



Criterion Performance

Criterion Performance

Criterion 1.2 – Avoid, then minimize adverse impacts to, and where practicable enhance, neighborhood cohesion

(Part of Value 1 – COMMUNITY LIVABILITY AND HUMAN RESOURCES)

◆ Performance Measure(s)
<ul style="list-style-type: none"> • Number of neighborhoods bisected by new construction • Number of significantly impacted neighborhoods (>10% of total area required for new construction) • Number of neighborhoods divided from their identified resources by new construction
◆ Best Performing Package(s) and/or Component(s)
<p>The alternatives with the least physical improvements score the highest on these measures because they would have the least adverse impact to existing neighborhoods. As such, No-Build alternatives (Alternative Packages 1 and 2) rate the highest. However, these packages can do little to enhance access or livability, and do not support the community’s future vision as expressed in local plans.</p> <p>Of the Build alternatives, only Alternative Package 3 completely avoids displacing the only grocery store on Hayden Island. Alternatives with LRT or BRT require more commercial acquisitions than alternatives using BRT-Lite or Express Bus only. Residential acquisitions or relocations range from 5 to 15 houseboats, and vary largely based on interchange configurations at Marine Drive, on Hayden Island, and at SR 500.</p>
◆ Key Findings
➤ River Crossing
<p>No neighborhoods will be bisected by new construction and no neighborhoods will lose more than 10% of their total area for construction. Therefore, the only remaining metric is whether a neighborhood is divided from its resources.</p> <p>Upstream replacement bridges require complete acquisition of Safeway, the only grocery store on Hayden Island and a significant resource for the neighborhood. A downstream replacement bridge and supplemental interstate bridge may require partial or full acquisition of Safeway as well due to interchange improvements. Only a supplemental arterial bridge (Alternative Package 3) would completely avoid direct impact to Safeway. Safeway could likely be relocated on Hayden Island.</p>
➤ Transit
<p>None of the transit options would bisect neighborhoods or affect more than 10% of any neighborhood. Alternative Packages 3 - 5 and 8 - 10 add high capacity transit to Vancouver and Hayden Island neighborhoods, helping to improve residents’ access to resources in these areas.</p>
➤ Roadways North and Roadways South
<p>The interchanges at Marine Drive and on Hayden Island can affect how many houseboats need to be acquired or relocated. A more complex interchange at Marine Drive pushes the bridge slightly north over the Oregon Slough, impacting additional houseboats. Removing an I-5 interchange on Hayden Island necessitates an arterial crossing over the Oregon Slough which would consume additional house boats.</p> <p>None of the Roadways North options would bisect neighborhoods or affect more than 10% of any neighborhood. Some interchange designs at SR 500 cause additional residential acquisitions. Given the preliminary level of current designs, it is premature to judge certain designs as superior or inferior.</p>
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
<p>The bicycle and pedestrian components included in Alternative Package 3 are slightly better than the other Build alternatives. This package provides the shortest distance to travel and easy access onto the facility, and places cyclists and pedestrians next to low-speed traffic traveling locally on an arterial bridge.</p> <p>The bicycle and pedestrian components of Alternative Packages 5, 6, and 7 are the least desirable because they have narrow lanes and limited shoulders, and place cyclists and pedestrians next to high-speed traffic. These packages that rely upon enhancements to the existing bridge appear to perform the worst. While Alternative Package 4 also relies upon enhancement of existing bike/ ped facilities, it does not place cyclists and pedestrians next to high-speed interstate traffic.</p>

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Criterion 1.4 – Avoid or minimize residential displacements

(Part of Value 1 – COMMUNITY LIVABILITY AND HUMAN RESOURCES)

◆ Performance Measure(s)
<ul style="list-style-type: none"> • How many residential units fall within the design area footprint?
◆ Best Performing Package(s) and/or Component(s)
<p>Note: Identifying necessary property acquisitions and displacements requires substantial design refinement and property analysis that are not included in the alternatives screening phase. For screening purposes, property acquisition estimates are generalized in accordance with the conceptual nature of the current level of design. They are based on a total count of properties affected (partial or full).</p> <p>Alternative Packages 1 and 2 would avoid residential property acquisitions.</p> <p>Based on conceptual designs of Build alternatives, all Build alternatives have fewer than 30 residential acquisitions. Differences occur primarily due to HCT and interchange designs. LRT and BRT require wider bridge crossings over the Oregon Slough and remove or relocate more houseboats. A more complex interchange at Marine Drive pushes the bridge north over the Oregon Slough, impacting additional houseboats. Removing an I-5 interchange on Hayden Island necessitates an arterial crossing over the Oregon Slough, which would consume or relocate additional house boats.</p>
◆ Key Findings
<p>➤ River Crossing</p> <p>Property acquisitions in the river crossing area (from SR 14 to Marine Drive) are a function of several factors, only one of which is the river crossing option itself. Interchange designs at SR 14, Hayden Island, and Marine Drive interchanges are a major factor. River crossings acquire or relocate between 5 and 15 houseboats on Hayden island depending upon interchange designs at Marine Drive and Hayden Island, and on whether the river crossing must accommodate LRT or BRT,</p>
<p>➤ Transit</p> <p>LRT and BRT (Alternative Packages 3 - 5 and 8 - 10) have higher potential to affect residential properties than BRT-Lite or Express Bus because they require dedicated ROW. LRT and BRT necessitate widening river crossings across the Oregon Slough, which requires acquisition or relocation of approximately 5 additional houseboats for most bridge options.</p>
<p>➤ Roadways North and Roadways South</p> <p>The interchanges at Marine Drive and on Hayden Island can affect how many houseboats need to be acquired or relocated. A more complex interchange at Marine Drive pushes the bridge slightly north over the Oregon Slough, impacting additional houseboats. Removing an I-5 interchange on Hayden Island necessitates an arterial crossing over the Oregon Slough, which would consume additional house boats.</p> <p>Roadways North options account for all likely residential acquisitions. Interchange configurations at SR 500 are the primary contributor to the range of residential acquisitions.</p>
<p>➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)</p> <p>Not Applicable.</p>

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Criterion 1.5 – Avoid or minimize business displacements

(Part of Value 1 – COMMUNITY LIVABILITY AND HUMAN RESOURCES)

◆ Performance Measure(s)
<ul style="list-style-type: none"> How many commercial or industrial properties fall within the design area footprint?
◆ Best Performing Package(s) and/or Component(s)
<p>Note: Identifying necessary property acquisitions and displacements requires substantial design refinement and property analysis that are not included in the alternatives screening phase. For screening purposes, property acquisition estimates are generalized in accordance with the conceptual nature of the current level of design. They are based on a total count of properties affected (partial or full).</p> <p>The approximate number of commercial properties that would be affected (from sliver impacts to full acquisitions) ranges from about 30 to 90 for the Build alternatives. BRT-Lite (Alternative Packages 6 and 11) or Express Bus only (Alternative Packages 7 and 12) require fewer commercial acquisitions than those with LRT or BRT (Alternative Packages 3 - 5 and 8 - 10).</p> <p>No-Build alternatives (Alternative Packages 1 and 2) would affect no commercial properties.</p>

◆ Key Findings
➤ River Crossing
<p>The property acquisitions in the river crossing area (from SR 14 to Marine Drive) are a function of several factors, only one of which is the river crossing option itself. Interchange designs are a major factor, including SR 14, Hayden Island, and Marine Drive interchanges. All river crossing alternatives require partial or full acquisition of approximately 30 commercial parcels.</p>
➤ Transit
<p>LRT and BRT (Alternative Packages 3 - 5, and 8 - 10) require partial or full acquisition of approximately 30 commercial properties. BRT-Lite (Alternatives 6 and 11) and Express Bus only (Alternatives 7 and 12) impact few or no commercial properties.</p>
➤ Roadways North and Roadways South
<p>Roadways North options account for all likely residential acquisitions. Interchange configurations at SR 500 are the primary contributor to the range of residential acquisitions. Potential commercial property acquisitions from Roadways South options are minimal (ranging from 0 to 14) largely depending upon the interchange configuration on Hayden Island. Likewise, commercial acquisitions from Roadways North are also minimal (ranging from 5 to 15) largely depending upon the impact of different interchanges at SR 14 on downtown Vancouver.</p>
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
<p>Not Applicable</p>

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Criterion 1.6 – Avoid or minimize adverse impacts to, or where practicable preserve, historic and prehistoric cultural resources

(Part of Value 1 – COMMUNITY LIVABILITY AND HUMAN RESOURCES)

◆ Performance Measure(s)
<ul style="list-style-type: none">• How many acres of land are located in high probability areas for archaeological resources?• How many of these properties are also within the potential noise impact footprint?• What is the total acreage of these properties?• How many historic, archaeological, and cultural properties fall within the design area footprint in the following categories: National Register listed, Potentially Eligible, National Historic Site?
◆ Best Performing Package(s) and/or Component(s)
<p>Alternative Package 3 would likely have the least adverse effects on historic and archaeological resources of the Build alternatives.</p> <p>Alternative Packages 8 and 12 would likely have the greatest adverse effects on historic resources, followed by 9, 10, and 11.</p> <p>Alternative Packages 4, 8, and 10 would likely have the greatest adverse effects on archaeological resources.</p> <p>Alternative Packages 4 and 7 would likely have the greatest adverse effects on the Vancouver National Historic Site/National Historic Reserve (NHS/NHR). This is due to the easternmost SR 14 WB to I-5 NB ramp’s location east of the cloverleaf ramps.</p> <p>Generally, packages that disturb the least amount of undisturbed native soil within the high probability areas for prehistoric sites would have the lowest potential adverse effects on archaeological resources.</p>

◆ Key Findings
<p>➤ River Crossing</p> <p><i>Above Ground Built Historic Resources:</i></p> <p>Supplemental bridge options (Alternative Packages 3 - 7) would retain the historic bridges. However, preliminary results from a Seismic Panel convened in August 2006 indicate that major seismic upgrades would likely be required for the bridges to avoid collapse in a major earthquake. These retrofits would likely have an adverse effect on the historic character of the bridges.</p> <p>All of the Alternative Packages may acquire the Columbia River levees; this may be reduced to “no adverse effect” and no “use” with appropriate design.</p> <p>Only a supplemental arterial bridge would avoid encroaching upon the historic Apple Tree Park. Downstream replacement bridges cut through or over the parcel more significantly than the others.</p> <p><i>Archaeological Resources:</i></p> <p>None of the river crossing options would directly affect a known archaeological site. However, the area in which all of the river crossing options are located has the potential to contain archaeological resources. At this time, there is little evidence to distinguish one option from another.</p>
<p>➤ Transit</p> <p><i>Above Ground Built Historic Resources:</i></p> <p>The preliminary BRT and LRT (Alternative Packages 3, 4, 5, 8, 9, and 10) alignment uses Washington and McLoughlin, traveling through Vancouver’s locally-designated downtown historic district. Conceptual designs do not appear to have a direct effect on any significant historic resources, but they would affect the visual character. Whether such an effect would be adverse or beneficial will depend on whether it is designed with regard to the character of the district. LRT alternatives may have a lower likelihood to pose an adverse effect than BRT. Both LRT and BRT options involving direct downtown access may result in beneficial effects from improved accessibility to the district, which would enhance the viability of the historic downtown area.</p>

Archaeological Resources:

BRT and LRT (Alternative Packages 3, 4, 5, 8, 9, and 10) would likely have the greatest potential to adversely affect historic and prehistoric resources beneath historic downtown Vancouver because they would require excavation into potentially native soils. Transit alternatives running down I-5 (2, 7, 11, and 12) would more likely impact fill or soils already disturbed by highway construction.

➤ **Roadways North and Roadways South**

Above Ground Built Historic Resources:

The potential increase in noise and congestion in historic downtown Vancouver may adversely affect its historic setting.

The SR 14 interchange is a key factor for effects on Fort Vancouver and on the Apple Tree Park. Impacts to these historic resources are largely determined by the design of this interchange. Designs seeking to minimize ROW requirements and include three levels of ramps could cause visual impacts to Fort Vancouver by overshadowing the historic hospital building. Conversely, interchange designs that expand outward and minimize vertical stacking of ramps could encroach on Apple Tree Park.

Archaeological Resources:

The easternmost SR 14 WB to I-5 NB ramp located farthest east in relation to the cloverleaf ramps (Alternative Packages 4, 7, 8, and 12) has the greatest potential adverse effects on archaeological resources within the National Historic Site (NHS).

➤ **Other (Bike/Ped, Freight, TSM/TDM, Tolling)**

Bike/pedestrian striping in the Downtown Historic District or the Fort Vancouver Reserve would need to consider the historic areas. Build outs or other structures that change the visual character of the historic areas need to be designed in consultation with the Department of Archaeology and Historic Preservation and the National Parks Service.

The pedestrian bridge would affect the Fort Vancouver Reserve, but if designed carefully could have “no adverse effect” and could enhance access to and from the Downtown Historic District. It could be considered a positive effect because it would make the Reserve easier to access from the Downtown Historic District.

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Criterion 1.7 Magnitude and significance of public park and recreation resources crossed by component's conceptual footprint

(Part of Value 1 – COMMUNITY LIVABILITY AND HUMAN RESOURCES)

◆ Performance Measure(s)
<ul style="list-style-type: none"> Number and area of 4(f) public parks that fall within the design area footprint?
◆ Best Performing Package(s) and/or Component(s)
<p>Of the Build alternatives, Alternative Package 3 would have the lowest direct or secondary impacts on recreational or park resources.</p> <p>Alternative Packages 4 and 8 would likely have the greatest impacts as they would affect both the NHS the greatest and City College Park. The greatest NHS open space impact is the result of SR 14 interchange options that require additional ROW to the east of the existing interchange; City College Park is impacted by Roadways North options and LRT; East Delta Park impact is associated with Marine Drive interchange choices and LRT; Leverich Park impacts are due to SR 500 and BRT/LRT improvements.</p> <p><i>Considerations:</i></p> <p>Any potential “use” of the NHS/NHR would likely affect the whole resource. This includes land within the Roadways North project segments.</p> <p>Sliver acquisition(s) may be allowable as a de minimis impact. This would need to be confirmed with officials that have jurisdiction over the affected resource.</p>
◆ Key Findings
➤ River Crossing
<p>All new river crossings (Alternative Packages 3 - 12) may temporarily or permanently affect recreational trails underlying the existing and/or new bridges. “Use” would need to be determined based on the location of features such as intermediate bent columns and fill, as well as the extent of potential removal of the existing bridges and transfer of ownership to recreational agencies. In this phase of conceptual design, there is no significant difference among the river crossing options.</p> <p><i>Considerations:</i></p> <p>Visual impacts could also be associated with this project. They could affect the historic setting and the recreational value associated with the NHS/NHR cultural landscapes. While visual impacts don’t frequently trigger a “constructive use,” they should be considered, given the importance of the historic cultural landscape.</p>
➤ Transit
<p>LRT and BRT impact City College Park slightly as they realign from McLoughlin Boulevard to I-5. This alignment is preliminary and it may be possible to refine the design to avoid any impact. Furthermore, this alignment provides improved access as it brings HCT to this park (and McLoughlin Park that is immediately to the south) with a major transit station by Clark College.</p> <p>All transit modes require modest slivers of the easternmost portions of Kiggins Bowl because they necessitate a wider I-5 ROW than existing conditions. BRT-Lite requires the most substantial acquisition of Kiggins Bowl.</p>
➤ Roadways North and Roadways South
<p><i>Roadways North:</i></p> <p>Improvements to the SR 14 interchange that extend east of the existing interchange can impact the Fort Vancouver Historic Reserve. Interchange designs for all Build alternatives except Alternative Package 3 require sliver acquisitions of properties within the NHS. These properties are now under US Army ownership, but will likely be transferred to other ownership, and remain within the NHS. They may become recreational properties in the future.</p> <p>Improvements to the interchange at SR 14 are also shown to impact the historic apple tree. All Build alternatives except Package 3 would require acquisition of part of the parcel with the apple tree. These takes are not likely to directly impact the tree, but could cause substantial indirect effects (encroachment, noise, shading, etc.).</p>

Some of the SR 14 interchange designs would also directly affect the land bridge that is currently under construction, while others would build ramps over or under the land bridge.

Marshall Community Park: Alternative Packages 4, 5, 6, 8, 9, 10, 11, and 12 would require sliver acquisitions along the western edge of the park and may result in a “use.” Impacts to Marshall Community Park resulting from the Roadways North segments and the transit impacts to City College Park may need to be considered within the context of the City of Vancouver’s Central Park, which encompasses both of these parks as well as other properties generally extending to the east and to the south (almost to the NHR).

Leverich Park: All Alternative Packages would require sliver acquisitions along the southern and/or western edge of the park, potentially resulting in a “use” of the resources.

Roadways South:

ROW impacts to East Delta Park would involve sliver acquisitions of no more than approximately 5,000 square feet under all Alternative Packages, except for Alternative Package 3, where there would be no ROW impacts.

➤ **Other (Bike/Ped, Freight, TSM/TDM, Tolling)**

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Criterion 1.8 – Support local comprehensive plans and jurisdiction-approved neighborhood plans including development and redevelopment opportunities, consistent with these plans.

(Part of Value 1 – COMMUNITY LIVABILITY AND HUMAN RESOURCES)

◆ Performance Measure(s)
<ul style="list-style-type: none"> • Does the project support/uphold principles of multi-modalism? • Is it in project lists of comprehensive plans? • Are alternatives consistent with the project-specific policies in the Vancouver City Center Vision? • How much developable land will be lost?
◆ Best Performing Package(s) and/or Component(s)
<p>While both BRT and LRT are included in local plans, LRT service (included in Alternative Packages 3, 4, 8, and 9) best supports most local plans.</p> <p>It is difficult to rank the components in terms of land use and impacts to downtown Vancouver, but it is likely that removing direct access to Hayden Island from Interstate 5 may cause significant traffic intrusion into downtown Vancouver.</p> <p>Of the Build alternative, Alternative Packages 8 and 9 appear to best meet local plans because they uphold principles of multi-modalism and will not require as much developable land as Alternative Packages 3 and 4. At this point in the analysis, the direct access to Vancouver and ability to support redevelopment opportunities, as called for in the Vancouver City Center Vision, are unknown.</p> <p>Alternative Packages 1 and 2 are the worst performers, as they fail to follow the recommendations of the Bi-State Trade and Transportation Study and do not provide BRT or LRT services.</p>

◆ Key Findings
➤ River Crossing
<p>An evaluation of compliance with multi-modal policies and planned project lists does not help to discern between river crossing options. Supplemental downstream and arterial bridges provide arterial and Interstate access, though at this point we cannot determine if access is improved. A supplemental arterial may cause significant traffic intrusion into downtown Vancouver without direct access to Hayden Island.</p> <p>River Crossing components have different land use and ROW impacts. Supplemental bridge options and a downstream replacement bridge would displace the Inn at the Quay. Replacement bridges with LRT will also directly impact the FHWA and Army buildings, and possibly the West Coast Bank building. A supplemental arterial bridge would impact two commercial blocks in the southern portion of downtown Vancouver east of Columbia Street.</p> <p>The replacement bridges with LRT and the new supplemental arterial bridge would generally have the most negative property impacts in downtown Vancouver, though all Build alternatives would have impacts. The extent of impacts to the west side of the existing bridge is unclear since the area is planned for redevelopment.</p>
➤ Transit
<p>Express buses in general purpose or managed lanes fail to provide HCT, as explicitly called for in local plans. LRT is most consistent with regional plan policies and was called for in recommendations by the Bi-State Trade and Transportation Study that is referenced in numerous plans. Alternative Packages 3, 8, and 9 provide the most reliable LRT service by placing transit on a new fixed span bridge that would eliminate delays in the transit system resulting from bridge lifts.</p>
➤ Roadways North and Roadways South
<p>Design options for Roadways North and Roadways South do not have significant differences.</p>
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
<p>Alternative Package 3 is the best option for bicyclists and pedestrians. This Alternative Package provides the shortest distance to travel and easy access onto the facility, and places cyclists and pedestrians next to low-speed traffic traveling locally on an arterial bridge.</p> <p>Alternative Packages 5, 6, and 7 are the least desirable because they have narrow lanes and limited shoulders, and place cyclists and pedestrians next to high speed traffic.</p>

Criterion Performance

Criterion 4.1 – Enhance vehicle/freight safety

(Part of Value 4 – Safety)

◆ Performance Measure(s)
<ul style="list-style-type: none"> Highway improvements to I-5 that specifically improve vehicle/freight safety within the Bridge Influence Area.
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none"> As designed, Alternative Packages 4, 5, and 10 would provide the most improvements to vehicle/freight safety within the Bridge Influence Area by (1) providing full shoulders on I-5; (2) removing three short weaving sections (at Marine Drive, Hayden Island, and SR 14); (3) operating transit in a separated guideway; and (4) adding freight bypass lanes at difficult merge locations. It’s important to note that all of these safety factors could be included with any of the river crossing Build options, except the new arterial bridge. All of these safety factors, except item 3 – separated guideway – could be paired with any of the transit modes. Only LRT and BRT would incorporate the “separated guideway” safety factor.
◆ Key Findings
➤ River Crossing
<p>No investment in I-5 would occur with Alternative Package 1, 2030 No Build, and therefore it would not improve vehicle/freight safety over the Columbia River. Alternative Package 2 would include minor improvements to correct some geometric deficiencies at SR 14, which may improve vehicle and freight safety at this interchange but would leave most of the river crossing’s substandard design features in place.</p> <p>A new supplemental bridge, with arterial traffic separated from I-5 traffic would allow the Hayden Island interchange on I-5 to be removed. This would improve vehicle and freight safety over the river by eliminating points of conflict and reducing the amount of vehicle weaving. Alternative Package 3 would remove the existing Hayden Island interchange on I-5 and provide a new supplemental arterial bridge connection to Hayden Island, and Alternative Packages 4 and 5 would provide a new supplemental bridge for I-5 that would also eliminate the interchange on Hayden Island. The arterial connection to Hayden Island would be via the existing Columbia River bridges plus a new local access bridge across the Oregon Slough,</p> <p>With a replacement bridge, access to Hayden Island from an interchange off of I-5 would be maintained. To improve vehicle and freight safety at this location on I-5, an interchange option (as included in Alternative Packages 8, 10, and 11) provides braided ramps to remove a short weave section from the I-5 main line between Hayden Island and Marine Drive. This would improve safety compared to other interchange options, though to a somewhat lesser degree than removing the interchange. This design feature could be used with any of the replacement bridge options (upstream or downstream).</p> <p>Vehicle and freight safety would be further improved with either a new supplemental or replacement bridge for I-5 (Alternative Packages 4 - 12) because a new bridge would include full highway shoulders and lanes in both the northbound and southbound direction.</p>
➤ Transit
<p>Vehicle and freight safety would be improved with those modes of transit that would operate in a separated guideway, which would reduce the number of buses on I-5 and in general purpose lanes. Therefore, Alternative Packages 3, 4, 5, 8, 9, and 10 that include LRT or BRT as the transit mode would improve vehicle/freight safety within the Bridge Influence Area. Introducing a new mode, such as LRT or BRT, to city streets creates potential conflicts at at-grade crossings. However, lower speeds and signal controls for at-grade crossings reduce the risk.</p>
➤ Roadways North and Roadways South
<p>North or south of the river crossing, within the Bridge Influence Area, improvements specifically for vehicle/freight safety would not be provided with Alternative Packages 1, 2, and 3.</p> <p>Operating I-5 on a new supplemental or replacement bridge (Alternative Packages 4 – 12) would improve vehicle and freight safety north and south of the river crossing because full shoulders would be provided along I-5 through the whole length of the Bridge Influence Area, from SR 500 in the north to Victory Boulevard in the south. Operating I-5 on a new supplemental or replacement bridge also allows a short weaving section at SR 14 to be removed. Between SR 14 and Mill Plain Boulevard, Alternative Packages 4 – 12 include either a braided ramp or a collector/distributor road, which would improve vehicle and freight safety on the I-5 mainline.</p>

South of the Columbia River, safety would be improved with the removal a short weaving section from Marine Drive to southbound I-5 by adding a braided ramp between the Marine Drive and the Interstate Avenue/Denver Avenue interchange. This improvement is included in Alternative Packages 4, 5, 8, 10, and 11; it could be included as an option with either a new supplemental or a replacement bridge for I-5.

➤ **Other (Bike/Ped, Freight, TSM/TDM, Tolling)**

Vehicle and freight safety would be improved with the addition of freight bypass lanes in locations where trucks currently have difficulty entering and exiting I-5. This improvement is included in Alternative Packages 4, 5, 9, and 10; it could be included as an option with either a new supplemental or a replacement bridge for I-5.

Outside of the Bridge Influence Area, re-striping I-5 (in both directions) to add a managed lane network between 139th Street and SR 500 is included in Alternative Packages 4 – 11. Re-striping to add a managed lane would reduce the width of the shoulders in this section of I-5, which may impact vehicle and freight safety.

Criterion Performance

Criterion 4.2 – Enhance bike/pedestrian facilities and safety

(Part of Value 4 – Safety)

◆ Performance Measure(s)
<ul style="list-style-type: none"> Qualitative assessment of improved bicycle and pedestrian pathways provided within an alternative package.
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none"> Alternative Packages 3 - 12 provide similar improvements to bicycle and pedestrian facilities that best enhance safety.

◆ Key Findings
➤ River Crossing
N/A
➤ Transit
N/A
➤ Roadways North and Roadways South
N/A
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
<p>New bicycle and pedestrian facilities would not be constructed with Alternative Package 1, 2030 No Build, and therefore bicycle and pedestrian safety would not be enhanced.</p> <p>A new supplemental or replacement bridge would include the construction of a two-way bicycle path and a two-way pedestrian path and improved connections to North Portland, Hayden Island, and downtown Vancouver. By providing separated facilities over the river, Alternative Packages 3 - 12 best enhance bicycle and pedestrian safety.</p>

Criterion Performance

Criterion 4.3 – Enhance or maintain marine safety

(Part of Value 4 – Safety)

◆ Performance Measure(s)
<ul style="list-style-type: none"> • Quality of marine navigation channel geometrics to accommodate ship movements, considering necessary tug and barge turning maneuvers and hazards of additional lift restrictions.
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none"> • A replacement bridge, with Alternative Packages 8 - 12, provides the most benefit to marine safety because the new bridge piers could be located to ease maneuvers between the I-5 bridge and the downstream railroad bridge and there would be no bridge lifts.

◆ Key Findings
➤ River Crossing
<p>Alternative Packages 1 and 2 would maintain the existing Columbia River channel geometrics between the existing I-5 bridges and the downstream railroad bridge.</p> <p>If I-5 traffic continued to operate on the existing bridges, as would occur with Alternative Packages 1, 2, and 3, the bridge lift restriction periods, and associated marine hazards, would remain and likely increase with future increases in congestion on I-5. As congestion on I-5 increases, more restrictions on bridge lifts would negatively impact marine navigation.</p> <p>For marine navigation and safety, a new supplemental bridge would have to be constructed so that the new piers would be in line with the piers of the existing bridges. Even with the piers in line, a new downstream supplemental bridge would reduce the available distance for ships to maneuver between the supplemental bridge and the downstream railroad bridge. Therefore, Alternative Packages 3 - 7, because they increase the number of obstructions in the water, would negatively impact marine maneuvers and safety.</p> <p>Operating I-5 on a new supplemental bridge and using the existing bridges for arterial traffic, as is proposed with Alternative Packages 4 - 7, could reduce the bridge lift restriction period. This aspect would benefit marine safety.</p> <p>A replacement bridge would allow the new bridge piers to be located to ease ship maneuvers between the I-5 bridge and the downstream railroad bridge, would reduce the number of obstructions in the water, and would eliminate bridge lifts. Therefore, Alternative Packages 8 - 12 would provide the greatest enhancement to marine safety.</p>
➤ Transit
➤ Roadways North and Roadways South
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)

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Criterion 4.4 – Enhance or maintain aviation safety

(Part of Value 4 – Safety)

◆ Performance Measure(s)
<ul style="list-style-type: none">Ability to accommodate Federal Aviation Administration (FAA) clearance zone for Pearson Airpark.
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none">Alternative Packages 8, 9, and 11, which include a downstream replacement bridge that would increase the distance between the I-5 bridge and Pearson Airpark, would best accommodate the FAA clearance zone for Pearson Airpark and therefore best enhance aviation safety.

◆ Key Findings
➤ River Crossing
<p>The towers of the existing I-5 bridges encroach 55 feet into the approach slope to Pearson Airpark. This impact to the FAA clearance zone would continue with those alternatives that would keep the existing bridges (Alternative Packages 1 - 7).</p> <p>A new supplemental bridge would be constructed at a lower elevation than the existing bridge towers; however, they would still have a slight impact on the desirable clearance zone for Pearson Airpark. In addition to the supplemental bridge, the existing bridges (which encroach into the airspace) would remain. Therefore, Alternative Packages 3 - 7 would result in two structures within the airspace that may impact aviation safety.</p> <p>A replacement bridge would enhance aviation safety because, as with a new supplemental bridge, they would be constructed at a lower elevation than the existing bridge towers and the existing bridges would be removed. Alternative Packages 8, 9, and 11 would provide the greatest benefit to aviation safety because the replacement bridge would be downstream from the existing bridges, which would increase the distance between the I-5 bridge and Pearson Airpark. Under Alternative Packages 10 and 12 the replacement bridge would be upstream from the existing bridges, which would slightly reduce the distance between the I-5 bridges and Pearson Airpark. With Alternative Packages 10 and 12, aviation safety would be enhanced but, because of the reduced distance between the bridge and Pearson Airpark, to a slightly lesser degree than with a downstream replacement bridge.</p>
➤ Transit
➤ Roadways North and Roadways South
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)

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Criterion 4.5 – Provide sustained life-line connectivity

(Part of Value 4 – Safety)

◆ Performance Measure(s)
<ul style="list-style-type: none"> Ability to accommodate life-line connections in the I-5 corridor across the Columbia River to be maintained in an earthquake.
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none"> All of the Build alternatives would create a life-line connection across the river. Alternative Packages 8 - 12, with a new replacement bridge, would provide the best sustained life-line connectivity in the I-5 corridor across the Columbia River in the event of an earthquake because they would be built to current seismic standards and would carry and maintain travel for all transportation modes (traffic, transit, and bicycle/pedestrian). While the existing bridge could be seismically upgraded, it is unlikely that such an upgrade would provide the same level of seismic safety as would a new bridge.
◆ Key Findings
➤ River Crossing
<p>Alternative Packages 1 and 2 would not include seismically retrofitting the existing bridges. Without being retrofitted, the existing bridges would be significantly more vulnerable to earthquake damage, which would mean a life-line connection would not be provided in the I-5 corridor across the Columbia River.</p> <p>With Alternative Package 3, the new supplemental arterial bridge would be constructed to current seismic standards and would maintain a connection across the Columbia River. However, the arterial bridge would have less capacity than I-5 and would not provide a direct connection through the I-5 corridor. I-5 would continue to operate on the existing bridges which could be retrofitted to current seismic standards. Unless the existing bridges are retrofitted, they may not withstand an earthquake event and a life-line connection with adequate capacity in the I-5 corridor would not be provided.</p> <p>Operating I-5 on a new supplemental or replacement bridge (Alternative Packages 4 – 12), constructed to current seismic standards, would provide a more effective life-line connection across the Columbia River in the event of an earthquake. Replacement bridge options, because they place all modes on the new bridge (Alternative Packages 8 - 12) – provide the most comprehensive life-line connection through the I-5 corridor.</p>
➤ Transit
<p>Transit service, which connects people to their homes, jobs, and other services, is part of the life-line connection in the I-5 corridor. The vulnerability of transit to an earthquake is less a function of the mode and more a function of the structures on which the mode operates. Operating transit on the existing bridges without seismic upgrade (No-Build and TSM/TDM only) provides the highest vulnerability; transit on a seismically upgraded bridge greatly reduces vulnerability; transit on a new bridge provides the highest likelihood for maintaining a life-line connection for transit. Any of the transit modes can be placed on the new structure. However, those packages that place LRT on the existing bridge would not have the flexibility to reroute it to the new bridge following earthquake damage.</p> <p>With Alternative Packages 3, 7, and 8 – 12, the proposed transit service would operate on the new supplemental or replacement bridge which would be constructed to current seismic standards and would likely maintain this connection across the Columbia River and in the I-5 corridor in the event of an earthquake.</p>
➤ Roadways North and Roadways South
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
<p>The bicycle and pedestrian connection across the Columbia River would be on the existing bridges with Alternative Packages 1, 2, and 4 - 7. Unless the existing bridges are seismically retrofitted, this life-line connection across the Columbia River would not be maintained.</p> <p>With Alternative Packages 3 and 8 – 12, the bicycle and pedestrian connection across the Columbia River would be on a new supplemental or replacement bridge which would be constructed to current seismic standards and would maintain this life-line connection across the Columbia River and in the I-5 corridor in an earthquake event.</p>

Criterion Performance

Criterion 4.6 – Enhance I-5 incident/emergency response access within the Bridge Influence Area

(Part of Value 4 – Safety)

◆ Performance Measure(s)
<ul style="list-style-type: none"> Ability to accommodate incident/emergency service access to incidents on I-5 in the Bridge Influence Area.
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none"> Alternative Packages 5 and 10 would provide the greatest amount of access and capacity improvements to I-5 (such as a new supplemental or replacement bridge for I-5, HCT in a separated guideway, and interchange improvements) that would best enhance emergency response access to incidents on I-5 in the Bridge Influence Area.
◆ Key Findings
➤ River Crossing
<p>If I-5 continued to operate on the existing bridges (Alternative Packages 1 - 3), emergency service access to incidents on I-5 would continue to be impacted by bridge lifts and by the substandard width of the bridges, which do not allow shoulders.</p> <p>With Alternative Package 2, the interchange improvements at SR 14 and Hayden Island, which would improve capacity and congestion, may slightly enhance emergency service access. However, the river crossing would still impact existing emergency response due to substandard shoulders. Similarly, in Alternative Package 3, capacity improvements on I-5 from the addition of a new supplemental bridge that would carry arterial traffic and the elimination of the Hayden Island interchange may slightly enhance emergency service access.</p> <p>A new supplemental or replacement bridge for I-5 would provide additional capacity over the Columbia River, include full shoulder widths, and not require bridge lifts. Therefore, Alternative Packages 4 - 12 would enhance emergency response and access on I-5 in the Bridge Influence Area.</p> <p>A new supplemental or replacement bridge for I -5 (Alternative Packages 4 – 12) would also allow for improvements at SR 14 and Hayden Island that would better manage congestion on I-5 and enhance emergency service to incidents.</p>
➤ Transit
<p>Emergency response access to incidents on I-5 would be enhanced through the Bridge Influence Area if HCT operated on a guideway separate from vehicle traffic, because capacity on I-5 would increase with less buses using general purpose lanes. Therefore, Alternative Packages 4 and 5 where LRT or BRT would operate on a separated guideway on a new supplemental bridge, or Alternative Packages 8, 9, and 10 where BRT or LRT would operate on a separated guideway on a replacement bridge, would enhance emergency response access to incidents on I-5 through the Bridge Influence Area.</p>
➤ Roadways North and Roadways South
<p>South of the river crossing, improvements to the Marine Drive interchange may improve emergency response on I-5. This improvement is proposed with Alternative Packages 4, 5, 8, 10, and 11; it could be included as an option with a new supplemental or replacement bridge for I-5.</p> <p>North of the river crossing, ramps to and from the north at SR 500 would be provided with either a new supplemental or replacement bridge for I-5 (Alternative Packages 4 – 12). Adding these ramps at SR 500 would increase access points to I-5, which would improve emergency service and access to incidents on I-5 in the Bridge Influence Area.</p> <p>Eliminating northbound ramps on I-5 at 39th Street (included as an option with Alternative Packages 4, 7, 8, and 12) would result in out-of-direction travel that may impact emergency service and access.</p>
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
<p>A managed lane network on I-5 through the Bridge Influence Area (included with Alternative Packages 4 – 11) would provide options to increase traffic efficiency, which may enhance emergency service access to incidents on I-5.</p>

Criterion Performance

Criterion 5.3 – Enhance or maintain efficiency of marine navigation

(Part of Value 5 – Regional Economy; Freight Mobility)

◆ Performance Measure(s)
<ul style="list-style-type: none"> • Potential for an alternative to avert extension of “no bridge lift” periods tied to I-5 congestion.
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none"> • The greatest benefit to the efficiency of marine navigation would be with Alternative Packages 8 - 12, which include a replacement bridge, because this would eliminate the existing liftspan bridge, thus eliminating the “no bridge lift” period and resulting in fewer obstructions to the navigation channel.

◆ Key Findings
➤ River Crossing
<p>As congestion on I-5 increases, it is likely that bridge lift restrictions could be increased, thereby further impacting river navigation. Continuing to operate I-5 on the existing bridges (Alternative Packages 1 - 3) would decrease the efficiency of marine navigation because the “no bridge lift” period would be extended.</p> <p>A new supplemental bridge for I-5 (Alternative Packages 4 - 7) would be constructed, which would remove the limitations that I-5 traffic places on bridge lifts. The existing bridges would be used for arterial traffic and the “no bridge lift” period may decrease, which would enhance marine navigation. However, there would be additional piers in the water.</p> <p>Providing a replacement bridge for I-5 and removing the existing bridges (Alternative Packages 8 – 12) would eliminate the “no bridge lift” period, remove the existing bridge and its navigation obstructions, and provide the greatest benefit to marine navigation.</p>
➤ Transit
<p>None of the transit modes would have a meaningful impact on marine navigation efficiency. However, marine navigation needs would likely impact reliability for some transit mode and river crossing combinations.</p> <p>With a supplemental bridge for I-5, the “no bridge lift” period could be reduced since there would be no direct impact to I-5 traffic. Operating the transit service on the existing bridges (Alternative Packages 4 – 6), which may be subjected to additional bridge lifts, could impact transit schedules but would enhance marine navigation.</p> <p>With a replacement bridge that would also carry transit service (Alternative Packages 8 – 12), the “no bridge lift” period would be eliminated and there would be no impacts to transit service.</p>
➤ Roadways North and Roadways South
<p>These elements would have no meaningful impact on river navigation efficiency.</p>
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
<p>These elements would have no meaningful impact on river navigation efficiency.</p>

Criterion Performance

Criterion 6.1 – Avoid, then minimize adverse impacts to, and where practicable enhance, threatened or endangered fish or wildlife habitat

(Part of Value 6 – Stewardship of Natural Resources)

◆ Performance Measure(s)
<ul style="list-style-type: none">• What is the total area of critical and native habitat for threatened and endangered species within the design area footprint?• What is the relative quality of the habitat?
◆ Best Performing Package(s) and/or Component(s)
<p>Replacement bridge options perform better than supplemental bridge options. Express Bus and BRT-Lite options have less direct impact than LRT or BRT, although any transit options that increase transit mode share and better support growth management would likely reduce long-term, indirect impacts to threatened and endangered species.</p> <p>Alternative Package 12 has the smallest impact on threatened and endangered species; however, the differences are relatively minor.</p>

◆ Key Findings
<p>➤ River Crossing</p> <p><i>Supplemental downstream bridge:</i></p> <p>Supplemental bridges will add new piers into Columbia River and Oregon Slough (critical habitat for salmonid species), and disturb the (already disturbed) riparian area along the Columbia River and the Oregon Slough. Construction of the supplemental bridge may cause disturbance to peregrine falcons and will disturb salmonid species. Seismic retrofitting of the existing bridge will impact salmonid species, disturb peregrine falcons, and temporarily remove peregrine falcon habitat. Demolition of the existing Oregon Slough Bridge will also impact salmonid species. A supplemental interstate bridge (Alternative Packages 4 – 7) combined with the existing bridges would have approximately 23 to 24 total acres of area over water. These areas are used as surrogates for the actual area/volume of piers in the water because that information is not yet available. It is assumed that the larger the bridge area, the larger the piers that would be needed. Bridges will also indirectly impact designated critical habitat by shading the river.</p> <p><i>Replacement downstream or upstream bridge:</i></p> <p>Replacement bridges will remove peregrine falcon habitat, add new piers to the Columbia River and Oregon Slough (critical habitat for salmonid species), and disturb the riparian area along the Columbia River. Construction of the replacement bridge and demolition of existing bridges will cause disturbance to salmonid species. A downstream replacement bridge (Alternative Packages 8, 9, and 11) would have approximately 20 to 23 acres of area over water. An upstream replacement bridge (Alternative Packages 10 and 12) would have approximately 18 to 24 acres of area over water. These areas are used as surrogates for the actual area/volume of piers in the water because that information is not yet available. It is assumed that the larger the bridge area, the larger the piers that would be needed. Bridges will also indirectly impact designated critical habitat by shading the river.</p> <p><i>Supplemental arterial bridge:</i></p> <p>Seismic retrofitting of the existing bridge will impact salmonid species, disturb peregrine falcons, and potentially remove peregrine falcon habitat. The new arterial bridge will add new piers into the Columbia River (critical habitat for salmonid species) and disturb the riparian area along the Columbia River. Construction of the arterial bridge may cause disturbance to peregrine falcons and will disturb salmonid species. The arterial bridge will have an area of 18 acres over the Columbia River and Oregon Slough.</p> <p>All river crossing options will impact peregrine falcons and salmonid species through habitat loss and disturbance. A replacement bridge performs better for threatened and endangered salmon in the long term. Building a supplemental or a replacement bridge will both require new piers in the Columbia River. Demolition of the existing bridges in the replacement option will cause additional disturbance to salmonid species, but once those piers are removed only the replacement bridge piers will remain. Building a supplemental bridge will require additional piers in the river, along with larger piers on the existing bridge due to seismic retrofitting. Short-term disturbance is likely greater for the supplemental options. In the long term, a replacement bridge will have fewer piers in the water, and therefore have a smaller impact. A supplemental arterial bridge (Alternative Package 3), combined with the existing bridges, would have the least total area over water. The new</p>

arterial bridge is a smaller supplemental bridge so will have fewer impacts than the supplemental interstate bridge.

➤ **Transit**

LRT and BRT options in Alternative Packages 8, 9, and 10 have a separate bridge for the transit component over the Oregon Slough. This would add more piers into the Oregon Slough (critical habitat for salmonid species) and cause disturbance to salmonids during construction.

LRT or BRT require a wider river crossing, increasing area over water.

All LRT and BRT options impact the riparian habitat of Burnt Bridge Creek, which is native habitat for salmonid species.

Express Bus and BRT-Lite components have little direct impacts on threatened and endangered species.

➤ **Roadways North and Roadways South**

Roadways North have no direct impact on threatened or endangered species.

Hayden Island Access and Folded Diamond components have the smallest impacts on salmonid critical habitat, with about 0.02 acres affected. The Full Standard option has a slightly larger impact with 0.06 to 0.08 acres of salmonid critical habitat impacted.

The Marine Drive Flyover Access has an arterial crossing and an on-ramp from MLK crossing the Oregon Slough. This will add additional piers into the Oregon Slough (critical habitat for salmonid species) and cause disturbance to salmonids during construction. This option impacts about 1.85 acres of salmonid critical habitat.

➤ **Other (Bike/Ped, Freight, TSM/TDM, Tolling)**

Criterion Performance

Criterion 6.2- Avoid, then minimize adverse impacts to, and where practicable enhance, other fish or wildlife habitat

(Part of Value 6 – Stewardship of Natural Resources)

◆ Performance Measure(s)
<ul style="list-style-type: none">• What is the total area of fish and wildlife habitat within the design area footprint?• What is the range of different habitat types within the design area footprint?• What are the impacts to wildlife crossings/passage?• What is the type and quality of habitat within the design area footprint?
◆ Best Performing Package(s) and/or Component(s)
<p>Replacement bridge options perform better than supplemental bridge options. Express Bus and BRT-Lite options have less direct impact than LRT or BRT, although any transit options that increase transit mode share and better support growth management would likely reduce long-term, indirect impacts to fish and wildlife.</p> <p>Alternative Package 12 has the smallest direct impact on fish and wildlife habitat; however, the differences are relatively minor.</p>

◆ Key Findings
<p>➤ River Crossing</p> <p>Replacement, downstream or upstream, bridge The replacement bridge options will remove a section of the riparian area (already disturbed) along the Columbia River, but would also provide the opportunity to restore riparian vegetation where the existing bridges are located. New piers will be added within the Columbia River, but the existing piers will be removed. This construction has the potential to impact native fish species, such as lamprey and sturgeon. Demolition of the existing bridge will remove habitat for bridge-nesting species; this can be replaced with the new bridge.</p> <p>Demolition of the existing Oregon Slough Bridge and construction of the new bridge will cause disturbance to native fish species and bridge-nesting species. Construction of the new bridge will also remove (already disturbed) riparian area along the slough, and will add piers in to the slough.</p> <p>Supplemental, downstream, bridge A supplemental bridge will remove a section of the riparian area along the Columbia River and will add new piers in the Columbia River, which has the potential to impact native fish species, such as lamprey and sturgeon. Seismic retrofitting of the existing bridge may also disturb native fish species in the Columbia River, along with bridge-nesting species using the existing bridges.</p> <p>Demolition of the existing Oregon Slough Bridge and construction of the new bridge will cause disturbance to native fish species and bridge-nesting species. Construction of the new bridge will also remove (already disturbed) riparian area along the slough, and add piers in to the slough.</p> <p>New arterial bridge Seismic retrofitting of the existing bridge will impact native fish species and bridge-nesting species using the bridge. The new arterial bridge will add new piers into the Columbia River and disturb a section of the riparian area along the Columbia River. Construction of the arterial bridge will cause disturbance to native fish species and bridge-nesting species. Demolition of the existing Oregon Slough Bridge and construction of the new bridge will cause disturbance to native fish species and bridge-nesting species. Construction of the new bridge will also remove (already disturbed) riparian area along the slough, and add piers in to the slough.</p> <p>All river crossing options impact City of Portland Environmental Zones (conservation zones), Metro Goal 5 habitat zones, and Clark County Sensitive and Critical lands. Impacts occur in the Burnt Bridge Creek area and along the Columbia River. In Portland, this would also include the Oregon Slough, Delta Slough, and the forested areas at the southwestern edge of the Marine Drive interchange. Alternative Package 3 has the smallest impact on these zones. The only habitats identified during field surveys that are impacted by the river crossings are the open water of the Columbia River and Oregon Slough. Overall, Alternative Package 3 has the smallest impact on these habitats, followed by Alternative Packages 9 and 12.</p>

All river crossing options have the potential to impact native fish in the Columbia River and Oregon Slough, bridge-nesting species using the existing bridges, and riparian habitat along the Columbia River and Oregon Slough. All options are likely to have the same impact on wildlife passage.

➤ **Transit**

The LRT and BRT options in Alternative Packages 8, 9, and 10 have a separate bridge for the transit component over the Oregon Slough. This will add additional piers into the Oregon Slough, alter the riparian area, and cause disturbance to native fish and bridge-nesting species during construction.

All LRT and BRT options impact the riparian habitat of Burnt Bridge Creek, which is habitat for native fish, migratory birds, and other wildlife species, and is a WDFW Priority Habitat and Clark County Sensitive and Critical Lands. LRT and BRT options also impact City of Portland Environmental Zones, Metro Goal 5 zones, and habitats identified during field surveys. These habitats are generally low to medium quality.

With two exceptions, Express Bus and BRT-Lite options have no direct impacts on fish and wildlife habitat. Alternative Packages 7 and 11 transit components impact roughly 1 acre of Clark County Sensitive and Critical Lands.

Transit components that increase transit mode share and better support growth management would likely help reduce long-term, indirect impacts to fish and wildlife habitat.

➤ **Roadways North and Roadways South**

Roadways North alternatives have an impact on WDFW Priority Habitats in the Burnt Bridge Creek riparian area and Urban Open Space, and on Clark County Sensitive and Critical Lands. The SR 500 Flyover Access has a greater impact on these habitats than the SR 500 Tunnel Access, and also impacts more of the habitats identified during field surveys. These habitats are of low to medium quality.

The Hayden Island Access option has no impacts to the Oregon Slough and very small impacts to City of Portland Environmental Zones, Metro Goal 5 zones, and on habitats identified during field surveys.

The Hayden Island Arterial Access option has an arterial crossing and an on-ramp from Martin Luther King Boulevard crossing the Oregon Slough. This will add additional piers into the Oregon Slough, alter the riparian area, and cause disturbance to native fish and migratory birds during construction. The Hayden Island Arterial Access has the largest impact on City of Portland Environmental Zones, Metro Goal 5 zones, and on habitats identified during field surveys (Westside Riparian Wetland habitats). These habitats are of low to medium quality.

The Full Standard option has a split off-ramp south from Hayden Island and a Martin Luther King Boulevard crossing over the Oregon Slough. This will add additional piers into the Oregon Slough, alter the riparian area, and cause disturbance to salmonids during construction. The Hayden Island Full Standard component has the second highest impacts to City of Portland Environmental Zones, Metro Goal 5 zones, and habitats identified during field surveys (Westside Riparian Wetland habitats). These habitats are of low to medium quality.

The Hayden Island Folded Diamond option has no impacts to the Oregon Slough and has the smallest impact on City of Portland Environmental Zones, Metro Goal 5 zones, and on habitats identified during field surveys.

➤ **Other (Bike/Ped, Freight, TSM/TDM, Tolling)**

Criterion Performance

Criterion 6.3 - Avoid, then minimize adverse impacts to, and where practicable enhance, rare, threatened, or endangered plant species

(Part of Value 6 – Stewardship of Natural Resources)

◆ Performance Measure(s)
<ul style="list-style-type: none">• What is the total area of rare plant habitat within the design area footprint?
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none">• All packages and components perform the same. There is no rare plant habitat impacted by any packages and/or components.

◆ Key Findings
➤ River Crossing
No impacts to rare plant habitat.
➤ Transit
No impacts to rare plant habitat.
➤ Roadways North and Roadways South
No impacts to rare plant habitat.
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
No impacts to rare plant habitat.

Criterion Performance

Criterion 6.4 - Avoid, then minimize adverse impacts to, and where practicable enhance, wetlands

(Part of Value 6 – Stewardship of Natural Resources)

◆ Performance Measure(s)
<ul style="list-style-type: none"> • What is the total area of wetlands within the design area footprint? • What are the types and quality of different wetlands within the design area footprint?
◆ Best Performing Package(s) and/or Component(s)
<p>None of the Alternative Packages or components directly impact wetlands. The BRT and LRT components come within 3 feet of a wetland along Burnt Bridge Creek and the Hayden Island Arterial and Full Standard access options come within 40 feet of a wetland southwest of the Marine Drive interchange.</p> <p>The differences among all alternatives are minor.</p>
◆ Key Findings
➤ River Crossing
<p>There are no impacts to wetlands from river crossing options.</p>
➤ Transit
<p>The Express Bus and BRT-Lite options are farthest from the Burnt Bridge Creek wetland, while BRT and LRT options come within about 3 feet of the Burnt Bridge Creek wetland. None of the transit options has any direct impacts to wetlands.</p> <p>Any transit options that increase transit mode share and better support growth management would likely reduce long-term, indirect impacts to other wetlands.</p>
➤ Roadways North and Roadways South
<p>Roadways North components have no impacts on wetlands.</p> <p>The Hayden Island Access and Hayden Island Folded Diamond components are the farthest from the wetland near the Marine Drive interchange, while the Hayden Island Arterial access and the Full Standard components are the closest (within 40 feet).</p>
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
<p>There are no impacts to wetlands under any of these components.</p>

Criterion Performance

Criterion 6.5 - Avoid, then minimize adverse impacts to, and where practicable enhance, water quality

(Part of Value 6 – Stewardship of Natural Resources)

◆ Performance Measure(s)
<ul style="list-style-type: none">• How much area of additional impervious surface would be introduced by this alternative?• How much existing impervious surface would remain?
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none">• Alternative Package 3 followed by Alternative Package 12 has the smallest design area footprints.• It will generally be easier to treat stormwater runoff from a new bridge than from the existing bridges. However, existing upland space for providing extensive treatment facilities is limited.
◆ Key Findings
➤ River Crossing
<p>The new arterial bridge (Alternative Package 3) has the smallest footprint. The replacement bridge options have less total impervious surface area than the supplemental bridge options (by approximately 10-20%).</p> <p>Replacement Alternative Packages 8 - 12 will generally perform better than supplemental alternative because they have less total impervious surface area and are more conducive to full stormwater collection, conveyance, and treatment.</p> <p>No-Build has the least impervious surface area but would not include any treatment of stormwater runoff.</p>
➤ Transit
<p>The BRT and LRT options have the largest footprints, while Express Bus only has no additional footprint. All of the options allow stormwater treatment.</p>
➤ Roadways North and Roadways South
<p>The Hayden Island Access option and the Hayden Island Folded Diamond option generally have a smaller footprint than the Hayden Island Arterial Access and Full Standard Options. All options would allow stormwater treatment.</p>
➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)

Criterion Performance

Criterion 6.7 - Avoid, then minimize adverse impacts to, and where practicable enhance, waterways

(Part of Value 6 – Stewardship of Natural Resources)

◆ Performance Measure(s)
<ul style="list-style-type: none"> • What are the removal/fill impacts to waterways? <p><i>Note: We did not have the areas of the piers or estimates of removal/fill to conduct this analysis. We used the total area of the bridge (from the Conceptual Design Package descriptions) as a proxy for the number of piers required and considered seismic retrofitting as well in the analysis.</i></p>
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none"> • Replacement bridges (downstream or upstream) have the fewest piers in the water, and would leave less in-water structure than alternative packages with a supplemental bridge; Express Bus and BRT-Lite options have no impacts to waterways. • Of the Build options, Alternative Package 12 has the smallest impact on waterways.
◆ Key Findings
<ul style="list-style-type: none"> ➤ River Crossing
<p>Replacement, downstream or upstream, bridge New piers will be added into the Columbia River and Oregon Slough but the existing piers would be removed. The downstream bridge would have an area of 20 to 23 acres and the upstream bridge would have at least 18 to 24 acres of area over water.</p> <p>Supplemental downstream bridge New piers will be added into the Columbia River and Oregon Slough. The supplemental bridge, combined with the existing bridges, would have a total area of 23 to 24 acres of area over water. Seismic retrofitting of the existing bridges will increase the footprint of the existing piers.</p> <p>New arterial bridge New piers will be added into the Columbia River and Oregon Slough. This bridge, combined with the existing bridges, will have a total area over water of 18 acres. Seismic retrofitting of the existing bridges will increase the footprint of the existing piers.</p> <p>All river crossing options will require new piers to be put in the Columbia River and Oregon Slough. Replacement bridges are bigger than supplemental bridges and therefore would require bigger piers; however, supplemental bridge crossings will require seismic retrofitting of the existing bridges. With the information currently available, we expect all river component options to have similar areas of fill in the water, although supplemental options would have more piers.</p>
<ul style="list-style-type: none"> ➤ Transit
<p>Express Bus and BRT Lite options have no impacts on waterways.</p> <p>LRT or BRT require a wider river crossing, increasing area over water. Furthermore, pairing BRT and LRT with a downstream replacement bridge uses a separate structure over the Oregon Slough in order to connect with the existing Expo MAX station.</p>
<ul style="list-style-type: none"> ➤ Roadways North and Roadways South
<p>Roadways North have no impacts to waterways.</p> <p>The Hayden Island Access and Hayden Island Folded Diamond Access options have the smallest impacts on waterways.</p> <p>The Hayden Island Arterial Access option has an arterial bridge over the Oregon Slough and an MLK on-ramp, both of which will require additional piers in the Oregon Slough.</p> <p>The Hayden Island Folded Diamond Access option has a split off-ramp heading south and an MLK crossing, both of which will require additional piers in the Oregon Slough.</p>
<ul style="list-style-type: none"> ➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)
<p>There will be no impacts to waterways under these components.</p>

Criterion Performance

Criterion 9.1 – Support adopted regional growth management and comprehensive plans

(Part of Value 9- Bi-State Cooperation)

◆ Performance Measure(s)
<ul style="list-style-type: none"> • Does the package support/ uphold principles of multi-modalism and compact growth? • Which package options are included in the RTP and MTP, project lists, and modeling? • Is the package consistent with other plan policies in regional plans listed in the land use MDR?
◆ Best Performing Package(s) and/or Component(s)
<ul style="list-style-type: none"> • HCT, and specifically LRT, is included in regional plans. Transit is the only component that provides LRT service and best supports most regional plans, including the Bi-State Trade and Transportation Study. • Packages that include a balance of transit and highway improvements are generally more likely to support multi-modalism and compact growth (Alternative Packages 3, 4, 8, and 9). • Medium performing packages include Alternative Packages 5, 6, 10, and 11 (HCT). • Low performing packages include Alternative Packages 1, 2, 7, and 12 (no HCT mode/stations).
◆ Key Findings
<p>➤ River Crossing</p> <p>River crossings that require less ROW acquisitions on Hayden Island and in downtown Vancouver will better support regional economic development goals, with Alternative Package 5 having the greatest impacts to downtown Vancouver. Alternative Package 3 appears to have the least impacts to downtown Vancouver.</p> <p>Additionally, the Clark County County-wide planning policies include historic preservation, supporting supplementation of the existing bridge. However, those packages that include a balanced approach of transit and highway improvements better support multi-modalism.</p>
<p>➤ Transit</p> <p>Components with Express Bus fail to provide HCT as explicitly called for in regional plans. Only the LRT component is consistent with plan policies that speak to the regional transit network and with the recommendations of the Bi-State Trade and Transportation Study which are referenced in numerous plans. In addition, this component provides the most reliable light rail service through the construction of a new fixed span bridge.</p>
<p>➤ Roadways North and Roadways South</p> <p>There is no discernable difference between packages for this criterion.</p>
<p>➤ Other (Bike/Ped, Freight, TSM/TDM, Tolling)</p> <p>Alternative Package 3 is the best option from a bicycle and pedestrian standpoint because it provides the shortest distance to travel, provides easy access onto the facility, and places bikers and pedestrians next to low-speed traffic traveling locally on an arterial bridge.</p> <p>Alternative Packages 5, 6, and 7 are less desirable options because they create longer distances to travel, place bicyclists and pedestrians close to high-speed freeway traffic, and have narrow lanes with limited shoulders.</p>