acquisition to permanent easement is not materially different in terms of the expected due diligence required. However, the liability to the Project associated with acquiring property as opposed to permanent easements is considered to be higher; thus, the potential hazardous materials impact of right-of-way acquisition for the Refined Long-span Alternative is less than for the Draft EIS Long-span Alternative.

The Refined Long-span Alternative options are all anticipated to have less groundwork associated with them than the Draft EIS Long-span Alternative and would therefore have less potential for encountering hazardous materials during ground improvements. The Refined Long-span Alternative would have a reduced temporary construction footprint in the water and would therefore have less potential for disturbing contaminated sediments. Finally, the Refined Long-span Alternative would have less permanent structure below the ordinary high water mark and would have fewer long-term effects.

The comparison of the Refined Long-span Alternative to the No-Build Alternative would essentially be the same as that discussed for the Long-span Alternative in the Draft EIS.

3.20.3 Mitigation

Mitigation would be the same as described in the Draft EIS for the Draft EIS Long-span Alternative.

3.21 Cumulative Effects

The following describes how the cumulative impacts would be the same or different for the Refined Long-span Alternative compared to the Draft EIS Long-span Alternative. While there is some variation, in no case would the cumulative impacts be significantly different than described for the Draft EIS Long-span Alternative.¹

3.21.1 Transportation

For an evaluation of long-term cumulative traffic impacts, please see the analysis in Section 3.1, Transportation. The analysis is based on the regional travel demand model which evaluates the project impacts together with the impacts from all planned and programmed future transportation improvements as well as population and employment growth.

Regarding active transportation, the Project (especially the replacement alternatives, including the Refined Long-span Alternative), with upgraded bicycle and pedestrian paths on the bridge and conversion of some parking lanes into wider bicycle lanes, would connect to the City's growing bicycle-pedestrian infrastructure. This expansion of Portland's network of modern bicycle and pedestrian infrastructure is likely to contribute to further growth in use and increased mode shares for bicycles and pedestrians.

Section 3.1 also addresses short-term cumulative transportation impacts that could occur due to overlapping timing of construction of the EQRB Project and the I-5 Rose Quarter Project. Construction activities of the two projects could have temporary impacts on some of the same transportation facilities. The analysis of construction-phase impacts identified that these cumulative impacts could increase some auto travel times and during construction would temporarily increase pedestrian and bicycle exposure to higher vehicle volumes on streets and at crossings. The analysis also suggests potential mitigation measures for these impacts.

3.21.2 Navigation

The cumulative navigation impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.3 Land Use and Right of Way

While the Refined Long-span would have slightly fewer right-of-way impacts compared to the Draft EIS Long-span Alternative, the cumulative land use and right-of-way impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

¹ The EQRB Draft EIS describes the key findings regarding cumulative impacts. A description of past, present, and future actions that are relevant to the EQRB cumulative impacts analysis can be found in the *EQRB Climate Change Technical Report* (Multnomah County 2021e).

For the built environment, the past timeline that is most relevant to cumulative effects runs from the early 1900s (prior to the opening of the current Burnside Bridge) to the present day. For the natural environment, analysis looks at broad changes beginning in the 1800s to capture a longer history of the effects of development on natural resources in the area. Although Native Americans occupied or traveled through the project area for thousands of years, those activities had relatively little effect on current environmental conditions. In the 1800s European-American settlement began, and the Portland area population began to increase dramatically.

The Draft EIS summary of cumulative impacts differentiates long-term cumulative impacts from short-term cumulative impacts that result from overlapping construction projects. Where relevant, post-Cascadia Subduction Zone (CSZ) earthquake impacts are also noted, as they are a form of cumulative impact (the impacts of the future CSZ earthquake combined with the impacts of the EQRB Project alternatives).

3.21.4 Economics

The cumulative economic impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.5 Public Services

While some of the lane configuration options of the Refined Long-span would have potentially greater impacts to emergency response vehicles using the Burnside Bridge compared to the Draft EIS Long-span Alternative, the cumulative public services impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.6 Utilities

The cumulative utilities impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.7 Social, Neighborhoods and Environmental Justice

The cumulative social, neighborhoods and environmental justice impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.8 Parks and Recreation

While the Refined Long-span Alternative would have slightly different short-term impacts to parks compared with the Draft EIS Long-span Alternative, the cumulative parks and recreation impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.9 Cultural Resources

The cumulative archaeological and historic impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.10 Visual and Aesthetics

As discussed in the Draft EIS, all of the Draft EIS replacement alternatives could install a vertical lift span, and the Draft EIS Long-span Alternative could install west and east approach spans with above-deck superstructure that would have a substantially different appearance than the existing bridge. This would be in contrast with the architecture and character of the area around the west approach which is defined largely by two historic districts and Governor Tom McCall Waterfront Park.

By contrast, the Refined Long-span Alternative, with a girder bridge for the west approach and a bascule bridge for the center span, would maintain the flat deck appearance of the existing bridge in these two segments. This is consistent with the architecture and character of the area around the west approach, which is defined largely by two historic districts and Governor Tom McCall Waterfront Park. By not building tall, modern bridge structures in and near these historic districts and over the park, the Refined Alternative would avoid adverse effects to the Skidmore/Old Town Historic District and would reduce the potential for contributing to long-term, cumulative effects on the visual context of the District and Waterfront Park.

On the east approach, the Refined Long-span would have either a cable-stayed or tied-arch bridge for the east approach, very similar to the Draft EIS Long-span. This bridge type is consistent with the changing visual character of the east end. These visual changes would combine with the recent and likely future

construction of new, modern design buildings around the east approach which have already transitioned the general look and feel of this part of Portland.

Any cumulative visual effects of overlapping construction projects in the area would be of very short duration and not significant.

3.21.11 Soils and Geology

While the Refined Long-span would have slightly different soils and geology impacts compared with the Draft EIS Long-span Alternative, the cumulative geology and soils impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.12 Wetlands, Waters, Hydraulics, Vegetation and Aquatic Resources

While the Refined Long-span would have slightly fewer impacts to wetlands, waters, hydraulics, vegetation and aquatic resources compared to the Draft EIS Long-span Alternative, the cumulative impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.13 Noise and Vibration

While the Refined Long-span would have slightly lower noise levels compared to the Draft EIS Long-span Alternative, the cumulative noise impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.14 Air Quality

While the Refined Long-span would have slightly different air emissions compared to the Draft EIS Long-span Alternative, the cumulative air quality impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.15 Hazardous Materials

The cumulative hazardous materials impacts with the Refined Long-span Alternative would be the same as those described for the Draft EIS Long-span Alternative in the Draft EIS.

3.21.16 Climate Change

Greenhouse gas (GHG) emissions and climate change analysis is meaningful only in the context of cumulative impacts. While the Refined Long-span would have slightly different GHG emissions compared to the Draft EIS Long-span Alternative, the cumulative climate change impacts with the Refined Long-span Alternative would be the same as described for the Draft EIS Long-span Alternative in the Draft EIS. This climate change discussion notes where there would be differences in GHG emissions from different alternatives. More information is included in the *EQRB Climate Change Technical Report* (Multnomah County 2021e) and in the *EQRB Climate Change Supplemental Memo* (Multnomah County 2022c).

The impacts of global climate change on the Portland metropolitan region and the state of Oregon will be seen in sea-level rise, changes in average and peak river levels, changes in precipitation and extreme weather events, additional runoff and associated flooding, and increases in wildfire risks. While climate is not defined by the presence of these phenomena in a given year, there is evidence suggesting that the impacts

of climate change are already occurring (IPCC 2014). For the EQRB Project, the two most relevant climate change issues are:

- How would the forecast changes in the Willamette River affect the bridge (impacts of changing flood patterns on navigation clearance and bridge stability)?
- How would the bridge alternatives and options affect GHG emissions that contribute to global climate change?

Resiliency

In a recent assessment of Columbia and Willamette River flood stages, simulated future peak stage and projected sea-level change for the Willamette River at the Morrison Bridge is projected to increase from historical measurements by 5.5 to 6.2 feet from the year 2030 to 2059 (Wherry et al. 2019). With its immediate proximity, these estimates for the Morrison Bridge are assumed to be the same for the Burnside Bridge. The U.S. Coast Guard requires that all current water vehicle traffic be safely accommodated with a bridge replacement, which for the Burnside Bridge results in a water crossing span with at least a 147-foot-high vertical clearance (when raised) and 205-foot-wide horizontal clearance. The simulated increase in future flood stages as a result of climate change impacts would not increase river levels so much that the current bridge or any build alternative bridge would be affected with the exception of the bridge approaches.

Based on a preliminary assessment of how the build alternatives could impact flood elevations (*EQRB Hydraulic Impact Analysis Technical Report* [Multnomah County 2021k]), the Refined Long-span and the Draft EIS Long-span would not be expected to increase base flood elevations over existing; the other build alternatives would increase base flood elevations over existing. To make the future bridge seismically resilient, the foundations and piers need to be larger than the existing ones. The replacement alternatives would have fewer impacts than the Retrofit Alternative because they would have less total in-water structure and less lateral surface area. Combined with climate changing increases in peak flows and a potential future extreme weather event, increases from any of the build alternatives could further increase peak flood levels on the river.

In all build alternatives, the project effect on base flood elevation in conjunction with the future effects of climate change are being considered in design. Detailed hydraulic modeling was conducted for the Draft EIS Long-span Alternative to help inform bridge type decisions and will be conducted again for any refinements to the Draft EIS Long-span Alternative during the Final EIS phase so that more precise estimates of impacts to flood levels can inform decisions on the bridge design.

Climate change impacts are also expected to increase the risk that higher flood levels could damage bridge piers, approaches, and other in-river structures. This risk is being accounted for in project design. Bridge approach stability would be improved in the build alternatives as liquefaction of soils and sediments are considered in design and construction of the bridge, making the bridge able to withstand more saturated soils and a higher base flood elevation which can cause soil liquefaction in areas not normally inundated with water.

GHG Emissions and Climate Change

None of the build alternatives would increase motor vehicle capacity on the bridge; however, the Refined Long-span Alternative would decrease the number of vehicle lanes to four. Modeling suggests that this would reduce the GHG emissions generated at the bridge itself but would result in traffic diversion and congestion that would increase GHG emissions elsewhere. 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. Regional modeling suggests that the traffic diversion and congestion associated with a four-lane Burnside Bridge could result in less reduction in future regional GHG emissions compared to No-build. 2045 regional GHG emissions from motor vehicles are projected to drop by 27.6 percent with No-Build compared to existing, whereas they would drop by only 27.0 percent with the Refined Alternative compared to existing (Multnomah County 2022c).

The EQRB build alternatives have the potential to help reduce long-term GHG emissions from motor vehicles by providing wider, more comfortable, and safer bicycle and pedestrian facilities on the Burnside river crossing. This will contribute to the City of Portland's policy and plan goals to encourage bicycle and pedestrian use and decrease automobile use for trips into and out of downtown Portland, and it will improve the connectivity of the Burnside Bridge to the city's growing bicycle and pedestrian transportation network, all of which could help to reduce future transportation-related GHG emissions.

Construction of any of the build alternatives would generate GHG emissions through the embedded emissions in construction materials, the emissions from construction equipment, and from traffic emissions due to increased congestion resulting from construction-related street closures and detours. While the No Temporary Bridge Option would detour all traffic, resulting in the highest traffic-related GHG emissions of the build alternative options, the total GHG emissions with this option would actually be lower than with the Temporary Bridge Options. This is because constructing and then deconstructing the temporary bridge would generate additional emissions and because the mining, manufacturing, and transport of materials to build the temporary bridge would generate substantial embedded GHG emissions. The lowest construction emissions would be with the Refined Long-span Alternative due primarily to it requiring fewer materials and less construction activity than the five-lane alternatives studied in the Draft EIS (Multnomah County 2022c).

Another consideration is the cumulative effect of the next Cascadia Subduction Zone earthquake on GHG emissions. While post-earthquake traffic scenarios and GHG emission levels are very difficult to predict because of the uncertainty regarding impacts to the rest of the transportation network and the extent to which vehicles will be trapped by damage and debris, it is likely that a seismically resilient Burnside Bridge would reduce post-earthquake GHG emissions. Immediately after the earthquake, travel is likely to be chaotic due to widespread damage and uncertainty about the roadway network and other transportation infrastructure. After the initial effects, the build alternatives might facilitate more trips being taken because of the availability of a usable river crossing, although the average vehicle trip length might be shorter given that the usable crossing would require less out-of-direction travel. A seismically resilient Burnside Bridge crossing would also allow many people to walk or cycle across the river rather than rely on motor vehicles that would need to travel long distances to access a usable river crossing miles upriver. Having a viable river crossing would also make rescue and recovery much more efficient and potentially reduce the need for evacuation outside of the region, which could reduce emissions (TRB 2016; Chang 2000; Madhusudan & Ganapathy 2011). As debris is cleared and the number of passable roads gradually increases, having a viable river crossing would continue to result in less out-of-direction travel and, thus, lower GHG emissions with the build alternatives.

3.22 The Relationship of Local Short-Term Impacts and Use of Resources and the Maintenance of Long-Term Productivity

The EQRB Project would have a clear trade-off between short-term impacts versus long-term productivity. Building a seismically resilient Burnside Bridge would consume natural resources for building materials and cause temporary traffic congestion, partial park and recreation facility closures, public service impacts, and temporary impacts to air, water, and other natural resources. Once constructed, there would be few long-term adverse impacts that would not be mitigated; the one exception is that the Refined Alternative, with four vehicle lanes rather than five, would have less vehicle capacity than the No-Build or the Draft EIS build alternatives. While congestion would result in average travel times for non-transit vehicles during some peak periods, it would also reduce the use of resources during construction, and as with the five-lane alternatives evaluated in the Draft EIS, it would result in significant long-term benefits to productivity by providing a seismically resilient river crossing.

As discussed in Chapter 1, Purpose and Need, the City of Portland and the broader region are divided by the Willamette River. The existing bridges crossing the river currently carry 45 lanes of traffic for autos, freight, and buses, as well as all five of the region's light rail transit lines and numerous bicycle and pedestrian lanes and sidewalks. The bridges are essential to moving people and goods in the Portland region. However, those bridges and/or their approaches are seismically vulnerable. Geologists warn that given the average rate of occurrence of Cascadia Subduction Zone (CSZ) earthquakes over the last 10,000 years, this region is overdue for the next big event. After the next CSZ earthquake, none of the existing downtown bridges is expected to be usable, and many will be damaged beyond repair. This defines the EQRB Project's primary need and its purpose to create a seismically resilient river crossing in downtown Portland that would be usable immediately after the next major seismic event to serve as a critical lifeline and to aid regional recovery in the weeks, months, and possibly years after the event. This would be a significant benefit to the Portland region's long-term productivity.

3.23 Irreversible and Irretrievable Commitments of Resources Which Would be Involved in the Proposed Action

Implementation of any of the build alternatives would involve a commitment of natural, physical, human, and fiscal resources. Most of the land that would be permanently occupied by the proposed bridge has been used for a bridge for over 100 years, and it is considered an irreversible commitment for the lifespan of the new bridge. If a greater need arises for use of the land or if the bridge is no longer needed, the land could be converted to another use. At present, there is no reason to believe such a conversion will be necessary or desirable in the foreseeable future.

Considerable amounts of fossil fuels, other energy sources, labor, and construction materials such as cement, aggregate and steel, would be expended to construct any of the build alternatives. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. They are also not currently in short supply, and their use would not have an adverse effect upon continued availability of these resources. Any construction would also require a substantial one-time expenditure of public funds which are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area and broader region would benefit from the proposed project. These benefits would consist of providing the only downtown bridge that would survive the next major earthquake, which would mean having a lifeline for evacuation and emergency response, as well as a critical transportation link to support long-term regional recovery. Other benefits include improved safety and capacity for bicyclists and pedestrians; potentially improved safety for motor vehicles, trucks, and buses (depending on the lane configuration); ability to

accommodate future streetcar service; and replacement of a structure that is in need of increasingly more frequent and intensive maintenance. These benefits are anticipated to outweigh the commitment of these resources.