

EQRB Active Transportation Access Options Memo

Project: Earthquake Ready Burnside Bridge NEPA

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1 Introduction

This technical memo describes a range of options being considered for secondary active transportation access near the west and east ends of the future Burnside Bridge. Any of the access options can be paired with any of the bridge alternatives or types. As such, the preferred alternative and bridge type decisions can be made independently of these access options, and the access option decisions can be made independently of the bridge alternative or bridge type decisions.

The options evaluated in this memo would not be the only way for bicyclists and pedestrians to access the bridge. Primary access for active transportation at each bridge end is already included as a fundamental aspect of every bridge alternative. These options are to provide additional and more direct access to/from perpendicular bicycle/pedestrian facilities that pass under the bridge near each end. Near the east end, access would be to the Vera Katz Eastbank Esplanade (Eastbank Esplanade), which passes under the bridge approximately 500 feet from the eastern abutment. Near the west end, access would be to 1st Avenue which passes under the bridge approximately 200 feet from the western abutment.

This memo has been prepared separately from the technical reports because late in the development of the draft environmental impact statement (DEIS), after completion of the technical reports, some stakeholders expressed concerns with the range of access options that were originally included for consideration. As a result, additional ideas were solicited from local stakeholders and a process to evaluate and consider them began. This memo documents the information regarding performance and impacts from a reasonable range of access options. Following the DEIS comment period, additional analysis or outreach may be needed prior to making a final decision on which access option to carry into final design. It is not expected that design refinements or supplemental analysis would reveal any new significant impacts.

2 Eastbank Esplanade Active Transportation Access Options

2.1 Existing Eastbank Esplanade Access

With the existing bridge, a stairway connects the southern sidewalk on the Burnside Bridge to the 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 Eastbank Esplanade and the bridge's northern (westbound) sidewalk and bike lane. There is ADA and bicycle access to the bridge approximately 500 feet east of these stairs.

2.2 Eastbank Esplanade Access Options

While the range of potential access configurations and designs is extensive, the range of reasonable alternatives can be organized into four fundamental options. These four options capture the range of potential impacts and benefits:

1. Stairs and Elevator on North and South Sides of the Bridge
2. Stairs and Elevator on South Side of the Bridge Only with a Signalized Mid-Block Crossing Connecting the North and South Sidewalks and Bike Lanes
3. Ramps on North and South Sides of the Bridge and Stairs on South Side
4. Ramp and Stairs on South Side Only with a Signalized Mid-Block Crossing Connecting the North and South Sidewalks and Bike Lanes

This section provides a description, conceptual design information, and construction assumptions for each option. Using this information, a preliminary impacts and performance assessment is provided in Section 2.3. See Attachment 1 for all figures referenced below. It should be noted that for all options, access will not be designed to meet the seismic design criteria developed for the bridge itself. As such, none of the options should be considered seismically resilient nor usable following a major seismic event. Instead, it should be assumed that any of these active transportation options would displace laterally along the bridge (towards the river) by up to 20 feet and/or may fail catastrophically as a result of a major earthquake.

2.2.1 Option 1: Stairs and Elevator on North and South Sides of the Bridge

2.2.1.1 OPTION DESCRIPTION

This option extends the Eastbank Esplanade spur, which leads to the existing stairway to stairs and ramps on either side of the bridge (Figure 1). Placed along and under the Burnside Bridge and over the river, this concept would provide ADA-compliant facilities to bicycle and pedestrian users on the bridge travelling in either the west or east directions. On the south side, the existing stairway would be removed, and a new stairs and elevator system would be constructed. On the north side, a single-span ramp from the south stairs would extend under the bridge, connecting to a new stairway and elevator on the north side of the bridge. Each stairs/elevator system would be constructed on separate, deep foundation supports.

To reduce natural resource impacts, an alternative stairway/elevator concept could be constructed as shown in Figure 2. In this case, the existing concrete platform supporting the stairway would need to be retrofitted for the loads of an elevator and linear stairs (similar to the existing stairway). A similar concept could be used for the system on the north side of the bridge, with a single-span bridge connecting the two.

Regardless of the concept selected, the stairway and access bridge would include top, bottom, and intermediate viewpoint landings. Additionally, the stairway widths would include enough space for a “bicycle gutter,” allowing bicyclists to ascend easier than a conventional stairway.

2.2.1.2 CONCEPTUAL DESIGN INFORMATION

The following design assumptions are incorporated with this concept, noting that information is based on the slightly more conservative option shown in Figure 1:

- **Permanent new fill in the river/floodplain.** This option requires new fill in the river/floodplain beyond what is already needed to construct the Burnside Bridge. As shown in Figure 1, the anticipated footprint includes 3,200 cubic yards (CY) of fill (with half placed on either side of the bridge). The entirety of this volume would be in shallow water habitat. See Table 1 for a comparison of fill volume estimates for the options.
- **No additional permanent physical impacts to the Eastbank Esplanade floating bridge.**
- **Permanent physical impacts to the Eastbank Esplanade at-grade (upland) sections.** For the more conservative option shown in Figure 1, the only impact to the at-grade section is where the stairs/elevator accessway connects to the existing walkway. There could be localized reconstruction to support the connection. If the concept depicted in Figure 2 is constructed, the existing concrete stairway platform would need to be retrofitted for the elevator loads and reconfigured widths.
- **No long-term impacts to ped/bike use of the Eastbank Esplanade.** Instead, these improvements enhance the connection by providing the most direct ADA-accessible route from the Eastbank Esplanade to the Burnside Bridge that bicyclists could also utilize.
- **Long-term impacts to ped/bike operations and reliability or user safety on the access facility.** Due to the size and speed of elevators, there could be peak times in which the use of elevators could take longer than traversing the ramp options. Furthermore, there could be periods in which elevator servicing and cleaning may require short-term service outages.

Table 1. Summary of Temporary and Permanent In-water Impacts

Eastbank Options	Permanent Fill	Temporary Fill
1. Stairs/Elevator N&S Sides	3,200 CY (half on each side of bridge, all in shallow water habitat)	600 CY fill, 5,000 CY riprap removal
2. Stairs/Elevator South Side Only (Mid-block Crossing)	1,600 CY (all placed south of bridge in SWH)	600 CY fill, 2,600 CY of riprap removal
3. Ramps on N&S Sides	19,200 CY (roughly half on each side of bridge, ~80% in SWH)	1,000 CY fill, 23,000 CY of riprap removal
4. Ramps on South Side Only (Mid-block Crossing)	19,200 CY (placed on south side of bridge, ~70% in SWH)	1,000 CY fill, 23,000 CY of riprap removal

CY (cubic yard)

2.2.1.3 CONSTRUCTION ASSUMPTIONS

The following construction assumptions are incorporated with this concept, noting that information is based on the slightly more conservative option shown in Figure 1:

- **Temporary fill and removal (riprap) in the river/floodplain.** This option requires approximately an additional 600 CY of fill (for the option foundations) and 5,000 CY of riprap removal in the river/floodplain beyond what is already needed to construct the Burnside Bridge.
- **No added temporary physical impacts to the Eastbank Esplanade floating bridge, nor removal of floating dock piles.**
- **No temporary physical impacts to the Eastbank Esplanade at-grade (upland) sections.**
- **No extension of or work outside the in-water work window beyond what is already needed to construct the Burnside Bridge.**
- **No additional temporary closure duration of the floating section beyond what is already needed for the construction of the Burnside Bridge.**

2.2.2 Option 2: Stairs and Elevator on the South Side of the Bridge Only with a Signalized Mid-block Crossing Connecting the North and South Sidewalks and Bike Lanes

2.2.2.1 OPTION DESCRIPTION

Like the previous option, this one has stairs and an elevator on the south side of the Burnside Bridge, but instead of having stairs and an elevator on the north side, it adds a mid-block, traffic-signalized, bicycle/pedestrian crossing (Figure 2). The mid-block crossing requires all motorized vehicles to stop, allowing bicyclists and pedestrians to cross the from the eastbound bicycle lane and sidewalk to the westbound bicycle lane and sidewalk on the north side of the bridge. To separate the queueing of bicycles and pedestrians waiting to cross the bridge from continuously flowing east-west bicycle traffic, belvederes would be constructed on either side of the bridge for storage space.

This traffic signal, and its stop bar locations, would be coordinated with the traffic signals for the movable span (just west of the mid-block crossing) to avoid overlapping queues. Westbound traffic would be stopped east of the mid-span crossing when the bicycle/pedestrian traffic signal is activated. This location coincides with the stop location when the bridge is raised. When the bicycle/pedestrian mid-block crossing is activated, eastbound traffic would stop west of the movable span. Similar to the stop location on the east side of the river, the west stop location also coincides with the stop location when the bridge is raised. This would likely require widening the bicycle and pedestrian facility to reduce/avoid conflicts between people waiting to cross north/south and bicyclists travelling east/west.

2.2.2.2 CONCEPTUAL DESIGN INFORMATION

The following design assumptions are incorporated with this concept, noting that information is based on the option shown in Figure 2:

- **Permanent new fill in the river/floodplain.** This option requires new fill in the river/floodplain beyond what is already needed to construct the Burnside Bridge. As shown in Figure 2, the anticipated footprint includes 1,600 CY of fill (with all placed on the south side of the bridge). The entirety of this volume would be in shallow water habitat.
- **No additional permanent physical impacts to the Eastbank Esplanade floating bridge.**
- **Permanent physical impacts to the Eastbank Esplanade at-grade (upland) sections.** The only impact to the at-grade section is where the stairs/elevator accessway connects to existing walkway. There could be localized reconstruction to support the connection. The existing concrete stairway platform would need to be retrofitted for the elevator loads and reconfigured widths.
- **No long-term impacts to ped/bike use of the Eastbank Esplanade.** Instead, these improvements enhance the connection by providing the most direct ADA-accessible route from the Eastbank Esplanade to the Burnside Bridge that bicyclists could also utilize without crossing under the bridge.
- **Long-term impacts to ped/bike operations and reliability, or user safety on the access facility.** Due to the size and speed of elevators, there could be peak times in which the use of elevators could take longer than traversing the ramp options. Furthermore, there could be periods in which elevator servicing and cleaning may be require short-term service outages. Additionally, the introduction of mid-block crossings creates conflict zones between bicycle users travelling along the bridge and bicyclists and pedestrians using the mid-block crossing . Finally, although there is a signal, some concern has been raised about pedestrian safety within mid-block crossings.
- **Limitations on how frequently the mid-block traffic signal would stop traffic.** In order to minimize delays to westbound traffic, the traffic signal would be coordinated with the signal at E Martin Luther King Junior Boulevard. The traffic signal is assumed to have an approximately 70 second cycle length, which provides sufficient green time between pedestrian phases, incurs minimal delay to traffic, and has 95 percent queuing that fits within available space between signals to the west and east.

2.2.2.3 CONSTRUCTION ASSUMPTIONS

The following construction assumptions are incorporated with this concept, noting that information is based on the option shown in Figure 2:

- **Temporary fill and removal (riprap) in the river/floodplain.** This option requires approximately an additional 600 CY of fill (for the option foundations) and 2,600 CY of riprap removal in the river/floodplain beyond what is already needed to construct the Burnside Bridge.
- **No additional temporary physical impacts to the Eastbank Esplanade floating bridge nor removal of floating dock piles and dock storage.**
- **No temporary physical impacts to the Eastbank Esplanade at-grade (upland) sections.**
- **No extension of or work outside the in-water work window beyond what is already needed to construct the Burnside Bridge.**

- **No additional temporary closure duration of the floating section.**

2.2.3 Option 3: Ramps on North and South Sides of the Bridge and Stairs on South Side

2.2.3.1 OPTION DESCRIPTION

This option reconstructs the Eastbank Esplanade spur as a separate bridge structure supported by a series of new, deep foundation supports (Figure 3). Placed generally perpendicular to and extending under the Burnside Bridge, this concept would provide ADA-compliant facilities to bicycle and pedestrian users on the bridge travelling in either the westbound or eastbound directions. A variety of layouts are being considered, including switchback ramps perpendicular to the bridge as shown on Figure 3, switchback ramps parallel to the bridge, spiral ramps, and elliptical ramps. The north ramp would include an undercrossing of the Burnside Bridge that ties into the south ramp. The south ramp would include stairs at the south end to bypass one switchback. All ramps and stairs would be on structure, and most of its construction would likely be adjacent to or over shallow water habitat.

2.2.3.2 CONCEPTUAL DESIGN INFORMATION

The following design assumptions are incorporated with this concept, noting that information is based on the option shown in Figure 3:

- **Permanent new fill in the river/floodplain.** This option requires new fill in the river/floodplain beyond what is already needed to construct the Burnside Bridge. The anticipated footprint includes 19,200 CY of fill (with roughly half placed on either side of the bridge). Roughly 80 percent of this volume would be in shallow water habitat.
- **No permanent physical impacts to the Eastbank Esplanade floating bridge.** The floating portions of the Eastbank Esplanade would be reconstructed in-kind or re-installed at its original positions following the construction of the access ramp.
- **No permanent physical impacts to the Eastbank Esplanade at-grade (upland) sections.** The at-grade portions of the Eastbank Esplanade would be reconstructed in-kind following the construction of the access ramp.
- **No long-term impacts to ped/bike use of the Eastbank Esplanade.** It would be reconstructed in-kind following the construction of the access ramp. These improvements enhance the connection by providing an ADA-accessible route from the Eastbank Esplanade to the Burnside Bridge that bicyclists could also utilize.
- **Long-term impacts to ped/bike operations and reliability, or user safety on the access facility.** Because of the approximately 50-foot change in elevation between the Burnside bridge deck and the Eastbank Esplanade, a ramp structure would need to be over 1000 feet in length (assuming a continual 5 percent grade). This extended length could create conflicts between experienced bicyclists, recreational users, and pedestrians.

2.2.3.3 CONSTRUCTION ASSUMPTIONS

The following construction assumptions are incorporated with this concept, noting that information is based on the option shown in Figure 3 and Figure 4:

- **Temporary fill and removal (riprap) in the river/floodplain.** This option requires approximately an additional 1,000 CY of fill (for the temporary work bridge foundations) and 23,000 CY of riprap removal in the river/floodplain beyond what is already needed to construct the Burnside Bridge.
- **Temporary physical impacts to the Eastbank Esplanade floating bridge, including the removal of floating dock piles and dock storage.** There are temporary impacts to the floating sections of the Eastbank Esplanade beyond what is already needed to construct the Burnside Bridge. As shown in Figure 4, this includes the removal and re-installation of the floating bridge section outlined in light blue. Storage areas for the removed sections would be as shown in the light blue shaded area north of the bridge.
- **Temporary physical impacts to the Eastbank Esplanade at-grade (upland) sections.** There are permanent impacts to the at-grade and upland sections of the Eastbank Esplanade beyond what is already needed to construct the Burnside Bridge. This includes the removal and replacement of the floating bridge section outlined in dark blue on Figure 4.
- **No extension of or work outside the in-water work window beyond what is already needed to construct the Burnside Bridge.**
- **Additional temporary closure duration of the floating section beyond what is already needed for the construction of the Burnside Bridge.** This option would require an additional 2 to 3 years of continual temporary closure of the Eastbank Esplanade beyond what is already needed to construct the Burnside Bridge. In effect, this access option would require the Eastbank Esplanade to be closed for the entirety of the bridge's construction duration.

2.2.4 Option 4: Ramp and Stairs on South Side Only with a Signalized Mid-block Crossing Connecting the North and South Sidewalks and Bike Lanes

2.2.4.1 OPTION DESCRIPTION

This option is the same as Option 3, but it adds a mid-block, traffic-signalized, bicycle/pedestrian crossing at the Eastbank Esplanade instead of a north ramp and undercrossing (Figure 5).

The mid-block crossing requires all motorized vehicles to stop, allowing bicyclists and pedestrians to cross the street and access the westbound bicycle lane and sidewalk on the north side of the bridge. To separate the queueing of bicycles and pedestrians waiting to cross the bridge from continuously flowing east-west bicycle traffic, belvederes would be constructed on either side of the bridge for storage space.

This traffic signal, and its stop bar locations, would be coordinated with the traffic signals for the movable span (just west of the mid-block crossing) to avoid overlapping queues. Westbound traffic would be stopped east of the mid-span crossing when the bicycle/pedestrian traffic signal is activated. This location coincides with the stop location when the bridge is raised. When the bicycle/pedestrian mid-block crossing is activated, eastbound traffic would stop west of the movable span. Like the stop location on the east side of the river, the west stop location coincides with the stop location when the bridge is raised. This would likely require widening the bicycle and pedestrian facility to reduce/avoid conflicts between people waiting to cross north/south and bicyclists travelling east/west.

2.2.4.2 CONCEPTUAL DESIGN INFORMATION

The following design assumptions are incorporated with this concept, noting that information is based on the option shown in Figure 5:

- **Permanent new fill in the river/floodplain.** This option requires new fill in the river/floodplain beyond what is already needed to construct the Burnside Bridge. As shown in Figure 5, the anticipated footprint includes 19,200 CY of fill (placed entirely on the south side of the bridge). Roughly 70 percent of this volume would be in shallow water habitat.
- **No permanent physical impacts to the Eastbank Esplanade floating bridge.** The floating portions of the Eastbank Esplanade would be reconstructed in-kind or re-installed at its original positions following the construction of the access ramp.
- **No permanent physical impacts to the Eastbank Esplanade at-grade (upland) sections.** The at-grade portions of the Eastbank Esplanade would be reconstructed in-kind following the construction of the access ramp.
- **No long-term impacts to ped/bike use of the Eastbank Esplanade, including bicycle operations and safety.** It would be reconstructed in-kind following the construction of the access ramp. These improvements enhance the connection by providing an ADA-accessible route from the Eastbank Esplanade to the Burnside Bridge that bicyclists could also utilize.
- **Long-term impacts to ped/bike operations and reliability or user safety on the access facility.** Because of the approximately 50-foot change in elevation between the Burnside bridge deck and the Eastbank Esplanade, a ramp structure would need to be over 1000 feet in length (assuming a continual 5 percent grade). This extended length could create conflicts between experienced bicyclists, recreational users, and pedestrians. Additionally, the introduction of mid-block crossings creates conflict zones between bicycle users travelling along the bridge with the mid-block crossing users travelling perpendicular to it. Finally, although there is a signal, some concern has been raised about pedestrian safety within mid-block crossings.
- **Limitations on how frequently the mid-block traffic signal would stop traffic.** In order to minimize delays to westbound traffic, the traffic signal would be coordinated with the signal at E Martin Luther King Junior Boulevard. The traffic signal is assumed to have an approximately 70 second cycle length, which provides sufficient green time between pedestrian phases, incurs minimal delay to traffic, and has 95 percent queuing that fits within available space between signals to the west and east.

2.2.4.3 CONSTRUCTION ASSUMPTIONS

The following construction assumptions are incorporated with this concept, noting that information is based on the option shown in Figure 5:

- **Temporary fill and removal (riprap) in the river/floodplain.** This option requires approximately an additional 1,000 CY of fill (for the temporary work bridge foundations) and 23,000 CY of rip rap removal in the river/floodplain beyond what is already needed to construct the Burnside Bridge.
- **Temporary physical impacts to the Eastbank Esplanade floating bridge, including the removal of floating dock piles and dock storage.** There are temporary impacts to the floating sections of the Eastbank Esplanade beyond what is already needed to

construct the Burnside Bridge. As shown in Figure 4, this includes the removal and re-installation of the floating bridge section outlined in light blue. Storage areas for the removed sections would be as shown in the light blue shaded area north of the bridge.

- **Temporary physical impacts to the Eastbank Esplanade at-grade (upland) sections.** There are permanent impacts to the at-grade and upland sections of the Eastbank Esplanade beyond what is already needed to construct the Burnside Bridge. As shown in Figure 4, this includes the removal and replacement of the floating bridge section outlined in dark blue.
- **No extension of or work outside the in-water work window beyond what is already needed to construct the Burnside Bridge.**
- **Additional temporary closure duration of the floating section.** This option would require an additional 2 to 3 years of continual temporary closure of the Eastbank Esplanade beyond what is already needed to construct the Burnside Bridge. In effect, this access option would require the Eastbank Esplanade to be closed for the entirety of the bridge's construction duration.

2.2.5 Options Dismissed from Consideration

The Project dismissed an option that would have created two-way (i.e. westbound and eastbound) bicycle lanes on the Burnside Bridge located on the south side of the bridge. This would have eliminated the need for bicyclists to travel from the Eastbank Esplanade to the westbound bicycle lane on north side of the bridge. However, it did not address desires for a similar connection for pedestrians between the Eastbank Esplanade and the north side of the bridge. This option also did not fit in the building-constrained segments of the bridge that are west of SW 1st Avenue and east of SE 2nd Avenue.

The Project has dismissed any options that would not provide a connection (either directly or with a mid-block traffic-signal protected crossing) to both the eastbound and westbound sidewalks and bikes lane on the Burnside Bridge. To provide access to only the eastbound facilities would have had the potential to induce wrong-way riding and conflicts with pedestrians or illegal crossings of the roadway to access the opposite side.

2.3 Impacts and Performance Assessment

Some aspects of performance are described above in Section 2.2. This section describes additional relevant impacts and performance of the reasonable options for improving access between the future bridge and the Eastbank Esplanade.

2.3.1 Hydraulics/Flooding

The DEIS hydraulic impact analysis qualitatively compares the proposed geometry of each reasonable option against the existing condition, focusing on the elements (such as lateral surface area in the floodplain and openings between columns) that affect how flow would move around piers and footings and the potential for hydraulic changes that could impact scour or base flood elevation. (Following the public comment period on the DEIS including the recommended Preferred Alternative, the bridge design will be advanced, detailed hydraulic modeling of the channel will be conducted, and results would be documented in a technical hydraulic design report that could support a no-rise certification.)

The proposed permanent designs for improving access between the future bridge and the Eastbank Esplanade would involve excavation of contaminated soils and placement of fill within the floodplain in the form of structural shafts and would aim to avoid or minimize widening of the embankment. Permanent impacts resulting from the placement of structural support shafts include the potential to increase base flood elevations, increase contraction scour by constricting flows and narrowing the channel area, as well as increase local or pier scour when the capacity of the flow to erode and transport sediments is larger than the capacity to replace the sediments. The sum of these scours, or the total scour, has the potential to mobilize contaminated sediments when compared to the No-Build Alternative.

Temporary construction of the options would involve the excavation and removal of contaminated soils and riprap in the main channel of the river, along the embankment, and in the riparian areas. In-water work to construct the ramp could include the use of cofferdams and a seal course, pile driving, and the placement of the support shafts. These activities would temporarily increase the potential for contraction scour and mobilization of contaminated sediments in the near-shore area during construction, in an area where previous scour effects have been noted.

Table 2 summarizes the potential hydraulic impacts. The impacts are expressed in relative terms based on the lowest to highest impact among the options.

Table 2. Summary of Temporary and Permanent Hydraulic Impacts

Eastbank Options	Permanent Fill	Temporary Fill	Additional Considerations
1. Stairs/Elevator N&S Sides	<ul style="list-style-type: none"> • Medium amount of fill in floodplain • Medium expected increase in scour 	<ul style="list-style-type: none"> • Medium amount of disturbed sediment 	Would place 3 additional shafts in the regulatory floodway of the river in the vicinity of previously identified riverbed scouring.
2. Stairs/Elevator South Side Only (Mid-block Crossing)	<ul style="list-style-type: none"> • Lowest amount of fill in floodplain • Least expected increase in scour 	<ul style="list-style-type: none"> • Lowest amount of disturbed sediment 	Would place no shafts below the ordinary high water level and regulatory floodway of the channel.
3. Ramps on N&S Sides	<ul style="list-style-type: none"> • Highest amount of fill in floodplain • Highest expected increase in scour 	<ul style="list-style-type: none"> • Highest amount of disturbed sediment 	Would place at least 7 shafts below the ordinary high water level of the channel and regulated floodway and 15 shafts within the floodplain.
4. Ramps on South Side Only (Mid-block Crossing)	<ul style="list-style-type: none"> • Similar to Option 3 	<ul style="list-style-type: none"> • Similar to Option 3 	Similar to Option 3.

2.3.2 Aquatic Habitat and Fish

Aquatic habitat and fish impacts consider how the changes from the potential options would affect the existing aquatic species and their habitat within the Willamette River. This analysis is a high-level summary of the resources that would be affected by constructing the access options. For a more detailed analysis of how impacts affect aquatic species, refer to the *EQRB Vegetation, Wildlife, and Aquatic Species Technical Report* (Multnomah County 2021).

All access options described above would result in both temporary and permanent impacts below ordinary high water, affecting aquatic species. Several fish species listed under the Endangered Species Act (ESA) are present in the Willamette River, using the area for migration, rearing, and feeding habitat during all life stages. In addition to the presence of shallow water habitat, the Lower Willamette River has been designated as critical habitat for several ESA-listed salmonids. Permanent fill within the river associated with all access options presented in this memo would cause a direct loss of habitat, including designated critical habitat. Construction activities to place the proposed structures that would result in permanent fill could temporarily affect fish and their habitat through a reduction of water quality, hydroacoustic impacts, and through degradation and reduction of available habitat.

Temporary removal of riprap in the river can increase turbidity which affects aquatic species in several ways including direct mortality, increased potential for gill tissue damage, physiological stress, behavior changes, and habitat impacts. Best management practices (BMPs) would be implemented to minimize the extent and duration of turbidity, including the establishment of a temporary mixing zone for turbidity whereby turbidity may temporarily exceed ambient levels and will require regular water quality monitoring during construction activities. An Erosion and Sediment Control Plan would be developed for the Project that outlines measures to be taken before and during construction to prevent sediment from accumulating and discharging in the river. In addition to increases in turbidity, construction activities involved with temporary fill and removal in the river affect the amount of available habitat for fish and other aquatic species. Turbidity levels associated with the Project are not anticipated to reach levels that would result in direct mortality or gill damage to fish; however, physiological stress and behavior changes such as temporary avoidance are likely.

Shallow water habitat is defined as 20 feet below the ordinary low water mark up to the ordinary high water mark. Shallow water habitat is important to migrating and rearing salmonids because it provides refuge from high flows found in deeper waters and provides rearing and feeding habitat for juveniles. There are 3.4 acres of shallow water habitat within the Project Area, which includes the access area. Fill and removal associated with the proposed access options would create additional impacts to the remaining shallow water habitat in the Project Area, which has already been degraded over time due to previous development. Fill placed within shallow water habitat would cause a direct permanent loss of habitat for aquatic species, including ESA-listed salmonids, other resident fish, and macroinvertebrates. This could lead to increased difficulties during juvenile migration due to a lack of refuge and feeding areas.

Floating dock piles would be temporarily removed and reinstalled with Options 3 and 4 described above. Removal of existing piles in the river could result in temporary increases in turbidity, resulting in behavioral responses in fish such as temporary avoidance of the area, and temporary unavailability of habitat. The floating dock piles would be replaced after construction of access foundations are complete, which would entail pile driving. Pile driving creates underwater noise, called hydroacoustic impacts, which can affect fish in several ways. Hydroacoustic impacts can alter behavior in fish, result in physical injury, or direct mortality. When the floating dock piles are reinstalled, pile driving would occur, potentially impacting fish. BMPs will be implemented to minimize the likelihood of impacts, including installing pile using a

vibratory hammer (rather than an impact hammer) and use of a bubble curtain during all impact pile driving. In addition, all pile driving will be performed during the approved in-water work window for pile driving (July 10 – October 15), which coincides with the lowest presence of ESA-listed species in the Lower Willamette River.

Option 2 has the least amount of proposed permanent fill and temporary fill and would have the least impact on fish and aquatic habitat, followed by Option 1. Options 3 and 4 have the same amount of proposed permanent and temporary fill, but Option 3 would result in approximately 10 percent more of permanent fill placed within shallow water habitat. Option 3 would have the largest impact on both aquatic species and habitat.

2.3.3 Vegetation

Vegetation removal can impact the surrounding environment as well as terrestrial and aquatic species. Temporary clearing of vegetation is proposed for construction staging and access for all access options. The existing vegetation near the proposed access construction areas is limited and highly disturbed. Riparian vegetation in the proposed access area is comprised mostly of herbaceous vegetation and tree seedlings. The majority of the riparian vegetation is comprised of invasive plant species such as Himalayan blackberry, however, some native species such as Douglas' spiraea are present. Few large trees are present, other than a row of street trees that lines the east side of the Eastbank Esplanade.

Options 3 and 4 would result in the removal of approximately 20 trees south of the existing bridge, just east of the Eastbank Esplanade Path. Options 1 and 2 would not require removal of these trees or any additional vegetation that isn't already proposed for removal associated with the construction of the build alternatives. Impacts associated with vegetation removal include a reduction of habitat and foraging resources for birds and wildlife. Upon construction completion, vegetation would be restored with a variety of native plant species. Some project elements will require the removal of vegetation and will not allow for restoration in the same area due to installation of structures. Losses of riparian vegetation can impact birds and wildlife through a reduction in habitat connectivity and food resources. Riparian vegetation can also help control erosion of banks, and if vegetation is removed, it could have an effect on water quality due to sediment entering the water column, thereby affecting fish and other aquatic species. In areas where vegetation currently exists that will be removed and is unable to be replaced, mitigation for permanent vegetation loss will occur within the Lower Willamette River (outside of the Project Area) or through the purchase of mitigation bank credits.

2.3.4 Parks (Eastbank Esplanade)

Impacts to the Eastbank Esplanade from the access options are focused on the duration and extent of temporary closure of and permanent changes to the Eastbank Esplanade.

Both options with stairs and an elevator would not require additional temporary closure duration of the floating portion of the Eastbank Esplanade compared to the 18 months needed to construct the Long-span Alternative without a Temporary Bridge (total of 18 months made up of several shorter intermittent closures). Both options with ramps would require an additional 2 to 3 years of closure for construction, meaning it would be closed for the full duration of bridge construction.

Both options with stairs and an elevator would not require additional physical impacts to the Eastbank Esplanade compared to those identified with the Long-span Alternative without a Temporary Bridge. Both options with ramps would require additional impacts including removal and replacement of the floating bridge leading down from the at grade section to the floating section of the Eastbank Esplanade.

2.3.5 Visual Impacts

Visual and aesthetics impacts consider how the changes from the potential options would affect the existing built and natural landscape and which viewer groups would be affected. This analysis builds from the principles, the descriptions of the existing environment and user groups included in the *EQRB Visual Resources Technical Report* (Multnomah County 2021).

Option 2 (stairs and elevator on the south side only) would have a very similar form to the existing stairs on the south side of the bridge and would not contrast with the visual character of the Eastbank Esplanade. Option 1, which adds stairs and elevator to the north side of the bridge, would also be similar in form to the existing stairs but with a larger footprint. Both options would require a foundation structure in the river itself, although this structure would be about twice as large with Option 1 compared to Option 2. This added structure in the river would adversely affect the views from the Eastbank Esplanade, although substantially less than the impact with the ramp options (see below).

Option 4 (ramp on the south side only) or Option 3 (ramps on both sides of the bridge) with switchbacks or spirals from the bridge deck to the Eastbank Esplanade would create a much greater footprint than the existing conditions or than Options 1 and 2. This greater footprint would remove up to 20 existing trees on the east bank, greatly affecting the visual character, especially as viewed from the Eastbank Esplanade or the eastbound bridge sidewalk. The fact that there are few trees along the Eastbank 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 ramp structure(s) (Options 3 and 4) would alter views from the Eastbank Esplanade and from the west side of the river looking east. The greatest impact would be with Option 3 (ramps on both sides of the bridge). In addition, the ramps would require foundations located in the river and on the shoreline, which would further alter views from the Eastbank Esplanade. The in-river foundations for the ramp options would be 6 to 12 times larger in volume than the structures supporting the stairs and elevator(s) with Options 1 and 2, respectively.

Travelers are the closest viewers. Vehicular travelers are minimally affected by the structure due to their rate of travel, but pedestrian and bicycle travelers would view the structure for a longer duration. The structure will be seen by neighbors on the Eastbank Esplanade and Tom McCall Waterfront Park (Waterfront Park). The increased footprint of the ramp structure(s) (Options 3 and 4) increases the distance from which they would be seen and the duration of time they would be seen.

The added structure of the ramps and their support columns would detract from the natural aesthetics of the river. While the visual effects of the ramp options would be substantial for

specific views, as noted above, the quality of the visual change for some views would depend in part on the detailed design of the ramp structures, including their compatibility with the Eastbank Esplanade and the Burnside Bridge. Blocking views to the freeway to the east may be seen as a beneficial impact. Another potential benefit of ramps would be added views and visual experiences for pedestrians and bicyclists on the ramps.

For any of the options, but for the ramp options in particular, final design should consider how to maximize aesthetic experience for all users approaching, on, and under the bridge by considering opportunities related to scale, forms and materials, viewing, wayfinding, transitions to and from public spaces, lighting/shade/shadows, and activating areas for public use.

3 West End Active Transportation Access Options

3.1 Existing Westside Access to 1st Avenue

With the existing bridge, direct access to 1st Avenue below the bridge is via a set of stairs on each side of the bridge that extends down to the sidewalk on the west side of 1st Avenue approximately 20 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.

3.2 Options for Westside Access to 1st Avenue

There are five options being considered to provide this access in the future:

1. In-Kind Stairs on the North and South Sides
2. In-Kind Stairs on North Side; New Ramp (Saturday Market Admin Site) and Stairs on South Side
3. In-Kind Stairs on North Side; New Ramp (Saturday Market Admin Site) and Stairs on South Side with Mid-block Crossing
4. In-Kind Stairs on North Side; New Ramp (Mercy Corps Parking Site) and Stairs on South Side
5. In-Kind Stairs on North Side; New ramp (Mercy Corps Parking Site) and Stairs on South Side with Mid-block Crossing

For noted options, the following design features apply:

- All layouts include a street-level sidewalk connection between 1st Avenue and Naito Parkway along the north face of the Mercy Corps building so that all users can access the ramp and stairs from either street.
- All ramp layouts reduce the amount of natural light under the Burnside Bridge between 1st Avenue and Naito Parkway.
- All layouts for Options 4 and 5 require acquisition of the entire surface-level parking lot between the Burnside Bridge and the Mercy Corps building. This parking could potentially be replaced under the bridge that is currently leased by the University of Oregon from the City of Portland.

- All layouts for Options 4 and 5 would require relocation of existing stormwater planter facilities in this parking lot. The new stormwater facilities would likely be vaults placed nearby, under the Burnside Bridge.
- All options can be constructed within the anticipated overall construction duration.
- All options have equivalent temporary impacts to operations at TriMet's Skidmore Fountain MAX station.

The sections below provide design information and construction assumptions, when applicable, unique to each option. See Attachment 1 for all figures referenced below.

3.2.1 In-Kind Stairs on North and South Sides

The stairway on the north side of the bridge to the Skidmore Fountain MAX station would be replaced with a new stairway (Figure 6). That, combined with the sidewalk circling the block, including W Burnside Street, NW 2nd Avenue, and NW Couch Street (see the blue path in Figure 8), would provide ADA access to the Skidmore Fountain MAX station and 1st Avenue.

The stairway on the south side of the bridge to the Skidmore Fountain MAX station would be replaced with a new stairway (Figure 6). That, combined with the sidewalk circling the block, including W Burnside Street, SW 2nd Avenue, and SW Ankeny Street (see the pink path in Figure 8), would provide ADA access to the Skidmore Fountain MAX station and 1st Avenue.

3.2.2 In-Kind Stairs on North Side; New Ramp (Saturday Market Admin Site) and Stairs on South Side

The stairway on the north side of the bridge to the Skidmore Fountain MAX station would be replaced with a new stairway (Figure 6). That, combined with the sidewalk circling the block, including W Burnside Street, NW 2nd Avenue, and NW Couch Street (see the blue path in Figure 8), would provide ADA access to the Skidmore Fountain MAX station and 1st Avenue.

The stairway on the south side of the bridge to the Skidmore Fountain MAX station would be replaced with a new stairway and a ramp just west of 1st Avenue in the current Saturday Market Admin site (Figure 7). Several layouts are being considered that have different switchback orientations and stair locations, but all fit into the same approximate footprint as previously identified in the technical reports. Concerns have been expressed that this ramp uses part of a current parking lot that could be better used as redevelopment space in the future. There are also questions whether the ramp should be oriented to serve the Skidmore Fountain MAX station or re-oriented towards Naito Parkway and Waterfront Park.

3.2.3 In-Kind Stairs on North Side; New Ramp (Saturday Market Admin Site) and Stairs on South Side with Mid-block Crossing

This option is the same as the previous option (i.e. In-Kind Stairs on North Side; New Ramp (Saturday Market Admin Site) and Stairs on South Side), but it adds a mid-block, traffic-signalized, bicycle/pedestrian crossing of the Burnside Bridge near 1st Avenue. This crossing provides a shorter-distance ADA route for north side pedestrians than the proposed route that goes around the block or uses the crosswalk at 2nd Avenue to access 1st Avenue and the Skidmore Fountain MAX station (see the red path in Figure 8). This crossing reduces the travel distance by approximately 200-feet to 300-feet. This crossing would need to be tied

into the nearby traffic signals on W Burnside Street. This traffic signal is assumed to have an approximately 90 second cycle length, which provides sufficient green time between pedestrian phases, incurs minimal delay to traffic, and has 95 percent queuing that fits within available space between signals to the west and east. There are a few issues with this crossing that cannot be mitigated:

- This crossing would have a cross slope of 4.2 percent, which is steeper than the desired 2 percent maximum for ADA circulation routes.
- The cross section in this area is constrained by buildings, so there is limited or no space to widen the bicycle and pedestrian facility to reduce/avoid conflicts between people waiting to cross north/south and bicyclists travelling east/west.

3.2.4 In-Kind Stairs on North Side; New Ramp (Mercy Corps Parking Site) and Stairs on South Side

The stairway on the north side of the bridge to the Skidmore Fountain MAX station would be replaced with a new stairway (Figure 6). That, combined with the sidewalk circling the block, including W Burnside Street, NW 2nd Avenue, and NW Couch Street (see the blue path in Figure 8), would provide ADA access to the Skidmore Fountain MAX station and 1st Avenue.

The stairway on the south side of the bridge to the Skidmore Fountain MAX station would be replaced with a new stairway and a ramp just west of 1st Avenue in the current Mercy Corps Parking site. Multiple layouts are being considered, as follows:

- The first layout uses a 4.75 percent grade ramp that ties into 1st Avenue. It includes extending the Burnside Bridge supports on both sides of 1st Avenue to allow the ramp to span over the MAX tracks. It has limited space to fit stairs (except potentially under the bridge at Naito Parkway) (Figure 9). An alternative to this layout uses a steeper 7.5 percent grade ramp to avoid crossing the MAX tracks. It more easily fits stairs into Naito Parkway at the east end of the switchback.
- A second layout uses a steeper 7.5 percent grade ramp to tie into Naito Parkway with stairs at 1st Avenue. It includes a span over Naito Parkway that would place ramp foundation supports in the Naito Parkway median and/or in the west edge of Waterfront Park (Figure 10). This layout has the greatest potential impact to Naito Parkway and/or Waterfront Park and could require one-way closures of Naito Parkway for up to three months during construction.

3.2.5 In-Kind Stairs on North Side; New Ramp (Mercy Corps Parking Site) and Stairs on South Side with Mid-block Crossing

This option is the same as the previous option (i.e. In-Kind Stairs on North Side; New Ramp (Mercy Corps Parking Site) and Stairs on South Side), but it adds a mid-block, traffic-signalized, bicycle/pedestrian crossing of the Burnside Bridge near 1st Avenue. This crossing provides a shorter-distance ADA route for north side pedestrians than the proposed route that goes around the block or uses the crosswalk at 2nd Avenue to access 1st Avenue and the Skidmore Fountain MAX station (see the red path in Figure 8). This crossing reduces the travel distance by approximately 200-feet to 300-feet. This crossing would need to be tied into the nearby traffic signals on West Burnside Street. This traffic signal is assumed to have an approximately 90

second cycle length, which provides sufficient green time between pedestrian phases, incurs minimal delay to traffic, and has 95 percent queuing that fits within available space between signals to the west and east. There are a few issues with this crossing that cannot be mitigated:

- This crossing would have a cross slope of 4.2 percent, which is steeper than the desired 2 percent maximum for ADA circulation routes.
- The cross section in this area is constrained by buildings, so there is limited or no space to widen the bicycle and pedestrian facility to reduce/avoid conflicts between people waiting to cross north/south and bicyclists travelling east/west.
- The introduction of mid-block crossings creates conflict zones between bicycle users travelling along the bridge with the mid-block crossing users travelling perpendicular to it.
- Although there is a signal, some concern has been raised about pedestrian safety within mid-block crossings.

3.2.6 Options Dismissed from Consideration

Elevators were considered on both sides of the bridge but were dismissed due to concerns about safety around and in elevators in this area.

A ramp option from the north side of the bridge was dismissed due to many conflicts with doors, trees, OCS poles, sidewalk circulation and concerns about safety.

Several ramp, stairway, and elevator options were considered to provide a direct connection between the Burnside Bridge and Waterfront Park. All these options were dismissed based on impacts to Waterfront Park functions and events, and a lack of support from local stakeholders.

3.3 Impacts

This section describes the relevant impacts and performance of the reasonable options for improving access between the future bridge and 1st Avenue on the west side.

3.3.1 Compatibility with City Land Use/Re-development Plans

The areas that would be affected under any of the options are all within the Skidmore/Old Town Historic District, the Central City 2035 Plan, and are designated with the Central Employment base zone and Comprehensive Plan designation and a Design overlay zone. Impacts generally consider whether the proposed use is consistent with the applicable designations and plans and whether the options are differentiated from the bridge alternatives in the DEIS based on these factors.

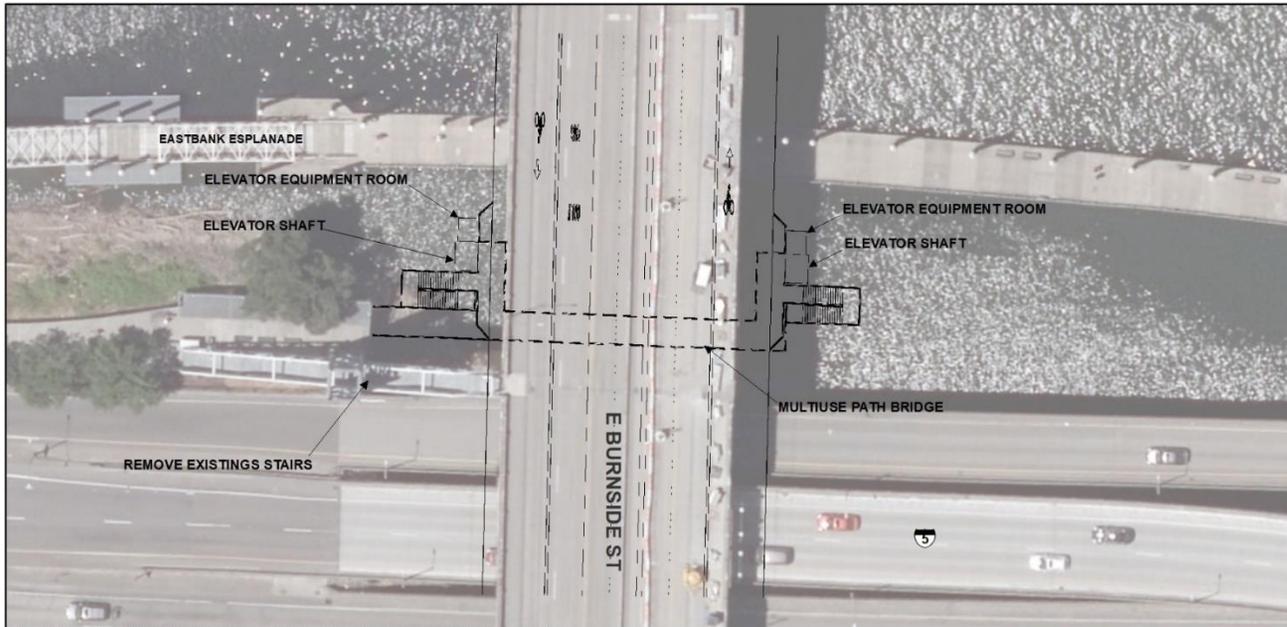
Options 1, 2, and 3 for westside access to 1st Avenue all present the same general future land use as considered for the bridge alternatives in the DEIS. The Portland Saturday Market Administration building is described in the DEIS as a permanent acquisition with a new transportation-related permanent structure, which is the same scenario under these three options. This site is also identified as a location with potential for redevelopment by its inclusion in the Buildable Lands Inventory. Use of this location for a ramp structure limits the employment and housing potential of the site. Any of these options would be required to meet standards in the Central City 2035 Plan and Design Standards.

Options 4 and 5 for westside access to 1st Avenue differ from all of the bridge alternatives in the DEIS because both Option 4 or 5 would require a permanent acquisition and structure, where the bridge alternatives only required a temporary construction easement on this property. However, the land use compatibility is similar for all five options because the applicable standards are the same. In addition, the second potential layout for Option 5 would require permanent impacts in Waterfront Park that would be in addition to those already considered for the bridge alternatives.

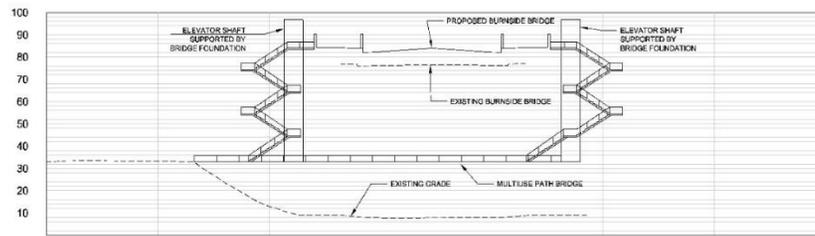
Attachment 1. Figures

Eastbank Esplanade Access Options

Figure 1. Stairs and Elevator on North and South Sides of the Bridge



Date: 1/15/2021 Author: ahmagps Path: U:\P\of\Projects\1616\1616 Burnside Bridge NEP\066\066\1616\1616 Transportation_Memo\fig_1_elevators_and_stairs.mxd



ELEVATION A

**EARTHQUAKE
READY**
BURNSIDE BRIDGE

Source:
City of Portland, Oregon
HDR, Parametrix



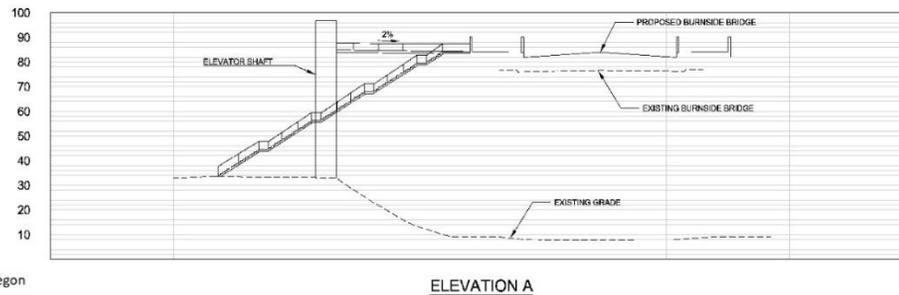
Elevators and Stairs

Earthquake Ready Burnside

Figure 2. Stairs and Elevator on South Side of the Bridge Only with a Signalized Mid-block Crossing Connecting the North and South Sidewalks and Bike Lanes



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Elevators and Stairs - South

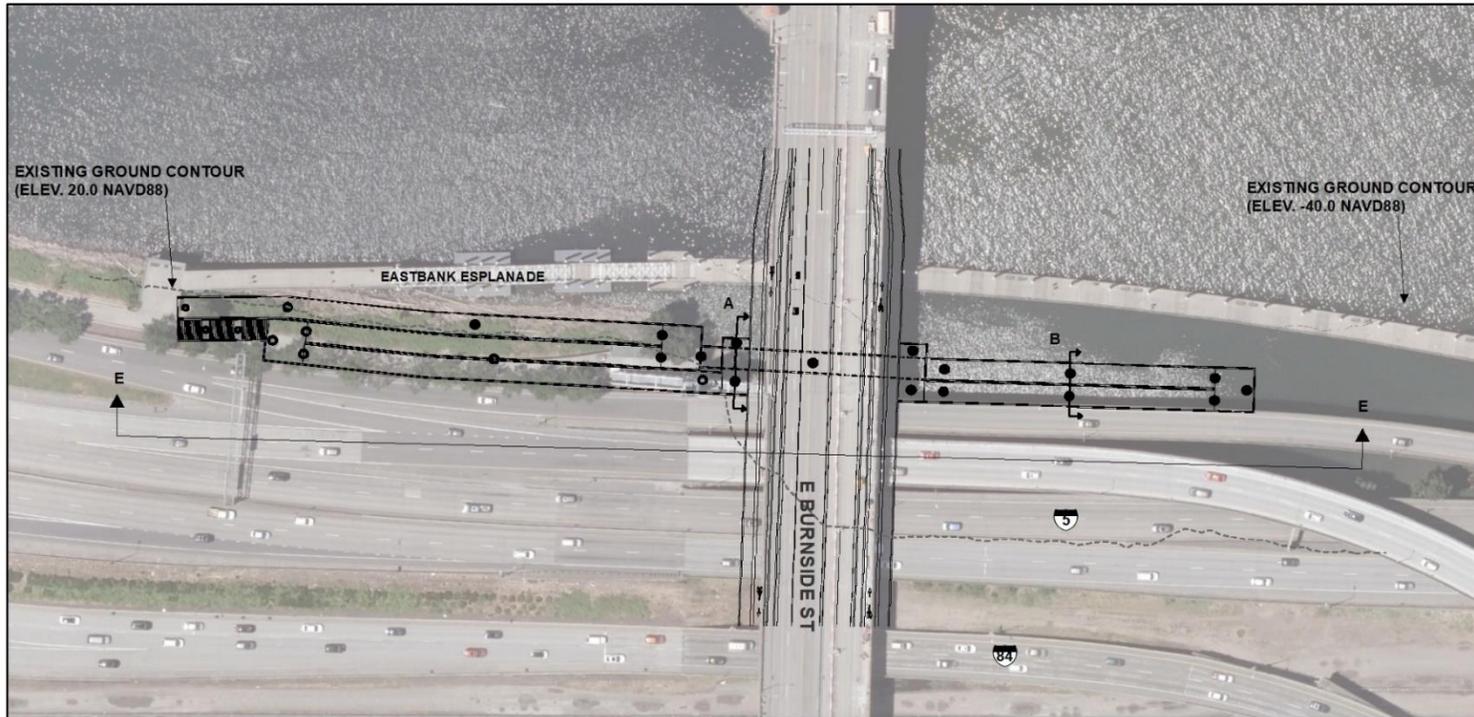


Source:
City of Portland, Oregon
HDR, Parametrix

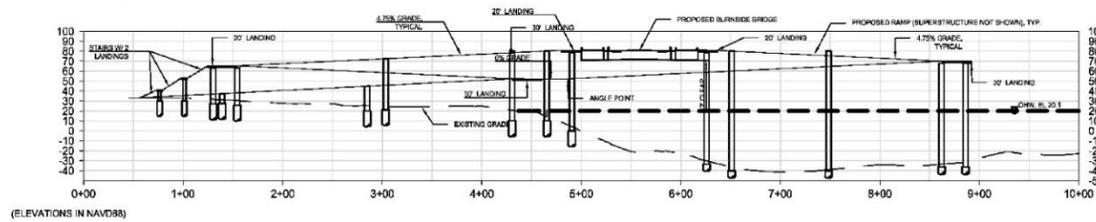


Earthquake Ready Burnside

Figure 3. Ramps on North and South Sides of the Bridge and Stairs on South Side

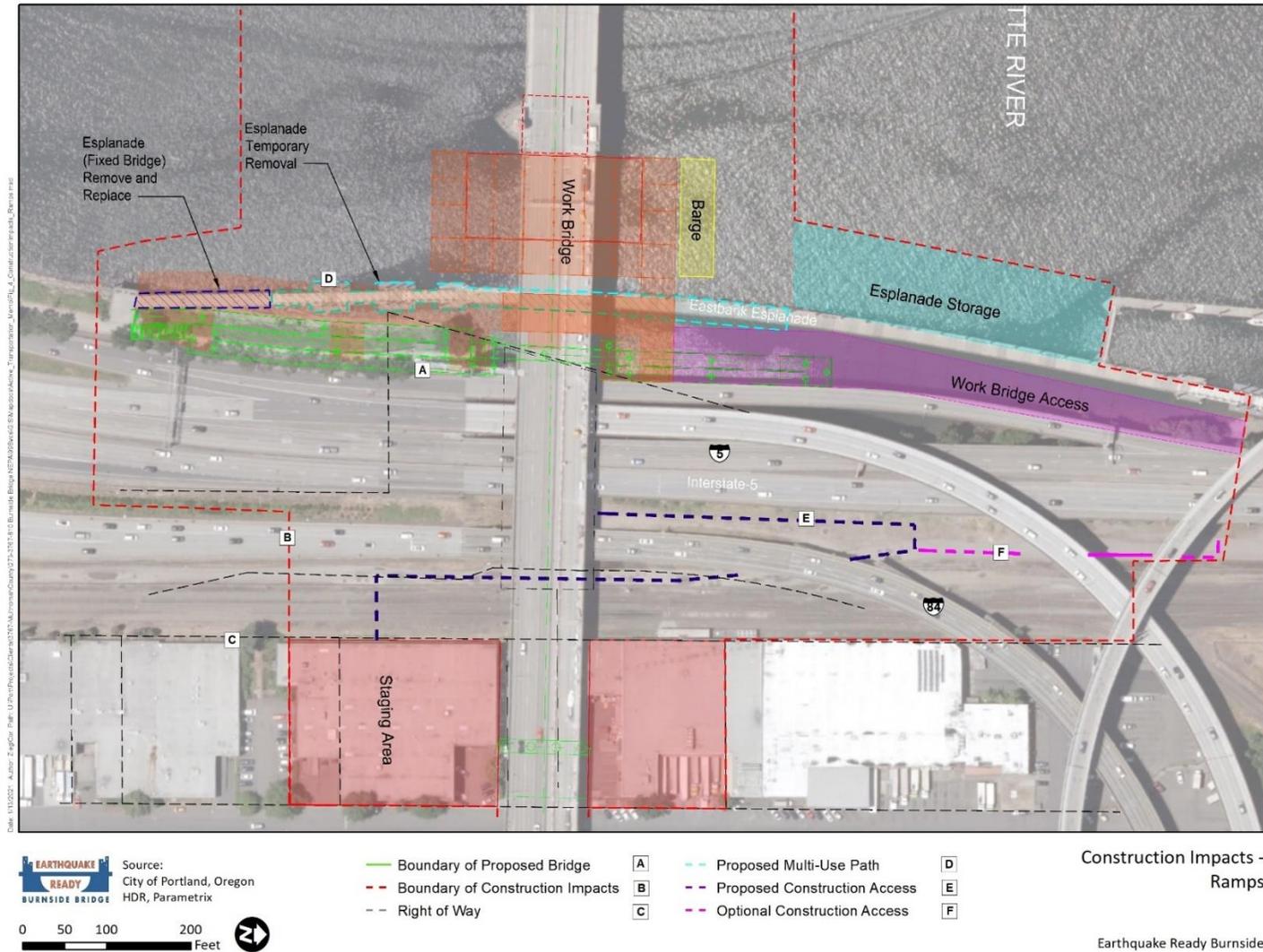


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Eastbank Esplanade -
Ramp Connection

Figure 4. Construction Impacts for Ramps on North and South Sides of the Bridge and Stairs on South Side



Note: Similar for ramp and stairs on south side only except limits of permanent construction shown in green is reduced.

Figure 5. Ramp and Stairs on South Side Only with a Signalized Mid-block Crossing Connecting the North and South Sidewalks and Bike Lanes

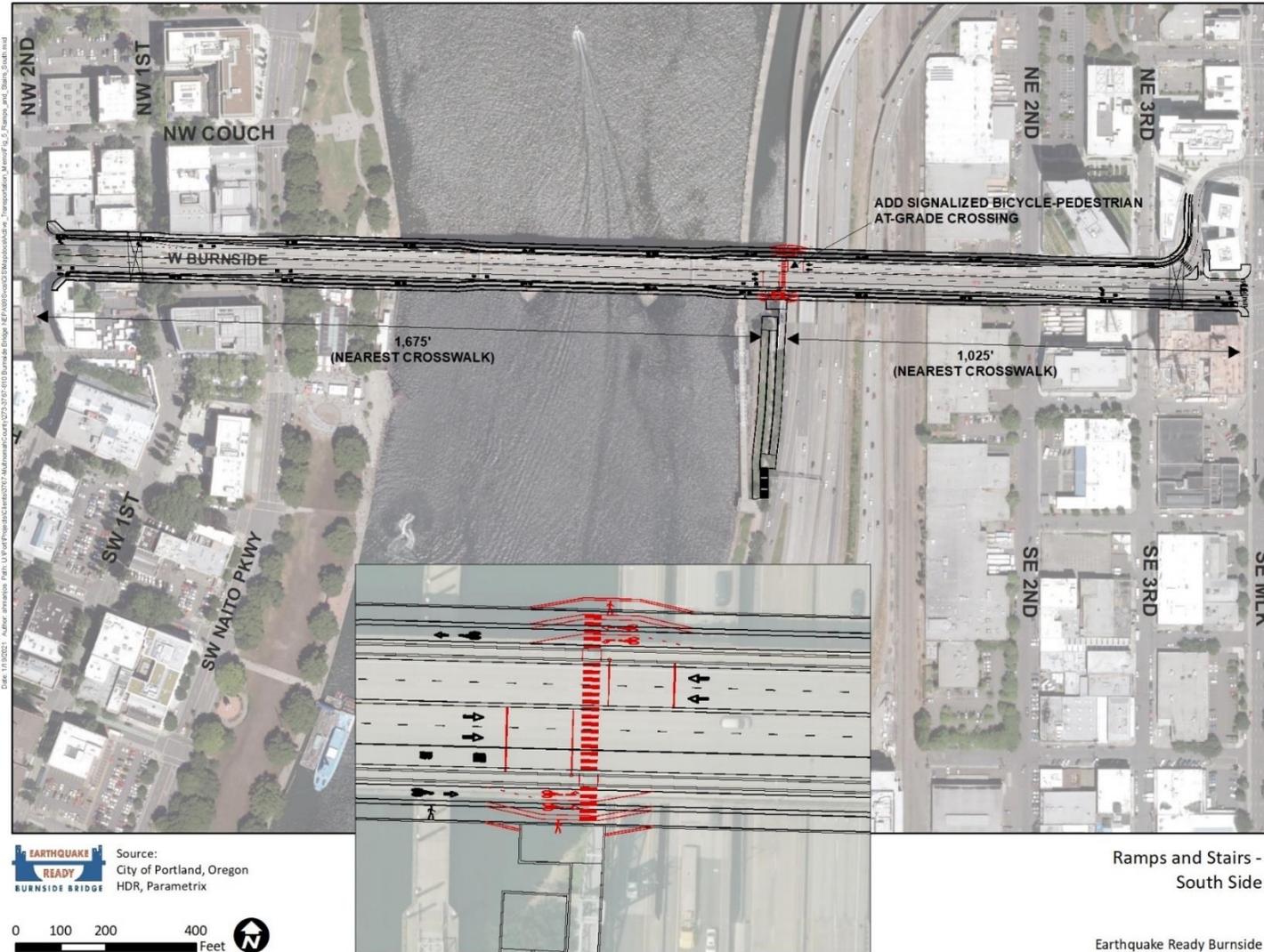
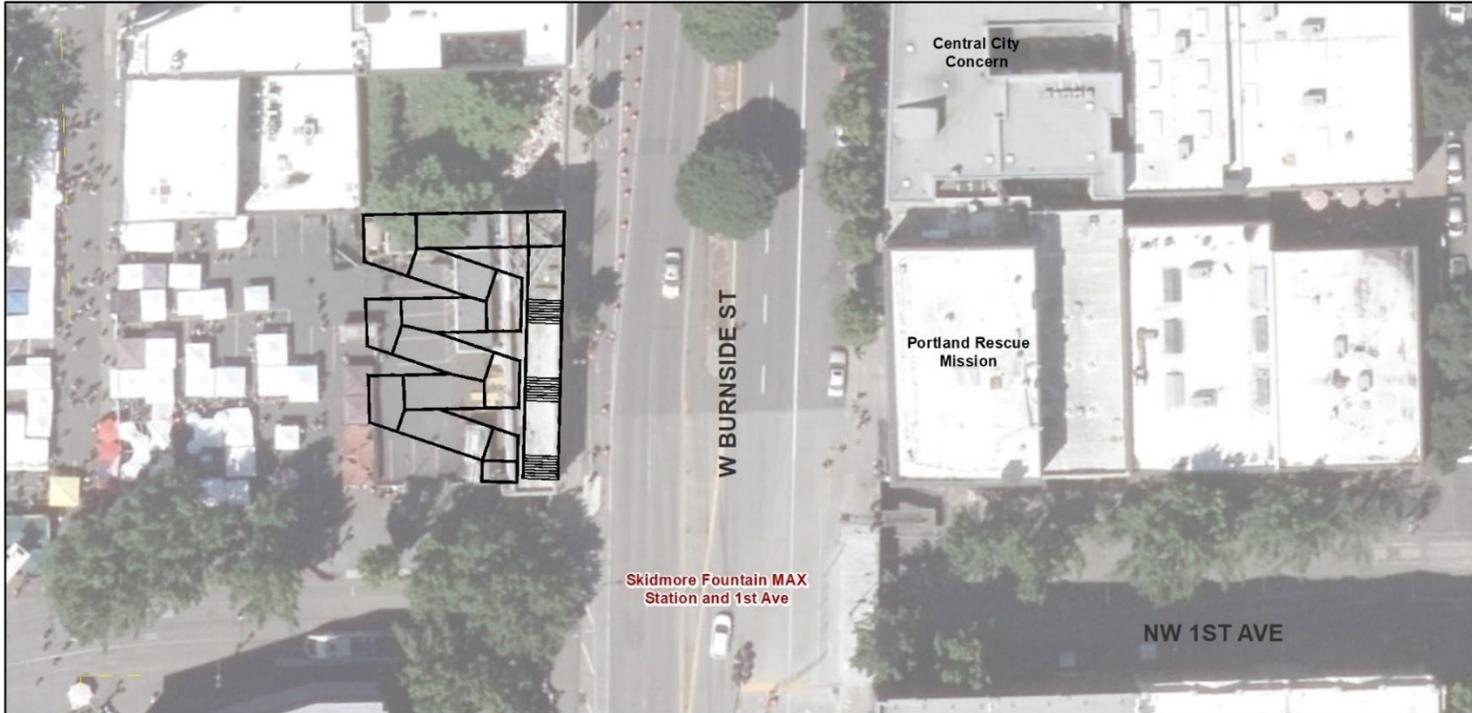
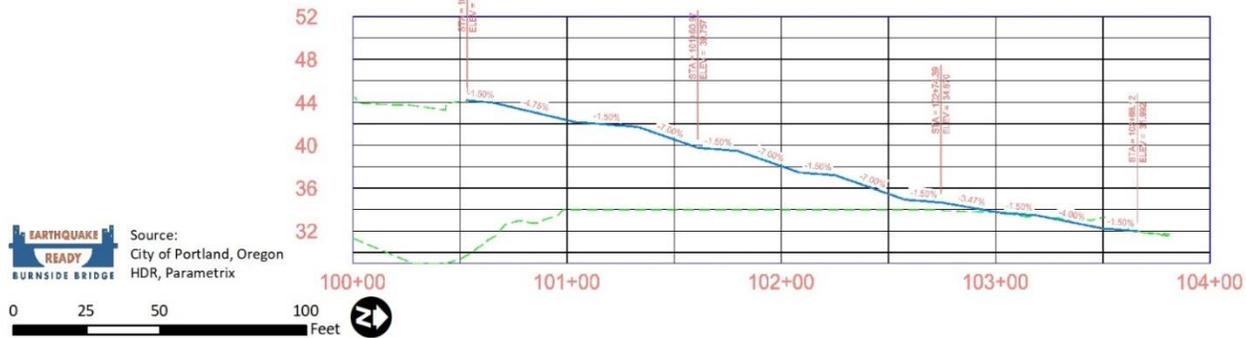


Figure 7. In-Kind Stairs on North Side; New Ramp (Saturday Market Admin Site) and Stairs on South Side



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In-Kind Stairs on North Side



**EARTHQUAKE
READY**
BURNSIDE BRIDGE

Source:
City of Portland, Oregon
HDR, Parametrix

Earthquake Ready Burnside

Figure 8. Potential Accessible Routes from North Sidewalk (Point A) to Skidmore Foundation MAX Station (Point B)

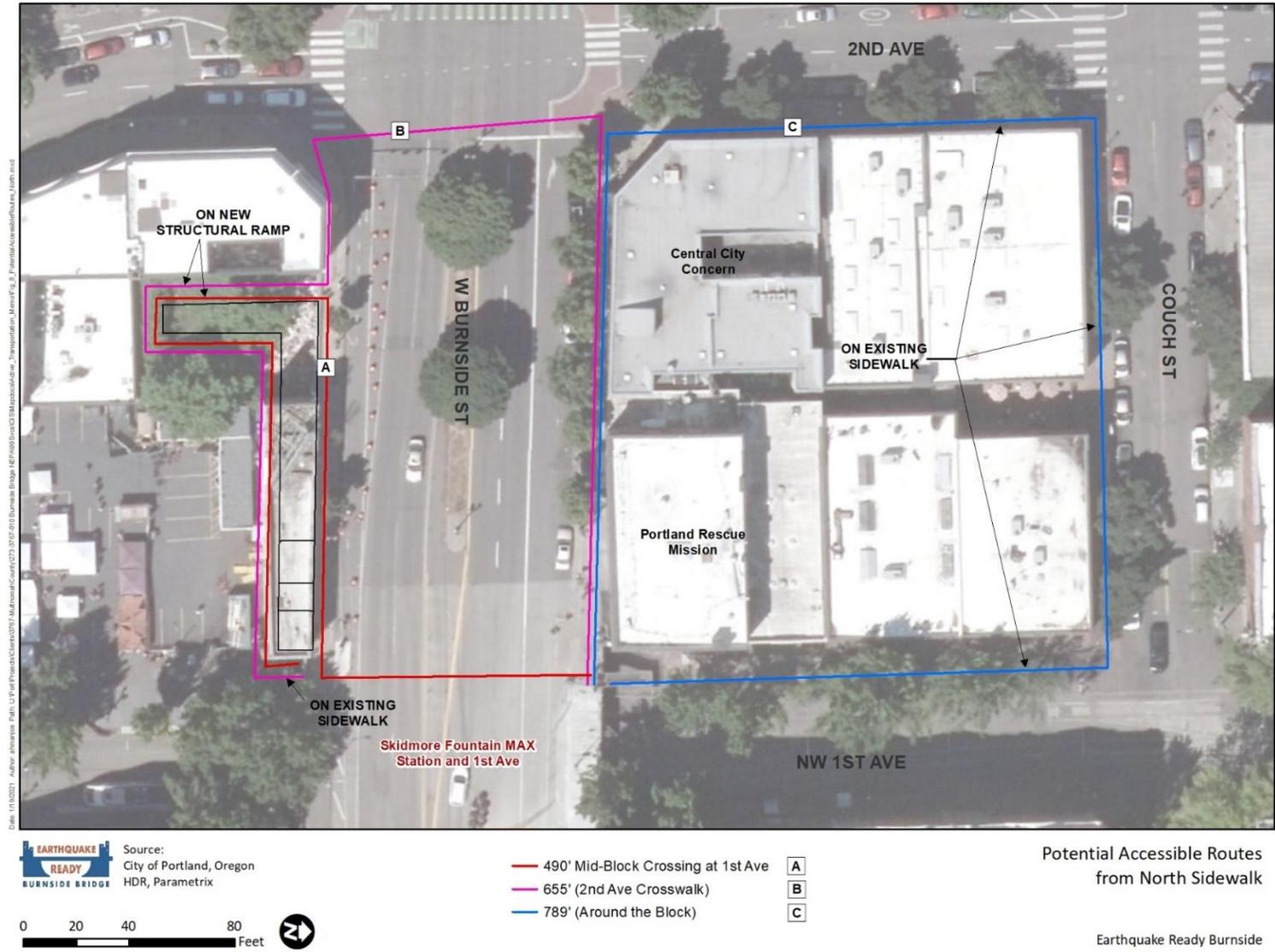
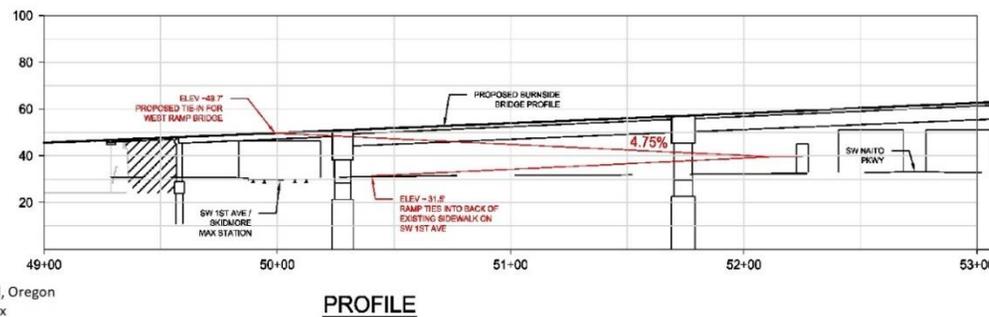


Figure 9. In-Kind Stairs on North Side; New Ramp (Mercy Corps Parking Site) and Stairs on South Side (Layout 1)

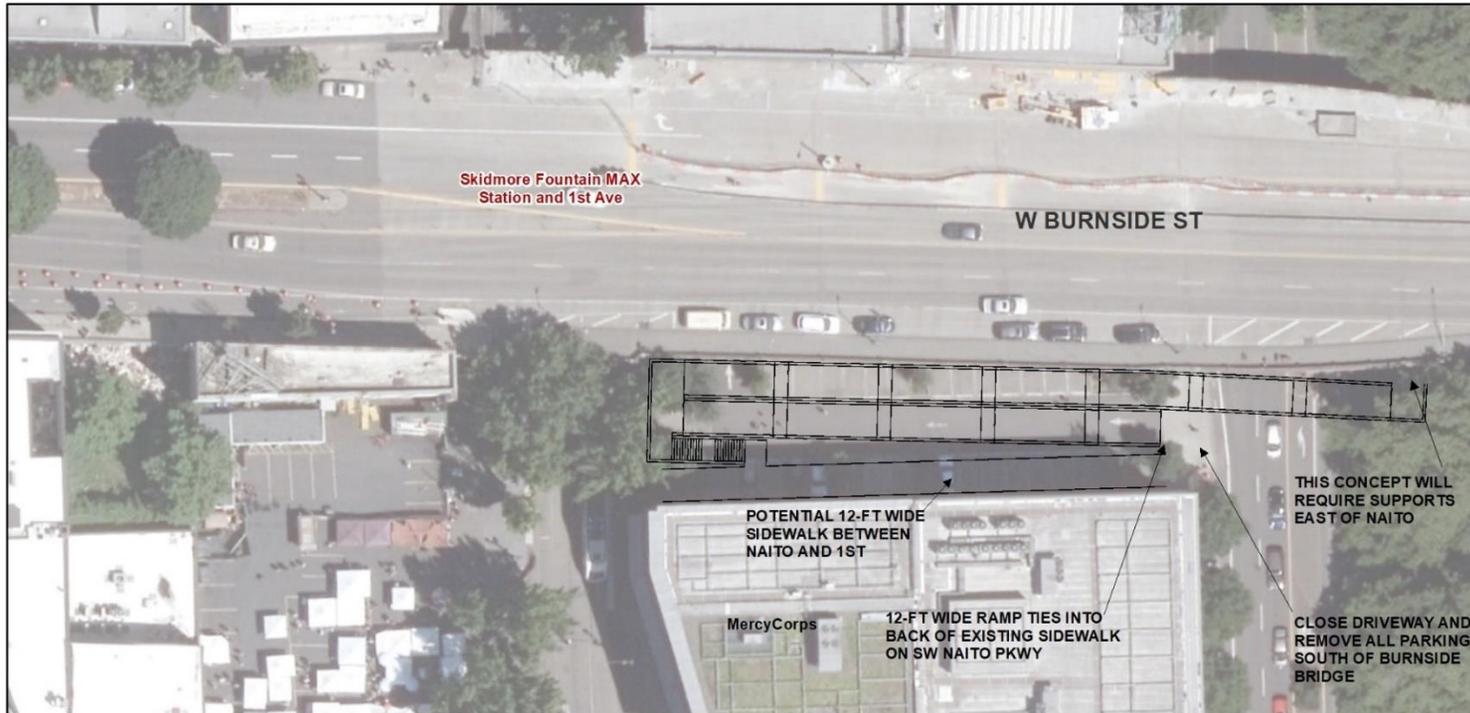


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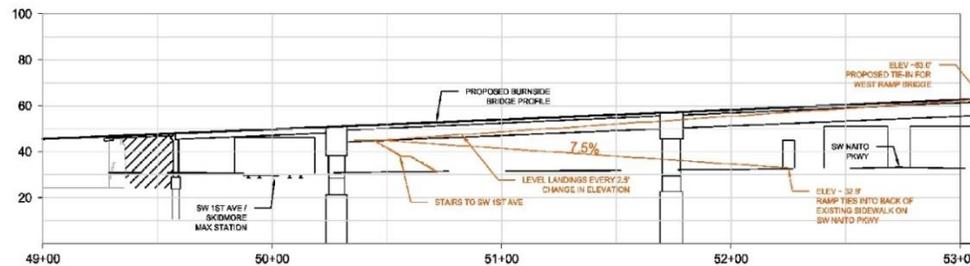


New Ramp and Stairs on South Side

Figure 10. In-Kind Stairs on North Side; New Ramp (Mercy Corps Parking Site) and Stairs on South Side (Layout 2)



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PROFILE



Source:
City of Portland, Oregon
HDR, Parametrix



New Ramp and Stairs
on South Side (Layout 2)

Earthquake Ready Burnside