Wetlands and Waters Supplemental Memorandum

Multnomah County | Earthquake Ready Burnside Bridge Project

Portland, OR

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Earthquake Ready Burnside Bridge Wetlands and Waters Supplemental Memorandum

Prepared for

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Acronyms, Initialisms, and Abbreviations

ADA	Americans with Disabilities Act
API	Area of Potential Impact
BMP	best management practice
CSZ	Cascadia Subduction Zone
DEIS	Draft Environmental Impact Statement
EIS	environmental impact statement
EQRB	Earthquake Ready Burnside Bridge
OHWM	ordinary high water mark
SDEIS	Supplemental Draft Environmental Impact Statement

Executive Summary

Impacts to jurisdictional waters were assessed for the Refined Long-span Alternative and compared to the Long-span Alternative and the No-Build Alternative that were evaluated in the Draft Environmental Impact Statement (EIS). The impacts from the Refined Long-span Alternative are the same type of impacts as the Draft EIS Long-span Alternative but at a different scale. Temporary and permanent impacts are anticipated to waters through removal and fill; this would impact the Willamette River through aquatic habitat reduction and increased scour potential. Other impacts include improvements to water quality based on the proposed stormwater treatment facilities. The Refined Long-span Alternative would result in approximately 1,292 square feet to 10,714 square feet of net removal of material below the ordinary high water mark (OHWM) of the Willamette River, depending on the movable span selected (Vertical Lift or Bascule Lift, respectively). A caisson is the preferred method for constructing the in-water piers opposed to a cofferdam which was presented in the Draft EIS. A caisson would reduce permanent impacts compared to a cofferdam as the only impacts would be temporary, whereas a cofferdam would leave behind a permanent seal course after construction. The permanent impacts associated with the Refined Long-span Alternative with a Bascule Lift would be smaller than the Draft EIS Long-span Alternative with either lift option. The Refined Long-span Alternative with a Vertical Lift would result in less removal below the OHWM than the Draft EIS Long-span Alternative with a Vertical Lift, but more removal than the Draft EIS Long-span Alternative with a Bascule Lift. The Refined Long-span Alternative with either movable span would have fewer impacts than the No-Build Alternative, which would have extensive impacts after an earthquake.

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1 Introduction

In support of the Supplemental Draft Environmental Impact Statement (SDEIS) for the Earthquake Ready Burnside Bridge (EQRB) Project, this supplemental technical memorandum has been prepared to evaluate the impacts of potential design refinements to the Preferred Alternative on wetlands and waters within the project's Area of Potential Impact (API). The intent of the design modifications is to reduce the overall cost and improve the affordability of the EQRB Project. This technical memorandum is a supplement to the Draft EIS technical reports and as such does not repeat all of the information in those reports, but instead focuses on the impacts of the design modification options, how they compare to each other, and how they compare to the version of the Preferred Alternative that was evaluated in the *EQRB Draft Environmental Impact Statement* (Multnomah County 2021b).

Much of the information included in the Draft EIS and Draft EIS technical reports, including project purpose, relevant regulations, analysis methodology and affected environment, is incorporated by reference because it has not changed, except where noted in this technical memorandum.

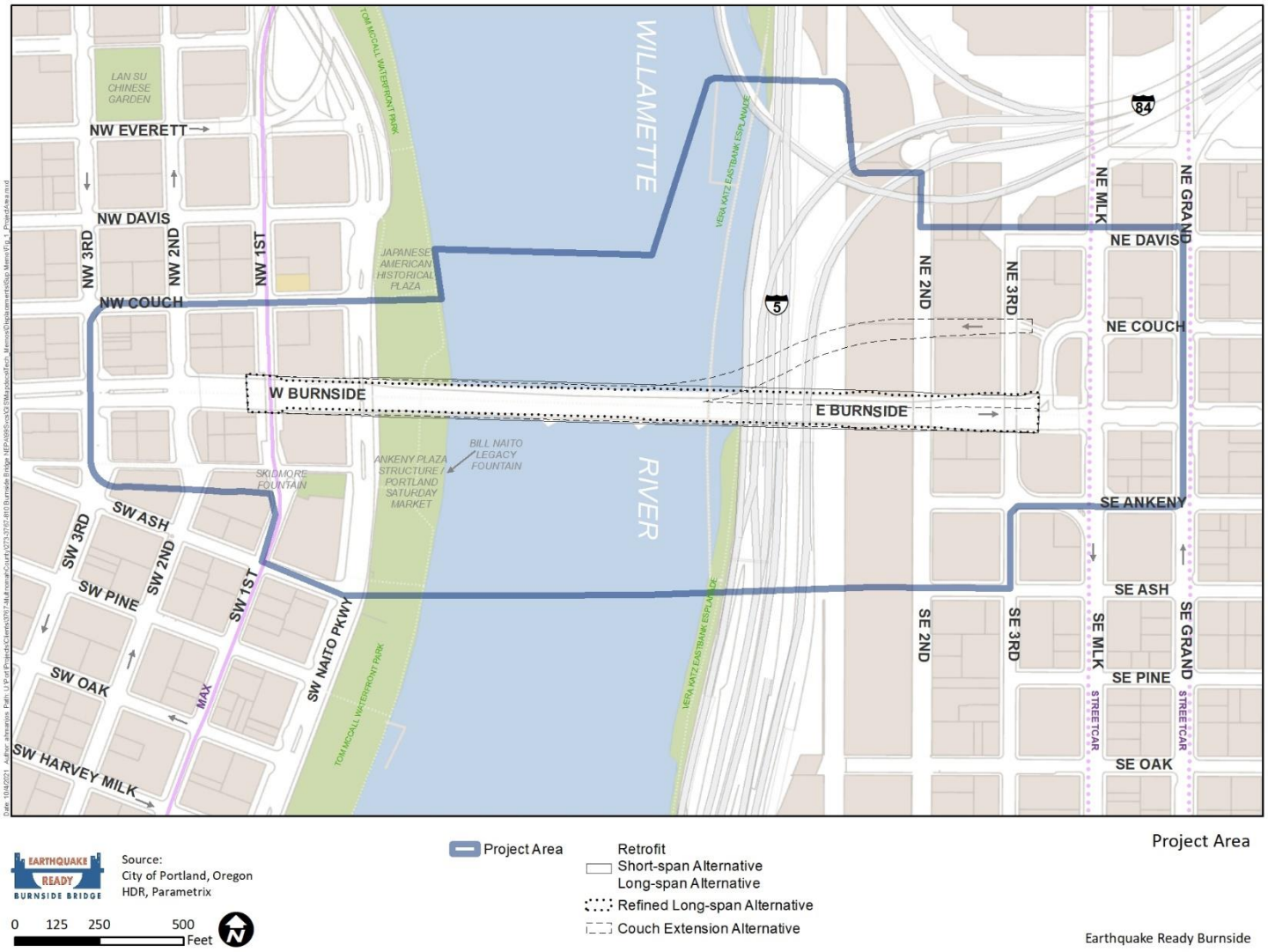
1.1 Project Location

The Project Area is located within the central city of Portland. The Burnside Bridge crosses the Willamette River connecting the west and east sides of the city. The Project Area encompasses a one-block radius around the existing Burnside Bridge and W/E Burnside Street, from NW/SW 3rd Avenue on the west side of the river and NE/SE Grand Avenue on the east side. Several neighborhoods surround the area including Old Town/Chinatown, Downtown, Kerns, and Buckman. Figure 1 shows the Project Area.

1.2 Project Purpose

The primary purpose of the Project is to build a seismically resilient Burnside Street lifeline crossing over the Willamette River that will remain fully operational and accessible for vehicles and other modes of transportation following a major Cascadia Subduction Zone (CSZ) earthquake. The Burnside Bridge will provide a reliable crossing for emergency response, evacuation, and economic recovery after an earthquake. Additionally, the bridge will provide a long-term safe crossing with low-maintenance needs.

Figure 1. Project Area



2 Project Alternatives

This technical memorandum evaluates potential design refinements to the Draft EIS Preferred Alternative. All of the Project Alternatives evaluated in the Draft EIS are summarized in Chapter 2 of the Draft EIS and described in detail in the *EQRB Description of Alternatives Report* (Multnomah County 2021a). Briefly, the Draft EIS evaluated a No-Build Alternative and four Build Alternatives. One of the Build Alternatives, the Long-span Alternative, was identified as the Preferred Alternative. The potential refinements evaluated in this technical memo are collectively referred to as the "Refined Long-span Alternative (Four-lane Version)" or the "Refined Long-span." The Refined Long-span includes Project elements that were studied in the Draft EIS but have been modified as well as new options that were not studied in the Draft EIS. These refinements and new options are intended to provide lower cost and, in some cases, lower impact designs and ideas that could be adopted to reduce the cost of the Draft EIS Preferred Alternative while still achieving seismic resiliency. The potential design refinements, and how they differ from the Draft EIS Long-span Alternative, are described below.

- Bridge width – The total width of the bridge over the river would be approximately 82 to 93 feet (the range varies depending on the bridge type and segment). For comparison, the Draft EIS Replacement Alternatives were approximately 110 to 120 feet wide over the river. The refined bridge width would accommodate approximately 78 feet for vehicle lanes, bike lanes, and pedestrians, which is comparable to the existing bridge.
    - The refined bridge design would accommodate four vehicle lanes (rather than five as evaluated in the Draft EIS). The following lane configuration options are being evaluated:
        - Lane Option 1 (Balanced) – Two westbound lanes (general-purpose) plus two eastbound lanes (one general-purpose and one bus-only lane)
        - Lane Option 2 (Eastbound Focus) – One westbound lane (general-purpose) plus three eastbound lanes (two general purpose and one bus only)
        - Lane Option 3 (Reversible Lane) – One westbound lane (general-purpose) plus two eastbound lanes (one general-purpose and one bus-only) plus one reversible lane (westbound AM peak and eastbound PM peak)
        - Lane Option 4 (General Purpose with Bus Priority) – Two westbound general-purpose lanes plus two eastbound general-purpose lanes, plus bus priority access (e.g., queue bypass) at each end of the bridge.
    - The width of the vehicle lanes would be, at minimum, 10 feet and could vary depending on how the total bridge width is allocated between the different modes.
    - The total width of the bicycle lanes and pedestrian sidewalks would be approximately 28 to 34 feet. This is wider than the existing bridge but 9 feet narrower than what was proposed in the Draft EIS for the replacement

alternatives. Physical barriers between vehicle lanes and the bicycle lanes are proposed and are in addition to the above dimensions.

  - The refined bridge would allow narrower in-water piers, due to less weight needing to be transferred to the in-water supports.

- Other design refinements being evaluated:
  - West approach – This memorandum evaluates a refined 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 not only reduce costs but also avoid an adverse effect to the Skidmore/Old Town National Historic Landmark District. It would have two sets of columns in Waterfront Park compared to just one with the Draft EIS tied-arch option and five with the existing bridge.

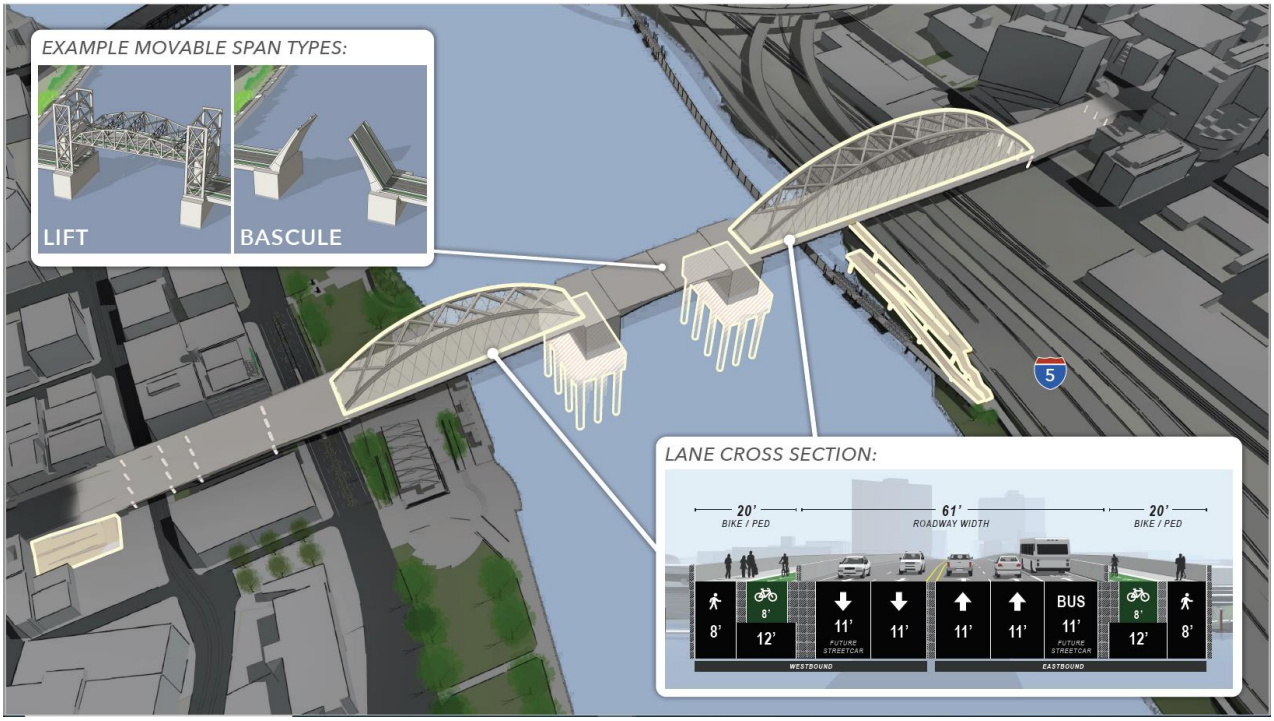
  - East approach – This memorandum evaluates a potential span length change for the east approach tied-arch option that would minimize the risks and reduce costs associated with placing a pier and foundation in the geologic hazard zone that extends from the river to about E 2nd Avenue. The refined tied-arch option would be about 720 to 820 feet long and approximately 150 feet tall (the Draft EIS Long-span Alternative was the same height and 740 feet long). 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 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.

  - Americans with Disabilities Act (ADA) access – This memorandum evaluates a refined approach for providing direct ADA access between the bridge and the Eastbank Esplanade, as well as between the bridge and W 1st Avenue and the Skidmore Fountain MAX station. The Draft EIS evaluated multiple ramp, stair, and elevator options for these locations. This SDEIS memo evaluates a refined option that would provide enhanced ADA access at both locations using both elevators and stairs. These facilities would also provide pedestrian and potentially bicycle access. For the west end, there is also the potential for replacing the existing stairs with improved sidewalk access from the west end of the bridge to 1st Avenue.

Figure 3 highlights the elements of the Draft EIS Long-span Alternative that have been modified to create the Refined Long-span Alternative, as described above. Figure 2 shows the Draft EIS Long-span Alternative and Figure 3 shows the Refined Long-span Alternative. Both figures include the tied-arch option for the east approach and the bascule option for the center movable span, but the east span could also be a cable-stayed bridge and the movable span could be a vertical lift bridge. For the west approach, the Draft EIS Long-span Alternative shows the tied-arch option while the Refined Long-span shows the refined girder bridge. The Refined Long-span Alternative image shows just one of the four possible lane configuration options being studied. All four configuration options, as well as many more graphics of the Refined Long-span, and how it compares to the Draft EIS Long-span Alternative, can be found in Chapter 2 of the *EQRB Supplemental Draft Environmental Impact Statement* (Multnomah County 2022a).

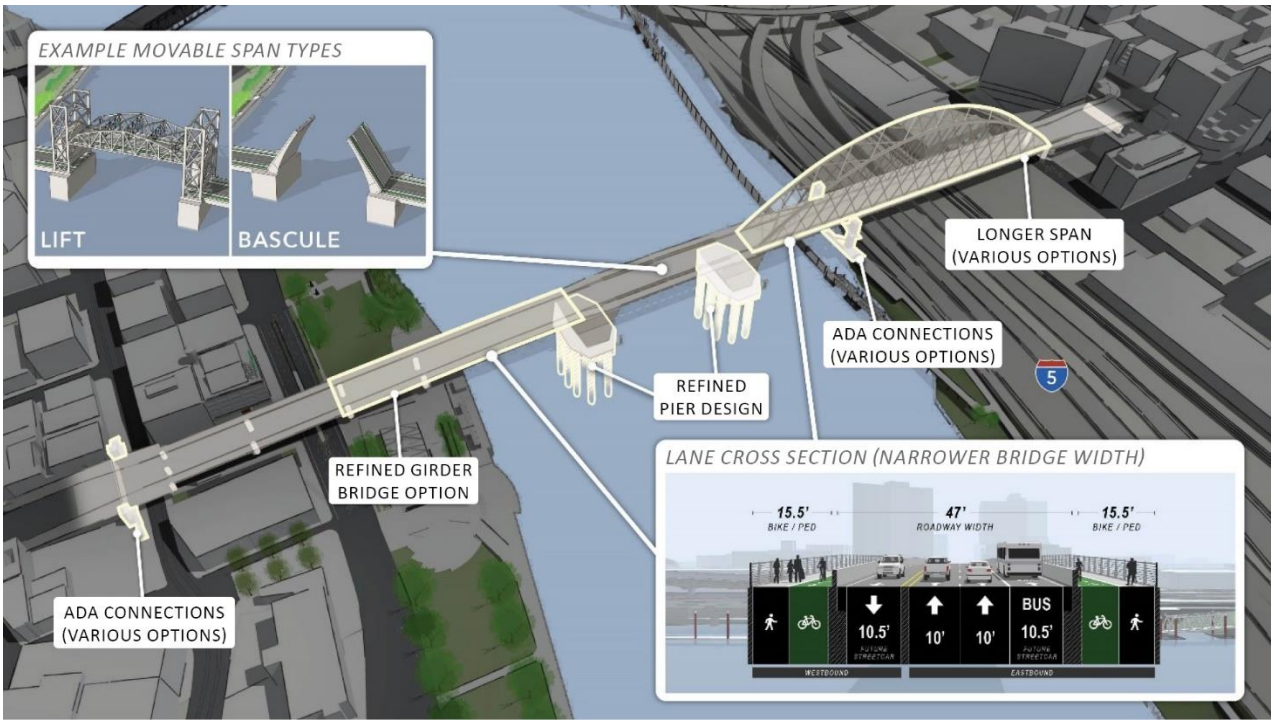
Figure 3 also shows just one of the possible ways to allocate the bridge width between vehicle lanes, bicycle lanes and sidewalks; the total width of the bicycle and pedestrian facilities could range from approximately 28 to 34 feet.

Figure 2. Draft EIS Long-Span Alternative



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

Figure 3. Refined Long-Span Alternative



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

- Construction assumptions:
  - Construction duration – The expected duration of project construction is 4.5 to 5.5 years, dependent upon the design option. See Table 1 for more information regarding construction impact extent and closure timeframes.
  - Construction area – Compared to the Draft EIS Long-span Alternative, the main refinement is that the construction area would be smaller for the west approach south of the bridge, including a smaller area within Tom McCall Waterfront Park south of the bridge,
  - Construction access and staging – The construction access and staging is expected to be the same as that described in the Draft EIS.
  - Vegetation – The Refined Long-span Alternative would remove slightly fewer trees and vegetation impacts than the Draft EIS Long-span Alternative, primarily within Tom McCall Waterfront Park south of the bridge.
  - In-water work activity – The in-water work would be similar to that described in the Draft EIS, except that the replacement bridge in-water foundations would consist of a perched footing cap and a group of drilled shafts. Whereas the Draft EIS discussed the use of cofferdams to isolate in-water work, the Refined Long-span Alternative proposes to use a temporary caisson lowered to an elevation about mid-height of the water column to construct footing caps, avoiding additional disturbance of the riverbed that would be needed for a cofferdam.

Additionally, the existing Pier 4 would be fully removed, Pier 1 would be partially removed below the mudline and Piers 2 and 3 removed to below the mudline. Existing in-water piles would be removed, subject to the design option advanced.

- Temporary freeway, rail, street, and trail closures – Temporary closures are expected to be the same as those described in the Draft EIS.
- Access for pedestrians and vehicles to businesses, residences, and public services – Access is expected to be the same as that described in the Draft EIS.
- On-street parking impacts – On-street parking impacts are expected to be the same as those described in the Draft EIS.
- 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.
- Temporary use of Governor Tom McCall Waterfront Park – The park area that would be temporarily closed for construction has changed since the Draft EIS. On the north side of the bridge, the closure area has been reduced to avoid removing ten cherry trees and a berm that are part of the Japanese American Historical Plaza; this change would apply to all of the build alternatives. On the south side of the bridge, the park closure area has also been reduced to include only the area north of the Tom McCall Waterfront Park trellis; this revision applies only to the Refined Long-span Alternative.

Table 1. Construction Impacts, Closure Extents, and Timeframes by Build Alternative

Facility Impacted	Draft EIS Long-Span Alternative	Refined Long-Span Alternative
Tom McCall Waterfront Park	4.5-year closure within boundary of potential construction impacts	Same; Smaller closure area south of the bridge
Willamette River Greenway Trail	Portion of trail within Tom McCall Waterfront Park closed for same duration as park; detours in place for construction duration	Same
Japanese American Historical Plaza	Southern portion of plaza would be closed for same duration as Tom McCall Waterfront Park	Same
Ankeny Plaza Structure	Closure for duration of construction but no impacts to Ankeny Plaza structure	Plaza Structure would not be closed during construction or impacted
Bill Naito Legacy Fountain	No closure of fountain and associated hardscape	Same
Vera Katz Eastbank Esplanade	18 months (this could extend to 3.5 to 4.5 years if project builds ramps rather than elevators and stairs for the ADA/bicycle/pedestrian connection); detours in place for construction duration	Same
Burnside Skatepark	4 months full closure	Same
River Crossing on Burnside Street	4- to 5-year closure	Same

Facility Impacted	Draft EIS Long-Span Alternative	Refined Long-Span Alternative
Saturday Market Location	4.5-year closure or use of alternative location	Same
Skidmore Fountain MAX Station	Approximately 5 weeks	Same
Navigation Channel/Willamette River Water Trail	Intermittent closures; 2 to 10 closures; each closure up to 3 weeks	Same
Overall Construction Duration	**4.5 to 5.5 years**	**Same**

3 Definitions

The following terminology is used when discussing geographic areas in the EIS:

- **Project Area** – The area within which improvements associated with the Project Alternatives would occur and the area needed to construct these improvements. The Project Area includes the area needed to construct all permanent infrastructure, including adjacent parcels where modifications are required for associated work such as utility realignments or upgrades. For the EQRB Project, the Project Area includes approximately a one-block radius around the existing Burnside Bridge and W/E Burnside Street, from NW/SW 3rd Avenue on the west side of the river and NE/SE Grand Avenue on the east side.
- **Area of Potential Impact (API)** – This is the geographic boundary within which physical impacts to the environment could occur with the Project Alternatives. The API is resource-specific and differs depending on the environmental topic being addressed. For all topics, the API will encompass the Project Area, and for some topics, the geographic extent of the API will be the same as that for the Project Area; for other topics (such as for transportation effects) the API will be substantially larger to account for impacts that could occur outside of the Project Area. The same API was used in the SDEIS as was used in the *EQRB Wetlands and Waters Technical Report* (Multnomah County 2021e).
- **Project vicinity** – The environs surrounding the Project Area. The project vicinity does not have a distinct geographic boundary but is used in general discussion to denote the larger area, inclusive of the Old Town/Chinatown, Downtown, Kerns, and Buckman neighborhoods.

4 Relevant Regulations

There are no differences in regulations with the Refined Long-span Alternative.

5 Analysis Methodology

The analysis methodology is the same as was used in the *EQRB Wetlands and Waters Technical Report* (Multnomah County 2021e).

6 Affected Environment

The affected environment for the Refined Long-span Alternative is the same as was included in the *EQRB Wetlands and Waters Technical Report* (Multnomah County 2021e).

7 Impacts from the Design Modifications and Comparison to Draft EIS Alternatives

The same impacts to waters are proposed with the Refined Long-span Alternative as the impacts that were analyzed in the Draft EIS which include hydraulic, geomorphic, water quality, and biological functions. However, impacts occur on a different scale. For a more detailed analysis of impacts to waters, refer to the *EQRB Wetlands and Waters Technical Report* (Multnomah County 2021e). See Figure 4 for the temporary in-water impacts from the Draft EIS Long-span Alternative and Figure 5 for the permanent in-water impacts from the Draft EIS Long-span Alternative.

Figure 4. Temporary In-water Impacts Draft EIS Long-Span Alternative

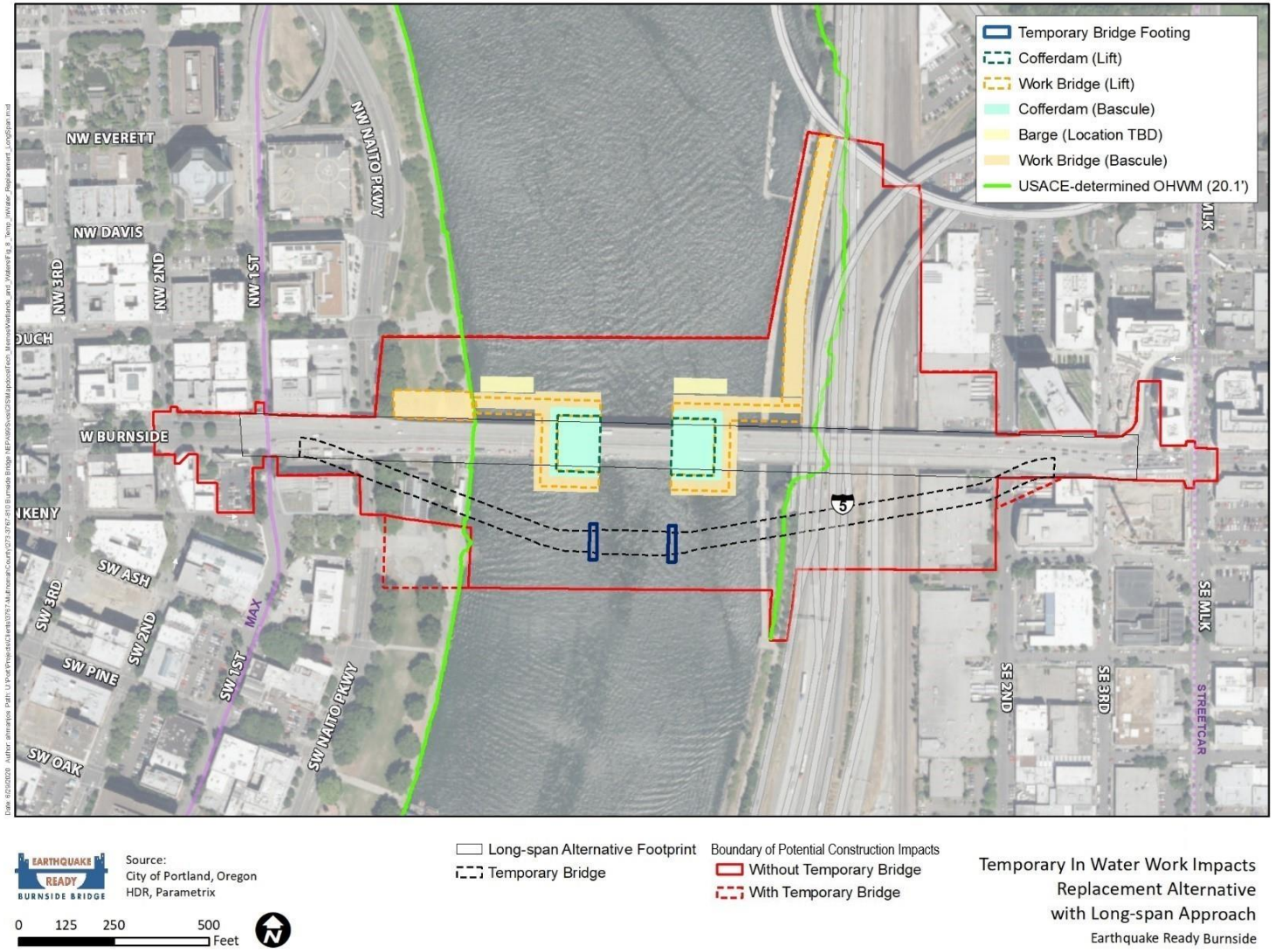
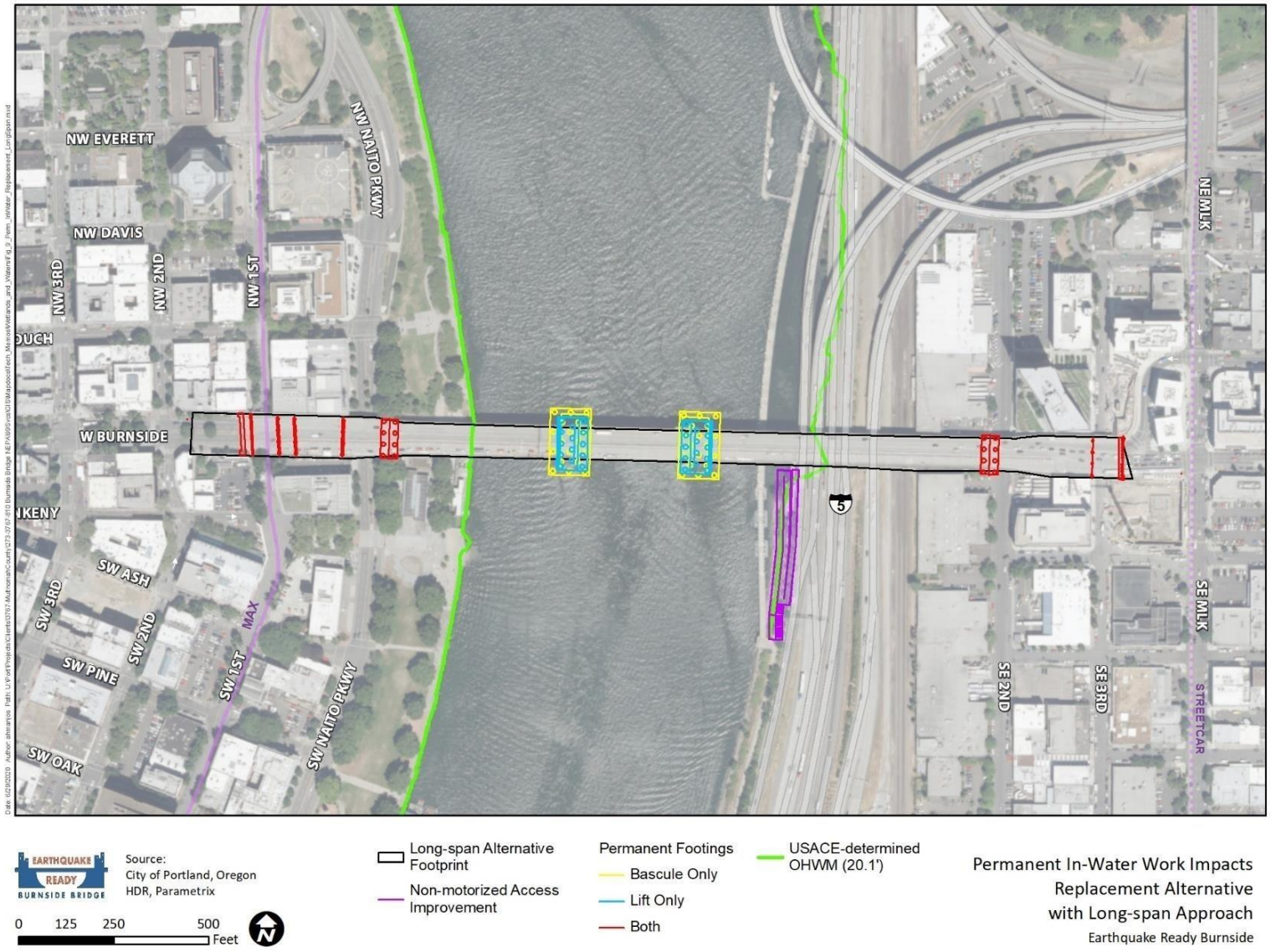


Figure 5. Permanent In-water Impacts Draft EIS Long-Span Alternative



7.1 Direct Impacts

7.1.1 Temporary Impacts

The impacts that would result from the Refined Long-span Alternative are the same type of impacts that were analyzed in the Draft EIS but at a different scale. Temporary impacts including fill and removal to the Willamette River during construction are anticipated from the installation and removal of piles to support the work bridges. The Refined Long-span Alternative with a Vertical Lift has a different layout of work bridges, but the same amount of pile approximated for the Draft EIS Long-span Alternative is anticipated. 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 total number of temporary piles needed for bridge work is approximately 566 to 677 piles, which is less than the Draft EIS Long-span Alternative (650-730 piles).

The Draft EIS summarized impacts from a pedestrian connection from the 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 as opposed to a ramp. This would result in both temporary construction impacts as well as permanent impacts to the Willamette River. Additional pile was be needed for the pedestrian connection: 165 piles (519 square feet) for the ramp, which has now been reduced to 67 piles (211 square feet) for the elevators and stairs. Temporary fill from work bridge piles would occur below OHWM, in the amount of approximately 210 square feet. Other temporary impacts include removal and storage of the Eastbank Esplanade floating dock. The in-river portion of the Eastbank Esplanade will be intermittently removed and stored on-site, moored to up to 30 temporary steel pile (see Figure 6). The pile would remain in place for the entire construction period. The total area of impact from the temporary removal and storage of the floating dock is 100 square feet below OHWM. Permanent impacts from the pedestrian connection include approximately 226 square feet of fill below OHWM from support columns (see Table 2). This is less than the impacts associated with the ramp connection (1,072 square feet below OHWM), however, the majority of the ramp would have been located above the OHWM in the riparian area, impacting trees and other vegetation.

To construct the work bridges for the Eastbank Esplanade pedestrian improvements (stairs and elevators), approximately 4,933 square feet (913 cubic yards) of riprap is proposed to be temporarily removed along the east bank so the piles can be installed. Once construction is complete, the same amount of riprap that was 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. The amount of riprap removal and replacement needed for the ramps is approximately 26,842 square feet (4,971 cubic yards).

Whereas a cofferdam was proposed for removal and replacement of the in-water piers in the Draft EIS, a different approach is now under consideration to use a caisson instead of a cofferdam for the Refined Long-span Alternative. A caisson would be located within the water column but would not disturb the riverbed (except for the shafts it is supported on). This significantly reduces the temporary impacts to waters when compared to the Draft EIS Long-span Alternative. Instead of a 0.8 acre to 1.1-acre area temporarily impacted from cofferdams, only 2,096 square feet (0.05 acre) to 3,008 square feet (0.07 acre) would be impacted, depending on the movable span. See Figure 6 for temporary in-water impacts with a bascule lift, Figure 7 for temporary in-water impacts with a vertical lift, and Table 2 for the proposed structure quantities below OHWM. Use of a caisson would temporarily impact waters during construction, whereas a cofferdam would leave behind a seal after construction, leading to permanent impacts.

If the tied arch bridge span option is selected, additional temporary impacts to the river would occur from the installation of four temporary falsework towers that would be used to erect the tied arch. Each tower would consist of four pipe pile that would be driven into the riverbed and then a steel tower erected on top. Once the tied arch is constructed, the towers and piles would be removed. The total impacts equal approximately 51 square feet of temporary fill below OHWM.

Figure 6. Temporary In-water Impacts Refined Long-Span Alternative with Bascule Lift

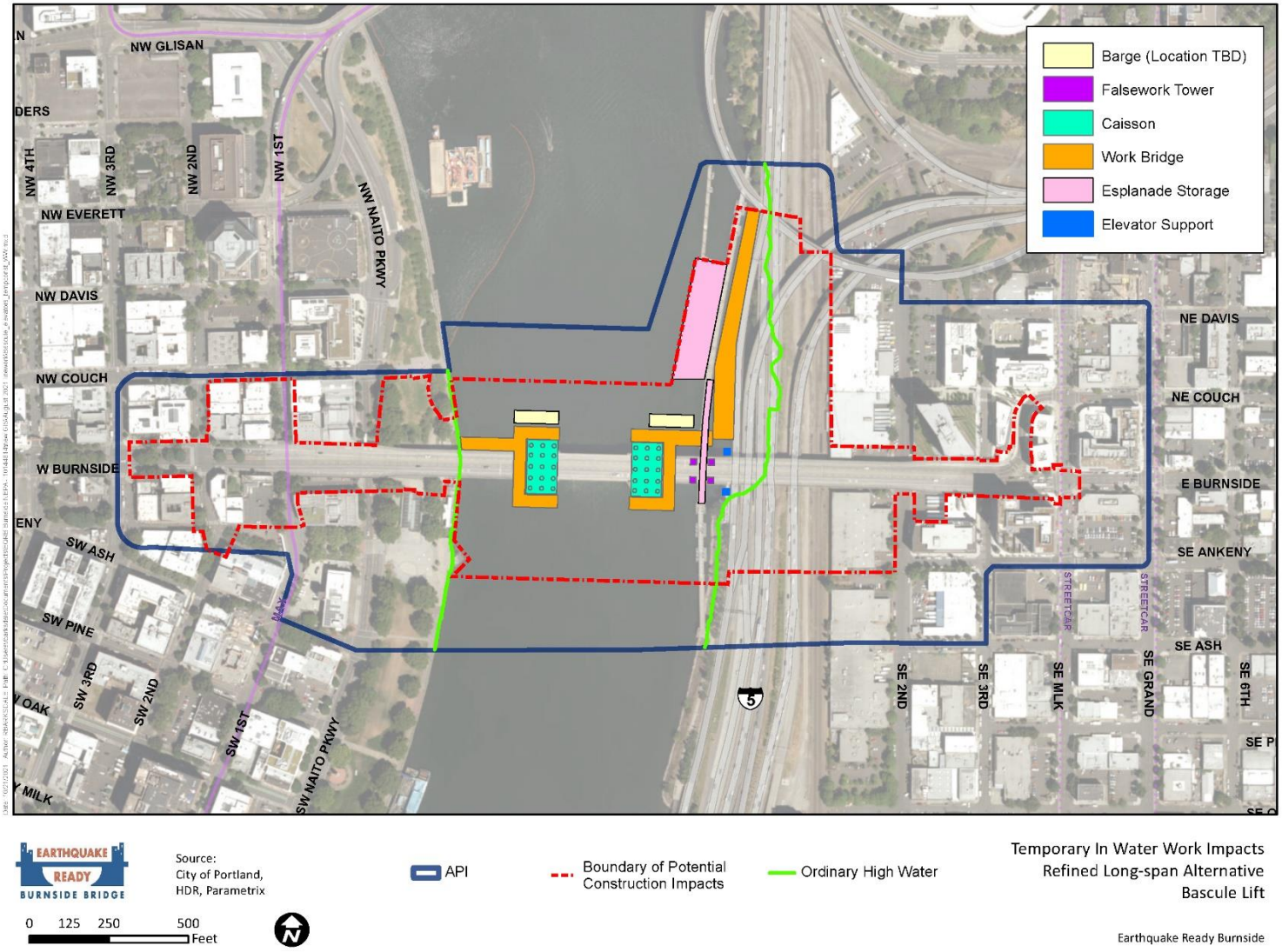


Figure 7. Temporary In-water Impacts Refined Long-Span Alternative with Vertical Lift

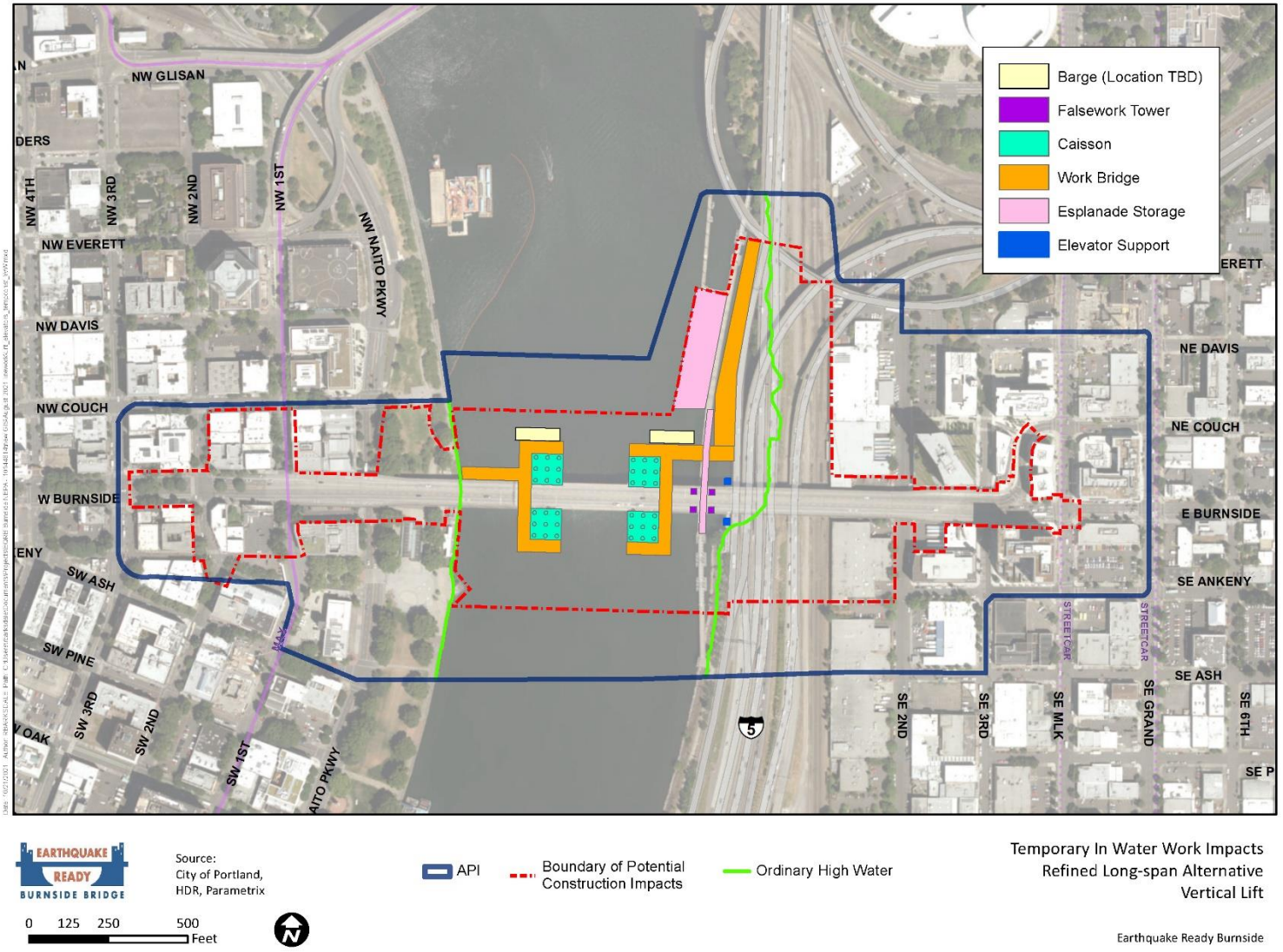


Table 2. Comparison of Permanent and Temporary Structures Below the OHWM

Alternative and Movable Span Option	Permanent		Temporary					
	Area of Structure * (acre)	Number of Shafts	Area of Piles (ft^2)	Number of Piles**	Cofferdam /Caisson (acre)	Esplanade Storage (ft^2)	Riprap Removal/ Replacement – Ramps (ft^2)	Riprap Removal/ Replacement – Elevators (ft^2)
No-build	0.4	-	-	-	-	-	-	-
DEIS Long-span (Bascule)	0.8	53	2300	730	1.5	100	26842	-
DEIS Long-span (Vertical Lift)	0.5	45	2050	650	1.5	100	26842	-
Refined Long-span (Bascule)	0.4	28	1790	566	0.05	100	-	4933
Refined Long-span (Vertical)	0.6	22	1860	677	0.07	100	-	4933

*Area of structure includes the pier footing, pier substructure, shafts, pedestrian connection columns, debris fender (Vertical Lift only), and navigation bollards.
**Number of piles includes all piles needed for bridge work and pedestrian improvements. The DEIS Long-span includes pile counts for ramps, while the Refined Long-span includes pile counts for elevators and stairs.

7.1.2 Permanent Impacts

Permanent impacts to the Willamette River are anticipated from the removal and replacement of the in-water piers. 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 proposed permanent fill from structures is shown in Table 2, which ranges from 0.4 acre with the Bascule Lift to 0.6 acre with the Vertical Lift. Permanent structure includes the pier substructure, shafts, navigation bollards, debris fender (only applicable with the Vertical Lift), and the pier footings. See Figure 8 and Figure 9 for permanent structure.

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. Portions of Piers 2 and 3 would be removed, Pier 4 would be entirely removed, as well as approximately 29,006 square feet of riprap. Pier 1 would be left in place. When adding the total proposed permanent removal below OHWM and subtracting that from the total proposed permanent fill, the result is a net removal of 10,714 square feet with the Bascule Lift Option, and a net removal of 1,292 square feet with the Vertical Lift Option (Table 3). The Draft EIS Long-span Alternative had a net fill of 3,029 square feet with the Bascule Lift, and a net removal of 11,781 square feet with the Vertical Lift. This results in a decrease in overall net impacts to waters with the design refinements for the Bascule Lift, and an increase with the Vertical Lift. Table 3 shows the total increase or decrease in fill material compared to the existing bridge.

Table 3. Comparison of Permanent Net Fill and Removal Below the OHWM

Alternative and Movable Span Option	Permanent Net Fill/Removal (square feet)
No-Build	0
Draft EIS Long-span (Bascule)	+3029
Draft EIS Long-span (Vertical Lift)	-11781
Refined Long-span (Bascule)	-10714
Refined Long-span (Vertical)	-1292

Figure 8. Permanent In-water Impacts Refined Long-Span Alternative with Bascule Lift

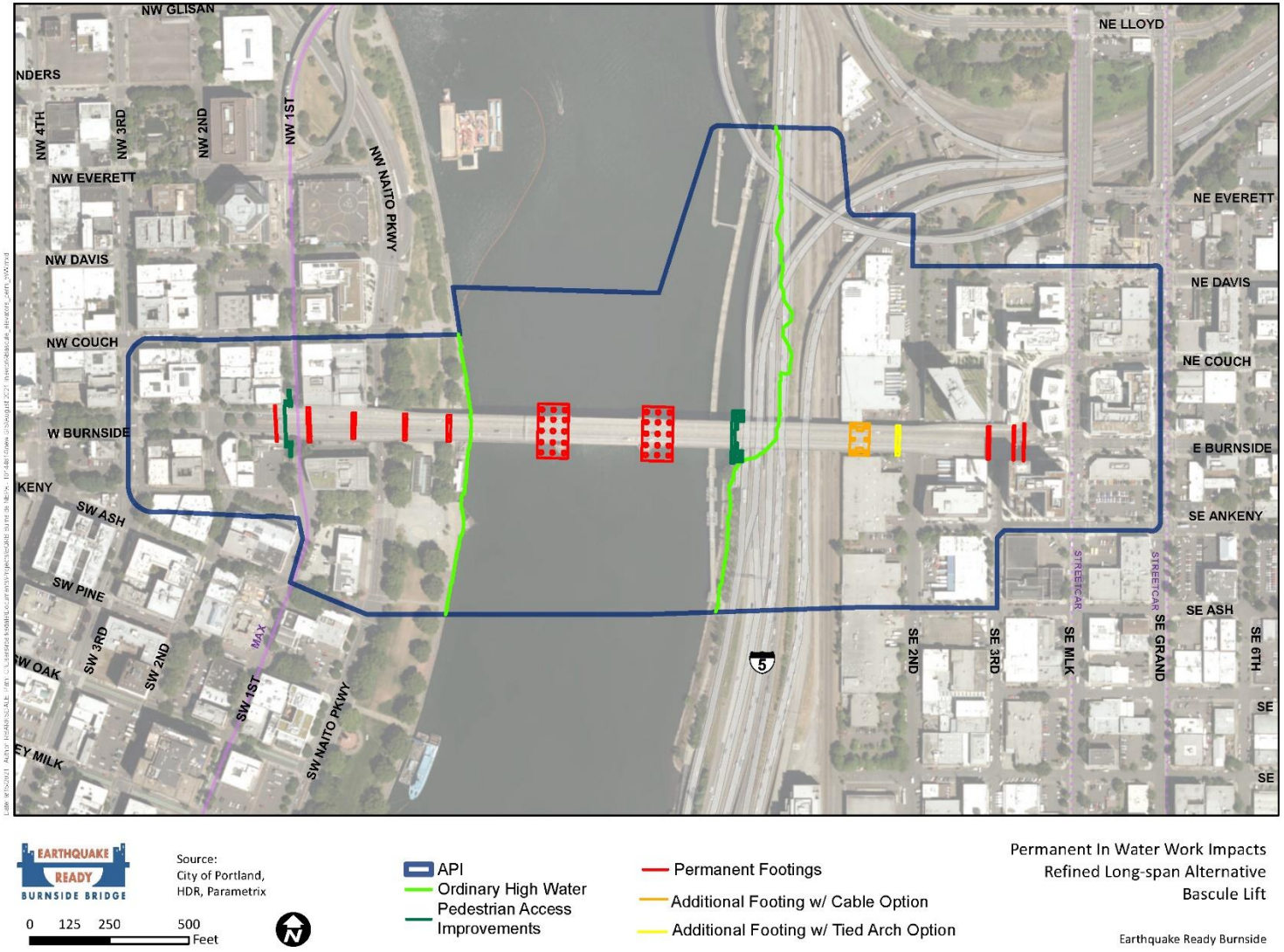
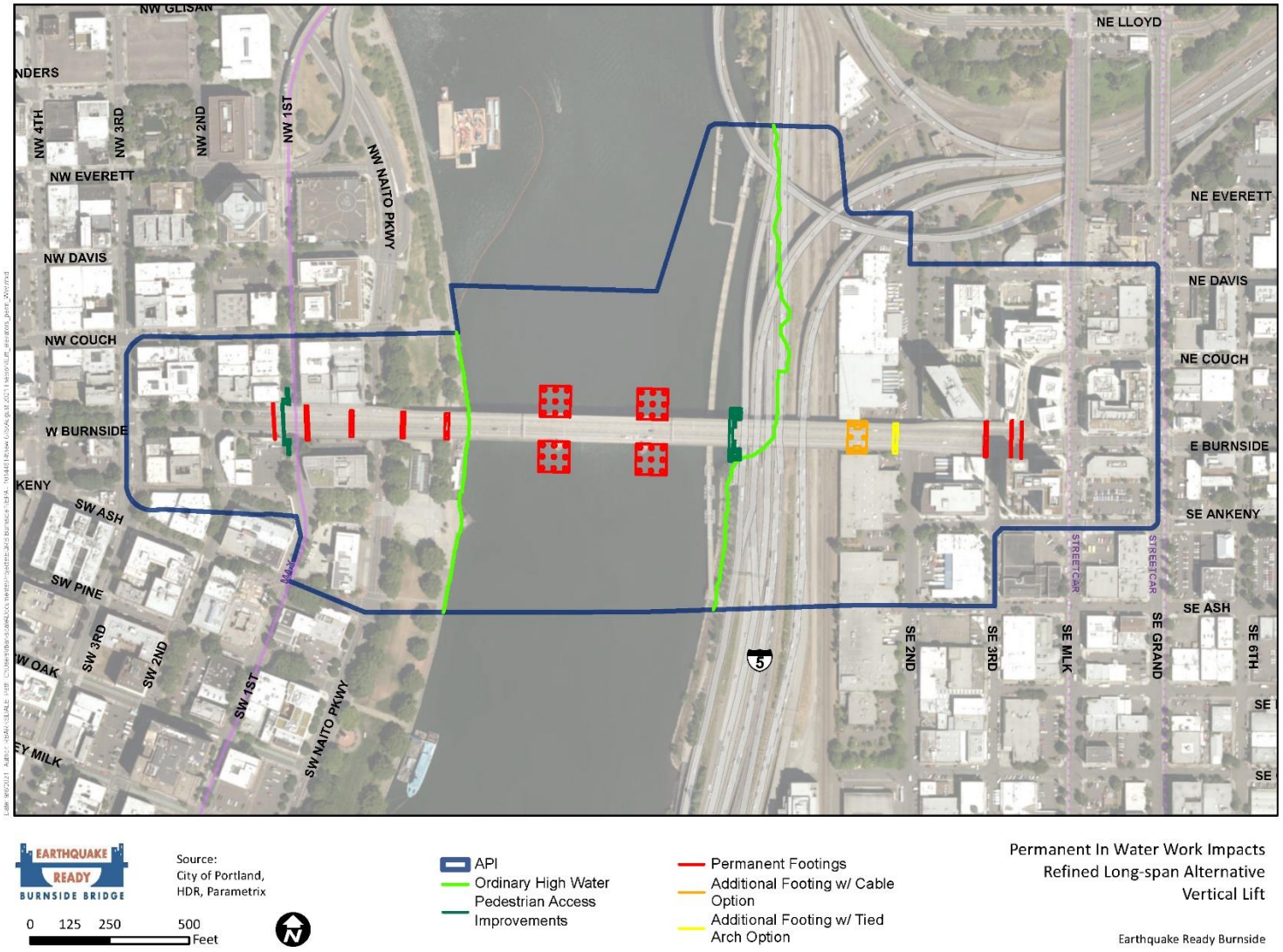


Figure 9. Permanent In-water Impacts Refined Long-Span Alternative with Vertical Lift



The proposed amount of permanent structure below OHWM from the Refined Long-span Alternative is less than what was proposed with the Draft EIS Long-span Alternative in the Draft EIS (Table 2). The net area of impact, calculated by subtracting the amount of existing structure below OHWM from the proposed structure below OHWM, is approximately 0.4 acre (Bascule Lift) to 0.6 acre (Vertical Lift). The Refined Long-span Alternative with a Bascule Lift has a smaller footprint than the Vertical Lift but has six additional shafts below OHWM. The Refined Long-span Alternative has equal to or greater permanent impacts below OHWM than the Draft EIS Long-span Alternative, depending on the movable span. The No-Build Alternative is unable to be quantified in terms of permanent impacts, however, it would have the most extensive impacts to waters after a CSZ earthquake. As discussed in the *EQRB Wetlands and Water Technical Report* (Multnomah County 2021e), the existing bridge would either collapse or become severely damaged, which would alter the riverbed and riparian area, as well as 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. Additional details regarding direct impacts to aquatic species and vegetation from the No-build Alternative are discussed in the *EQRB Vegetation, Wildlife, and Aquatic Species Technical Report* (Multnomah County 2021d).

Removal and fill impacts from the Refined Long-span Alternative would cause degradation of aquatic habitat through turbidity, hydroacoustic impacts, and both temporary and permanent losses of habitat. Other impacts resulting from the construction of the bridge and pedestrian connection would increase scour potential at the bridge, as discussed in the *EQRB Wetlands and Waters Technical Report* (Multnomah County 2021e) *and the EQRB Hydraulic Impact Analysis Technical Report* (Multnomah County 2021c). Increased scour could mobilize and transport sediment, which could potentially be contaminated from years of industrial development. Contaminated sediment could become suspended in the water column, lowering water quality, and becoming available for uptake by aquatic organisms. Any contaminated sediment that is excavated will be contained through the implementation of Best Management Practices (BMPs) and disposed of in accordance with federal and state regulations.

Less fill below OHWM 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 below OHWM would exacerbate these impacts. The Refined Long-span Alternative with a Bascule Lift would be anticipated to decrease impacts when compared to the Draft EIS Long-span Alternative with a Bascule or Vertical Lift. The Refined Long-span Alternative with a Vertical Lift would be anticipated to have less of an impact when compared to the Draft EIS Long-span Alternative with a Bascule Lift, but more of an impact when compared to the Draft EIS Long-span Alternative with a Vertical Lift. Although impacts to waters would occur from any of the Build Alternatives, BMPs would be implemented to ensure proper disposal of contaminated materials, prevention of hazardous material contamination, and minimizations measures were in place. Although the No-Build scenario has no pre-earthquake impacts to waters, post-earthquake it would have the most impacts since there would be no measures in place to prevent the bridge from collapsing.

Stormwater treatment facilities would be constructed to capture and treat runoff from impervious surfaces, which would discharge to the Willamette River after treatment. Runoff would be treated to current regulatory standards and would treat areas of existing impervious surface that are currently untreated. Whereas the Draft EIS Long-span Alternative would increase the amount of impervious surfaces by 0.9 acre, the Refined Long-span Alternative would decrease the amount of impervious surfaces by 0.3 acre, due to the proposed bridge being narrower than the existing. Overall, this would have a beneficial impact on water quality.

The *EQRB Wetlands and Waters Technical Report* (Multnomah County 2021e) discussed the potential of dredging the Willamette River as a form of mitigation for a rise in the base flood elevation, which would disturb the riverbed and potentially contaminated sediment. Dredging is no longer proposed with the Refined Long-span Alternative, therefore, a reduction of impacts to waters is anticipated.

7.2 Indirect Impacts

There are no potential indirect effects to waters anticipated for the Refined Long-span Alternative.

8 Potential Mitigation

Mitigation will still be required for permanent impacts to the Willamette River, as discussed in the Draft EIS, but the amount differs due to the updated amount of impacts proposed with the Refined Long-span Alternative. The minimization measures are the same, which include constraining the in-water footprint as much as practicable, implementing construction BMPs, and providing stormwater treatment. Compensatory mitigation is also still proposed, as required by U.S. Army Corps of Engineers, Oregon Department of State Lands, and the City of Portland. A mitigation bank has been identified to potentially purchase mitigation credits to compensate for the unavoidable impacts to the Willamette River. Some on-site riparian restoration is proposed along the east bank of the river, which would include removal of invasive vegetation and revegetation with native trees and shrubs. Exact locations and amounts of restoration and mitigation bank credits will be determined at a later date.

9 Agency Coordination

No additional agency coordination occurred for this memorandum.

10 Preparers

Name	Professional Affiliation [firm or organization]	Education [degree or certification]	Years of Experience
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11 References

Multnomah County

2021a EQRB Description of Alternatives Report. https://www.multco.us/earthquake-ready-burnside-bridge/project-library

2021b EQRB Draft Environmental Impact Statement. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.

2021c EQRB Hydraulic Impact Analysis Technical Report. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.

2021d EQRB Vegetation, Wildlife, and Aquatic Species Technical Report. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.

2021e EQRB Wetlands and Waters Technical Report. https://www.multco.us/earthquake-ready-burnside-bridge/project-library.

2022a EQRB Supplemental Draft Environmental Impact Statement https://www.multco.us/earthquake-ready-burnside-bridge/project-library.