INTERSTATE 5 COLUMBIA RIVER CROSSING

Cumulative Effects Technical Report

May 2008

Columbia River CROSSING

TO: Readers of the CRC Technical Reports

FROM: CRC Project Team

SUBJECT: Differences between CRC DEIS and Technical Reports

The I-5 Columbia River Crossing (CRC) Draft Environmental Impact Statement (DEIS) presents information summarized from numerous technical documents. Most of these documents are discipline-specific technical reports (e.g., archeology, noise and vibration, navigation, etc.). These reports include a detailed explanation of the data gathering and analytical methods used by each discipline team. The methodologies were reviewed by federal, state and local agencies before analysis began. The technical reports are longer and more detailed than the DEIS and should be referred to for information beyond that which is presented in the DEIS. For example, findings summarized in the DEIS are supported by analysis in the technical reports and their appendices.

The DEIS organizes the range of alternatives differently than the technical reports. Although the information contained in the DEIS was derived from the analyses documented in the technical reports, this information is organized differently in the DEIS than in the reports. The following explains these differences. The following details the significant differences between how alternatives are described, terminology, and how impacts are organized in the DEIS and in most technical reports so that readers of the DEIS can understand where to look for information in the technical reports. Some technical reports do not exhibit all these differences from the DEIS.

Difference #1: Description of Alternatives

The first difference readers of the technical reports are likely to discover is that the full alternatives are packaged differently than in the DEIS. The primary difference is that the DEIS includes all four transit terminus options (Kiggins Bowl, Lincoln, Clark College Minimum Operable Segment (MOS), and Mill Plain MOS) with each build alternative. In contrast, the alternatives in the technical reports assume a single transit terminus:

- Alternatives 2 and 3 both include the Kiggins Bowl terminus
- Alternatives 4 and 5 both include the Lincoln terminus

In the technical reports, the Clark College MOS and Mill Plain MOS are evaluated and discussed from the standpoint of how they would differ from the full-length Kiggins Bowl and Lincoln terminus options.

Difference #2: Terminology

Several elements of the project alternatives are described using different terms in the DEIS than in the technical reports. The following table shows the major differences in terminology.

DEIS terms	Technical report terms
Kiggins Bowl terminus	I-5 alignment
Lincoln terminus	Vancouver alignment
Efficient transit operations	Standard transit operations
Increased transit operations	Enhanced transit operations

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Difference #3: Analysis of Alternatives

The most significant difference between most of the technical reports and the DEIS is how each structures its discussion of impacts of the alternatives. Both the reports and the DEIS introduce long-term effects of the full alternatives first. However, the technical reports then discuss “segment-level options,” “other project elements,” and “system-level choices.” The technical reports used segment-level analyses to focus on specific and consistent geographic regions. This enabled a robust analysis of the choices on Hayden Island, in downtown Vancouver, etc. The system-level analysis allowed for a comparative evaluation of major project components (replacement versus supplemental bridge, light rail versus bus rapid transit, etc). The key findings of these analyses are summarized in the DEIS; they are simply organized in only two general areas: impacts by each full alternative, and impacts of the individual “components” that comprise the alternatives (e.g. transit mode).

Difference #4: Updates

The draft technical reports were largely completed in late 2007. Some data in these reports have been updated since then and are reflected in the DEIS. However, not all changes have been incorporated into the technical reports. The DEIS reflects more recent public and agency input than is included in the technical reports. Some of the options and potential mitigation measures developed after the technical reports were drafted are included in the DEIS, but not in the technical reports. For example, Chapter 5 of the DEIS (Section 4(f) evaluation) includes a range of potential “minimization measures” that are being considered to reduce impacts to historic and public park and recreation resources. These are generally not included in the technical reports. Also, impacts related to the stacked transit/highway bridge (STHB) design for the replacement river crossing are not discussed in the individual technical reports, but are consolidated into a single technical memorandum.

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Cover Sheet

Interstate 5 Columbia River Crossing

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ACRONYMS

Acronym	Description
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
API	Area of Potential Impact
BIA	Bridge Influence Area
BLM	Bureau of Land Management
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe Railroad
BPA	Bonneville Power Administration
BRT	Bus Rapid Transit
CFR	Code of Federal Regulations
CRC	Columbia River Crossing
DAHP	Washington Department of Archeology and Historic Preservation
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FTA	Federal Transit Administration
HCT	High-Capacity Transit
LRT	Light Rail Transit
NEPA	National Environmental Policy Act
ODOT	Oregon Department of Transportation
RCW	Revised Code of Washington
SHPO	State Historic Preservation Office
TSM	Transportation System Management
WSDOT	Washington State Department of Transportation

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1. Introduction

This report describes the potential cumulative effects of the I-5 Columbia River Crossing (CRC) project alternatives when combined with other past, present, and future actions.

1.1 Organization of This Report

This report first defines cumulative effects and outlines the approach, timeline and geographic scope for analyzing those effects. It then summarizes the other past, present and reasonably foreseeable actions that are part of the cumulative effects analysis. The results of the cumulative impacts analysis are in Section 2 (built environment), Section 3 (natural environment), and Section 4 (cultural environment).

1.2 Description of the Alternatives

The alternatives being considered for the CRC project consist of a diverse range of highway, transit and other transportation choices. Some of these choices – such as the number of traffic lanes across the river – could affect transportation performance and impacts throughout the bridge influence area or beyond. These are referred to as "system-level choices." Other choices – such as whether to run high-capacity transit (HCT) on Washington Street or Washington and Broadway Streets – have little impact beyond the area immediately surrounding that proposed change and no measurable effect on regional impacts or performance. These are called "segment-level choices." This report discusses the impacts from both system- and segment-level choices, as well as "full alternatives." The full alternatives combine system-level and segment-level choices for highway, transit, pedestrian, and bicycle transportation. They are representative examples of how project elements may be combined. Other combinations of specific elements are possible. Analyzing the full alternatives allows us to understand the combined performance and impacts that would result from multimodal improvements spanning the bridge influence area.

Following are brief descriptions of the alternatives being evaluated in this report, which include:

- System-level choices,
- Segment-level choices, and
- Full alternatives.

1.2.1 System-Level Choices

System-level choices have potentially broad influence on the magnitude and type of benefits and impacts produced by this project. These options may influence physical or operational characteristics throughout the project area and can affect transportation and other elements outside the project corridor as well. The system-level choices include:

- River crossing type (replacement or supplemental)

- High-capacity transit mode (bus rapid transit or light rail transit)
- Tolling (no toll, I-5 only, I-5 and I-205, standard toll, higher toll)

This report compares replacement and supplemental river crossing options. A replacement river crossing would remove the existing highway bridge structures across the Columbia River and replace them with three new parallel structures – one for I-5 northbound traffic, another for I-5 southbound traffic, and a third for HCT, bicycles, and pedestrians. A supplemental river crossing would build a new bridge span downstream of the existing I-5 bridge. The new supplemental bridge would carry southbound I-5 traffic and HCT, while the existing I-5 bridge would carry northbound I-5 traffic, bicycles, and pedestrians. The replacement crossing would include three through-lanes and two auxiliary lanes for I-5 traffic in each direction. The supplemental crossing would include three through-lanes and one auxiliary lane in each direction.

Two types of HCT are being considered – bus rapid transit and light rail transit. Both would operate in an exclusive right-of-way through the project area, and are being evaluated for the same alignments and station locations. The HCT mode – LRT or BRT – is evaluated as a system-level choice. Alignment options and station locations are discussed as segment-level choices. BRT would use 60-foot or 80-foot long articulated buses in lanes separated from other traffic. LRT would use one- and two-car trains in an extension of the MAX line that currently ends at the Expo Center in Portland.

Under the efficient operating scenario, LRT trains would run at approximately 7.5 minute headways during the peak periods. BRT would run at headways between 2.5 and 10 minutes depending on the location in the corridor. BRT would need to run at more frequent headways to match the passenger-carrying capacity of the LRT trains. This report also evaluates performance and impacts for an increased operations scenario that would double the number of BRT vehicles or the number of LRT trains during the peak periods.

1.2.2 Segment-Level Choices

1.2.2.1 Transit Alignments

The transit alignment choices are organized into three corridor segments. Within each segment the alignment choices can be selected relatively independently of the choices in the other segments. These alignment variations generally do not affect overall system performance but could have important differences in the impacts and benefits that occur in each segment. The three segments are:

- Segment A1 – Delta Park to South Vancouver
- Segment A2 – South Vancouver to Mill Plain District
- Segment B – Mill Plain District to North Vancouver

In Segment A1 there are two general transit alignment options - offset from, or adjacent to, I-5. An offset HCT guideway would place HCT approximately 450 to 650 feet west of I-5 on Hayden Island. An adjacent HCT guideway across Hayden Island would locate HCT immediately west of I-5. The alignment of I-5, and thus the alignment of an adjacent HCT guideway, on Hayden Island would vary slightly depending upon the river crossing and highway alignment, whereas an offset HCT guideway would retain the same station location regardless of the I-5 bridge alignment.

HCT would touch down in downtown Vancouver at Sixth Street and Washington Street with a replacement river crossing. A supplemental crossing would push the touch down location north to Seventh Street. Once in downtown Vancouver, there are two alignment options for HCT – a two-way guideway on Washington Street or a couplet design that would place southbound HCT on Washington Street and northbound HCT on Broadway. Both options would have stations at Seventh Street, 12th Street, and at the Mill Plain Transit Center between 15th and 16th Streets.

From downtown Vancouver, HCT could either continue north on local streets or turn east and then north adjacent to I-5. Continuing north on local streets, HCT could either use a two-way guideway on Broadway or a couplet on Main Street and Broadway. At 29th Street, both of these options would merge to a two-way guideway on Main Street and end at the Lincoln Park and Ride located at the current WSDOT maintenance facility. Once out of downtown Vancouver, transit has two options if connecting to an I-5 alignment: head east on 16th Street and then through a new tunnel under I-5, or head east on McLoughlin Street and then through the existing underpass beneath I-5. With either option HCT would connect with the Clark College Park and Ride on the east side of I-5, then head north along I-5 to about SR 500 where it would cross back over I-5 to end at the Kiggins Bowl Park and Ride.

There is also an option, referred to as the minimum operable segments (MOS), which would end the HCT line at either the Mill Plain station or Clark College. The MOS options provide a lower cost, lower performance alternative in the event that the full-length HCT lines could not be funded in a single phase of construction and financing.

1.2.2.2 Highway and Bridge Alignments

This analysis divides the highway and bridge options into two corridor segments, including:

- Segment A – Delta Park to Mill Plain District
- Segment B – Mill Plain District to North Vancouver

Segment A has several independent highway and bridge alignment options. Differences in highway alignment in Segment B are caused by transit alignment, and are not treated as independent options.

The replacement crossing would be located downstream of the existing I-5 bridge. At the SR 14 interchange there are two basic configurations being considered. A traditional configuration would use ramps looping around both sides of the mainline to provide direct connection between I-5 and SR 14. A less traditional design could reduce right-of-way requirements by using a “left loop” that would stack both ramps on the west side of the I-5 mainline.

1.2.3 Full Alternatives

Full alternatives represent combinations of system-level and segment-level options. These alternatives have been assembled to represent the range of possibilities and total impacts at the project and regional level. Packaging different configurations of highway, transit, river crossing, tolling and other improvements into full alternatives allows project staff to evaluate comprehensive traffic and transit performance, environmental impacts and costs.

Exhibit 1-1 summarizes how the options discussed above have been packaged into representative full alternatives.

Exhibit 1-1. Full Alternatives

	Packaged Options				
Full Alternative	River Crossing Type	HCT Mode	Northern Transit Alignment	TDM/TSM Type	Tolling Method[a]
1	Existing	None	N/A	Existing	None
2	Replacement	BRT	Vancouver or I-5	Aggressive	Standard Rate
3	Replacement	LRT	Vancouver or I-5	Aggressive	Two options[b]
4	Supplemental	BRT	Vancouver or I-5	Very Aggressive	Higher rate
5	Supplemental	LRT	Vancouver or I-5	Very Aggressive	Higher rate

[a] In addition to different tolling rates, this report evaluates options that would toll only the I-5 river crossing and options that would toll both the I-5 and the I-205 crossings.
[b] Alternative 3 is evaluated with two different tolling scenarios, tolling and non-tolling.

Modeling software used to assess alternatives' performance does not distinguish between smaller details, such as most segment-level transit alignments. However, the geographic difference between the Vancouver and I-5 transit alignments is significant enough to warrant including this variable in the model. All alternatives include Transportation Demand Management (TDM) and Transportation System Management (TSM) measures designed to improve efficient use of the transportation network and encourage alternative transportation options to commuters such as carpools, flexible work hours, and telecommuting. Alternatives 4 and 5 assume higher funding levels for some of these measures.

Alternative 1: The National Environmental Policy Act (NEPA) requires the evaluation of a No-Build or "No Action" alternative for comparison with the build alternatives. The No-Build analysis includes the same 2030 population and employment projections and the same reasonably foreseeable projects assumed in the build alternatives. It does not include any of the I-5 CRC related improvements. It provides a baseline for comparing the build alternatives, and for understanding what will happen without construction of the I-5 CRC project.

Alternative 2: This alternative would replace the existing I-5 bridge with three new bridge structures downstream of the existing bridge. These new bridge structures would carry Interstate traffic, BRT, bicycles, and pedestrians. There would be three through-lanes and two auxiliary lanes for I-5 traffic in each direction. Transit would include a

BRT system that would operate in an exclusive guideway from Kiggins Bowl in Vancouver to the Expo Center station in Portland. Express bus service and local and feeder bus service would increase to serve the added transit capacity. BRT buses would turn around at the existing Expo Station in Portland, where riders could transfer to the MAX Yellow Line.

Alternative 3: This is similar to Alternative 2 except that LRT would be used instead of BRT. This alternative is analyzed both with a toll collected from vehicles crossing the Columbia River on the new I-5 bridge, and with no toll. LRT would use the same transit alignment and station locations. Transit operations, such as headways, would differ, and LRT would connect with the existing MAX Yellow Line without requiring riders to transfer.

Alternative 4: This alternative would retain the existing I-5 bridge structures for northbound Interstate traffic, bicycles, and pedestrians. A new crossing would carry southbound Interstate traffic and BRT. The existing I-5 bridges would be re-striped to provide two lanes on each structure and allow for an outside safety shoulder for disabled vehicles. A new, wider bicycle and pedestrian facility would be cantilevered from the eastern side of the existing northbound (eastern) bridge. A new downstream supplemental bridge would carry four southbound I-5 lanes (three through-lanes and one auxiliary lane) and BRT. BRT buses would turn around at the existing Expo Station in Portland, where riders could transfer to the MAX Yellow Line. Compared to Alternative 2, increased transit service would provide more frequent service. Express bus service and local and feeder bus service would increase to serve the added transit capacity.

Alternative 5: This is similar to Alternative 4 except that LRT would be used instead of BRT. LRT would have the same alignment options, and similar station locations and requirements. LRT service would be more frequent (approximately 3.5 minute headways during the peak period) compared to 7.5 minutes with Alternative 3. LRT would connect with the existing MAX Yellow Line without requiring riders to transfer.

1.3 Defining Cumulative Effects

Cumulative effects result from the incremental effect of the proposed action when added to those of other past, present, and reasonably foreseeable future actions, regardless of the agency (federal or non-federal) or person that undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions that take place over a period of time (definitions paraphrased from 40 CFR, 1508.7).

The National Environmental Policy Act (NEPA) scoping process helped to inform the extent and level of analysis that will be required for each environmental resource. Consultations with cooperating agencies, participating agencies, and the public contributed to defining the scope and scale of the cumulative effects analysis.

For all technical disciplines, current and planned projects included those assumed in the regional modeling of 2030 transportation conditions. On a discipline-by-discipline basis, additional projects and trends were considered if relevant to the analysis of cumulative effects. For example, the natural environment disciplines consider the effects of increased urbanization and land use changes on the amount of natural area near the project, and the built environment disciplines consider the plans and policies adopted for the area.

1.4 General Analytical Approach

The project team assessed which environmental and community resources would be affected by the CRC project, and how other past, present, or reasonably foreseeable future actions may affect the same resources. These actions and their cumulative effects were compared to the potential effects resulting from the project alternatives. Planned transportation projects, land use forecasts, and other major public and private projects under development were considered. The temporal and geographic scales of analysis for the assessment of actions and forecasts can vary for each discipline. For some cumulative effects, namely climate change and energy, the analysis also assesses how global trends could affect the CRC alternatives.

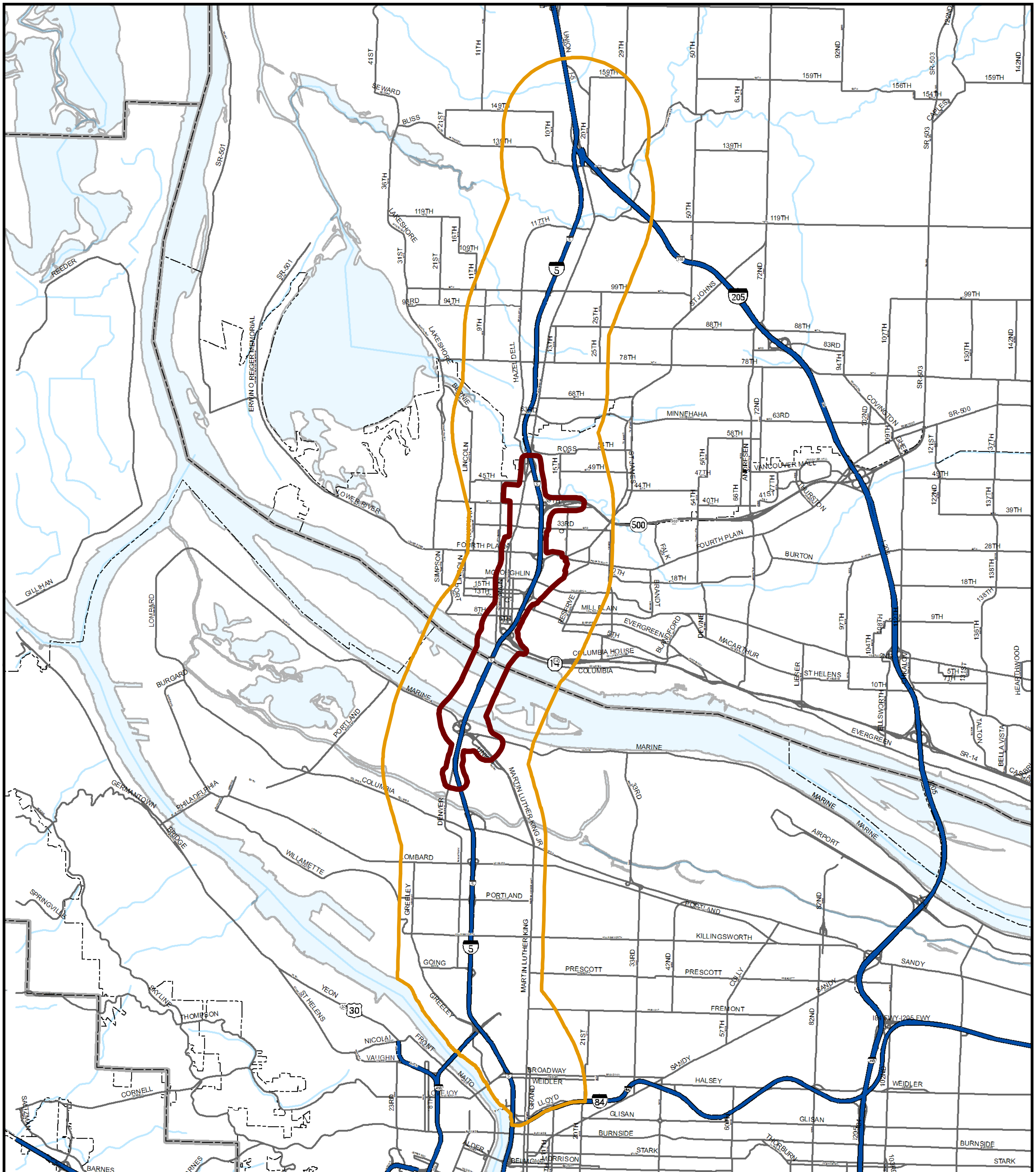
The analysis of cumulative effects for the CRC project first employed quantitative methods where applicable. The analysis is also qualitative, with emphasis on comparing the relative cumulative effects of various alternatives compared to the No-Build Alternative. This allows the appropriate context to be used in considering and comparing project alternatives, based on available data.

The general analytical approach for each environmental resource (built, natural, and cultural) includes three major steps:

1. Identify appropriate timeframe and outline general past and future actions, as data allow. Assess the general impacts of these past actions on relevant built, natural, or cultural environment resources. Solicit input from the agencies or designated work group to assess the nature and extent of past, present, and reasonably foreseeable future effects on those resources.
2. Summarize the effects to environmental resources from the CRC No-Build and build alternatives. Assess changes in transportation systems (impervious surface, traffic volumes, patterns, and noise) and land use. These summaries draw from the technical reports prepared for the project.
3. Compare the aggregate effects of the CRC alternatives combined with other past, present, and reasonably foreseeable future actions.

1.5 Area of Analysis: Area of Potential Impacts

The project's area of potential impact (API) includes areas that would reasonably be impacted by the project, either directly or indirectly. Two general APIs have been defined for the project, based on the anticipated range of alternatives, the primary API and the secondary API, shown in Exhibit 1-2.



Primary API

Secondary API

Exhibit 1-2: Area of Potential Impact

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Analysis by Analyst name; Analysis Date: Aug.-2007; Plot Date: Aug.-2007; File Name: Exhibit1_ProjCorr_JL083.mxd

Direct effects are most likely to occur within the primary API because it encompasses the area in which CRC's construction is proposed. It extends about five miles, north to south, from the I-5/Main Street interchange in Washington to the I-5/Columbia Boulevard interchange in Oregon. Temporary direct impacts could potentially occur outside this area with construction staging.

The secondary API represents the area where indirect effects (e.g., traffic and development changes) could occur as a result of the proposed project alternatives. The secondary API, over 15 miles long, runs from a point approximately 1 mile north of the I-5/I-205 interchange all the way south to the I-5/I-84 interchange. It also extends 1 mile on both the east and west sides of the I-5 right-of-way. Traffic projections helped determine the geographic extent of potential indirect or secondary impacts.

1.6 Timeframe for the Analysis: Past, Present, and Reasonably Foreseeable Future Projects

To address cumulative effects, the project team established a temporal frame of reference for the analysis. The time frame of reference for cumulative impacts considered in this report is:

- The relevant timeframe for considering past actions varies by general discipline. The natural environment analysis looks at changes beginning in the 1800s. The cultural environment starts with prehistory, and the relevant past actions for evaluating built environment cumulative impacts started in the early 1960s with the construction and opening of I-5.
- Present is 2007.
- Future is 2030, the design year of this project.

The time periods and types of projects included in the analysis are described in greater detail below.

1.6.1 Past Projects and Actions

Past built environment projects include transportation, housing, and other developments that have influenced the social, economic, and natural environment in the project area. Prior to the 1917 construction of a bridge across the Columbia River in this location, ferries and other boats were used to transport people and goods between Oregon and Washington. A second bridge, currently carrying southbound I-5 traffic, was added in 1958 to provide increased capacity and to separate southbound and northbound traffic. At that time, the bridges were linked to Oregon 99, the main north/south highway. The bridges later became part of the interstate system when I-5 was opened in the project area in the early 1960s.

For the built environment, the "past" will run from 1960 (prior to the opening of I-5) to the present day. For the natural environment, an earlier base year is evaluated to capture a longer history of the effects of development on natural resources in the area. To determine base thresholds the cultural environment team solicited input from the Cultural

Resources/Section 4(f) Workgroup, which is composed of local and state agency representatives, the Washington Department of Archaeology and Historic Preservation (DAHP), and the Oregon State Historic Preservation Office (SHPO).

Native Americans have occupied or traveled through the CRC project area for thousands of years. Those activities had little effect on current environmental conditions in the CRC project area. In the 1800s European-American settlement began and expanded and the Portland and Vancouver area population began to dramatically increase. The following key historic events provide a basis for analysis of past actions that have helped shape current environmental conditions:

Past Actions

Pre-1800s	Native American paths along Siskiyou Trail on what is now the I-5 Corridor connected tribes from the Pacific Northwest to California's Central Valley.
1810 to 1850	Settlement of Fort Vancouver and the Hudson Bay Company. Commercial fur trapping on the Columbia and associated waterways developed between 1810 to the 1850s. Fur trappers from the Hudson Bay Company operating out of Fort Vancouver adopted the Siskiyou Trail as a major transport corridor between the Northern Oregon Territory and California.
1846	Ferry service across the Columbia between Vancouver and Portland was established by Carl Switzler. Private ferry service between Vancouver and Portland was offered intermittently after that time by various operators[1]. The State of Washington begins offering ferry service at other points along the Columbia in the 1930s.
1890s to present	The advent of the trolley line system in Portland and Vancouver encouraged greater urbanization and development of neighborhoods east of the Willamette in Oregon, and north to Fourth Plain Boulevard in Vancouver. The automobile was introduced in the early 1900s and by the 1930s many middle class families could afford cars and travel greater distances for work, shopping, or leisure. This greatly influenced the urbanization of Portland and Vancouver.
1905	Pearson Airfield became a dirigible landing area. It was officially dedicated as Pearson Airfield in 1925.

[1] http://www.columbian.com/history/transportation/ferry1.cfm, accessed on September 27, 2007.

Past Actions

1910 to present	Railroad construction, including a rail bridge over the Columbia River in 1910 allowed increased freight transport and increased the viability of the Port of Vancouver and Port of Portland in interstate trade. Industrialized farming, irrigation and water impoundment, and grain shipment increased.
1917	The Columbia River Interstate Bridge opened in 1917 and allowed easier transport of cargo and people between Vancouver and Portland, as well as the broader Pacific Northwest. This supported the expansion of industry and commerce in the region. In 1958, a second parallel bridge was constructed and the original 1917 bridge was converted to northbound only I-5 traffic.[2]
1930s to 1970s	Construction of hydroelectric dams on the Columbia (Bonneville, The Dalles, John Day) – Several dams were built on the Columbia River between the 1930s and 1970s to provide electricity and irrigation water for the Pacific Northwest. Over-fishing and construction of these dams dramatically decreased salmon runs. This had a negative impact on the economic well-being of Native American tribes, for whom the salmon were a significant material and cultural resource.
1940s	Mobilization of shipyard manufacturing in support of World War II brought wartime employment in the Portland and Vancouver area to 75,000. This massive influx of workers from all over the U.S. created a housing shortage and many nearby areas were impacted by this temporary increase in housing demand and resulting building boom.
1948	The 1948 Vanport City Flood – In 1948 the Columbia River flooded and displaced approximately 20,000 public housing residents, including many minorities. Relocation occurred throughout the area and the Vanport community's residential base never recovered to those levels supported in 1948.
1950s	Post World War II housing construction was financed through federal grants and GI loans and created a greater supply and demand of outer urban and suburban housing both in Oregon and Washington.
1958	The Vancouver-Portland Interstate Toll Bridge was constructed in 1958. This development doubled automobile capacity across the Columbia, reduced congestion and allowed further commuting across the Columbia. This bridge carries southbound traffic.

[2] http://www.nwcouncil.org/history/Bridges.asp, accessed on August 27, 2007

Past Actions

1960s	Portland International Raceway and Delta Park were established on former roads and land from the Vanport Community that was destroyed by floods in 1948.
1952-60s	Construction of the interstate highway system in the 1950s and early 1960s greatly increased freight and automobile traffic. The new highway separated neighborhoods in Portland and Vancouver. Construction of the interstate highway system also increased access to downtown Vancouver.
1973 to present	Growth management and implementation of Oregon planning laws in the 1970s have limited urban sprawl in the Portland metropolitan area.
1970s to present	Development of the Silicon Forest in the late 1970s and continuing through the 1990s – Firms settling in Beaverton, Hillsboro and other nearby suburbs were major players in the national high tech boom of the latter 20th Century. As the area’s economy shifted from timber processing and sales to high tech and services, there was a high demand for professional workers. This encouraged commuting from throughout the Portland Metropolitan Area, including Vancouver, which increased commuting across the Columbia.
1990	The Washington Growth Management Act passes in 1990 and like the growth management and planning laws adopted by Oregon in the 1970s, this act seeks to restrict unplanned urban sprawl and concentrate growth in existing urban areas.

1.6.2 Recently Constructed Projects

Some of the more significant recent transportation and development projects in or near the CRC area are listed below. The development projects give a sense of the recent development trends in the area. The projects will create additional travel demand, and generally increase the density of housing, commercial, and retail enterprises in the project area.

Recent Transportation Projects

- Failing Street Pedestrian Bridge rehabilitation
- Interstate Max
- Widening of I-5 north of the CRC project area

Recent Development

- Esther Short Park and Propstra Square (Vancouver)
- Heritage Place retail development (Vancouver)

- The Vancouver Center mixed use development (Vancouver)
- The Lewis and Clark Plaza housing and public space (Vancouver)
- The Esther Short Commons residential and retail development (Vancouver)
- The Vancouver Convention Center and Hilton Hotel (Vancouver)
- The Columbian Building office space (Vancouver)
- The West Coast Bank Building commercial and residential mixed use (Vancouver)
- The Northwynd at Columbia Shores commercial and residential mixed use (Vancouver)
- The Waterside Condominiums (84 units) Portland
- Salpare Bay Condos (204 units) Portland

1.6.3 Reasonably Foreseeable Future Projects

There are multiple plans that lay out lists of reasonably foreseeable future projects. These plans include Transportation System Plans, neighborhood plans, comprehensive plans, among others. Projects identified in plans for which need, commitment, financing, and public and political support are identified and are reasonably expected to be implemented were considered in the cumulative effects analysis. A list of the projects and plans considered follows.

The No-Build Alternative includes a list of projects through 2030, including present projects and planned improvements for which need, commitment, financing, and public and political support are identified and are reasonably expected to be implemented. These projects meet the criteria of being “reasonably foreseeable”. All transportation improvements included in the No-Build Alternative are included in either Metro’s 2025 Regional Transportation Plan (RTP) (including amendments) or the Regional Transportation Council’s (RTC) 2030 Metropolitan Transportation Plan (MTP). Transportation infrastructure projects under way or planned through 2030 within the CRC project limits are listed in Appendix A, which includes highway and transit projects on both sides of the Columbia River.

With the exception of the I-5 widening to six lanes from Lombard Street to Victory Boulevard, the No Build alternative does not assume any major capacity improvements on Interstate 5 near the API. Outside of the API, there are minor I-5 capacity enhancements and several major maintenance projects, specifically identified in the financially constrained regional transportation plans of both Metro and RTC.

Projects more specific to the immediate area include local transportation improvements, infrastructure associated with higher density residential communities along Marine Drive in Portland, the revitalization of downtown Vancouver, and general infrastructure improvements such as sewer and water facility expansions which further enable development.

Appendix A includes a comprehensive list of projects considered in the 2030 traffic model.

1.6.3.1 State, Regional and Local Plans

Several adopted state, regional and local plans include visions of growth or change in the API over the next 20 years. These include:

1.6.3.1.1 State Plans

The Washington Transportation Plan includes goals to reduce person and freight delays on WTP corridors, increase travel options, and promote competitive freight movement.

The Oregon Statewide Planning Goals encourage urbanized growth within the Portland metropolitan area.

The Oregon Transportation Planning Rule requires local jurisdictions to consider changes to land use densities as a way to meet transportation needs and encourages transit and multimodal transportation systems.

The Oregon Highway Plan (OHP) requires coordination of land use and transportation decisions to protect highway mobility. It identifies I-5 as a major truck freight route.

The OHP grants alternative standards to the Portland metropolitan area due to its established higher minimum densities, mixed-use development, and multimodal transportation options.

The OHP requires the adoption of Interchange Area Management Plans for all new or upgraded highway interchanges the function of the interchange from changes in adjacent land uses.

1.6.3.1.2 Regional Plans

C-TRAN's Service Preservation Plan outlines performance standards for C-TRAN and fare increases to account for inflation. It requires equitable service hours for local urban service, paratransit services, commuter services to Portland, and service to smaller Clark County cities. There are several service changes in the project area; more information on these can be found in the transit technical report.

The Metropolitan Transportation Plan for Southwest Washington supports an efficient, balanced, multimodal regional transportation system for personal travel and acceptable mobility for freight. The MTP includes redesigns of Vancouver's Broadway and Main Streets and designates I-5 and SR 500 as high-capacity transit corridors.

The Regional Transportation Plan includes an extension of the light rail system into downtown Vancouver.

The Metro 2040 Growth Concept encourages efficient use of land, a balanced transportation system, and other elements that will aid Portland Metropolitan cities to manage growth.

The Metro Regional Framework Plan includes policies to provide adequate transportation facilities to support adopted land use plans, and enhance jobs, housing, and community identity. It also provides for a system of arterials and collectors to connect the central city, regional centers, industrial areas, and intermodal facilities.

TriMet's Transit Investment Plan provides a framework for regional transportation partnerships and places a high priority on expanding high-capacity transit, including options such as commuter rail, streetcar, bus rapid transit and other modes.

1.6.3.1.3 Local Plans

The Vancouver City Center Vision (VCCV) for the Vancouver downtown area expands the City Center boundary to approximately 130 city blocks including the city center waterfront. It includes high-density residential uses, especially along the waterfront with public access to the river's shoreline area. Other planned uses include recreation, cultural, hospitality, entertainment and commercial uses. The plan identifies several new city blocks in the area of the existing I-5 downtown Vancouver interchange that may be available for development as a result of the CRC project.

The plan proposes easy access to Oregon from downtown Vancouver through high-capacity transit and a new southbound I-5 off-ramp to Sixth Street. It proposes easy access to the Vancouver National Historic Reserve and an integrated pedestrian, bicycle, transit and automobile transportation system. Downtown connectivity is improved in the plan through a new arterial route south of the railroad berm extending from east of I-5 to Jefferson, connecting with Columbia, Esther, and Jefferson Streets.

The City of Vancouver Comprehensive Plan includes policies that encourage achievement of average densities of eight units per acre within the urban area, and infill and redevelopment. It encourages full development of urban centers and corridors that provide a range of transportation options and the development of mixed uses. The Comprehensive Plan encourages integrative area planning and the development of compatible and complementary uses.

The Comprehensive Plan designates future growth within the primary impact area from the Columbia River to Mill Plain Boulevard as City Center, Public Facility, and Parks and Open Space. The City Center designation has been expanded and plans include future redevelopment of the area and a greater focus on the riverfront area. Designations north of Mill Plain Boulevard within the primary impact area include Light Industrial, Urban Medium and Low density, and Community Commercial.

The Vancouver Shoreline Management Master Program includes design elements with goals for a "visually coherent" design that enhances the waterfront, an integrated trail system, good transportation networks, and strong bike and pedestrian circulation.

The City of Vancouver has several overlay districts within the project API. These include an Historic Preservation Overlay which preserves significant architectural character or areas within the city with cultural significance. There are areas within the overlay along the southern blocks of Main Street. There is a Noise Impact Overlay District along the Columbia River shoreline and extending west to Esther Short Park neighborhood and along blocks that abut I-5 up to McLoughlin Boulevard. An Office Development Overlay District protects neighborhoods from noise, light and increased pedestrian and automotive traffic, or other community aesthetic changes. Transit Overlay Districts within the API encourage high-density residential and commercial development along main traffic corridors.

The City of Portland Comprehensive Plan was updated in 2006 to include the Freight Master Plan and the Transportation System Plan. The Comprehensive Plan supports minimizing the effects of interregional traffic on Portland neighborhood and commercial areas. It supports public transportation such as light rail and bus service, intermodal freight facilities and congestion pricing. It promotes energy efficient transportation through the construction of a regional light rail system.

The Comprehensive Plan designates future growth within the primary API north of Marine Drive as: General, Central, and Urban Commercial; and south of Marine Drive as: Industrial Sanctuary and Open Space, south of Marine Drive. Most of the areas with the primary impact area are developed, however, new residential development is occurring along Marine Drive and further redevelopment on Hayden Island is anticipated.

The Comprehensive Plan designates future growth within the secondary impact area as: Industrial Sanctuary and Mixed Use immediately south of the primary impact area; High Density and Central Commercial west of I-5, and Residential 5,000 east of I-5. The southern limits of the secondary impact area also include Industrial Sanctuary, Central Commercial, Urban Commercial and Institutional Residential. Open space designations are interspersed throughout the secondary impact area. Many of the areas within the secondary impact area are developed and some are undergoing redevelopment and infill development, consistent with the Comprehensive Plan.

There are several overlay districts within the primary and secondary impact areas including: Alternative Design Density, which encourages infill development; Environmental and Conservation overlays, which protect natural resources; Design Overlay, which preserves areas of the City with special scenic, architectural or cultural value; and Aircraft Landing Overlay, which provides safer operating conditions for aircraft in the vicinity of Portland International Airport.

The primary API and most of the secondary API south of the Columbia River is within the boundaries of the Albina Community Plan which was adopted in 1993. The Albina Community Plan does not include Hayden Island. Like the Portland Comprehensive Plan, the Albina Community Plan designates much of the area north of Columbia Boulevard as Industrial Sanctuary, Open Space and Urban Commercial. The plan designates Martin Luther King Jr. Interstate Boulevards as higher density development corridors. The plan supports light rail and frequent stops within the community and supports better access to I-5 from the community. The plan includes recognition of Columbia Slough as a significant natural resource, and creation of buffers to mitigate I-5 noise.

The Interstate Corridor Urban Renewal Area includes goals and objectives for new job opportunities, major infrastructure improvements such as light rail, and alternatives to automobile travel. The plan also includes goals to discourage freight movement on local residential streets.

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2. Built Environment Cumulative Effects

The built environment includes the following disciplines or resource areas:

- Air quality
- Acquisitions
- Climate change
- Economics
- Electric and magnetic fields
- Energy and Peak Oil
- Environmental justice
- Land use
- Neighborhoods
- Noise and vibration
- Public services and utilities
- Visual quality and aesthetics
- Transportation

Key elements of the built environment in the primary area of potential impact (API) include the roadway and transit network, downtown Vancouver and surrounding neighborhoods, and the neighborhoods and commercial uses on Hayden Island and north Portland near the river. Development projects that are likely to be considered in the analysis include large commercial developments, especially near highway interchanges, highway-oriented developments, industrial developments or redevelopment (e.g., the area between Columbia Boulevard and Columbia Slough), and housing developments near the highway or urban edge.

The temporal frame of reference for the built environment "past" will generally be from 1960, prior to the opening of I-5 through Oregon and Washington, to the present. As data allow and are relevant, a general discussion of cumulative effects may stretch back to 1917, the time of construction and opening of the first bridge across the Columbia River.

2.1 Air Quality and Air Toxics

2.1.1 Project Effects

Air pollutant emissions are expected to be substantially lower in the future than under existing conditions. Differences between alternatives are smaller for all pollutants, and generally much smaller than the reduction between existing and future conditions for both the region and the subareas. On a regional basis, future differences between alternatives are small enough not to be meaningful within the accuracy of the estimation methods.

2.1.2 Effects from Other Projects (Past, Present, Future)

Regional air quality trends and the model forecasts suggest that air quality in the future will be significantly better than current conditions.

During the 1970s, pollutant concentrations in the Portland-Vancouver area exceeded the standards for CO on one out of every three days, and ozone levels were often as high as 50 percent over the federal standard. Programs and regulations put into effect to control air pollutant emissions have been effective, and air quality in the area has improved. The area was redesignated from a nonattainment area to a maintenance area in 1997. In general, most pollutants have shown continuing patterns of reductions in recent years.

Starting in the early 1970s, EPA promulgated numerous regulations to control air pollutant emissions from motor vehicles. Recent regulations promulgated in the early 2000s, and most recently in February 2007, adopted controls on heavy-duty diesel on-road and off-road vehicles, sulfur in fuels, and air toxic emissions from mobile sources through control of fuel formulations. The gasoline reformulation rules are expected to substantially reduce benzene emissions. While these standards will not apply directly to the project alternatives, they apply to all vehicles on the highway system and are the regulatory controls responsible for substantial reductions in vehicle emissions since the 1970s and additional projected vehicle emissions reductions over the next 25 to 30 years.

Traffic data used in the air quality analysis are based on projected land use and employment information and include expected overall growth in the region and the project area. Background concentrations representing the cumulative emissions of other sources in the area are added into the predicted local concentrations for CO at intersections.

2.1.3 Conclusions

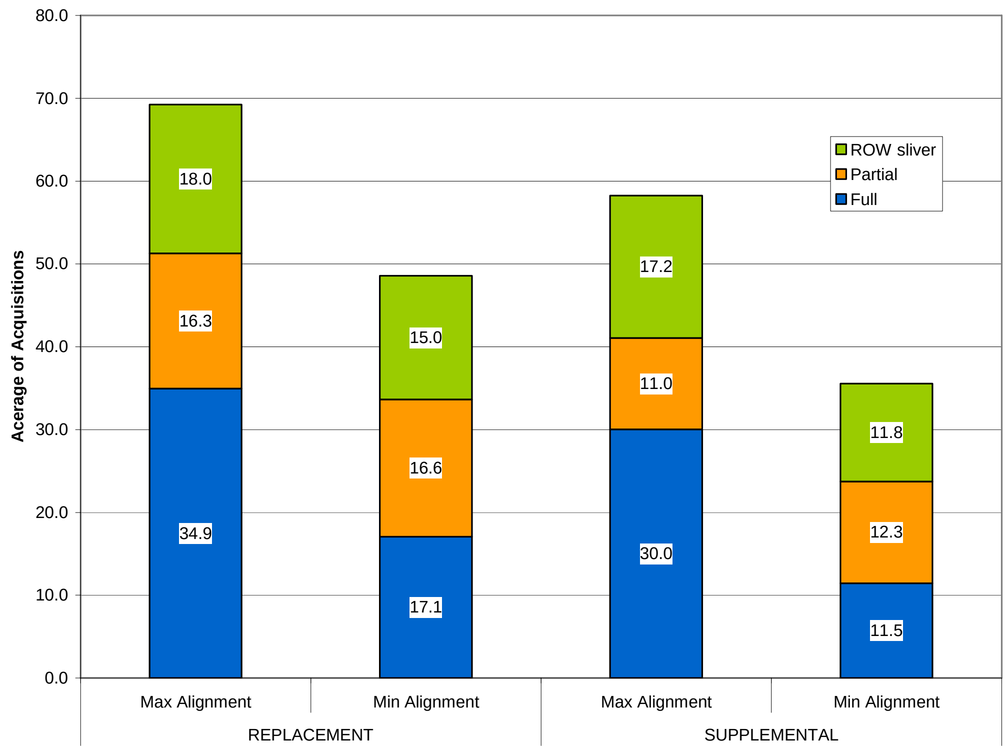
The air quality analysis incorporates reasonably foreseeable changes in the region’s future land use, population, employment and travel behavior, including the effects of the CRC project. For all pollutants analyzed, future 2030 emissions are projected to be about 40 to 90 percent lower than existing conditions.

2.2 Acquisitions

2.2.1 Project Effects

The CRC project is anticipated to require between 24 and 41 full property acquisitions, and acquire portions of approximately 120 to 180 other parcels. The designs associated with the replacement bridge have generally more acquisition needs than the designs associated with the supplemental bridge. Exhibit 2-2 illustrates the new right-of-way acreage that would be required for the different project alternatives.

Exhibit 2-1. Acreage of Right-of-Way Required by the Project



2.2.2 Effects from Other Projects (Past, Present, Future)

Most of the area directly affected by the CRC alternatives is already occupied by public right-of-way resulting from previous city planning or roadway construction projects.

The original construction of I-5 during the later 1950s and early 1960s had significant property acquisitions and displacements in Portland and Vancouver. For example, when the segment of Interstate 5 known as the Minnesota Freeway was constructed from the Rose Garden area to the Columbia River Slough in northeast Portland, it removed over 180 dwellings and displaced more than 400 residents (Kramer 2004).

2.2.3 Conclusions

The real estate acquisitions required for the build alternatives are moderate for a project of this size, and are significantly smaller when compared to the acquisitions associated with past major transportation projects in the corridor. There will be very few residential displacements in neighborhoods that were directly affected by the original construction of I-5. Most of the full acquisitions would be commercial properties and the likelihood of successfully relocating the businesses is high. The highest potential for cumulative impacts is on Hayden Island, where the alternatives would acquire or cause the relocation of 13 to 23 floating homes and the relocation of more than 10 businesses. Effects on the floating home residents may be exacerbated by shortages in the supply of available moorage space; state and federal regulations that make it difficult to permit new moorage space; and unrelated, future land use changes on Hayden Island. While the commercial property acquisition is a very small share of the total retail space on Hayden Island, unrelated, future land use changes are expected that could also result in acquisitions. The City of Portland is currently preparing a sub-area plan for the island that contemplates allowing substantial changes to the island's development, which could result in substantial changes in the land use and business mix on the island. See the Land Use Technical Report for more discussion on this topic.

It will be important to carefully consider mitigation for displaced floating homes, and to coordinate with the City of Portland's on-going land use planning efforts for Hayden Island.

2.3 Economics

2.3.1 Project Effects

Direct economic effects can be summarized in three ways: the effects to vehicular and freight movements, the effects to transit use and quality, and the effects to businesses and land use. The direct effects that are expected under the build alternatives follow.

2.3.1.1 Vehicular and Freight Effects

Most long-term economic effects after project construction should be positive. The ability to effectively and efficiently move people and commerce through this corridor, which serves interstate, regional, and local needs, is a paramount improvement. The ability to efficiently move cargo in a safer manner along the river is an added benefit from the project.

Overall, the elimination of the existing bottleneck that the current bridge creates would help to relieve existing congestion and improve access conditions at Marine Drive, Hayden Island, SR 14, Evergreen Boulevard, Mill Plain Boulevard, McLoughlin Boulevard, Fourth Plain Boulevard, and SR 500. The project would positively contribute to the increased level of vehicle access associated with the initial construction of I-5, especially for freight access to industrial areas in the highway corridor such as Rivergate, Swan Island, the Port of Portland, and the Port of Vancouver.

The combination of congestion relief and improved access associated with this project would serve to maintain or increase the appeal of industrial and commercial properties in North Portland and South Vancouver. This represents a substantial positive incremental contribution to the stimulation of economic impacts resulting from I-5 construction.

This project is expected to substantially benefit freight mobility and the greater economy. This project would ease congestion on I-5 and improve travel time reliability and predictability, which is important to freight operations. Additionally, this project would support freight mobility. This represents a positive contribution to past and planned highway improvements, such as I-5 Delta Park widening project, to enhance access to the Lloyd and Rose Quarter Districts.

2.3.1.2 Transit Effects

Transit improvement would positively and substantially contribute to the regional transit network by creating a high-capacity transit link to Vancouver. Light rail transit has greater potential to integrate into existing infrastructure when compared to bus rapid transit. Providing high-capacity transit across the Columbia River could positively affect highway projects by potentially lowering vehicle miles traveled and single-occupancy vehicles, thus extending the useful life (added capacity) of these projects, reducing congestion, and helping transportation-based businesses such as freight and wholesalers. Experiences with HCT, BRT and LRT, demonstrate that transit improvements are often linked to economic development around station areas.

2.3.1.3 Land Use and Business Effects

Enhanced vehicular and transit access to downtown Vancouver and across the Columbia River would positively affect employers and businesses in the area. This would be a substantial positive incremental contribution to economic impacts. This project would increase the attractiveness of commercial and industrial properties located in the vicinity of the I-5 corridor project area, due to easier highway and transit access, which may attract new employers and jobs. Tolls may temper these benefits, but potential benefits to businesses are expected to outweigh potential tolling cost.

2.3.1.4 Effects from Other Projects (Past, Present, Future)

The I-5 corridor is one of the most critical components of the region's transportation network. Together, past projects have worked to solidify I-5 as a critical component of the regional infrastructure. Demand on I-5 comes from freight, public, and personal vehicle use. Freight needs are a major driver for future improvements demanded along the I-5 corridor.

The ports of Portland and Vancouver are critical to the economic growth and prosperity of the region. In order for the ports to remain competitive with other West Coast ports, efficient and cost-effective multimodal transportation systems must be available. Reducing freight travel times by investing in transportation infrastructure improvements that improve access and decrease congestion helps maintain the area's competitiveness. The total annual tonnage moving through the two ports is expected to double from approximately 300 million tons in 2000 to almost than 600 million tons in 2035. This growth has implications for the transportation network as products move to and from the regional marketplace.

The No-Build Alternative retains the existing I-5 bridge crossing and makes only minor preservation improvements to the highway within the API. The No-Build project list includes many projects that improve I-5 access to and from regional centers, local collectors, and arterials. The project list also includes capacity projects along I-5 both north and south of the API. Exhibit 5-1 lists specific projects within or adjacent to the API, and non-highway and transit projects within the API.

The Metro RTP includes several capacity and safety projects at Rivergate, and along Columbia Boulevard and Marine Drive west of I-5 that are designed to improve safety and flow for commercial trucks traveling between Rivergate and I-5.

Improvements along Lombard Street and Marine Drive will generally improve conditions for commercial trucks. These improvements will improve travel times along the local arterial network (Platman 2007), but travel times once on I-5 are expected to increase absent the Build Alternatives. However, travel times for commercial trucks traveling along I-5 are expected to improve under the No-Build due to capacity projects north of Vancouver and south of Expo Center. However, these benefits will be tempered by worsened conditions within the API. Making no improvements to the highway itself would increase the severity of the existing bottleneck at the CRC bridge, lengthening the periods of congestion (spreading the peak).

2.3.2 Conclusions

This project would positively contribute to other projects aimed at reducing congestion and enhancing freight mobility by further relieving congestion. Congestion relief in this area would greatly benefit freight traffic generated by Swan Island, the Rivergate area, the Port of Portland, and the Port of Vancouver. Incremental benefits would be to decrease travel times, increase mobility, and increase reliability of travel times.

The project will provide increased access to Hayden Island, which will increase its ability to succeed as a shopping center and as an option for residential development (benefits may be tempered by tolls).

This project would enhance vehicular and transit access to and from downtown Vancouver, SR 14, Evergreen, and Mill Plain, which would benefit employers, businesses, and economic activity. The VCCV and other goals for downtown Vancouver may be more achievable with more access and transit service.

The effect on Pearson Airfield would be similar to the effect of other developments in the area, which is the result of the area around the historic airfield becoming highly urbanized. Cumulative impacts to Pearson Airfield from the CRC project are a consequence of the area surrounding Pearson Airfield becoming increasingly urbanized, making the incremental effect of the CRC project relative to all other development in the area negligible.

This project would ultimately positively affect access from I-5 to Fourth Plain Boulevard commercial businesses, Salmon Creek businesses, and Hazel Dell businesses. The CRC project would reinforce the purpose of the Salmon Creek interchange project positively.

Without the Build Alternatives, economic development planned for the area may occur more slowly as business owners may be more reluctant to locate in an area with poor access and mobility for employees and customers. Customers may elect to shop in other areas with easier access and mobility.

2.4 Electric and Magnetic Fields

Alternatives that include extending the light rail line would result in the generation of Electric and magnetic fields (EMF) and thus could have potential impacts. Alternatives that do not involve extending LRT would not produce any appreciable amounts of EMF above existing levels. Based on EMF measurements and available data, operation of future segments of the MAX LRT are unlikely to generate sufficiently intense levels of EMF to cause significant exposure risks to human health. The anticipated intensities of electromagnetic fields at locations where humans would be exposed (within and adjacent to the LRT right-of-way, near power substations, or in the light rail vehicles) are considerably below exposure guidelines set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the American Conference of Governmental Industrial Hygienists (ACGIH).

A survey conducted for the EMF Rapid Program (a program conducted under the National Institutes of Health) provides some perspective to the potential exposures of EMF from light rail. The purpose of the 1997 survey was to characterize personal magnetic field exposure in the general population (Enertech Consultants 1998). Slightly over 1,000 people participated in the survey of exposure over a 24-hour period. The results indicated approximately 14 percent of the general population is exposed to a 24-hour average magnetic field strength exceeding 2 mG. About 25 percent of the people spent more than one hour at fields greater than 4 mG, and 9 percent spend more than one hour at fields greater than 8 mG. Approximately 1.6 percent of people experience at least one gauss (1,000 mG) during a 24-hour period.

Any of the alternatives that involve extending the LRT would increase the number of persons that are potentially exposed to EMF. However, EMF is wide spread throughout the general environment and EMF levels from the light rail system are well below the ICNIRP exposure standards. There would be some slight cumulative effects for those persons riding or working on the light rail system. However, it is not anticipated that human health would be adversely affected by LRT generated EMF.

2.5 Energy and Peak Oil

The amount of energy demand to construct the CRC alternatives is locally large but minor compared to the total demand for petroleum-derived energy in Washington and Oregon. The most energy-intensive alternative, Alternative 4, would account for approximately 0.59 percent of Washington’s and Oregon’s demand.

However, the potential for cumulative energy impacts requires looking beyond this region or even the states. The cumulative impact of primary concern for energy is “peak oil”. Peak oil refers to the point in time at which the maximum global petroleum production rate is reached, after which the rate of production enters a terminal decline. Potentially significant impacts could occur if peak oil production does not coincide with a terminal decline in petroleum demand. Peak oil results from many incremental actions, few of which are individually significant, including the CRC project. However, the potential impacts of reaching peak global petroleum production is an important consideration for projects intended to address transportation needs for decades to come. For this reason, this section on cumulative energy impacts is organized very differently from the other sections.

Key questions include:

- How will the CRC alternatives affect peak oil?
- When will peak oil occur and how will it affect petroleum prices and availability for CRC project users?
- How will the rising cost of petroleum affect travel demand projections developed for the CRC project?
- Will the transportation infrastructure proposed for the CRC alternatives accommodate the transition from petroleum-based transportation energy to other energy sources?
- How can the CRC project ease the potential impacts of peak oil on the project, and the impacts of the project on peak oil?

2.5.1 How will the CRC alternatives affect peak oil?

Under the CRC No-Build scenario, future (2030) transportation demand for petroleum in the CRC energy impact area is projected to increase by about 40 percent compared to today. At the global scale this will be a very small but incrementally adverse contribution to increasing oil demand. In this same time frame (2030) global oil demand is projected to grow by 37 percent, driven in large part by transportation needs.

Compared to doing nothing, the CRC Build Alternatives are projected to reduce future (2030) transportation petroleum demand in the CRC energy impact area by one to three percent. At the global scale, these fuel savings will be very small but incrementally beneficial over the No-Build alternative.

The CRC alternatives include a number of elements that will reduce adverse impacts on peak oil, relative to the No-Build scenario. These include:

- The bridge and highway improvements are focused on replacing or updating aging infrastructure, not on building new highway corridors;
- They include significant improvements to public transportation;
- They provide substantially improved facilities for non-motorized transport
- They support land use planning that seeks to control sprawl, concentrate development, and decrease auto dependency
- They include road use pricing options (highway tolling).

These elements are consistent with national and international recommendations for addressing peak oil in transportation projects.

2.5.2 When will peak oil occur and how will it affect petroleum prices and availability for CRC users?

That peak oil will occur is foreseeable, but the timeframe is uncertain. Oil production in the United States – the world's third largest oil producing nation – reached its peak around 1970 and has been in a declining trend since then. Most estimates place peak global production occurring some time between 1990 and 2040, although a few suggest that it will not occur until the next century.

The US Department of Energy published a report titled *Peaking of World Oil Production: Impacts, Mitigation, & Risk Management* (USDOE 2005). It stated, "The peaking of world oil production presents the U.S. and the world with an unprecedented risk management problem. As peaking is approached, liquid fuel prices and price volatility will increase dramatically, and, without timely mitigation, the economic, social, and political costs will be unprecedented. Viable mitigation options exist on both the supply and demand sides..." Some of the conclusions from the USDOE report include:

- World oil peaking is going to happen, and will likely be abrupt.
- The problem is liquid fuels (growth in demand mainly from the transportation sector).
- Mitigation efforts will require substantial time.
- Both supply and demand will require attention.
- More information is needed to more precisely determine the peak time frame.

When peak oil occurs, it is likely to cause petroleum prices to increase. There are uncertainties, however, regarding peak oil's timing and the availability of substitute fuels – both variables that will determine the effect of peak oil on fuel prices (petroleum and substitutes), and on travel behavior. The effect that peak oil has on transportation fuel prices will depend largely on when peak oil occurs and the availability of substitute fuels.

2.5.3 How will the rising cost of petroleum affect travel demand projections developed for the CRC project?

A concern relevant to planning the CRC project is the potential impact of peak oil on economic activity and travel behavior. The concern is this: if substitute fuels are not readily available as petroleum supplies decrease, the rising cost and reduced supply of petroleum could directly reduce auto and truck travel, and could result in dramatic reductions in economic activity, which, among other effects, could further reduce vehicle trips below those forecasted. These vehicle trip forecasts influence the proposed size of the transportation facilities. A traffic demand model estimates that VMT in the corridor will increase, even with a doubling of fuel prices (VMT would increase 22 percent instead of 32 percent if fuel prices doubled).

2.5.4 Will the transportation infrastructure proposed for the CRC alternatives accommodate the transition from petroleum-based transportation energy to other energy sources?

The future transition from existing transportation vehicles that use petroleum, to vehicles that use substantially less petroleum or use none, poses a potential risk to the CRC alternatives. The risk is that the new transport vehicles would not properly operate on the CRC infrastructure (HCT guideway, bridges, highway, and bike and pedestrian paths) that are being designed for existing vehicles. This risk seems low. Based on the alternative fuel vehicles that are currently being researched and developed, it is highly likely that they can be readily accommodated by the basic transportation infrastructure that is proposed in the CRC project. The electric hybrids, electric plug-ins, and vehicles powered by biodiesel, ethanol, and hydrogen fuel cells, are being designed to operate on modern highway and roadway infrastructure. The CRC HCT guideway, whether built for BRT or LRT, can be used by vehicles powered by a variety of fuel types. And, the capacity of the proposed bicycle and pedestrian facilities can accommodate substantial growth in non-motorized transportation demand. It is possible that some adaptation may be required.

Transportation infrastructure has been demonstrated to be adaptable to changing technologies. For example, the northbound I-5 bridge over the Columbia River was built in 1917 and originally carried electric trolley cars and Model T autos (which ran on either gasoline or ethanol). As transportation technology, energy policy and prices, vehicle types, and travel behavior evolved over the past century, the original bridge was periodically adapted to accommodate those changes. It is highly likely that the proposed CRC infrastructure could readily accommodate and/or adapt to the transition to substitute fuel vehicles, higher than projected growth in non-motorized modes and higher growth in transit demand. Regarding specific alternatives, LRT, compared to BRT, probably provides greater accommodation for such changes because of the much greater carrying capacity of light rail trains compared to buses, and because the light rail vehicles would be fully electric.

2.5.5 How can the CRC project ease the potential impacts of peak oil on the project, and the impacts of the project on peak oil?

A number of factors are likely to ease the impact of peak oil on the CRC alternatives, and the impacts of CRC alternatives on peak oil. Many aspects of the CRC alternatives are consistent with international and national recommendations for preparing transportation to address peak oil’s impacts (as well as climate change impacts). Some of these recommendations include:

- Focus on maintaining or replacing aging infrastructure rather than building new highway corridors;
- Invest in public transportation;
- Improve facilities for non-motorized transport (such as bicycling and walking)

- Use land use planning and infrastructure planning to influence mobility needs
- Implement road pricing (such as tolling)

Numerous other measures have been proposed for mitigating the potential effects of peak oil, most of which are outside the direct purview of the CRC project. These include a variety of changes to national and international energy policies, fuel and transportation taxes and fees, research and development funding, local land use regulations, education, agricultural policy and practices, and other measures.

2.5.6 Conclusions

Cumulative effects related to energy use are partially incorporated into the long-term energy demand estimates prepared for the CRC project. Those estimates are based on travel demand forecasts that factor in projected local changes in land use patterns, employment, population growth, and other programmed transportation improvements. Two factors related to CRC, including (1) the energy demand to construct the CRC project, and (2) background traffic growth in the corridor, are projected to increase petroleum demand which will add to global oil demand. At the same time, all of the CRC build alternatives are projected to lower the transportation demand for petroleum relative to No-Build. Peak oil could reasonably occur within the life of the CRC project, and could potentially affect the way travelers use the facilities. Those changes can likely be supported and/or accommodated by the proposed alternatives.

2.6 Environmental Justice

2.6.1 Project Effects

The project would acquire right-of-way from residences and businesses along I-5 and the selected transit alignment. Acquisitions would displace few homes, but would bring the highway closer to fifteen homes, which may cause noise and visual impacts. Tolling options could result in negative impacts to low-income populations. The effects of tolling on low-income populations may be mitigated via program funding.

The transit component of the project would increase transit accessibility and would improve the existing level of transit service. The increased capacity on the bridge would improve travel times.

There are few direct effects to resources important to potential environmental justice communities in the project area.

The project will require the relocation of the Wellness Project in Vancouver. The Wellness Center is especially important to low-income persons with needs for mental health services. The Project does not “serve an especially important social, religious, or cultural function” but does provide a necessary service. Its relocation is included in the mitigations for this project. Plans will be made to locate within the same general area, or in a new location accessible to users, in an area that offer substantially the same accessibility to mental health persons as the current building. If the Wellness Project is served by High Capacity Transit, persons living there will actually experience benefits from the project.

The only possible disproportionate effects are the noise impacts, which will not be high impacts and not disproportionately impact low-income neighborhoods. Rather, specific low income housing developments located near the transit lines and the highway may experience noise impacts in locations were it is not possible to completely mitigate all noise impacts (including existing noise impacts). The Smith Towers, Fort Apartments, and Normandy Apartments will experience direct noise impacts. Overall, these sites will experience generally improved travel conditions, noise, and air quality in the future build scenarios.

In summary, there will not be disproportionately high and adverse effects on a minority or low-income population that would be appreciably more severe or greater in magnitude than the effect that would be suffered by the non-minority and/or non-low-income population.

Additionally, benefits that would accrue to minority or low-income populations include the construction of High Capacity Transit, improved travel times on the Interstate, significantly improved bike and pedestrian facilities, safer vehicle, bicycle and pedestrian travel, and an improvement in noise in locations were no sound walls currently exist. The decrease in transit travel time and increase in transit reliability would be a key benefit for all the traveling public, but particularly for low-income people who ride transit proportionally more than people with higher incomes.

2.6.2 Effects from Other Projects (Past, Present, Future)

The development of I-5 divided neighborhoods and displaced large numbers of residences, and affected businesses along the corridor.

The construction on I-5 through Portland had significant effects on the populations in and adjacent to the highway's path. Entire blocks were cleared for the development of the roadway, dividing neighborhoods and displacing homes. Historically, these neighborhoods were composed of more minority and low-income persons than in Portland as a whole.

The construction of I-5 through Vancouver changed the city by closing 5th Street (the route heading east) and encouraging development of housing to the north of downtown. Fewer displacements occurred in Vancouver because the area was less densely developed than Portland at that time.

Generally, the development of transit in the region (TriMet and C-TRAN) benefits low-income populations, who ride transit in higher proportions than higher-income populations.

2.6.3 Conclusions

Past projects directly impacted low-income and minority populations in the I-5 corridor (such as the displacements associated with the 1960 construction of I-5 through North Portland). The CRC alternatives, and other recent transportation projects, do not have disproportionate high and adverse effects on low-income and minority populations. The Build Alternatives create only slightly widened roadway profiles along I-5, and will not greatly disrupt existing communities. Additionally, recent emphases in planning and project development on transit and alternative modes will improve service to lower-income populations. Finally, potential mitigation discussed in the Environmental Justice Technical Report (e.g., transportation assistance under toll scenarios and enhanced communications) could minimize adverse impacts and increase benefits to these populations.

In addition to the avoidance and mitigation measures described above, there are now requirements for improved public involvement and communication. Based on guidance from federal and state government, there is now increased attention paid to community outreach and input associated with highway and transit project development. Historically, projects were not necessarily planned and implemented with extensive input and communication with the public. Now, it is an important component of project development to involve communities who would be affected by a proposed project. Thus, project teams attempt to minimize the impacts of proposed projects via extensive outreach and incorporation of community input.

2.7 Land Use

2.7.1 Project Effects

The No-Build Alternative would fail to support the principle elements of plans for the area, including accepted levels of service, improved freight mobility, multimodal transportation, and safety.

The build alternatives are consistent with local plans and policies, which encourage investment in inner urban infrastructure, multimodal transportation, freight mobility, economic development, and compact urban development.

The greatest direct impacts on land use would occur as a result of the park and ride facilities. The Vancouver transit alignments would entail building the Lincoln Park and Ride, which would occupy 17 acres (12 of which are already owned by WSDOT). The I-5 alignment would require the acquisition of a smaller, but still large space for the Kiggins Park and Ride. Both transit alignments would include a large park-and-ride near Clark College.

Additionally, the Vancouver transit alignments have the potential to impact the medical office cluster north of the Southwest Washington Medical facilities, at 33rd and Main Street. This would be inconsistent with goals for economic development, specifically the City of Vancouver's No Net Loss of Employment Capacity policy.

2.7.1.1 Transit Investment

Some plan policies and goals can be interpreted to prefer the choice of LRT as the high-capacity transit (HCT) mode. Other plan policies specifically call for light rail on Hayden Island or in Vancouver.

Adding HCT stations in Hayden Island and downtown Vancouver could result in more mixed use and compact housing development around transit stations, with the possibility that the effect would be greater with LRT. There are indications that investment along a LRT line could yield a higher return than would investment along a BRT line. Surveys of developers show that LRT is thought to attract more economic investment than BRT due to the higher visibility of rail lines, light rail's stronger public image, and the fact that rail infrastructure is seen as a more permanent public investment.

There is a moderate to high potential for transit-oriented development on Hayden Island and in the City of Vancouver (particularly the Mill Plain district). The City of Portland, Metro, and other plans call for the extension of light rail to Hayden Island. There is currently no LRT station zoned on Hayden Island. City of Vancouver plans are supportive of TOD.

2.7.2 Effects from Other Projects (Past, Present, Future)

The analysis considered more recent trends including highway construction, urbanization, and growth management in order to understand the impacts of this project in spatial and temporal contexts.

The Oregon portion of the secondary API is largely residential, with commercial activity on the major transportation corridors such as Interstate Avenue and Martin Luther King, Jr. Boulevard. I-5 and the Interstate Avenue MAX line run north-south through the area. The MAX currently terminates at the Expo Center.

Vancouver's downtown has changed greatly during the past decade. The focus of the downtown and waterfront areas has broadened from employment-related uses to tourism and recreation development, retail shopping, meeting and convention activities, housing, and entertainment. Along with revitalizing overall downtown activity, new residential opportunities and revitalization of the retail core and central waterfront have been emphasized. New office and mixed-use development has increased in the last decade, with projects such as the Vancouver Center, West Coast Bank Building, Public Service Center, Convention Center, and numerous smaller projects. New and growing uses in the downtown include eateries, bars/ taverns, a new playhouse, and personal services.

Hayden Island is located in the Columbia River and is accessible via I-5. The primary land use close to I-5 is commercial, including the Jantzen Beach Center (a large shopping mall) and surrounding retailers. Residential uses in the area include manufactured homes and floating homes associated with small marinas, as well as other low to medium density developments. The City of Portland has initiated a planning effort for Hayden Island, which could change the development patterns on the island.

In addition to private and private-public partnered projects, Vancouver has recently adopted the Vancouver City Center Vision (VCCV), and is working on plans for both the lower Grand Avenue area and Central Park. The Historic Reserve Trust has completed and adopted a reuse and management plan for the West Barracks in Fort Vancouver. These projects have value commercially, in terms of tax revenue, and in terms of providing inner-urban opportunities for family-wage jobs.

The VCCV plan includes projections of employment capacities and housing units. These projections were used to model and assess potential impacts of planned development. The plan's build-out projections are used in this report to assess the impacts to different developments and areas.

Redevelopment plans for the Hayden Island Shopping Center are in preliminary stages. The project intends to transform the area from a conventional suburban shopping center to a more Main Street atmosphere. The City of Portland, the developers, and the CRC project team are sharing information, such as the preliminary transportation circulation plan for the Center. A significant element of the plan is to construct a facility to allow traffic cross the Interstate alignment without interfering with traffic on the I-5 ramps.

2.7.3 Conclusions

Any of the build alternatives would generally support the land use policies listed above and be generally consistent with expected development trends.

Under any of the Build Alternatives, subsequent development would be planned according to the local jurisdictions. The Build Alternatives will continue the trend of roadway development, and will balance that development with the improvement of transit, bicycle, and pedestrian infrastructure.

The project includes high capacity transit, which will contribute to the intensification and mixing of land uses both on Hayden Island and Vancouver. These changes in land uses have been planned for and are consistent with adopted policies.

2.8 Neighborhoods

2.8.1 Project Effects

There would be a range of effects on neighborhoods resulting from the Build Alternatives, from acquisitions to the installation of noise walls, to the addition of high capacity transit in Vancouver.

The Supplemental or Replacement Crossing Alternatives, combined with high-capacity transit, would displace approximately 13 to 23 floating homes on Hayden Island. The number varies depending on the highway alignment and whether the transit alignment is adjacent to the highway or offset. By removing several homes within this neighborhood, and more importantly separating one group of homes from the larger collection of floating homes in this particular community, cohesion may be impacted. Also on Hayden Island, both the Supplemental and Replacement Crossing Alternatives would acquire the existing Safeway, the only grocery store on the island. This could be potentially mitigated through relocation assistance that would allow the grocery store to move elsewhere on Hayden Island prior to project construction.

Either crossing option would require acquisition of right-of-way from 20-25 residential parcels along I-5. Since these parcels are along the highway, it is unlikely that the incremental increase in the width of the highway would have a notable adverse effect on neighborhood cohesion.

Additionally, the replacement crossing may require a full acquisition of the former Hayden Island Yacht Club, where the Hayden Island Neighborhood Network holds their meetings. This building was identified as a community resource during the community resource mapping process. This could be potentially mitigated by finding an alternative location for holding neighborhood meetings.

The River Crossing, as it influences HCT alignment, could result in some noise impacts that would be difficult and costly to mitigate. However, as the project will provide mitigation where none exists today, and will improve existing sound walls, the project will result in an overall decrease in noise levels in the corridor as compared to the No-Build Alternative or to existing conditions.

High capacity transit in Vancouver will influence neighborhood development, from the look and feel of the neighborhood, to improving access, to adding the potential for transit-oriented development in the neighborhood. Most people would probably see these changes as positive influences on their neighborhood.

2.8.2 Effects from Other Projects (Past, Present, Future)

As described in Section 2.6 (Environmental Justice), past highway development had significant effects on neighborhoods along the I-5 corridor. The development of I-5 required the acquisition of right-of-way and the relocation of many businesses and homes. Local planning efforts serve to strategically place and design current and future transportation so as to maximize benefits and minimize negative impacts.

2.8.3 Conclusions

Past projects (such as the displacements associated with the 1960 construction of I-5 through North Portland) directly impacted neighborhoods in the I-5 corridor. These neighborhoods have experienced both incremental adverse effects as well as improvements since then. More recent transportation projects have generally provided net benefits through improved access, pedestrian oriented development, mitigation and other amenities. The CRC project is expected to continue this more recent trend. Historically, projects were not necessarily planned and implemented with extensive input and communication with the public. Now, it is an important component of project development to involve communities who would be affected by a proposed project. Thus, project teams attempt to minimize the impacts of proposed projects via extensive outreach and incorporation of community input.

2.9 Noise and Vibration

The analysis of noise impacts is based on reasonably foreseeable changes in traffic resulting from background land use and population changes through 2030. In the project area there are currently an estimated 211 traffic noise impacts to noise sensitive land uses and that number would rise to 221 under the future No-Build Alternative. Under the No-Build Alternative, routine maintenance of the existing noise walls in Vancouver would occur but no new noise walls would be constructed. Background traffic growth would cause a general increase in traffic noise levels throughout the project area. Growth in aviation activity would likely also increase noise levels in some areas.

The full build alternatives, which would include noise walls, would reduce noise levels substantially throughout the project corridor compared to today's and the projected No-Build Alternative noise levels. Several noise-sensitive land uses currently with no or only partial noise wall mitigation are exposed to traffic noise levels that exceed the relevant criteria. Many of these land uses would receive long-term noise reduction benefits with the proposed mitigation.

2.10 Public Services

2.10.1 Project Effects

Overall, the direct physical impacts to public services from the segment level alternatives are minor. Only two public service buildings, an ODOT Permitting Station on Hayden Island and the Clark Public Utilities information building immediately east of the bridge in Vancouver, would have a direct impact. In both cases, the sites are predicted by right-of-way analysis to remain buildable (thus redevelopment of the sites is anticipated). At other public service locations, including Kiggins Bowl, Discovery Middle School, the City of Vancouver Police Administration office, and some non-developed areas would be impacted by right-of-way acquisition, and no long term loss of parking at any of these sites would occur. Projected traffic congestion on local streets under the No-Build alternative and the build alternatives would include some intersections performing at unacceptable levels of service. Intersections with unacceptable levels of service negatively impact the mobile services of public service providers and cause delays in response times for emergency vehicles. Mitigation is proposed under the build alternatives to reduce the number of failing intersections, which would lessen the impact to public services.

2.10.2 Effects from Other Projects (Past, Present, Future)

Past development has incrementally increased demand on public services. It is unknown what effects other future projects would have to local public services. Presumably, the primary effects from most development would be changes to traffic patterns and increased demand on services. These effects are mitigated via participation from affected service providers. These providers are generally included in planning processes and have adequate time to make needed adjustments prior to changes in development patterns and the street network.

2.10.3 Conclusion

The combined impact of the CRC and adopted plans will likely create an increased demand for public services (via growth in population, businesses, and travel demand). However, since those increases are planned, it is reasonable to assume that the public service sector will have adequate time to plan and adjust for future conditions. The CRC project is not expected to be credited for an increase in population or development (rather this will be attributed to general planned growth), so the incremental addition to cumulative effects for public services is minor.

2.11 Visual and Aesthetics

2.11.1 Project Effects

The visual impacts from the proposed CRC project would occur from the greater height and width of the Columbia River crossing, the widened or higher ramps for reconfigured interchanges at Marine Drive, Hayden Island, SR 14, Mill Plain, and SR 500, and the effective widening of the I-5 corridor due to adding auxiliary lanes, a transit guideway, and guideway ramps along I-5.

The choice of a supplemental bridge may have higher negative visual impacts, as the existing bridges would be retained next to a bridge of a substantially different design.

The transit choice through Vancouver (I-5 or Vancouver alignment) will have visual impacts. The I-5 alignment will follow the highway and therefore not have significant effects. The Vancouver alignment will go through parts of town that are not currently served by high capacity transit. The stations will be placed in strategic neighborhood locations and could serve as activity centers.

2.11.2 Effects from Other Projects (Past, Present, Future)

In the Columbia River, Portland, and Vancouver areas, visual character has steadily evolved toward urban and suburban from frontier through rural and agricultural. The I-5 corridor has steadily grown in extent and intensity of use as a major transportation route.

The urbanization trend has led to a decline in quality of views due to obstruction of views into and within scenic or natural landscapes by walls; signage; berms and ramps; pilings, columns, and bridges; and the loss of vegetation, natural landforms, and smaller scale, historic settlements. The decline is not irreversible if cities and the region implement well-designed, visually coherent urban areas that protect scenic or important views.

Unrelated projects involving transportation, urban design, and development will be implemented and continue the transformation of the landscapes of the Columbia River, Portland, and Vancouver region. The trend has been and will likely continue to be one of increasing urbanization. Projects being considered by various jurisdictions and agencies include:

- Interchange improvements such as constructing or rebuilding highway ramps

- Bridge upgrades, replacement or construction (such as the pedestrian Land Bridge being constructed just east of the SR 14 interchange)
- Local street network and regional access routes improvement
- Street improvements including new traffic signals, wider sidewalks, curb extension, bike lanes, on-street parking and street trees, pedestrian crossings and pavement reconstruction
- Intersection realignment
- Vancouver Waterfront redevelopment
- The Hayden Island sub-area plan

Neighborhood or regional center improvements include boulevard design retrofit, new traffic signals, improved pedestrian facilities and crossings, street lighting, bicycle lanes, and multimodal safety improvements. Cumulative visual impacts would result from the collective individual actions.

2.11.3 Conclusions

Cumulative visual impacts are observable when the character of a place changes (for example from an agricultural landscape to residential development) or when the vividness, unity, or intactness of the visual environment changes. In the Columbia River, Portland and Vancouver areas, visual character has steadily progressed toward urban and suburban from frontier through rural and agricultural. The I-5 corridor has steadily grown in footprint and intensity of use as a major transportation route. Overall, impacts from the project will continue and reinforce that urban transportation corridor character.

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3. Natural Environment Cumulative Effects

This section provides an overview of the proposed cumulative effects for the natural environment under the NEPA process. Local, state, and federal regulations require protection of natural areas, slowing the destruction of these habitats and mandating replacement of their functions. Where feasible, the approach for analyzing cumulative effects under the federal Endangered Species Act and other state or federal regulations, as applicable, was coordinated in order to develop a common area of analysis and project list**.**

The natural environment includes the following disciplines, or resource areas:

- Ecosystems (terrestrial and aquatic habitats, and plant and animal species)
- Geology and soils
- Water quality and hydrology
- Wetlands
- Hazardous materials

Key resources in the natural environment include Burnt Bridge Creek, the Columbia River, and the backwaters and other tributaries of the Columbia River, including the Columbia Slough. Non-transportation-related projects that are considered in the analysis include the Vanport Wetlands project (restoration of wetlands by the Port of Portland) and active habitat improvement and restoration activities on the Columbia Slough.

Historical environmental conditions within the primary API were greatly influenced by the seasonal flows of the Columbia River. Historically, river volumes were highest between April and September during basin-wide snowmelt, and lowest from December to February when much of the basin's moisture was locked up in snow and ice.

Though annual flooding affected the Oregon side of the API much more than the Washington side, flood control measures have been implemented that affect the entire lower river environment. Levees and river embankments were constructed in the early 1900s on both sides of the river, which isolated the majority of the floodplain from all but the highest flows. As the floodplain experienced increased development, elaborate pumping operations were implemented on the Oregon side to prevent overbank flow. Today, pumps run 9-10 months a year, and continuously 24 hours every day during the winter rainy period, resulting in over a billion gallons pumped per day by the Multnomah County Drainage District #1. Construction of the mainstem Columbia River dams effectively regulated flows, culminating with completion of the Bonneville Dam in 1938.

3.1 Ecosystems

3.1.1 Project Effects

The direct effects resulting from the build alternatives include disturbance to native vegetation and trees, wetlands impacts, removal and fill in the Columbia River and impacts to fish. Wetlands and removal and fill impacts are discussed in Section 3.5 of this document.

Disturbance to native vegetation and trees is anticipated in three areas: cottonwood trees near the Expo Center in Oregon, vegetation along the banks of the Columbia River, and the cutting of 12-24 [up to 30-in diameter at breast height] Douglas Firs at Kiggins Bowl. Replacement options would also remove the peregrine falcon nesting habitat in the steel structure of the existing I-5 bridge. Fill in the Columbia River could impact fish habitat and fish both during construction and long term.

3.1.2 Effects from Other Projects (Past, Present, Future)

Historically, many activities, including deforestation, urbanization, dams for hydroelectricity, irrigation and flood control, and over fishing have contributed to a loss of habitat and a reduction in fish and wildlife. These past actions have made significant changes to the health and capacity of the natural environment in the region. Growth and development will likely continue to impact portions of the project area. No specific projects have been identified in or adjacent to the API that would significantly impact habitat but it is reasonable to assume that temporary and permanent impacts are likely to occur.

3.1.3 Conclusions

The impacts resulting from the build alternatives are small, but historic development and expected growth throughout the region will likely continue to have impacts on ecosystems. The mitigation measures that are likely under any of the build alternatives will serve to reduce harmful effects, and even improve parts of the local ecosystem relative to existing conditions.

3.2 Geology and Soils

3.2.1 Project Effects

The river crossing area is underlain by soils with a high earthquake hazard rating, susceptible to liquefaction in a major seismic event. The primary difference between the No-Build and build alternatives is that the No-Build Alternative would not include upgrades to or retrofitting of the existing bridge; where the build alternatives would have seismic upgrades in the design. As such, the build alternatives would likely be better in withstanding a major seismic event.

The aggregate needed for concrete construction may be more than is available through local supplies. The mineral industry may need to transport fill in at an increased cost to the project.

3.2.2 Effects from Other Projects (Past, Present, Future)

Past activities in the project area include settlement and development of the region, clearing of native vegetation, filling of lowland areas, grading of slopes, and construction in earthquake prone areas. Current development projects, including roads, bridges, and buildings, are being constructed under updated codes which require additional protection against earthquakes or in sensitive zones (e.g., landslide prone areas). However, in some cases, future activities may include development and regrading in the area that could lead to soil erosion, even with erosion control practices in place.

3.2.3 Conclusions

The slopes and soils in the project area have been impacted by prior activities along the alignment and would be impacted by future developments as well. Small changes that would occur due to this project include: reworking of disturbed soil, localized minor grade changes, minor changes in slope stability, and ground improvements. These activities would have little or no meaningful impact to geology or soils and are not expected to materially cause or increase any significant cumulative impacts.

Left alone, as transportation facilities age, they become more prone to earthquake hazards. This hazard applies to the I-5 bridges and other regional facilities. Thus, the upgrading of the bridge under the Supplemental bridge option or the replacement of the bridge with a new structure would represent an improvement compared to current conditions.

3.3 Water Quality and Hydrology

3.3.1 Project Effects

All of the build alternatives have the potential to increase stormwater runoff but with mitigation will likely result in lower pollutant loading than under existing conditions.

In the Columbia River basin, the increased water quantity is not a critical issue, due to the total volumes handled in the basin. In downtown Vancouver and on the Oregon side of the river, water quality is an issue. All of the build alternatives would result in improved water quality in most locations.

Treatment plans for the bridge have not yet been determined, but it is reasonable to assume that net benefits are likely given adequate water treatment options.

3.3.2 Effects from Other Projects (Past, Present, Future)

The increased number of vehicles anticipated by 2030 could result in an increased pollutant load in the runoff (e.g., gasoline, oil, and other vehicle wastes). Increased urbanization and land use changes have decreased the amount of natural areas and natural flow regimes in the project area. Flood control measures have been implemented that affect the entire lower Columbia River environment. Levees and river embankments were constructed in the early 1900s on both sides of the river, which isolated the majority of the floodplain from all but the highest flows.

A decrease in upstream heavy industrial activities and an emphasis on addressing known contamination sources have improved water quality in the Columbia Slough over the last ten years, although the water quality remains substantially impaired.

Past projects and land use actions followed then-current water quality regulations that were not as stringent as they are at this time. Local, state, and federal regulations require protection of water quality. Increased scrutiny by regulatory agencies on chemicals at much lower levels than current standards is occurring and may result in new standards. Current treatment systems and regulations do not fully address these likely new standards. Even with new treatment systems, increased development may still lead to impaired water quality.

3.3.3 Conclusions

Growth throughout the region will likely impact water quality. Located just south of the primary API, the I-5: Lombard to Delta Park project will affect water quality within the Columbia Slough watershed. No additional projects have been identified but it is reasonable to assume that temporary and permanent impacts are likely to occur. However, new development needs to meet existing stormwater requirements. Since most of the land in the API is already developed, most future projects will be redevelopment of existing properties and thus the redevelopment is likely to reduce stormwater runoff and associated pollution.

Additional impervious surface area would induce additional project-generated runoff. Pollutants carried in the runoff could adversely affect receiving waters. Stormwater regulations require that total dissolved sediments be reduced by treating stormwater prior to its discharge to receiving waters. A stormwater conveyance and treatment system has been conceptually designed to be consistent with the regulations for each of the four jurisdictions involved: ODOT/WSDOT for interstate roadway; and Cities of Portland and Vancouver for non-interstate roadways. Thus, the project will improve stormwater runoff compared to existing conditions, resulting in net improvements for the region.

3.4 Wetlands

3.4.1 Project Effects

The build alternatives are associated with removal or fill impacts to wetlands ranging from 0.06 to 0.16 acre and 1.7 to 1.9 acre in the Columbia River. The project team has worked to avoid impacts to Burnt Bridge Creek and sloughs in Delta Park. Wetlands impacts would be near Burnt Bridge Creek, along SR 500, and at the Expo Center. The bridge piers are associated with removal and fill volumes in the Columbia River. The supplemental bridge option would result in fill into the Columbia River, without the removal of any existing structures.

3.4.2 Effects from Other Projects (Past, Present, Future)

Beginning with the base year of Interstate construction in 1958, improvements have occurred to some wetlands near the southern portion of the project. The Port of Portland has an ongoing wetland restoration project at the 90-acre Vanport wetlands parcel adjoining the existing highway and light rail line to the west. Other historic wetlands east of the highway in the Delta Park area and on Hayden Island have undergone increased development, draining, or filling since 1964.

Growth throughout the region will affect portions of the primary API. Located just south of the primary API, the I-5: Lombard to Delta Park project will impact a relatively small area of wetland habitat and natural areas. No additional projects have been identified in or adjacent to the primary API that would impact wetlands but it is reasonable to assume that temporary and permanent impacts are likely to occur from projects in the API and throughout the region.

Increased urbanization and land use changes have decreased the amount of wetlands in the project area. Local, state, and federal regulations require protection of wetlands and jurisdictional waters, slowing the destruction of these habitats and mandating replacement of their functions.

3.4.3 Conclusions

Compared to historical conditions, there are very few wetlands remaining in the project area. Mechanical methods introduced to control water flow (dikes in the project vicinity and dams on the Columbia River), have reduced the presence of wetlands in the project area. The habitat losses due to these activities are irrecoverable. The CRC project will neither help to recover or further the loss of such habitats.

In the context of widespread urban development in the project area, the potential impacts to wetlands resulting from the build alternatives are minor. Additionally, the wetlands that may be affected by the project are not of high quality or function, but they do provide habitat functions on the fringes of a larger wetlands complex such as Vanport and Smith and Bybee Lakes. Mitigation for these impacts would replace or improve the functions to the extent possible, as close to the project as is feasible.

Based on the volume of flow and the existing conditions in the Columbia River, the removal and fill associated with the build alternatives is not likely to have significant effects on the function of the river. The replacement bridge options would entail 2.62 acres of fill and 0.75 acres of removal, and the supplemental bridge options would measure 1.93 acres of fill and 0.25 acres of removal, with more net fill associated with the replacement bridge. The difference between the two build alternatives is 0.2 acre.

3.5 Hazardous Materials

3.5.1 Project Effects

The CRC project area is heavily urbanized, and has a history of generation, use, and storage of hazardous materials. Hazardous material sites that are most likely to impact the project are those being acquired for right-of-way or near roadway or transit options.

Under the No-Build Alternative existing hazardous materials sites would likely remain in their current condition unless other projects directly impact the sites. Therefore, the potential for direct exposure or aggravating identified or unidentified hazardous materials from nearby hazardous materials sites would not exist. Conversely, there may be hazardous materials within the API that currently pose an environmental risk. Choosing the No-Build Alternative means that these potential sites will not be investigated or remediated, and may continue to pose long-term environmental risk.

For the build alternatives, disturbances to hazardous materials sites that might not otherwise be realized would result in site cleanup and could increase demand for contaminated soil disposal facilities. Cumulative exposure from hazardous materials to construction and excavation workers or ecologic receptors could occur. It is not anticipated that the operation or maintenance of the build alternatives would increase the occurrence or transport of hazardous materials within the study corridor.

Compared to the No-Build Alternative, long-term adverse effects to human health and the environment from hazardous materials will likely be reduced because all build alternatives would entail:

- Upgrades or enhancements to the current stormwater conveyance and treatment system. This would reduce the spread of existing residual contaminants to soil, surface water and groundwater from stormwater runoff and infiltration.
- Likely placement of surficial caps or barriers at any sites identified with existing contamination, which decreases likelihood of direct exposure to potential receptors.
- Increases and enhancements to roadway and transit system capacities. This could lower the frequency of incidental spills or releases of hazardous substances associated with trucking and automotive transit.

3.5.2 Effects from Other Projects (Past, Present, Future)

The evaluation of existing hazardous materials risks to the CRC is based on a review of past actions, and their effects on existing and potential soil and groundwater contamination. There may also be unknown contamination caused by past land uses and actions in the corridor, that pose additional risk.

Future, unrelated development in the project area could add exposure risks, and add clean up and remediation benefits. Population and employment growth could cause increased traffic that may result in slightly higher incidents of hazardous materials spills. Since 1964, several laws have been implemented that have led to improved handling of hazardous materials, reducing the amount of new hazardous materials releases into the soil and groundwater. Environmental liability laws generally require identification and cleanup of hazardous materials during property transfers, which have resulted in the overall reduction of hazardous material contamination near the project area.

3.5.3 Conclusions

Because any hazardous material discovered during construction would be remediated, development of the build alternatives could result in reduced hazardous material exposure to the general public. Because the project is unlikely to introduce new hazardous material sites, and may identify or remediate existing hazardous material sites, it may contribute to a cumulative beneficial impact to groundwater, human, and ecological receptors in the project area.

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4. Cultural Environment Cumulative Effects

Resources included in the cultural environment are parks, historic, and prehistoric resources. The cultural environment technical team addressed issues associated with Section 4(f) and Section 106 resources. Tribal consultations fed into the Cultural Resources technical analysis.

Key cultural resources include Fort Vancouver, potential archaeological (historic and prehistoric) sites along the Columbia River, and a variety of historic buildings and properties in the project area.

Projects considered in addition to those listed in Appendix A include the Land Bridge pedestrian overpass and Interpretive Trail over SR 14, and the Vancouver Barracks, West Reserve Area, and other improvements planned for the Fort Vancouver Historic Reserve.

The analysis examined the general adverse and beneficial effects of past development, and the cumulative effects resulting from the CRC project in conjunction with other past, present, and reasonably foreseeable future actions. Issues considered include past effects on cultural resources in the project area, including loss of historic resources due to development and past effects on areas used for burial sites. The project team conducted the analysis with the appropriate consultation with DAHP, SHPO, tribal governments, local planners, and others.

4.1 Archaeology and Cultural Resources

4.1.1 Existing Conditions and Potential Effects

In view of the great amount of ground disturbance in the I-5 corridor and adjacent areas, the identification of archaeological sites will require extensive subsurface investigations using a variety of excavation methods. This additional discovery work will be required before a final determination of long-term effects can be finalized. However, based on extensive background research, archaeological reconnaissance, and predictive models, the construction of the CRC alternatives are highly likely to encounter both historic and prehistoric archaeological resources.

4.1.2 Effects from Other Projects (Past, Present, Future)

Both shores of the Columbia River have been the location of extensive development in the past 200 years. Several types of historic era development occurred within or immediately adjacent to the present I-5 transportation corridor, and there are indications of Native American settlements associated with those developments, as well as previous use of the area.

Over time, dredging and filling along the shores have altered the banks of the Columbia River. The Interstate Bridge transformed both Hayden Island and Vancouver. Its first unit was completed in 1917 as part of the major west coast highway corridor (Pacific Highway 99) running from Canada to Mexico. Engineers built a second bridge structure, doubling capacity, in 1958, and it began service as I-5 in 1964. Traffic on the route has mounted with the steady growth of Clark and Multnomah counties and surrounding areas. Intensive residential, commercial and transportation investments over the past 160 years have had major impacts on the cultural and historic landscape in the I-5 corridor and vicinity.

Historic Sanborn insurance maps indicate that the City of Vancouver had begun to spread north of 20th Street by 1907 and had reached 41st Street by 1949, indicating that there is a moderate likelihood of encountering buried historical archaeological deposits associated with residences and businesses dating to the early 20th-Century settlement of Clark County.

While not every parcel contains significant archaeological resources recent historical archaeological investigations demonstrate the potential for encountering archaeological remains associated with early residences, businesses, and industries in this portion of Vancouver. Based on the results of these projects, there is reason to believe that abundant and well preserved archaeological remains are present beneath the older portions of Vancouver.

4.1.3 Conclusion

Past activities have had a dramatic impact on the preservation of archaeological resources in the project area. Many have been lost. Unrelated future actions are likely to disturb or destroy additional archaeological resources, although some will likely be preserved or restored as well.

The project’s incremental impact to the loss of the area’s archaeological resources is not certain. There is a high likelihood that archaeological resources will be discovered prior to and during construction of any of the Build Alternatives. Measures will need to be taken to protect, preserve, or document the presence of these resources.

4.2 Historic Resources

4.2.1 Project Effects

Within the primary Area of Potential Effect (APE), 857 resources (dated 1967 or before) were inventoried, of which there were approximately 300 National Register listed and/or potentially eligible historic resources. Of those, 34 historic resources could potentially be affected by the alternatives. The number affected depends on which highway and transit options are selected. Section 106 evaluations of effect on the 34 historic resources are discussed in more detail in the Historic Built Environment Technical Report. Many of the 34 resources are homes built in the first half of the 20th century that may experience a partial or full acquisition.

Removing or otherwise substantially altering the existing and historic I-5 bridge could potentially be an adverse effect to the region's historic fabric. These bridge structures have been part of the landscape for both Oregon and Washington since 1917 (northbound) and 1958 (southbound), respectively. A potentially adverse effect to the Vancouver National Historic Reserve could be considered regional because that area was one of the first Euroamerican settlements in the Pacific Northwest and its multi-layered historic context represents a continuous record of the area's development.

4.2.2 Effects from Other Projects (Past, Present, Future)

For the purposes of historic resources, the base year in analyzing cumulative impacts is 1960, prior to I-5 construction, which created a substantial change in land use and historic context in the project area. The highway removed several buildings that had been constructed during the early history of Vancouver, and created a substantial barrier between eastern and western portions of the historic community.

Several other substantial projects and developments since that time have had an impact on the historic built environment in the project study area, including:

- Significant population growth from 1950 to the present in Portland, Vancouver, and surrounding areas has put a high demand on housing in historic neighborhoods, caused new development adjoining to historic sections of town, and diminished the integrity of historic neighborhoods.
- Significant population growth from 1950 to present in Portland, Vancouver, and the surrounding areas has attracted urban and industrial development in the project area, changed the use and nature of the open space along the river, and caused the displacement of some historic buildings.
- Interstate-5 was completed through Vancouver in 1954, using access on the 1917 bridge to Portland. Construction of the parallel bridge in 1958 (southbound) to accommodate increased traffic flow on the new highway resulted in increased interstate traffic and commerce.
- In 1961, an urban renewal project covering 28 blocks in downtown Vancouver removed or altered many nineteenth and early twentieth century buildings.
- The downtown lost business from competition with shopping malls built in the 1970s at Jantzen Beach in Portland and the Vancouver Mall.

Unrelated present and future development will likely affect historic properties in the APEs, such as the Kiggins House, adjacent to I-5, which is destined to be relocated by pending private development. In addition, large historic resources (such as the Barnes Hospital) that are currently vacant or underutilized may be lost through deterioration because of their current state of disrepair and the high cost of adapting them for reuse.

4.2.3 Conclusion

Past activities have had a dramatic impact on the preservation of historic resources in the project area. Many were demolished, and the historic contexts largely altered to the extent that, except for few places such as the Fort Vancouver National Historic Reserve, the I-5 bridge, and other existing National Register Districts in the study area, the area would be not easily recognized by few people from the historic periods prior to the 1950s. Unrelated future actions are likely to demolish additional historic resources, although some will likely be preserved or restored as well.

The project's incremental impact to the loss of the area's historic fabric is relatively small compared to the combined effects of these other projects and developments. The options are being designed to avoid most of the areas with significant concentrations of historic resources.

4.3 Parks and Recreation Areas

4.3.1 Project Effects

The CRC alternatives would improve access to recreational resources in Portland and Vancouver, including the Expo center, Portland International Raceway, Delta Park, and Fort Vancouver. Additionally, the Build Alternatives would result in improved pedestrian and bicycle access in the area, particularly between Oregon and Washington. Trail linkages, including those on Marine Drive in Portland and along the Columbia in Vancouver, would be greatly improved under any build scenario.

Build alternatives could impact the planned Bridgeton Trail connection near the Oregon shoreline. CRC project design will coordinate with the City to minimize impacts.

The Heritage Apple Tree, which is the primary component of Old Apple Tree Park, would be shaded by one of the crossing options. This impact could also be avoided through feasible design revisions.

Waterfront Renaissance Trail and the Discovery Loop Trail could require realignment due to bridge pier location.

Up to 1.3 acres of Waterfront Park plaza and viewing area would be shaded as a result of the new bridge. New land would also be opened through removal of the existing bridges, as part of the replacement crossing.

Acquisition of NHS and NHR property on the Fort Vancouver National Historic Reserve would be required through "strip" acquisitions of parkland.

Users of the Confluence Project land bridge crossing may experience a reduction in their overall recreational experience with the new wider highway ramps constructed under the facility. Noise levels and views of the Fort area to the northeast would be minimally affected. Views of the HBC Village area would be affected by the highway reconfigurations.

The highway improvements would require approximately 1.2 acre strip of Marshall Community Park. The land is landscaped passive recreation area adjoining a park ball field adjacent to the existing I-5 alignment.

The highway improvements would require acquisition of a portion of Leverich Park's passive recreation border, berms, and landscaping. An elevated highway ramp would cross over the park's primary automobile entrance road.

4.3.2 Effects from Other Projects (Past, Present, Future)

Park and trail development have been ongoing efforts in the region. These efforts will be continued and are supported by current plans and programs. The impacts listed above are small in the context of local park resources and are balanced by investments in parks elsewhere in the area (e.g., Esther Short Park in downtown Vancouver, the development of the Land Bridge over SR 14 in Vancouver, the potential opening of the Vanport wetland mitigation site to the public).

Other development could result in loss of park or historic properties, but the extent of such loss is currently not known.

4.3.3 Conclusion

Park impacts that would result from the Build Alternatives, considered in context of the past and planned projects (including park expansions), are relatively minor and do not constitute a negative cumulative effect for the region.

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5. Climate Change

This section explains the project's approach to assessing potential cumulative impacts of the project on climate change, in addition to discussing methods to manage future uncertainty and risk caused by climate change. Note: the Energy Tech report discusses the methodology and data results for greenhouse gases. This section only discusses the cumulative impacts related to climate change.

5.1 What is Climate Change?

Climate change, also referred to as global warming, is an increase in the overall average atmospheric temperature of the earth. The Intergovernmental Panel on Climate Change stated: "Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations" (IPCC 2007). In short, a growing number of scientific analyses indicate that rising levels of greenhouse gases in the atmosphere are contributing to climate change. In the coming decades, scientists anticipate that as atmospheric concentrations of greenhouse gases continue to rise, average global temperatures and sea levels will continue to rise as a result and precipitation patterns will change.

Greenhouse gases come from both natural sources and human activity. Six types of gases are generally referred to as greenhouse gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), hydrofluorocarbons (HFC), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). When present in the atmosphere, greenhouse gases share the common trait of expanding their heat storage capacity. This increased storage capacity allows the atmosphere to retain more incoming solar radiation and other energy that would normally be reflected or radiated back into space. This added energy warms the atmosphere. Increasing concentrations of greenhouse gases could accelerate the rate of climate change.

The ability to reliably predict global climate change involves many uncertainties with regard to magnitude, timing and location. Scientists generally expect that the average global surface temperature could rise between 1 and 2 degrees Fahrenheit by 2100, with significant regional variation. Evaporation will increase as the climate warms, which will increase average global precipitation. Soil moisture is likely to decline in many regions, and intense rainstorms could become more frequent. Sea level could rise up two feet along most of the U.S. coast. In the Pacific Northwest, glacier melt could occur earlier in the year and with more intensity, and causing a more drastic river flow rise in the spring and drop in the summer.

The CRC project is located in the Columbia River Basin. The Columbia River is a snowmelt river fed in the winter by rain and run-off from lower elevations. In the spring and summer the Columbia River Basin experiences an elevated flow due to rain fall and the melting of the snow pack at higher altitudes. This annual peak flow cycle is dependent on the amount of snow that fell during the winter and the amount of precipitation that falls as rain year round. The factor that affects these precipitation patterns most is the temperature of the atmosphere.

Changes to this cycle potentially due to climate change in the Columbia River Basin have been the focus of several climate prediction models[3] over the last 10 years. The basic premise of these studies used existing data about the Columbia River Basin to model climate and river flow patterns during the next 50 to 100 years, taking into account the effects of global warming and other emergent conditions in the basin. The overall conclusion is that in the next century the flow pattern of the Columbia River could be transformed from a primarily snowmelt fed river to one supported by a mix of rainfall and diminished snow-melt. Studies conclude that the increase in winter rain (which would normally fall as snow) will lead to increased winter flow of the Columbia River and a weaker snowmelt increase during the spring and summer. Under the worse case scenario, the river level of the Columbia River would rise another 5 feet during winter flow in 2030 as compared to existing conditions.

5.2 Transportation and Climate Change

Virtually all human activities have an impact on our environment, and transportation is no exception. Transportation is a significant source of greenhouse gas emissions, and contributes to global warming through the burning of gasoline and diesel fuel. Any process that burns fossil fuel releases carbon dioxide into the air. Carbon dioxide is the primary greenhouse gases emitted by vehicles, and therefore it is the focus of this analysis.

Studies show that the transportation sector accounts for almost 30 percent or more of total domestic CO2 emissions. The “transportation sector” includes domestic air transport, road vehicles, rail, pipeline transport, national navigation and non-specific transport. Consistent with IPCC guidelines it does not include international aviation or marine bunker fuels. This percentage is based on 2004 data from the International Energy Administration and is consistent with 1996 guidelines on greenhouse gas emissions calculations issued by the IPCC.

5.2.1 Carbon Emissions for CRC Build and No-Build Alternatives

Future carbon emissions for the CRC Project are difficult to project because such a wide variety of factors could influence carbon emissions from now until 2030. Some the factors that could change between now and 2030 include, the political environment (i.e., government regulations); price of fuel and alternative energy sources; availability of fuel and other alternative energy sources; and commercial trends in the automotive and trucking industries (e.g. hybrid cars).

[3] *Effects of climate change on hydrology and water resources in the Columbia River Basin*, Lettenmaier and Hamlet. I general the simulations conducted show a reasonably consistent basin average increases in temperature of about 1.8-2.1°C for 2025, and about 2.3-2.9°C for 2045.)

The National Highway Traffic and Safety Administration (NHTSA), which is part of U.S. DOT, is responsible for establishing and amending the Corporate Average Fuel Economy (CAFÉ) standards for trucks. The CAFE program provides vehicle manufacturers with an incentive to sell more fuel-efficient vehicles automobiles and light trucks. The U.S. Congress sets the CAFE standards for cars. U.S. EPA reports the CAFE results for each manufacturer to NHTSA annually, and NHTSA determines if the manufacturers comply with the CAFE standards and assesses penalties as required. A tax is imposed on manufacturers of new cars that fail to meet the minimum fuel economy level of 22.5 mpg. In 2011, the standard will change to include many larger vehicles.

Greenhouse gas emissions estimates were prepared for the full alternatives, which represent an array of choices for the project. *The Energy Tech report contains the analysis and data results for greenhouse gases.*

Overall, both alternatives with a Replacement river crossing would reduce CO_2 emissions compared to the No-Build and Supplemental Alternative. Between the four build alternatives, Replacement river crossing with LRT on the Vancouver Alignment (alternative 2) would have the lowest daily consumption of energy and the lowest daily CO_2 emissions. This is a result of reduced travel demand, more vehicle trips moving to public transit (because of increased transit service), and faster vehicle speeds across the I-5 and I-205 bridge crossings that improves fuel efficiency through 2030.

Alternatives 4 and 5, which include the Supplemental river crossing, were estimated to increase CO_2 emissions relative to No-Build. This is primarily due to aggressive increases in the frequency of LRT or BRT and other bus routes needed to meet transit demands.

The full alternatives were also broken down to system-level choices between the build alternatives. The CO_2 emissions for some of the comparisons are partial and should not be interpreted as total CO_2 emission estimates for that area of the project. Rather, CO_2 emissions of the system-level choice are simply relative difference in emissions between the choices being compared. The long-term effects of system-level choices are summarized below.

Although LRT does not emit CO_2 when it travels, the fuel it takes to operate LRT would emit almost the same amount of CO_2 as BRT. Thus, the difference of impacts on climate change between LRT and BRT are minimal.

LRT is operated by electricity. Although LRT rail cars do not individually emit CO_2 during travel, the process of converting fuel to electricity to operate LRT does. The chart above calculates the amount of energy that would be required for the CRC project to operate HTC by electricity. Based on this amount, estimates of future CO_2 emissions associated with LRT were projected. This differs from the calculations used to estimate CO_2 emissions for vehicles, trucks and buses in the project area. The CRC project does not provide power to vehicles and trucks, rather gasoline and diesel is brought into the project area. Thus, the energy consumed for LRT is based on overall operations (e.g., converting electricity); whereas the energy consumed by vehicles, trucks, and buses is based on energy consumed while driving through the project area (e.g., it does not include emissions from transporting fuel).

The electricity used to operate LRT would come from sources available in the project area. Approximately 40% of the total electricity needed for LRT would be provided by Portland General Electric based on the location of $_2$ substations in the Portland area. From these substations, 42% would come from coal and 13.9% would come from natural gas (the remaining portions would come from other non-CO_2 emitting sources, such as hydro, nuclear, wind etc). Approximately 60% of the total electricity needed would be provided by Clark County Public Utilities based on the location of 3 substations in the Vancouver area. From these substations, 7% would come from coal and 28% would come from natural gas. The remaining portions would come from other non-CO_2 emitting sources, primarily hydropower.

Transit that travels down the Vancouver alignment is expected to emit slightly less CO_2 than the I-5 Alignment, although a change in design or length could cause the transit on the I-5 alignment to produce fewer emissions. For example, transit ending at the Mill Plain MOS will emit less CO_2 than both proposed alignments simply because it is shorter in length. In summary, the difference of carbon emissions between HCT alignments is minimal; however, the overall reduction of carbon emissions by providing HCT within the project area is potentially significant to the region.

Lastly, carbon emissions would likely decrease with a higher toll, or by tolling both I-5 and I-205, because models show that tolling decreases the number of people who want to drive over the bridge, and increases the number of people who want to take transit.

5.2.2 Climate Change Goals

Several jurisdictions in the project area have goals to reduce greenhouse gases. On May 3, 2007, the Washington legislature passed SB 6001, which among other things, adopted the Governor Gregoire's Climate Change goals into statute. The statute aims to achieve 1990 greenhouse gas levels by 2020, and a 50% reduction below 1990 levels by 2020. Regulations to implement this measure have not been published yet.

On August 7, 2007, Governor Kulongoski signed the Climate Change Integration Act. The Act creates greenhouse gas emissions reduction goals for the State of Oregon, which aims to reduce the emissions 10 percent below 1990 levels by 2020 and achieve a 75% reduction below 1990 levels by 2050. Oregon's reduction targets are more aggressive than those adopted by Washington State, which aim to achieve 1990 levels by 2020, and a 50 percent reduction below 1990 levels by 2050. Oregon HB 3543 also created the Oregon Global Warming Commission which is tasked with the responsibility of recommending policies to State and local governments to reduce GHG emissions. The Commission is expected promulgate rules to direct agencies on how to regulate and enforce the act. At this time, the HB 3543 does not require the transportation sector to take specific actions.

Both Oregon and Washington are also members of the Western States Initiative. On August 22, 2007, members announced a regional, economy-wide greenhouse gas emissions target of 15 percent below 2005 levels by 2020, or approximately 33 percent below business-as-usual levels.

In 1993, Portland became the first local government in the U.S. to adopt a plan to address global warming. In 2001, Multnomah County joined the City of Portland in adopting a revised plan, the Local Action Plan on Global Warming, outlining more than one hundred short- and long-term actions to reduce emissions 10% from 1990 levels by 2010 in Multnomah County. In addition, mayors of City of Portland and City of Vancouver signed the US Mayor's Climate Protection Agreement committing to reduce carbon emissions in cities below 1990 levels.

The climate change goals in the project area are summarized below.

Exhibit 5-1. Project Area Climate Change Goals

Entity	Base Year	Future Year	Target Reduction	Notes
United Nations, Kyoto Protocol (Annex I, Developed)	1990	2012	7% below 1990 level	U.S. did not sign the 2004 Kyoto Protocol agreement.
Western Governs Initiative	2005	2020	15% below 2005 level	Oregon and Washington are members.
U.S. Mayors' Federal Climate Policy Framework	1990	2012	7% below 1990 level	Mayors of City of Portland and City of Vancouver signed a MOU in 2007
Oregon	1990	2020 2050	10% below 1990 level 75% below 1990 level	House Bill 3543 was signed into law on August 7, 2007
Washington	1990	2020 2035 2050	Reduce to 1990 level 25% below 1990 level 50% below 1990 level	SSB 6001 was signed into law on May 3, 2007
Multnomah County	1990	2010	10% below 1990 level	Climate changes goals adopted in 1993. Local Action Plan on Global Warming adopted in 2001
City of Portland	1990	2010	10% below 1990 level	Local Action Plan on Global Warming adopted in 2001
City of Vancouver	-	-	-	Mayor member of U.S. Mayor's Federal Climate Policy

The CRC build alternatives will help states and local jurisdictions meet these goals, as discussed below.

5.2.3 Potential Mitigation

Energy consumption and CO_2 emissions are projected to increase by 2030 under all build or No-Build Alternatives. However, all build alternatives would assist states and local jurisdictions to meet climate change goals by reducing the cumulative effects of CO2 emissions compared to No Build.

All build alternatives include a variety of options that are expected to reduce vehicle travel demand and improve the operations of the I-5 bridge crossing compared to No-Build. Options that help the build alternatives reduce travel demand and improve operations relative to the No-Build alternative include:

- Tolling the I-5 bridge crossing reduces auto trips,

- Fast and reliable high capacity transit reduces auto trips,
- TDM/TSM measures reduce auto trips,
- Improved bike and pedestrian facilities and connections reduce auto trips, and
- Additional bridge crossing capacity reduces congestion which enables vehicles on the highway to run at more energy efficient speeds and with lower emissions.

Reducing the number of auto trips reduces the amount of energy consumed by vehicles and also reduces the amount of CO_2 emissions. Decreased traffic congestion allows vehicles to operate at higher speeds that result in improved fuel efficiency and reduced fuel consumption and ultimately lower CO_2 emissions.

The replacement bridge Alternatives would reduce CO_2 emissions compared to the No-Build Alternative due to the reduction in travel demand and operational improvements. Although Alternatives 4 and 5 would reduce the amount of energy use and CO_2 emissions associated with vehicle travel, both of these alternatives would use more energy and emit more CO_2 compared to the No-Build Alternative as a result of shortened transit headways and higher transit VMT.

Currently no regulations identify mitigation measures for climate change impacts caused by transportation projects. However, WSDOT has identified potential mitigation measures applicable to all alternatives, including:

- Implementing programs that further encourage use of public transit
- Promoting compact and transit-orientated development
- Offering ridesharing and commuter choice programs
- Providing safer and more accessible connections to paths for bicyclists and pedestrians
- Promoting diesel engine emission reduction

Other possible mitigation measures include: planting CO2-absorbing trees and fauna to set off emissions, buying carbon offsets, or purchasing clean energy for transit.

5.2.4 Adaptation

The CRC project may have to adapt to the changes brought about by climate change. The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as “adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change” (IPCC, 2001). For example, an adaptation strategy to prevent damage from climate change is shore protection (e.g., dikes, bulkheads, beach nourishment), which can prevent sea level rise from inundating low-lying coastal property, eroding beaches, or exacerbating flooding. In unmanaged natural systems, adaptation is a natural process or reaction in response to changes in environmental conditions. For example, as the climate warms, tree and animal species may migrate northward to remain in suitable climatic conditions and habitat.

In the 2030 analysis for CRC the project team considered some of the potential risks caused by climate change. The CRC Project also considered potential human adaptation measures to mitigate risk in the future. Based on the information available, potential adaptation measures include:

- Raising the bridge 5 feet to account for the worse case scenario for rise in the river level of the Columbia River in 2030.
- Ensuring that the design and the materials used to build the bridge can withstand major storms and droughts.
- Building dikes or embankments along the Columbia River in the project area to prevent the rise in river level from damaging the bridge, state property or private property.
- Avoiding and minimizing building highway or guide way in 100-year or 500-year floodplain.

Decision-makers in the region could also develop analytical tools to assess adaptation options related to land use.

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6. Temporary Effects – Construction

Cumulative impacts during construction can result when other simultaneous or sequential construction projects have an additive effect to the temporary effects resulting from CRC project construction. Simultaneous or sequential construction projects can increase congestion, employment and spending, community impacts and natural resource impacts. Other construction projects that may contribute to these effects when combined with CRC include:

- I-5: Salmon Creek interchange improvements
- I-5: I-205 to 179th Street auxiliary lanes
- I-205: Mill Plain Exit
- Fourth Plain: I-5 to railroad bridge widening
- Highway 99: 63rd to Ross Street railroad crossing rebuild and widen to five lanes
- SR 500 St. John’s interchange
- Main Street two-way conversion from Sixth
- Widen Columbia Shores railroad portal.

These projects have their own traffic control plans developed, but some may influence the travel route of commuters and trucks and could place more traffic in the CRC project corridor. Likewise, some of the projects are on planned haul routes and could influence the delivery of supplies and materials to the job sites for the CRC project. As more detailed plans are developed, traffic control plans will need to be developed with consideration of these projects and their timelines.

Other likely or potential construction projects in the vicinity are described in the CRC Land Use Technical Report.

Construction activities associated with of any of the build alternatives have the potential to cause economic impacts by temporarily blocking visibility and access to businesses, causing traffic delays, and rerouting traffic on detours that increase travel times and make access to some locations difficult. Access restrictions or difficulties may divert customers and clients, hamper deliveries, and complicate the provision of emergency services. However, most traffic movements would remain open for either alternative throughout the construction stages.

Construction of any of the build alternatives could also result in increased employment and spending in the project area during construction. The extent of these effects depends on the source of project funding and the makeup of work crews used during construction. Funds from local or regional sources are transfers that could be spent by residents and businesses on other economic activities. Federal or state funds that are new to a region can have a measurable economic effect on employment and income gains resulting from project construction. The federal government and the states of Oregon and Washington would provide the funds for the CRC project resulting in some income and job benefits that would otherwise not occur.

Some likely effects to marine commerce are as follows:

- The duration of in-water construction is projected to be periodic over about six years.
- The lift span channel would be closed for a two-month period under all alternatives. This channel is one of three channels available to marine commerce and during construction, efforts will be made to keep at least one channel open at all times.
- The 300-foot channel is expected to be closed for a three-month period; after this there could be room for selected river traffic, but it would be on a case by case basis and require coordination to maintain safe and effective working conditions. This channel is one of three channels available to marine commerce and during construction efforts will be made to keep at least one channel open at all times.
- Marine commerce may need an extra tow to help maneuvering during construction, which will carry an extra cost.
- Temporary river travel restrictions are anticipated in all alternatives as barges are used to ferry materials to and from work sites.

The temporary effects from the CRC project, in combination with other planned projects, will cause delays and disruptions to local residents and businesses. Mitigation plans, including traffic control plans and business assistance, will reduce the negative consequences of the construction project, while the employment demands will result in positive economic outcomes for the region.

Community impacts due to local traffic congestion and rerouting, as well as noise and air quality impacts, where CRC construction overlaps with the construction of other projects in the area. The highest potential for such impacts is likely near the bridge landing in Vancouver and on Hayden Island where other large projects are anticipated and where CRC construction duration and intensity are likely to be high.

In terms of the natural environment and biological resources, most of the construction impacts would be localized to the extent that cumulative effects from other projects would not a serious concern. Other projects in the area would not directly impact the same waters or wetlands, or regulated habitats that the CRC project would affect. However, in the project area, there could be increased erosion potential during the construction period due to ground disturbance. This, combined with other construction projects in the area, could increase the risk of erosion and water pollution in the event of a storm while ground surfaces are exposed.

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APPENDIX A

Project List – Transportation Model

Metro's 2025 Regional Transportation Plan (RTP)

2040 Link	Jurisdiction	Project Name (Facility)	Project Location	Project Description	Est. Project Cost in 2003 dollars	RTP Program Years	Primary Modal Type*	2040 Category**
Central City	ODOT	I-5/McLoughlin Ramps	McLoughlin to I-5 north at Division	Construct new I-5SB off-ramp and I-5 NB on-ramp at McLoughlin Boulevard	$ 23,100,000	2016-25	13	1
Central City	ODOT	I-5/North Macadam Access Improvements	NB I-5 to NB Macadam Avenue	Construct new off-ramp	$ 20,000,000	2016-25	13	1
Central City	Portland/ODOT	MLK/Grand Improvements	Central Eastside and Lloyd districts	Complete boulevard design improvements	$ 3,465,000	2016-25	4	1
Interstate SC	Portland	Killingsworth Bridge Improvements	Killingsworth at I-5	Improvements to bridge to create a safe and pleasant crossing for pedestrians and bicyclists over I-5	$ 2,700,000	2016-25	15	3
PDX IA	ODOT	I-205 Interchange Improvement	I-205 NB/Airport Way Interchange	New I-205 NB on-ramp at I-205/Airport Way interchange (Phase 1 in FC: modify signing, striping channelization and signal timing for NB on-ramp)	$ 23,100,000	2004-09	13	2
PDX IA	ODOT	I-205 Interchange Improvement	I-205 SB/Airport Way Interchange	Widen I-205 SB on-ramp at Airport Way; modify signing, striping channelization and/or signal timing for the I-205 NB on-ramp at Airport Way	$ 650,000	2004-09	13	2
PDX IA	Portland	47th Avenue Intersection and Roadway Improvements	at Columbia Boulevard	Widen and channelize NE Columbia Boulevard to facilitate truck turning movements; add sidewalks and bike facilities	$ 2,800,000	2004-09	1	2
PDX IA	Portland	33rd/Marine Drive Intersection Improvement	NE 33rd and Marine Drive	Signalize 33rd/Marine Drive intersection for freight movement	$ 288,750	2010-15	1	2
Region	ODOT	Greeley Street Ramp Improvements	Greeley Street/I-5 ramps	Modernize Greeley Street ramps	$ xxx,xxx	2004-09	13	1
Region	ODOT	I-5 North Improvements	Lombard Street to Expo Center/Delta Park	Widen to six lanes	$ 41,000,000	2004-09	13	1
Region	ODOT	I-5/Columbia Boulevard Improvement	I-5/Columbia Boulevard interchange	Construct full direction access interchange based on recommendations from I-5 North Trade Corridor Study	$ 56,000,000	2010-15	13	2
Region	ODOT	I-5 Trade Corridor Study and Tier 1 DEIS	I-405 (OR) to I-205 (WA)	Plan improvements to I-5 to benefit freight traffic	$ 15,000,000	2004-09	2	2
Rivergate IA	ODOT/Portland	N. Lombard Improvements	Lombard Street from Rivergate Boulevard (Purdy) to south of Columbia Slough bridge	Widen street to three lanes	$ 3,610,000	2004-09	1	2
Rivergate IA	Port/Portland	North Lombard Overcrossing	South Rivergate	Construct overpass from Columbia/Lombard intersection into South Rivergate entrance to separate rail and vehicular traffic. Project includes motor vehicle lanes, bike lanes, and sidewalks.	$ 24,453,660	2004-09	1	2
Rivergate IA	Port	Leadbetter Street Extension and Grade Separation	to Marine Drive	Extend street and construct grade separation	$ 8,000,000	2004-09	1	2
Rivergate IA	Port/Portland	Terminal 4 Driveway Consolidation	Lombard Street at Terminal 4	Consolidate two signalized driveways at Terminal 4	$ 1,000,000	2004-09	1	2
Region	TriMet	I-205 LRT Extension	Gateway RC to Clackamas TC	Construct LRT and improvements to downtown transit mall	$ 475,000,000	2004-09	3	1
Central City	Portland	Transit Mall Restoration	Central City	Reduce maintenance and repair costs	$ 2,852,850	2004-09	3	1
Central City	Portland	Portland Streetcar - Eastside, Phase 1 (Lloyd District)	Pearl District to Lloyd District	Construct street car from NW Lovejoy/10th Avenue to NE 7th Avenue/Oregon Street	$ 36,900,000	2004-09	3	1
Central City	Portland	Portland Streetcar - Eastside, Phase 2 (Central Eastside Industrial District)	Lloyd District to Central Eastside Industrial District	Construct street car from NE Oregon Street to Water Avenue	$ 44,000,000	2004-09	3	1
South Shore IA	TriMet	181st Avenue Frequent bus	Gresham to Columbia South Shore	Construct improvements that enhance Frequent Bus service	$ 1,350,000	2010-15	3	1
PDX IA	Port/Portland	Lightrail station/track realignment	PDX terminal	Realign light rail track into terminal building (includes double tracking)	$ 14,000,000	2010-15	3	2

Metro's 2025 Regional Transportation Plan (RTP)

2040 Link	Jurisdiction	Project Name (Facility)	Project Location	Project Description	Est. Project Cost in 2003 dollars	RTP Program Years	Primary Modal Type*	2040 Category**
Region	TriMet	Transit center and park-and-ride upgrades	Various locations in subarea	Construct, expand and/or upgrade transit stations and park-and-rides throughout subarea	See Tri-Met Total	2004-25	3	3
Region	WashCo/TriMet	Beaverton-Wilsonville Commuter Rail	Wilsonville to Beaverton	Peak-hour service only with 30-minute frequency in existing rail corridor	$ 82,582,500	2004-09	3	1
Region	TriMet/SMART	Transit Center Upgrades	Region-wide	New or improved transit centers at various locations in the region	$ 20,002,273	2004-25	3	1
Region	TriMet	Vehicle Purchases	1.5% per year expansion	Vehicle purchases to provide for expanded service	$ 169,785,000	2004-25	3	1
Region	TriMet/SMART	Bus Operating Facilities	Region-wide	Bus operating facilities	$ 75,000,000	2004-25	3	1
Region	TriMet/SMART	Frequent/Rapid Bus Improvements	Baseline Network	Transit stations, improved passenger amenities, bus priority and reliability improvements	$ 26,297,000	2016-25	3	1
Region	TriMet	Tri-Met Park and Ride Lots	Baseline Network	Park-and-ride facilities to serve bus and light rail stops and stations	$ 5,782,970	2004-25	3	1
Region	SMART	SMART Park and Ride Lots	SMART district	Park-and-ride facilities to serve bus and commuter rail station	$ 3,927,000	2004-25	3	1
Region	TriMet/SMART	Bus Stop Improvements	Region-wide	Bus stop improvements region-wide	$ 7,939,181	2004-25	3	1
Region	TriMet/SMART	Bus Priority Treatments	Region-wide	Bus Priority Treatments	$ 19,891,988	2016-25	3	1
Region	TriMet	LIFT Vehicle Purchases	Region-wide	4% per year expansion	$ 16,890,000	2004-09	3	1
Region	TriMet	Ride Connection Vehicle Purchases	Region-wide	Purchase five vehicles per year	$ 4,767,600	2004-09	3	1

* Modal Type: 1 (Roads), 2 (Future Plans), 3 (Transit Capital), 4 (Boulevards), 5 (Bike), 6 (Pedestrian), 7 (Demand Management), 8 (primarily benefits freight, includes rail, marine, air freight), 9 (TOD), 10 (Bridges), 11 (Other), 12 (System Management), 13 (Freeways and highways), 14 (TDM/TMA), 15 (Bike and Pedestrian)
** 2040 Benefit: (1) Central City and Regional Centers, (2) Industrial Areas and Intermodal Facilities, (3) Town Centers, Main Streets, and Station Communities, 4 (Other)

SW Washington Regional Transportation Council (RTC) Metropolitan Transportation Plan (MTP) projects and local projects

Jurisdiction	Project Name (Facility)	Project Location	Project Description	Est. Project Cost in 2003 dollars	MTP Program Years
WSDOT	I-5	99th Street to I-205	3 lanes ea. direction	N/A	2007
WSDOT	I-5	SR-502 Interchange	New Interchange	N/A	2008
WSDOT	I-5	Pioneer Street (Ridgefield)/ SR-501 Interchange	Improve Interchange	N/A	2009
WSDOT	I-5	The Salmon Creek Interchange Project (SCIP) at 134th/139th Street	Construct NE 139th St. from NE 20th Ave. to NE 10th Ave. Reconstruct interchange with ramps added at 139th St. Improve access to I-205 with flyover from 134th St to I-205 southbound NE 10th Ave. Improve NE 10th Ave. from 134th to 149th St. to include turn	N/A	2010-2013
WSDOT	I-5	I-205 to 179th Street	Auxiliary lane in each direction	N/A	2012-2013
WSDOT	I-5	179th Street Interchange	Reconstruct Interchange	N/A	2016-2025
WSDOT	I-5	179th Street to SR-502	Auxiliary lane in each direction		2016-2025
WSDOT	I-205	Mill Plain Exit (112th Avenue connector)	Build direct ramp to NE 112th Avenue	N/A	2007
WSDOT	I-205	Mill Plain to 28th Street	Ramps/Frontage Road between Mill Plain and 28th Streets	N/A	2013
WSDOT	I-205	SR-14 to Mill Plain	Ramp Separation	N/A	2016-2025
WSDOT	I-205	28th Street	North ramps	N/A	2016-2025
WSDOT	I-205	SR-500	WB SR-500 to SB I-205 Flyover	N/A	2016-2025
WSDOT	I-205	SR-500 to Padden Parkway	3 lanes each direction 83rd ramps	N/A	2016-2025
WSDOT	I-205	Padden Parkway to 134th Street	3 lanes each direction	N/A	2016-2025
WSDOT	SR-14	NW 6th Av. to SR-500/Union	2 lanes ea. direction w. interchange	N/A	2011
WSDOT	SR-14	I-205 to 164th Avenue	3 lanes ea. direction	N/A	2016-2025
WSDOT	SR-14	SR-500/Union to 32nd Street	Improve capacity	N/A	2016-2025
WSDOT	SR-14	32nd Street Vicinity	Interchange	N/A	2016-2025
WSDOT	SR-500	I-205	Extend westbound auxiliary lane	N/A	2009
WSDOT	SR-500	St. Johns Interchange	New Interchange	N/A	2011
WSDOT	SR-500	42nd Avenue	Grade Separation	N/A	2016-2025
WSDOT	SR-500	54th Avenue	Interchange with collector-distributor connecting to Andresen	N/A	2016-2025
WSDOT	SR-502	NE 10th Avenue to Battle Ground	2 lanes each direction	N/A	2013
Clark County/ WSDOT	SR-503	Padden Parkway	Add Interchange	N/A	2016-2025
Clark County	Padden Parkway	Andresen	Add Interchange	N/A	2016-2025
Clark County	179th Street	I-5 to NW 5th Avenue	2 lanes ea. direction, w/turn lane	N/A	Partial Completion 2003 Completion will be by frontage improvements
Vancouver	Main Street	6th Street to 15th Street (Mill Plain)	Convert to two-way street	N/A	2006

SW Washington Regional Transportation Council (RTC) Metropolitan Transportation Plan (MTP) projects and local projects

Jurisdiction	Project Name (Facility)	Project Location	Project Description	Est. Project Cost in 2003 dollars	MTP Program Years
Vancouver	26th Avenue	Fourth Plain to Whitney Road	1 lane ea. direction, w/turn lane new minor industrial arterial	N/A	2012
Vancouver	Columbia Shores	S. of SR-14	Rail Trestle, Widen Portal	N/A	2012
Vancouver	Esther Street	At RR Tracks	Railroad Undercrossing	N/A	2009
Clark County	Highway 99	NE 63rd to NE 99th Street	Pedestrian route completion		
Ridgefield	Pioneer Street/SR-501	I-5 NB Ramps to S 10th Street	2 lanes each direction w/ turn lane		2008
Ridgefield	Pioneer Street/SR-501	.5 mile west of S 45th to I-5 NB ramps	2 lanes each direction w/ turn lane		2010
Vancouver	Broadway	6th Street to 15th Street	Reconstruct and convert to two-way street	N/A	2007
Vancouver	I-205 South Corridor		Conduct environmental analysis for approved access plan for I-205 south corridor	N/A	2007
Vancouver	Fourth Plain	I-5 to Railroad Bridge	2 lanes each direction	N/A	2012
Vancouver	Highway 99 South	63rd to Ross St.	Build to 5 Lane principal arterial standard, rebuild rail bridge	N/A	2013
Vancouver	Lincoln Street	Fourth Plain Boulevard to Railroad Avenue	Realign, reconstruct and grade separate		2010
Vancouver	Lincoln Street	Fourth Plain to 39th Street	Construct new section of road 1 lane each direction		2013
Vancouver	Jefferson/ Kauffman St.	Mill Plain to 6th St.	Realign offset @ 13th, grade separate from rail @ 8th St.		2012
Vancouver	Railroad Avenue	Columbia to new Lincoln Avenue grade separated facility	New waterfront east/west arterial		2010
C-TRAN	99th Street Park and Ride	off I-5	Park & Ride	$ 8,399,000	2006-2007
C-TRAN	Vancouver Transit Center	Mall area	Relocate Van Mall Transit Center to C-TRAN AOM	$ 5,700,000	2006-2007
C-TRAN	Salmon Creek Park & Ride	at I-5/NE 134th Street	Realign Salmon Creek Park & Ride at current site in conjunction with I-5/134th/139th Interchange	$ 4,000,000	2011
C-TRAN	219th Park & Ride	at I-5/NE 219th Street - Ridgefield	Park & Ride (600 spaces)	TBD	TBD
C-TRAN	Central County Park & Ride	at Padden Parkway/78th/I-205	Park & Ride (480 spaces)	TBD	TBD
C-TRAN	C-TRAN Fleet	N/A	Vehicle Replacement for fixed route and demand response (through 2010)	$ 5,722,000	2010
C-TRAN	C-TRAN Transit Enhancements	N/A	Improvements/amenities at bus stops (through 2010)	$ 314,000	2010
C-TRAN	C-TRAN System	System Wide	Transit Service Change	N/A	Continuing
C-TRAN	C-TRAN System	System Wide	Deploy ITS (Phase 2 and 3)	$ 8,521,000	Continuing
C-TRAN	C-TRAN System	Super Stops	Enhanced stop locations at key connections	$ 430,000	2006-2008